SCMS JOURNAL OF INDIAN MANAGEMENT

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Volume 4 **October - December 2007** **Number 4**

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The Chairman speaks ...

At the outset, let me wish all our readers a more happy and prosperous 2008.

With this edition in your hand, *SCMS Journal of Indian Management* has now completed four years of purposeful publication. I am sure all our readers will appreciate the steady improvements in quality in content as well as production of the journal. We are uncompromising in our dedication to continuously enhancing the quality of our journal.

The pharmaceutical industry in India is a success story. It has evolved from almost a non-existent position to become a global leader in the production of high quality — low cost generic drugs, which accounts for nearly 20 per cent of world's production. It provides employment for nearly 75 million people while ensuring that essential drugs are made available at affordable prices to the vast population. India has adequate resources in terms of manufacturing base, scientific manpower and facilities to manufacture as well as to undertake research and development in bulk drugs.

Among the countries in Asia, India has the best chance to become a hub of R&D activities for development of new drugs and formulations because of the advantages like vast patient population, low cost, IT strength, skilled R&D workforce and favourable regulatory environment.

I am sure our readers will be interested to know more on this topical matter. The lead article in this issue is a well-researched paper covering the Indian drug scenario with special reference to drug discovery and development.

A variety of contemporary topics are dealt with in this issue, from business research to tourism. We hope you find this issue worth the efforts put in.

Dr.G.P.C.NAYAR
Chairman - SCMS Group of Educational Institutions

SCMS Journal of Indian Management

A Quarterly Publication of

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Editorial

Smell and Management

The sense of smell is critical for all: for finding food, for avoiding predators, or for choosing mates. We can distinguish over ten thousand different odour molecules. Smell/odour is perfume/fragrance when it is pleasant. It's stench /repugnant when it is unpleasant. We utilize our sense of smell to enjoy the aroma of fresh coffee, or decide the person with whom to sit next on the bus.

Every time we inhale, currents of air swirl up through the nostrils, over the bony turbinates to millions of olfactory receptor neurons. The interaction of the right molecule with the right receptor causes the receptor to change its shape (structural conformation). This change in structural conformation gives rise to an electrical signal that goes to the olfactory bulb, then to the brain that converts the electrical signal to a smell. Yes, people interact with the environment through the senses.

Smell or effluvia is considered from the chemical, physical, and physiological points of view. It is interesting to note how odours may affect cognitive performance. In business, the idea that the sense of smell can have strong effects on consumer responses to retail environments is well made use of. The claims, that the odours have strong persuasive powers, tantalize retailers looking for the competitive edge. A lot of retailing relevant olfaction research is going on throughout the world.

Some Software company one day may announce a radical breakthrough in Computer Scent Technology. The Internet will come to its "senses." Now, you can already chat, email, download music and watch video through the internet, but imagine you are able to smell fresh seaside air from the heart of the city, or savour the smell of your favourite restaurant's cuisine while booking a table. Digital Scent Technology can also change the interactive entertainment experience to movies, games, music, animation, or any digital media.

Anthropology of odour has been instrumental to establishment of many industries. It's interesting to learn how cultures rely on fragrance for healing, communication and hunting. The effect of odoriferous plants on the annual economy of nations is a subject matter worth study. The scent of lavender and jasmine enhance sleep. Earlier studies investigating the effects of aroma on sleep found a tendency for the scents to disrupt sleep. It can contribute to enjoyment of life through the perception of pleasant odours such as perfume, food and flowers.

Flavour and fragrance industry leaders have "telling" tales of over 175 industries on the prospects in the field. The cosmetic/beauty store industry comprises 10,000 stores with combined annual income of about $7 million. The industry is labour-intensive with average annual revenue per worker being $85000. Stenchy trash can also become crowning resource for industry. Trafficking in toxic waste is also another area of interest of the world. Products of environmental solutions for chemically-free water treatments, air-conditioners, water conditioners and water softeners are of high demand in the markets. Anyhow "Smell" will open up umpteen avenues for business activities.

Dr.D.Radhakrishnan Nair

Indian Drug Scenario:
Discovery and Development

Pankaj M.Madhani

This paper focuses on major issues of drug discovery and development. Developing a new drug and taking it to market is a long and costly process. The industry focus is shifted toward developing the right drug for the right patient in the shortest time at the least cost. Emerging trend in pharma industry is to outsource clinical trials to emerging markets. The clinical trial is the most expensive stage of drug development and accounts for about sixty per cent of total costs. Paper underscores India's major strengths in clinical trials. India has tremendous potentials to become ultimate destination for drug development.

The Pharmaceutical industry has been associated with saving lives of people and thus has always been held in high esteem. But now with the high cost of drug discovery and development, rising costs to the end users, the product recalls being done and adverse side effects, all these topped with more education, alertness and awareness on the part of the consumers, the industry image has been battered. The average cost and time of discovering a new drug and taking it to market is about one billion dollars and 15 years respectively. Thus it is essential that the industry finds means of reducing the time and costs of drug discovery and development and at the same time producing drugs which are target specific and with minimal side effects. In short, focus is shifted towards developing the right drug for the right patient in the shortest time at the least cost. Time-savings benefit drug developers since each day of delay to market for a blockbuster drug can cost more than $1 million in sales.

Prof.Pankaj M.Madhani, Faculty, ICFAI Business School, ICFAI House, Near GNFC Tower, SG Road, Bodakdev, Ahmedabad-380054, Email: pmmadhani@yahoo.com

Traditional Drug Discovery and Development Process

Drug development is a very lengthy process. The traditional approach to drug development is expensive, time consuming and prone to failure. Cutting the time and costs involved in drug discovery and development are very crucial for ensuring continued productivity and profitability of drug companies. The drug discovery process can be divided into several stages. Once a new compound with the potential to produce a desired effect has been identified in the laboratory, medicines are developed as follows:

1. **Discovery/Basic Research**

    1. Synthesis and Extraction – the process of identifying new molecules with the potential to produce a desired change in a biological system.

    2. Biological Screening and Pharmacological Testing – studies to explore the pharmacological activity and therapeutic potential of compounds.

2. **Preclinical Testing**

In this study the pharmacological properties of the drug are determined by testing the product on animals, isolated cell cultures, enzymes and cloned receptor sites and computer models. From these tests, it is determined whether the compound will likely produce the required benefits and its pharmacological activity. Adverse effects are also observed. A compound which exhibits the most therapeutic potential and minimum side effects then proceeds to the next stage which is the clinical stage.

3. **Clinical Trials: Phase I**

Phase I involves the testing of the compound in healthy volunteers, usually men between the ages of 18-30 years to determine absorption, distribution, metabolism and excretion (ADME) patterns. These studies are designed to determine the pharmacokinetic (how the drug is absorbed, distributed, metabolized, and excreted by the body) and pharmacologic (the effect of the drug on the body) actions of the drug in humans, the side effects associated with increasing doses, and, if possible, early evidence on effectiveness. Upon conclusion of Phase I studies, the company determines whether results are promising enough to pursue a Phase II study to help determine the scientific validity of the drug. If the answer is negative, research on the compound is terminated.

4. **Clinical Trials: Phase II**

Phase II studies are designed to obtain data on the effectiveness of the drug for a particular indication or indications in patients with the disease or condition. They also help determine the common short-term side effects and risks associated with the drug. Phase II studies are closely monitored and conducted in a relatively small number of patients. At this point, the company again evaluates whether it should pursue further research on the molecule. A positive decision will lead to Phase III studies.

5. **Clinical Trials: Phase III**

Phase III studies are normally controlled and blinded to reduce bias. Here larger populations of patients, up to 5000, are used and divided into several arms, usually the ones given a placebo, the control group and the ones given the test drug. The test drug may also be compared with the current standard treatment if available to determine effectiveness of the drug. Once a drug proves effective and safe, an application to market the drug is then filed to the relevant regulatory authority, which in the case of the USA is the Food and Drug Administration (FDA). Once satisfied the FDA then allows the drug to be marketed. More testing may be required to be done in the post-marketing period as well as the continual monitoring of side effects. The number of human subjects involved progressively increases from phase to phase, with Phase III studies typically including several hundred to several thousand people.

6. **New Drug Application (NDA) / Biologic License Application (BLA)**

Following the completion of all three phases of clinical trials, a company analyzes all of the data and files an NDA or BLA with FDA if the data successfully demonstrate both safety and effectiveness. The applications contain all of the scientific information that the company has gathered. Applications typically run 100,000 pages or more.

7. **Approval**

Once FDA approves an NDA or BLA, the new medicine becomes available for physicians to prescribe. A company must continue to submit periodic reports to FDA, including any cases of adverse reactions and appropriate quality-control records.

Traditional Drug Discovery and Development: Major Issues

Discovering and developing safe and effective new medicines is a long, complex, and expensive process. For decades, Pharmaceutical companies have taken the old-fashioned approach to drug discovery: the drug in question is put through a battery of preclinical safety tests, followed by a lengthy and very expensive set of clinical trials on animals and humans. At the end of this nearly decade-long process, drug developers cross their fingers in hopes that their drug will be approved by the Federal Drug Administration (FDA). Only five in 5,000 compounds that enter preclinical

testing make it to human testing. One of these five tested in people is approved. On average, it takes an average of 15 years and costs a company $880 million to get one new medicine from the laboratory to market place, according to a report by the Tufts Center for the Study of Drug Development, Boston, MA, USA.

The various stages of drug development process are given below in Table- I.

Table - I: The Traditional Drug Discovery, Development and Approval Process

Drug Discovery and Development Process	Time Years	Cost Mission	Test Population	Success Rate
Target Discovery	*2.5*	*4%*	Laboratory and animal studies	5000 compounds evaluated
Lead Generation and Lead Optimization	*3.0*	*15%*		
Preclinical Development	*1.0*	*10%*		
Phase I, II & III Clinical Trials	*7.0*	*68%*		5 enters trial
Phase I	*1.5*		20-100 healthy volunteers	
Phase II	*2.0*		100-500 patient volunteers	
Phase III	*3.5*		1000-5000 patient volunteers	1 approved
FDA Review and Approval	*1.5*	*3%*		
Drug to the Market	15	$880		

Source: Tufts Center for the Study of Drug Development

Clinical development of medicine, the process leading up to the regulatory approval for new pharmaceutical products has been identified as the greatest cause of increasing costs in the drug development and is predominantly attributed to drugs failing the stringent registration approval process. Frost and Sullivan Research indicate that the cost of clinical development has increased by nearly 40 per cent over the last ten years. It also estimates that only 40 per cent of drug candidates entering the clinical development pipeline actually receive regulatory approval and reach the market.

According to the Pharmaceutical Research and Manufacturers of America (PhRMA), in 2004 biotechnology and pharmaceutical companies spent a whooping $38.8 billion in Research and Development. This increase has not been matched by an increase in the number of New Drug Applications (NDA) being submitted to the FDA for approval. Since mid -1990s NDAs have fallen by almost 50 per cent, this is due to the reduced flow of product pipeline. With such a high rate of failure and such extraordinarily high costs, researchers are eager to find ways to streamline and accelerate the drug discovery process.

Drug Discovery and Development: Major Trends

Pharmaceutical industry is constantly undergoing a change. In the past pharmaceuticals had a different strategy, companies use to build all the products internally and confine access to information or resources to third parties. The past situation is changing; in-house resources are getting exhausted with a very thin product pipeline and in addition many drugs are going off patent by 2008

hampering company sales and competitiveness. Patient recruitment and medical personnel account for nearly 70 per cent of the clinical costs that are required to bring a drug to market. Threat from generics, low productivity of R&D process, higher costs for product approval and parallel imports are the major market feature for decreasing pharmaceutical profits.

Global outsourced R&D expenditure is increasing every year leading to rise in business prospects for Contract Research Organizations (CRO). CRO offers monitoring, regulatory and compliance services for new drug development, medical devices and biologics and combination of products. CROs also provide clinical testing services to the pharmaceutical industry for prescription, consumer and over the counter medications. CROs have an in-depth experience and resources with regulatory processes around the world. CRO have scientific, regulatory and information management expertise along with ready made infrastructure of global research personnel, services and facilities for efficient completion of drug development process. Realizing these benefits of outsourcing clinical efforts, pharma firms have increased the budgets for CRO contracts. The pharmaceutical companies and outsource partners can work in symbiotic relationship where pharma companies provide their core competencies in marketing and commercialization and outsource partners supply new innovative products. The growth in outsourcing of the drug discovery process is being fueled primarily by two factors: (1) Relatively new fields of genomics and proteomics have produced a host of new drug targets to work on and (2) Most drugs marketed were not actually discovered by the company doing the marketing.

A number of CROs have set up shop in India to provide trial monitoring, project management, data management, safety reporting, drug distribution and central laboratory services. There are only a few CROs and pharmaceutical companies specifically working in contract drug discovery such as Rubicon, Syngene, Origene, Shantha Biotech, Strand Genomics, Avestha Gengrame and TCG The Chatterjee Group. Public institutions like CSIR are also actively participating in drug discovery contract services and have recently been awarded for their excellent performance in drug discovery services. According to TCS Research, the CRO segment in India has grown from $5 million in 1995 to $120 million in 2005 and India is now holding the lion's share of the world's contract research business. India is considered 'the king' of offshoring and outsourcing. Contract research market in India is valued at $100-120m and growing at a rate of 25-30 per cent each year. It is expected to grow to $300 million by 2010. India holds nearly double the business of its nearest rival, Italy, with a market value of $60-70m. India is believed to inherently possess sources of competitive advantage for clinical trials. It is estimated that nearly 20 per cent of all global clinical trials will be conducted in India by 2010.

The challenge to the drug discovery community now is to identify the winners earlier and advance only those into clinical development. New technologies are likely to reshape the drug discovery and development process. Their impact will change the way in which drugs are discovered, developed and manufactured. Much of the trouble enmeshing the drug industry is blamed on the exorbitant and overblown cost of drug discovery. The drug development process, from pre-clinical testing through phase III clinical trials, can take anywhere from nine to twelve years, with phase II and III clinical trials consuming half that time. Given those numbers, it is no surprise that pharmaceutical companies have always looked for ways to conduct trials more quickly and inexpensively.

A major technological paradigm shift in biotechnology occurred with the launching of the human genome project in 1990. The entire process of drug discovery underwent a radical change. Now drugs could be designed using the information on genes. This developed a new upstream segment or the 'drug discovery platform,' referring to the activities of companies that did not produce drugs, but either produced something or offered a service for a drug company interested in creating a new drug. The drug discovery platform encompasses a diverse and constantly evolving range of technologies that are used to exploit the information available on the genome and proteome in order to identify potential targets for new drugs, design the potential drugs in new ways, test them, and predict their efficiency and risks for health. These technologies are often grouped under the names of genomics, proteomics, rational drug design, pharmacogenomics, etc. The constant evolution of these technologies is the driver of the orientation of pharmaceutical research. A complementary sector called bioinformatics also developed. It formed a component in the drug discovery platform, offering its services to generate compile and analyze biological information using computer software designed specifically for the purpose.

Following is the global trend in drug discovery and development process.

1. Use of Bioinformatics
2. Outsourcing and Contract Research

Time and cost required for designing a new drug are immense and at an unacceptable level. Hence pharmaceutical industry is in search of finding new ways of developing drugs which are cost-effective and shorten the time-line by only working with potential successful leads early on and eliminating failures quickly. This is where bioinformatics comes into play. Bioinformatics plays a crucial role at virtually every stage of the drug discovery and development process. Bioinformatics tools help by validating the potential drug targets and determining which ones are the most suitable for entry into the drug development pipeline. Application of bioinformatics can help improve efficiencies throughout the drug discovery process and also help drugs to "fail fast" (before expensive later-phase trials), thus saving time and money. Pharmaceutical companies are expected to increase their R&D expenditure in the future and a major portion of this spending is expected to go into bioinformatics.

New drug research and development hinges on successful, cost-effective and competent clinical development. The dual challenge of accelerating clinical development and reducing costs is driving global pharmaceutical companies to outsource clinical trials. As the cost of developing new drugs and the complexity of conducting clinical trials continue to grow, an increasing number of pharmaceutical companies are outsourcing activities to India, China, and countries in Latin America and Eastern Europe. And as multinational drug companies in the United States and Western Europe look east to outsource research and clinical trial activities, countries such as India will gain proficiency and expertise, assisting its move from generic and specialty contract manufacturing to innovative drug discovery and development in its own right, setting the stage for increased global competition.

At present, 88 per cent of global audited prescription drug sales (US $518 billion) are jointly accounted for by North America, Europe and Japan. US alone can be a huge value driver for CROs. The global pharma industry spends nearly US $70 billion on R&D activities, with the US leading with an estimated spending of $25 billion. About 40 per cent of US pharma companies outsource some of their R&D work and about 33 per cent of drug development funding is spent on outsourcing from Contract Research Organizations (CROs). The total pharmaceutical outsourced market is currently pegged at

Table - II: Global R&D Outsourced Market and CRO Market (2001-07)

US$ Billion	2001	2002	2003	2004	2005	2006*	2007*
Global R &D Outsourcing Market	11.4	12.7	14.1	16.3	18.7	21.7	24.9
CRO Market	8	8.8	9.9	11.4	13.1	15.1	17.5

**estimated*
Source: Frost & Sullivan

$36 billion and is expected to reach to $48 billion whereas R&D outsourcing expenditure is around 50 per cent of the total market as stated below in Table-II.

What is Bioinformatics?

Bioinformatics is defined as the application of computer technology to the management of biological information. It involves the development of software tools for the management and treatment of biological information. The explosion of information resulting from the Human Genome Project (Oct.1990 - Apr. 2003) has propelled the rapid development of bioinformatics as a discipline. The Human Genome Project's information management challenge involves tracking the sequencing of the entire human genome - approximately three billion base pairs of DNA that make up our 23 pairs of chromosomes - and the precise mapping of the 100,000 or so genes that are interspersed on these chromosomes.

Bioinformatics is a highly interdisciplinary, using techniques and concepts from applied mathematics, informatics, statistics, chemistry, biochemistry, physics and computer science to solve biological problems and is the interface between the biological and computational sciences. It is the application of computer technology to the management and analysis of biological data such as the sequences of DNA (Deoxyribonucleic acid) and RNA

(Ribonucleic acid) in genes and amino acids in proteins. Bioinformatics is a science of developing and utilizing computer databases and algorithms to accelerate and enhance biological research. More narrowly it is defined as the use of computer technology to organize and analyze genomic, biological, and chemical data in order to support the drug discovery process. Bioinformatics deals with methods for storing, retrieving and analyzing biological data, such as nucleic acid (DNA/ RNA) and protein genomic, biological and chemical data to support the drug discovery process.

Bioinformatics: A Vital Tool for Drug Discovery and Development

Bioinformatics has a key role to play in the pharmaceutical sector. It can be used to reduce the time and cost involved in drug discovery process. Bioinformatics is a set of enabling technologies responsible for the annotation, storage, analysis and retrieval of nucleic acid sequence, protein sequence and structural information. This interdisciplinary field drives an exciting process of understanding the secret of life. Bioinformatics is being applied to speed up the drug discovery process by moving towards data-driven drug discovery, to improve efficiency, trim down costs and the timeliness and provide wider access to the entire life sciences sector. In order to gain a competitive advantage in the drug discovery process, pharmaceutical and life sciences companies are placing increasing emphasis on bioinformatics as it reduces the time and costs of developing medicine because of its facilitation with filtering data and with choosing the best way to proceed. Bioinformatics has the potential to hugely decrease the risk, cost, and expertise required for the early stages of drug development, target selection and validation.

Bioinformatics has proven indispensable to drug discovery and development process to solve the cost and time woes of the pharmaceutical industry. Bioinformatics based computational drug discovery has created many opportunities to speed up and rationalize the multidisciplinary drug discovery process, and provide novel approaches to the design of drugs otherwise not possible. By eliminating potential drug failures early on during the process, bioinformatics also helps cut the time researchers take to get a drug from the laboratory to the patient as they only concentrate their efforts on the leads which hold the greatest potential only. Thus the pharmaceutical industry will increase the number of drugs in their pipelines which has been dwindling. Reduced time and cost of drug discovery also benefits the patients immensely as they will have quicker access to life saving drugs at an affordable price.

Bioinformatics is seen as an emerging field with the potential to significantly improve how drugs are found, brought to clinical trials and eventually released to the marketplace. It has significant advantages over traditionally expensive and time consuming "wet lab" research methods, because computational tools give the most predictive and accurate information about genes and proteins with regards to mediating aspects of drug action. Bioinformatics solutions could help biotech companies in identifying novel biomarkers and drug targets based on a computational approach to analyze masses of biological data pouring out from genomic and proteomic studies. Bioinformatics is used to solve complex biological questions related to metabolic pathways, genes, protein function and pharmacological/developmental aspects of drugs and medicines. By integrating data from many inter-related yet heterogeneous resources, bioinformatics can help in our understanding of complex biological processes and help improve drug discovery.

Following are key areas where bioinformatics supports drug discovery and research (See Annexure – I).

1. Similarity Searches

A common activity in pharmaceutical companies is the search for drug analogues. Starting with a promising drug molecule, one can search for chemical compounds with similar structure or properties to a known compound. There are a variety of methods used in these searches, including sequence similarity, 2D and 3D shape similarity, substructure similarity, electrostatic similarity and others. A variety of bioinformatics tools are available for this work.

2. Sequence Analysis

It is very useful to determine how similar or dissimilar the organisms are based on gene or protein sequences. With this information one can infer the evolutionary relationships of the organisms, search for similar sequences in bioinformatics databases and find related species to those under investigation. There are many bioinformatics sequence analysis tools that can be used to determine the level of sequence similarity.

3. Homology Modeling

Determining the 3-D structure of proteins is an important aspect of

rug design. Most drug targets are proteins, so it's important to know their 3-D structure in detail. It's estimated that the human body has 500,000 to 1 million proteins. However, the 3-D structure is known for only a small fraction of these. Homology modeling is one method used to predict 3-D structure. In homology modeling, the amino acid sequence of a specific protein (target) is known, and the 3-D structures of proteins related to the target (templates) are known. Bioinformatics software tools are then used to predict the 3-D structure of the target based on the known 3-D structures of the templates.

4. **Virtual High-Throughput Screening (vHTS)**

Pharmaceutical companies are always searching for new leads to develop into drug compounds. One search method is virtual high-throughput screening. In vHTS, protein targets are screened against databases of small-molecule compounds to see which molecules bind strongly to the target. If there is a "hit" with a particular compound, it can be extracted from the database for further testing thus allowing researchers to only work with promising leads only. With today's computational resources, several million compounds can be screened in a few days. Pursuing a handful of promising leads for further development can save researchers considerable time and expense.

5. **Drug Lead Optimization**

When a promising lead candidate has been found in a drug discovery program, the next step (a very long and expensive step!) is to optimize the structure and properties of the potential drug. This usually involves a series of modifications to the primary structure (scaffold) and secondary structure (moieties) of the compound. This process can be enhanced using bioinformatics software tools that explore related compounds (bioisosteres) to the lead candidate.

6. **Drug Bioavailability and Bioactivity**

Most drug candidates fail in Phase III clinical trials after many years of research and millions have been spent on them. And most fail because of toxicity or problems with metabolism. The key characteristics for drugs are Absorption, Distribution, Metabolism, Excretion, Toxicity (ADMET) and Efficacy—in other words Bioavailability and Bioactivity. Although these properties are usually measured in the lab, they can also be predicted in advance with bioinformatics software.

Drug Discovery and Development: Benefits of Bioinformatics

Bioinformatics with rapid advances in gene, protein, and drug identification will lead to swift, sharp reductions in both the time and cost of drug discovery. Tangible proof that the bioinformatics revolution will economize drug discovery is emerging. Following are major benefits of bioinformatics in drug discovery and development process.

1. **Cost Saving**

Growth of the bioinformatics market is primarily attributed to its increased usage in the pharmaceutical industry. Many pharmaceutical companies now use computational methods and bioinformatics tools to reduce drug discovery and development cost burden. The application of bioinformatics is expected to reduce the annual cost of developing a new drug by 33 per cent, and the time taken for drug discovery by 30 per cent.

2. **Time Saving**

The predictive power of bioinformatics can help drug research programs choose only the most promising drug candidates. By focusing drug research on specific lead candidates and avoiding potential "dead-end" compounds, pharmaceutical companies can get drugs to market more quickly. Using bioinformatics is more like a focused marketing aspect where one assesses the needs of the consumer and then comes with a product to meet those needs, instead of making a product first and then imposes it onto the consumer hoping that it will meet their needs.

3. **Insight**

One of the non-quantifiable benefits of bioinformatics tools is the deep insight that researchers acquire about drug-receptor interactions. Molecular models of drug compounds can reveal intricate, atomic scale binding properties that are difficult to envision in any other way. Bioinformatics thus clearly allows exploitation of the data that is available and this together with increased understanding of molecular biology greatly improves the drug discovery process. The data from the Human Genome

Project has availed great opportunities for drug discovery and streamlining the choice of targets to support the drug discovery pipeline.

Bioinformatics tools can be used to gather all the necessary information about potential targets. This information includes nucleotide and protein sequencing, homologue mapping, function prediction, pathway information, disease associations, variants, structural information, gene and protein expression data and species distribution among others. The accumulation of this information into databases about potential targets means pharmaceutical companies can save themselves much time, effort and expense exerting bench efforts on targets that will ultimately fail.

Why should Pharma Companies Outsource Bioinformatics?

Pharma alliance or partnership holds cost benefit advantage by reducing huge amounts of capital outlay for producing latest technology in-house. Outsourcing allows pharma companies to ramp up the R&D operations at a fast pace with minimal capital outlay.

Bioinformatics outsourcing offers the following advantages. Companies will:

1. Decrease time from lab to market,
2. Increase manufacturing efficiency and productivity ,
3. Minimize financial risk by minimizing operational and ownership cost ,
4. Cash in on in-depth experience and resources with regulatory processes around the world,
5. Be able to focus on the core strengths,
6. Divert resources to focus on other competencies like marketing,
7. Outsourcing reduce the overall costs by 30 per cent to 35 per cent ,
8. Faster and cheaper to have discovery work outsourced, reduces drug development cost, and
9. Improve net earnings and cash flow.

Bioinformatics for Drug Discovery and Development: Indian Advantage

India is becoming increasingly competitive in bioinformatics. India has a wide pool of three to four million English speaking scientists willing to work with one fifth of the salary offered in the US and Europe. There is access to vast amounts of clinical and biological material for conducting research. India's globally recognized software skills provide a natural advantage in bioinformatics. The Bioinformatics sector in India is estimated to have grown to Rs.120 crore in 2005-06 compared to the previous year's figure of Rs.100 crore. As per NASSCOM-KPMG Research Report (2004), India bioinformatics market is expected to exceed US $2 billion by 2008. The R&D being outsourced to India relates to areas such as molecular biology, DNA sequencing, molecular biology software packages, molecular modeling, among others.

Following are strengths of India in bioinformatics.

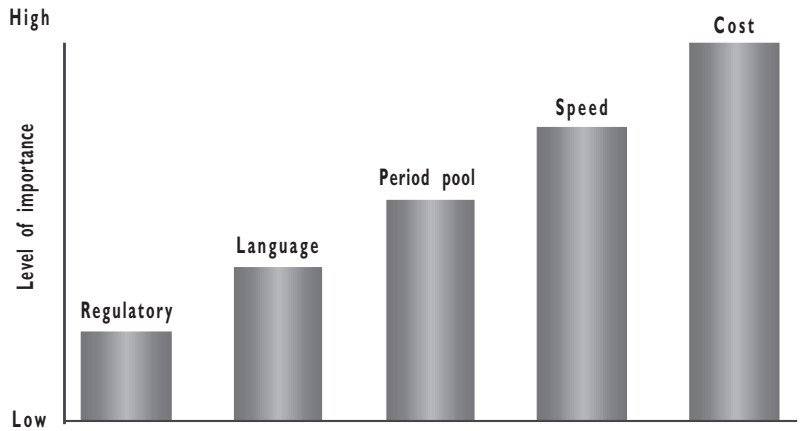
1. Strong IT capabilities,
2. R&D strength in modern biology and bioinformatics,
3. Highly trained manpower in biotechnology and bioinformatics,
4. English speaking, low cost, qualified manpower,
5. Strong biotechnology infrastructure, and
6. Wide networking of research institutions and research scientists.

Outsourcing of Clinical Trials

In the complicated process of drug development, approximately 30 per cent of the costs are incurred in actual drug development while the remaining 70 per cent are incurred in clinical testing. Such costs could be reduced to half when clinical research activities are outsourced to low cost economies such as India. Other Asian countries like China, Malaysia, South Korea and Taiwan are also attracting a number of international pharma companies to outsource their R&D activities. There are at any point in time over 500 molecules undergoing clinical trials in various phases in a large number of centers around the World. In contrast to the drug discovery process, the clinical development process is heavily dependent on the human element; hence regions of the world with cost-competitive human resources are an attractive alternative. With nearly one billion people as potential patients and a large number of highly skilled investigators, India clearly falls into this category.

According to a survey by the Outsourcing Institute, the top five criteria for the selection of an outsourcing partner by global pharma companies are: price, commitment to quality, flexible contract terms, reputation and scope of resources. Indian advantages apart from lower costs rest with availability of large and diverse patient populations, skilled clinicians, ability to meet global ICH (International Conference on Harmonization) guidelines etc. The recent changes in Schedule Y of the Drugs and Cosmetics Act also permits on the merit of each case the conduct of trials in a concurrent phase with those carried out in centers abroad. English being the language of science and medicine in India, excellent communication facilities and adequate documentation and analytical systems are the other advantages that India provides. At present many Clinical Research Organizations (CROs) have been

Figure 1: The "India Advantage"



set up in India and many trials have been carried out meeting FDA standards.

Why India is a Potential Destination for Clinical Trials

India's competitive advantages in clinical trials are based on favourable regulatory climate, English language proficiency of doctors, staff of hospital, clinical analysts and investigators, Large pool of treatment naïve patients, high speed of subject recruitment and low cost of clinical studies as explained in Figure 1. These points are also elaborated below.

1. ***Large pool of Treatment-Naive Patients and Faster Subject Recruitment:***

India provides a large pool of "treatment-naive patients" who hail from multi-ethnic and multi-racial backgrounds. Many of India's numerous poor patients are "treatment naïve," meaning they have never received drugs for treatment. This makes patient enrolment and trial management much simpler. In India, subject recruitment is rapid thereby collapsing the time needed for the clinical development process. Subject recruitment is the most common rate-limiting step in the drug development process. Sponsors normally cannot reduce study timeliness, however, without sacrificing quality and incurring increased cost. India offers sponsors the opportunity to recruit subjects quickly while maintaining a high level of quality. The relative cost savings result not only from shorter timeliness but also from the low cost of performing studies in India. Globally, more than 80 per cent of clinical trials fail to enroll on time, and this subject recruitment problem is extremely costly for drug companies, contributing to 85–95 per cent of the lost days in a clinical trial. Subject compliance is an important aspect of clinical trials. Subjects generally recruited in the studies performed in India are not only treatment naïve but also recognize that study participation can offer access to quality health care and medicines that may not be otherwise affordable. As result, subjects are very compliant and are keen to attend all their study visits.

An independent study by a global CRO concluded that India has one of the best subject return rates in the world. For example, ClinTec International, UK claims to have decreased its time for recruiting patients

to half the time it takes in the US by conducting clinical trials in India. The time for data analysis is also shorter. In another example, Germany's Mucos Pharma asked Siro Clinpharm in Mumbai to help with a clinical trial for a drug to treat head and neck cancer. To find 650 out of 750 volunteers for the trial, Siro Clinpharm had to go to only five hospitals in India and found the volunteers within 18 months. To find the remaining 100 volunteers in Europe, Mucos Pharma spent nearly twice as much time and recruited patients from 22 hospitals. Currently, about 80 government and privately owned Indian hospitals are engaged in global and local clinical trials. Observers predict that this figure will increase exponentially.

2. ***India's Provides Significant Cost Savings:***

The global drug giants are increasingly outsourcing clinical trials to India because of India's large population and low costs. The cost of conducting trials in India is cheaper by 30-50 per cent as compared to that in the West. Over 40 per cent of drug development costs are incurred in clinical trials and India offers immense savings on that aspect. Trials can get done fast, which is also an important criterion. For instance, in the US, clinical trials for a standard drug can cost about $150 to $170 million, whereas the Rabo India Finance study estimates that drugs could be tested in India for as little as 60 per cent of that price.

3. ***India provides a Rich pool of Biodiversity:***

India has large population concentrations in major urban areas offering ready access to trial subjects and a population that offers vast genetic diversity. Due to the high population density of the urban areas and relatively small number of hospitals, recruiting a large number of subjects within a short time frame is not difficult. Also, the accessibility of these hospitals allows for cost-effective monitoring of studies. According to a study by Rabo India Finance, India's huge patient pool provides a lot of genetic diversity making India "an ideal site for clinical trials." For example, India has the world's largest pool of diabetics – over 20 million suffer from it. Diabetes is also the most researched condition across the world nowadays. Trials are also going on in areas such as psychiatry, neurology, cardiology, gastroenterology, endocrinology, dermatology and ophthalmology.

4. ***Presence of Established Players:***

Almost all top names in the pharmaceutical universe such as Eli Lilly, GlaxoSmithKline, Pfizer, Aventis, Novo Nordisk and Novartis, are conducting clinical trials in India. Pfizer is already conducting trials for osteoporosis, cardiovascular diseases and psychiatric conditions in India and has plans to hold trials for many more diseases here. Apart from them, a number of Indian and global organizations such as Quintiles Transnational Corp, Omnicare and Pharm-Olam, Research Triangle Park, N.C. are holding clinical trials in India on behalf of US-based pharmaceutical companies. Roche, the Swiss pharma major has also set up clinical trial sites in India as part of its global trials for treatment of a particular variant of lung cancer. One of the reasons for considering India is that it has a vast patient population infected by this type of lung cancer, which is primarily triggered by the use of tobacco products. India is also being considered a prospective site for Roche's future clinical trials involving new drugs and therapies for blood cancer. India is having around 25 Contract Research service (CRO) providers with excellent infrastructure and well trained and experienced staff to conduct clinical development activities.

5. ***Established Research Facilities:***

Indian research/data generation capabilities are of international standards and Indian data is accepted by all major medical conferences and journals.

6. ***Favourable Regulatory Climate:***

India has a commercial and legal environment which is supportive and conducive to contract research and clinical trials. Like most other countries, India has both local Institutional Review Boards (IRBs) and a national regulatory body, the Drug Control General India (DCGI.). Studies must first be approved by the local IRB, called the Independent Ethics Committee (IEC) and then submitted to the DCGI for additional approval. Bioequivalence studies involving drugs that have been marketed in India for more than four years do not need to go to the DCGI, as these studies can be approved by the local ethics committee. The Indian government and the pharmaceutical services sector are working together to firmly position India as a major global player. For now, India enjoys a distinct advantage over China due to easier regulatory hurdles and, of course, the use of English as a major language. The Indian patent act amended on March 2005 i.e. TRIPS opens a new avenue for India into the global pharmaceutical market.

Compared with Russia, Latin America, China or Africa, the speed of regulatory approval in India is relatively rapid. With proper documentation, clinical trial applications can be approved in as little as eight to ten weeks (for drugs marketed in India for more

than four years), or may stretch to 12–14 weeks for drugs not approved in India. This compares with six to twelve months for similar studies in other countries, making India look quite attractive.

7. *Strong Support by Indian Government:*

India announced in December 2001 that all pharmaceutical clinical research must strictly follow government issued GCP (good clinical practice) guidelines. These guidelines were formulated by an expert committee set up by the Central Drugs Standard Control Organization in consultation with relevant experts. Consequently, the level of research and ethics in some institutions is now on par with International Standards. High level of International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH) good clinical practice (GCP) and US Food and Drug Administration (FDA) standards compliance – since 2001, DCGI has implemented conformity to ICH GCP/good laboratory practice (GLP) guidelines. Generally, most competent authorities (CAs), including the FDA, will find the standards of Indian clinical trials acceptable.

The 2003 budget gave encouraging gestures for R&D in the pharma sector particularly in respect of clinical trials. Exemption of customs duty for materials and samples was a great boost to the CROs in bringing samples for trials. Pressure on the industry was also reduced by abolishing the minimum export turnover concept. India is emerging as a major player for conducting clinical research from phase I to phase IV. Speedier customs clearance of clinical trial materials and frozen biological samples has provided a great opportunity for the clinical trial companies to grow and provide much needed service to pharma companies. The Drugs and Cosmetic Rules Act has also been amended, whereby no institution will be permitted to undertake clinical trials for a new drug without the permission of the Drug Control General India (DCGI). Further, post marketing surveillance studies (phase IV study) have been made mandatory in case of clinical trials for import and manufacture of new drugs. This will increase the demand for high quality clinical research services.

8. *Medical Infrastructure:*

High quality of research professionals – India has a strong reputation for graduating students in the medical and scientific fields. Moreover, India also has other facilities, such as almost 14,000 hospitals, 5,00,000 doctors, 700,000 specialty hospital beds, 221 medical colleges, 17,000 medical graduates per year and skilled English-speaking medical personnel.

9. *English Speaking Skilled Men Power:*

All hospitals and private institutions store comprehensive source data in English. India also has the world's second largest pool of English speakers (making communications significantly less of an operating issue than in other countries). India has an excellent higher education system, which produces a large number of graduates with advanced degrees in the basic sciences, medicines, laboratory technology and in information science. India is also having a large pool of talented clinical research investigators. Many of them have been trained in the US and/or Europe and are exposed to ICH guidelines for GCP.

10. *Wide Spectrum of Disease:*

India has wide spectrum of disease with diseases of both the tropical and industrialized world. Diseases such as multi-drug-resistant pneumonia, hepatitis B, diabetes, and some cancers are far more prevalent in India than in the West. The comparatively less intensive medical surveillance suggests that the true cancer caseload in India would be significantly higher than diagnosed cases. The speed of patient recruitment for oncology clinical trials in India is up to seven times faster than in the United States.

Following are major diseases of interest for clinical research:

1. Cardiovascular and respiratory disease:
    1. 80 million individuals suffering from cardiovascular disease,
    2. 15 per cent of the population hypertensive, and
    3. 50 million asthmatics, many steroid naïve with uncontrolled symptoms.

2. The Metabolic Syndrome (insulin resistance, hyperlipidaemia and obesity):
    1. Type II Diabetes Mellitus - 60 million cases with a five fold greater prevalence in cities, and
    2. Largest number of individuals with metabolic syndrome in the world.

3. Psychiatric and Neurological Diseases:
    1. One per cent of the population having schizophrenia, mania and / or bipolar disorders,
    2. Eight million epileptics,
    3. 1.5 million individuals, believed to have Alzheimer's disease, and

4. Parkinson's disease and migraine, widely prevalent

4. Large and growing no. of cancer patients, of whom many seeking to participate in global trials:
   1. Number of diagnosed cases, presently around three million,
   2. Cancers of the oral cavity, lung, and cervix forming over 50 per cent of cases, and
   3. Other common cancers being those of the breast, head and neck and pancreas.

11. ***A Major Resource Center:***

Today India is identified as a major resource center for conducting clinical trials and data management services. With its large patient populations, well-trained and enthusiastic investigators, and per-subject trial costs considerably lower than those in developed nations, it is widely recognized as a nation able to offer unique opportunities for conducting clinical trials.

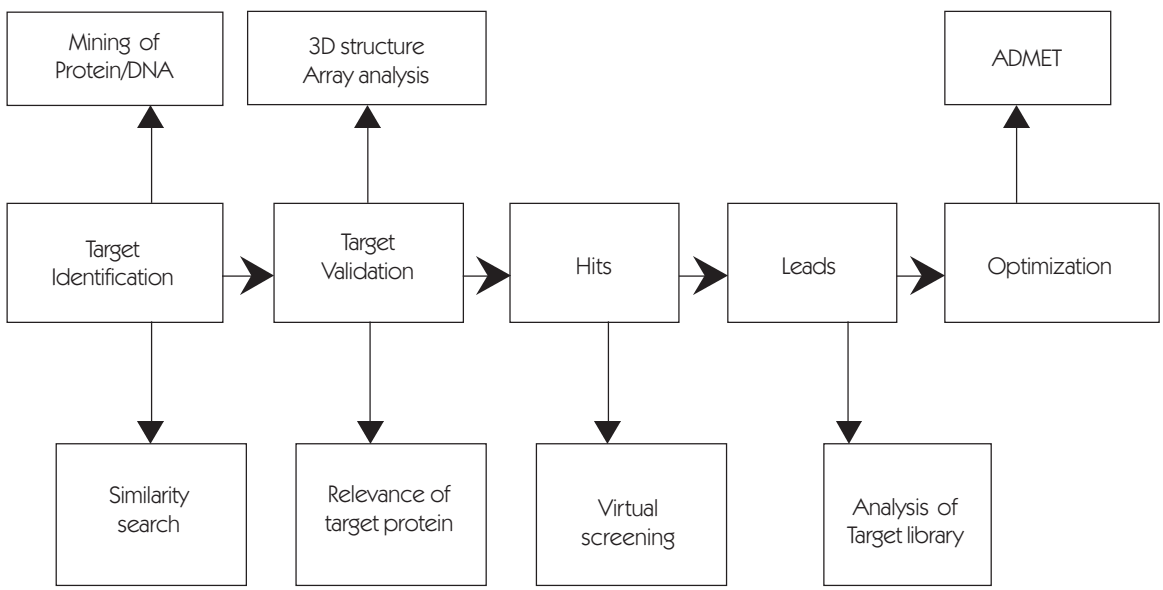
12. ***India's Strong Pharmaceutical Sector:***

Indian pharmaceutical industry is recognized as one of the leading global players with 4th position in terms of volume and 13th position in terms of value. India today has the largest number of US Food and Drug Administration (FDA) approved drug manufacturing facilities outside the US. India is having more than 70 FDA-approved plants and 200 manufacturing facilities certified as having good manufacturing practices (GMP), more than any other foreign country. With presence of over 10,000 pharmaceutical companies, one fourth of it can provide contract manufacturing facilities to foreign pharmaceutical companies.

India can emerge as a world leader in drug development as Indian pharmaceutical companies have the numerous strengths and capabilities. India has long been a formidable player in pharmaceutical manufacturing, with Indian companies producing some 22 per cent of the world's supply of generic drugs, according to the Indian Pharmaceutical Alliance (IPA). By 2007, India will capture a third of the world's generic drug business, predicts the IPA. Indian companies are increasingly submitting more and more abbreviated new drug applications (ANDAs) to the FDA. Indian companies contributed about a third of the total ANDAs, according to a report by Credit Lyonnais Securities. Big pharma is hoping to capitalize on the cost savings by shifting some research activities to India. Last year Ranbaxy entered into a collaborative agreement with GlaxoSmithKline (GSK), Brentford, UK, to develop new chemical

Annexure - 1

Applications of Bioinformatics in Drug Development and Design



entities for select therapeutic targets using GSK's libraries of patented molecules. GSK will conduct clinical trials and market successful drugs.

13. ***Fast Turnaround Time:***

In India, clinical trials are conducted in 30 per cent less time, while there has been a backlog reduction of 50 per cent in transcription processing. Also, India and the US have a zonal time difference of about 12 hours, thus effectively giving companies a 24 hours work environment. Most of the processing functions are performed during the day time in India, when it is night time in the developed countries. As a result of this zonal time difference, there is no or little backlog in the front end and processing tasks.

Conclusion

Although approximately $40 billion is spent annually on drug development, pharma companies have realized that periods of rapid growth and unprecedented profits are now far and few. Researchers are finding fewer and fewer unique molecules, ending the era of "blockbuster drugs" and increasing development timeliness, sometimes to as long as 15 years. Today pharmaceutical and life sciences companies are placing increasing emphasis on bioinformatics investments in order to gain a competitive advantage in the drug discovery process. India offers substantial cost advantages in bioinformatics. By off-shoring data mining and analytics, cost advantages range as much as 70 per cent. The large number of patent expirations, decreasing R&D productivity and high costs of drug development are forcing big pharmaceutical companies to outsource their R&D operations to other low cost locations. India is proving to be the most preferred destination to carry out their drug discovery and development activities. Availability of a vast patient population, low cost, strength of IT, skilled R&D workforce and a favourable regulatory environment are the main driving forces to transform India into the hub of R&D activities and bioinformatics for successful drug discovery and development.

Keywords: *Bioinformatics; Clinical Trial; Drug Discovery; Drug Development; Outsourcing.*

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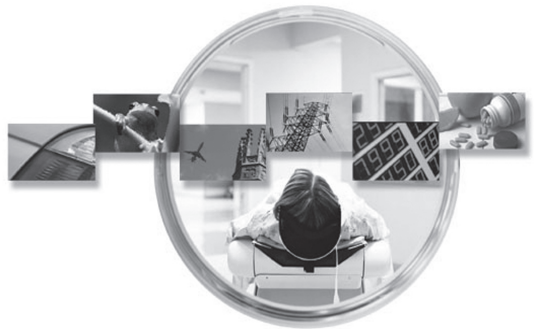
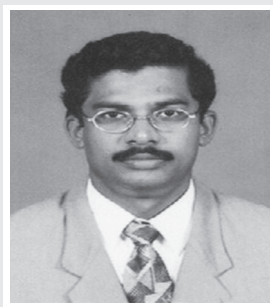
Business Research:
Factorial Manova

Israel D.



Multivariate Analysis of Variance (Manova) has been an inherent tool in data analysis in the field of management for several decades. Numerous articles still continue to appear in leading journals making use of this unique technique for studying the impact of one or several categorical-scaled predictors on several continuous-scaled dependent variables. Unfortunately, the awareness and applications of this important tool is least amongst the researchers in the management discipline in India. The author hence endeavours that the application of this technique is well understood and is confidently applied. Using an illustration, this article provides non-technical step-by-step descriptions in performing a Factorial Manova. The inclusion of SPSS screenshots and the discussions on the output will be of immense use in enabling the practitioners in gaining full comprehension of this wonderful tool.

MANOVA, an acronym for Multivariate Analysis of Variance, is an extension of ANOVA to test the impact of one or more categorical independent variables (also known as predictors or treatment variables) on two or more continuous scaled dependent variables (also known as criterion variables). Using MANOVA, we can test the independent and interactive effect of the predictors on a set of dependent variables. Whereas ANOVA measures the significant difference in the mean values of a single dependent variable across different levels or categories of a single or several predictors, the MANOVA tests the significant differences in the centroid (called vector) or the mean of a set of dependent variables say, a set of ratings of employee performance, purchase decisions or service quality perception etc. Thus MANOVA takes into account the inter-correlation existing among the dependent variables thereby reducing the information loss. In a factorial-design MANOVA, we will have two or more predictor variables each measured on a categorical scale and two or more dependent variables.



Dr.Israel D., Assistant Professor (Marketing Area), School of Business and Human Resources, Xavier Labour Relations Institute (XLRI), Jamshedpur, Jharkhand-831 001, Email: disrael@xlri.ac.in

MANOVA is a dependence technique and is formulated as:

$$Y1+Y2+Y3+.....+Yn = X1+X2+X3+.....+Xn$$

The Y variables on the left hand side are dependent variables that are measured on a continuous scale viz., interval or ratio scale (e.g. income, sales

volume, price etc.). The X variables on the right hand side of the equation are the independent or predictor variables measured on nominal scale (e.g. gender, sales territory, color of the package etc.). MANOVA aims at finding at how far different categories of a predictor variable are different across a set of dependent variables (i.e. Y variables) which is also known as dependent covariate. Thus MANOVA is imperative in dissecting the impact of treatment effect on a set of related dependent variables.

Requirements

1. The predictor variable(s) should be measured on a nominal scale.

2. There can be one or many such predictor variables.

3. There should be at least two dependent variables.

4. The dependent variables should not be totally independent from each other. At the same time, they should not be highly correlated say, 0.8 or above as this will betoken the symptom of multicollinearity. Nonetheless, the dependent variables in the model should share a moderate amount of correlation. This is examined through Bartlett's test of sphericity whose value should be significant at 0.05 level, meaning there is a sufficient correlation between the dependent variables in the model. In case of multicollinearity, it is advisable to remove one or more of the highly correlated dependent variables even before submitting the variables for analysis.

5. The subjects or respondents in different categories of the independent variable(s) should be independent of each other. This can be ensured through random assignment of the subjects into different categories of the predictor variable. Further, a minimum sample size of 20 should be present in each cell or category of the independent variable (Hair et al. 1998).

6. There should be homogeneity of variance for each dependent variable across subjects in different levels of predictor variable. This can be assessed through Box's M test. The Box's M test checks the null hypothesis that the dependent variable variance-covariance matrices are equal across the levels of the independent variable. If the Box's M test is significant, that is, the level of significance is greater than .05; it is an indication of homogeneity of covariance of dependent variable across different levels of independent variable. In case, the Box's M test is insignificant (that is, the level of significance is less than .05), we have to resort to transforming the data into standardization or log-conversion. Or, we can rely on Pillai's Trace criterion while examining the significance of multivariate effect (Tabachnik and Fidell, 2001).

7. It is also a pre-requisite to assess the normality diagnostics for each level of independent variable on each dependent variable. For this purpose, we can compute Kolmogorov-Smirnov or Shapiro-Wilk tests. The level of significance obtained for these tests should be greater than .05 to reveal no normality violations. In addition, we have to look for the value of kurtosis and skewness whose values should be between + or -1. Or, we can inspect the normal Q-Q plots for the distribution of dependent variable for each level of the factors in the model. But normally this requirement is connived in Manova, as the multivariate test statistics are themselves robust against the violations of the normality assumptions.

8. MANOVA assumes linear relationships between pairs of dependent variables. In case of non-linearity, we have to transform the data into standardized or log format.

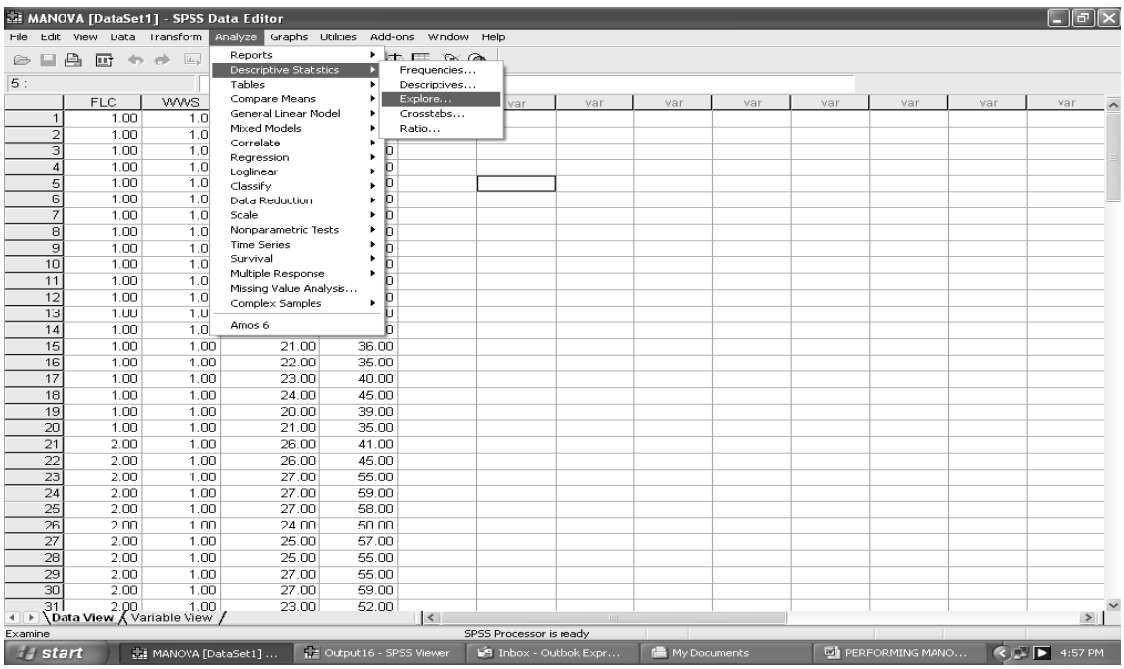
Illustration

A study was made to find out how the spousal influence on the purchase of durable goods varies for (a) families in which wife is gainfully employed outside the home and not, and (b) families in different life-cycle stages. The spousal influence on the purchase of a Television set and a Refrigerator was assessed from couples belonging to 60 families who have reported having bought them during the last one year period. The relative influence of spouses on a set of 14 decision elements such as initiating the idea of purchase, gathering information, decision on brand, style, model, amount to spend, time of purchase etc. were measured on a five point scale ranging from "Husband exclusively =1" to "wife exclusively =5" and the total score in respect of purchase of a television-set and refrigerator was calculated separately for each family. Thus the two dependent variables for this study are purchase influence (total) score for refrigerator and television set. The predictor variables are wife's work status (with a code of 1= working-wife families and 2=non-working wife families) and family life-cycle (with a code of 1= couples married under 5 years, 2= couples married for 5-10 years and 3= above 10 years).

Procedures: Performing a MANOVA test involves the following stages:

Stage 1: **Perform Normality Diagnostic Test** on each dependent variable for each level of independent variable. For example, if we have two dependent variables and one independent variable with two categories, then we have to assess four sets of normality diagnostics (2 dependent variables x 2 levels of the independent variable = 4). Two statistics are used for this purpose: Kolmogorov-Smirnov test and Shapiro-Wilk Statistic. These test results should be insignificant in order to conclude normal distribution of dependent variable scores for each category of the independent variable. But it is very rare to obtain a non-significant result of these statistics. Hence, we can examine the Kurtosis and Skewness of the dependent variables for each category of the independent variable in the model. If the values are between + or –1, then we need not bother too much about the violation of normality assumption. To obtain normality diagnostic statistics, click Analyze Descriptive Statistics Explore.

Fig. 1: Data Editor Preparing to perform Explore Operations



In the Explore dialogue box, shift the dependent variables TV set and Refrigerator to the Dependent List. Similarly, move the independent variables FLC (family life-cycle) and WWS (wife work status) to the Factor List. Select Plots… push-button to activate Explore Plots dialogue box. Check the box Normality plots with tests. Leave the other options default. Click Continue then click OK in the main dialogue box.

The following results are produced: Descriptives - which indicate the entire descriptive statistics viz., mean, median, standard deviation, minimum and maximum values and such. But, for us the values of skewness and kurtosis that are important. So long as these values are between + or – 1, we can be assured of normality property of the data. These values are computed for each dependent variable across all the levels of each independent variable in the model. Thus the Descriptive table shown below indicates that the skewness and kurtosis values are well within the suggested boundary of + or - 1 for most of the cases (excepting for refrigerator in respect of the second category of FLC). Hence, it is affirmed that the normality assumption is not seriously violated. On the contrary, the normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) are statistically significant for most of the cases, indicating violations of normality assumption in both the dependent variables. However, the normal Q-Q plots in Figure – seem approximately normal that is, most of the data points fall on the diagonal lines. With these results, we can confidently affirm that the data are ready for multivariate analysis.

Fig. 2: Explore Main Dialog Box and Explore Plots Dialog Box to compute Normality Statistics and generate Normal Q-Q Plots

Fig. 3: Descriptive Statistics for the Dependent Variables TV-set and Refrigerator separated by the Factor FLC

Descriptives

	F L C			Statistic	Std. Error
TV Set	5 years or below	Mean		22.6750	.22755
		95% Confidence	Lower Bound	22.2147	
		Interval for Mean	Upper Bound	23.1353	
		5% Trimmed Mean		22.6944	
		Median		22.5000	
		Variance		2.071	
		St. Deviation		1.43915	
		Minimum		20.00	
		Maximum		25.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		.065	.374
		Kurtosis		-.605	.733
	6-10 years	Mean		26.0250	.23339
		95% Confidence	Lower Bound	25.5529	
		Interval for Mean	Upper Bound	26.4971	
		5% Trimmed Mean		26.0278	
		Median		26.0000	
		Variance		2.179	
		St. Deviation		1.47609	
		Minimum		23.00	
		Maximum		29.00	
		Range		6.00	
		Interquartile Range		2.00	
		Skewness		-.196	.374
		Kurtosis		-.051	.733
	Above 10 years	Mean		29.0750	.22755
		95% Confidence	Lower Bound	28.6147	
		Interval for Mean	Upper Bound	29.5353	
		5% Trimmed Mean		29.1389	
		Median		30.0000	
		Variance		2.071	
		St. Deviation		1.43915	
		Minimum		26.00	
		Maximum		31.00	
		Range		5.00	
		Interquartile Range		2.00	
		Skewness		-.790	.374
		Kurtosis		-.342	.733

	FLC			Statistic	Std. Error
Refrigerator	5 years or below	Mean		40.2750	.66889
		95% Confidence Interval for Mean	Lower Bound	38.9220	
			Upper Bound	41.6280	
		5% Trimmed Mean		40.2500	
		Median		40.0000	
		Variance		17.897	
		St. Deviation		4.23046	
		Minimum		33.00	
		Maximum		49.00	
		Range		16.00	
		Interquartile Range		8.00	
		Skewness		.104	.374
		Kurtosis		-.930	.733
	6-10 years	Mean		54.1250	.69077
		95% Confidence Interval for Mean	Lower Bound	52.7278	
			Upper Bound	55.5222	
		5% Trimmed Mean		54.5000	
		Median		55.0000	
		Variance		19.087	
		St. Deviation		4.36881	
		Minimum		41.00	
		Maximum		59.00	
		Range		18.00	
		Interquartile Range		5.75	
		Skewness		-1.324	.374
		Kurtosis		1.321	.733
	Above 10 years	Mean		61.3000	.22755
		95% Confidence Interval for Mean	Lower Bound	59.3713	
			Upper Bound	63.2287	
		5% Trimmed Mean		61.5000	
		Median		63.5000	
		Variance		36.369	
		St. Deviation		6.03069	
		Minimum		50.00	
		Maximum		69.00	
		Range		19.00	
		Interquartile Range		10.50	
		Skewness		-.645	.374
		Kurtosis		-.841	.733

Fig. 4: Results from Tests of Normality for Factor FLC

Tests of Normality

FLC		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	d f	Sig.	Statistic	d f	Sig.
TV set	5 years or below	.180	40	.002	.926	40	0.12
	6-10 years	.148	40	.032	.945	40	.050
	Above 10 years	.265	40	.000	.867	40	.000
Refrigerator	5 years or below	.143	40	.038	.958	40	.143
	6-10 years	.279	40	.000	.856	40	.000
	Above 10 years	.173	40	.004	.897	40	.002

a. Lilliefors significance correction

Descriptives

	W W S			Statistic	Std. Error
TV Set	Working	Mean		25.6167	.37739
		95% Confidence	Lower Bound	24.8615	
		Interval for Mean	Upper Bound	26.3718	
		5% Trimmed Mean		25.6481	
		Median		26.0000	
		Variance		8.545	
		St. Deviation		2.92327	
		Minimum		20.00	
		Maximum		31.00	
		Range		11.00	
		Interquartile Range		4.75	
		Skewness		-.024	.309
		Kurtosis		-.858	.608
	Non-Working	Mean		26.2333	.39443
		95% Confidence	Lower Bound	25.4441	
		Interval for Mean	Upper Bound	27.0226	
		5% Trimmed Mean		26.2593	
		Median		26.5000	
		Variance		9.334	
		St. Deviation		3.05524	
		Minimum		20.00	
		Maximum		31.00	
		Range		11.00	
		Interquartile Range		6.00	
		Skewness		-.144	.309
		Kurtosis		-1.194	.608
Refrigerator	Working	Mean		51.7167	1.32172
		95% Confidence	Lower Bound	49.0719	
		Interval for Mean	Upper Bound	54.3614	
		5% Trimmed Mean		51.7407	
		Median		54.0000	
		Variance		104.817	
		St. Deviation		10.23800	
		Minimum		33.00	
		Maximum		69.00	
		Range		36.00	
		Interquartile Range		17.00	
		Skewness		-.107	.309
		Kurtosis		-1.027	.608
Working	Non-Working	Mean		52.0833	1.28117
		95% Confidence	Lower Bound	49.5197	
		Interval for Mean	Upper Bound	54.6470	
		5% Trimmed Mean		52.2222	
		Median		55.0000	
		Variance		98.484	
		St. Deviation		9.92393	
		Minimum		33.00	
		Maximum		69.00	
		Range		36.00	
		Interquartile Range		14.75	
		Skewness		-.195	.309
		Kurtosis		-1.076	.608

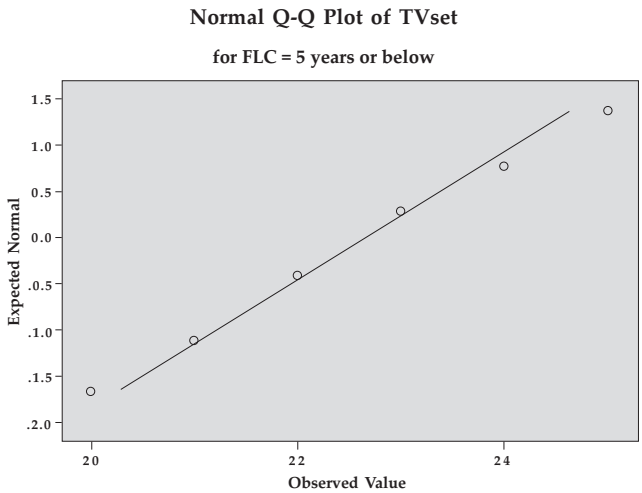
Fig. 5: Results from Tests of Normality for Factor WWS

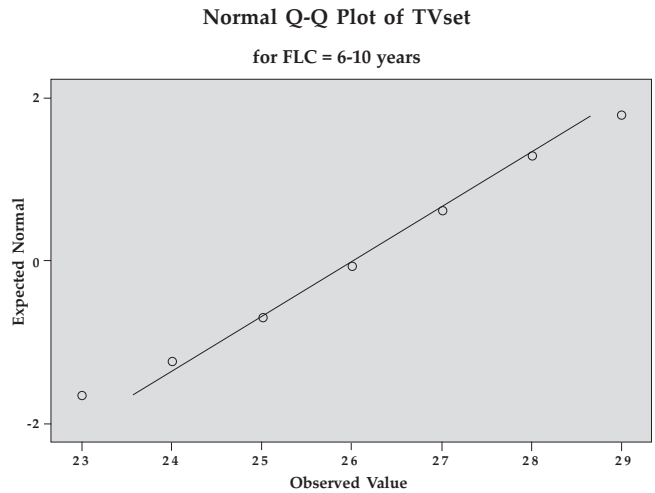
Tests of Normality

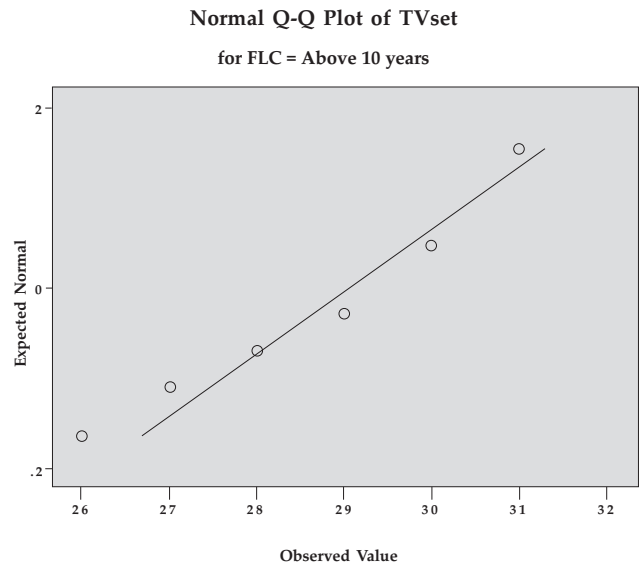
WWS		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	d f	Sig.	Statistic	d f	Sig.
TV set	Working	.083	60	.200*	.960	60	.048
	Non-Working	.122	60	.027	.940	60	.006
Refrigerator	Working	.126	60	.019	.956	60	.032
	Non-Working	.149	60	.002	.955	60	.026

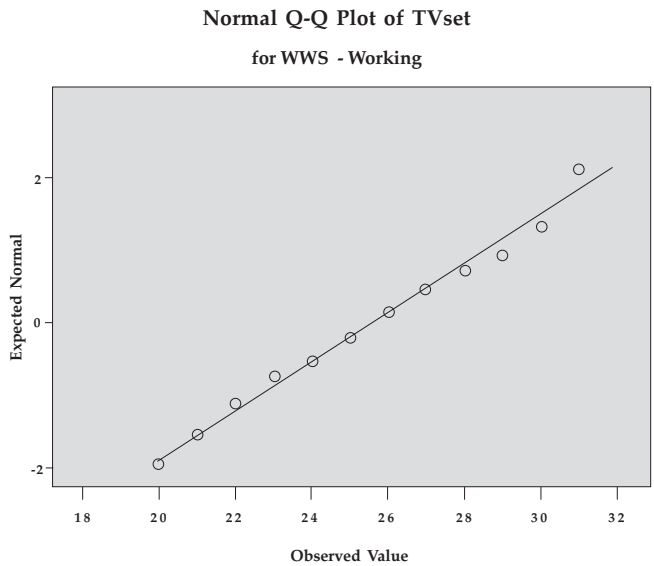
* This is a lower bound of the true significance.
a. Lilliefors signifcance correction.

Fig. 6: Normal Q-Q Plots



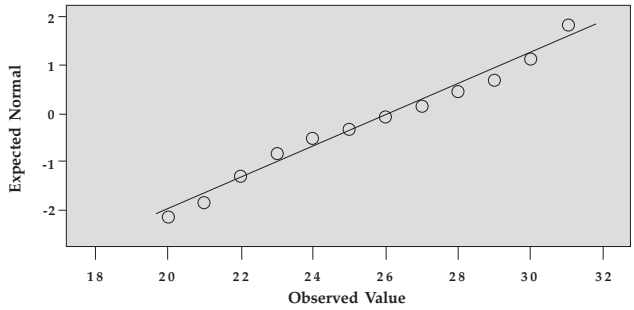






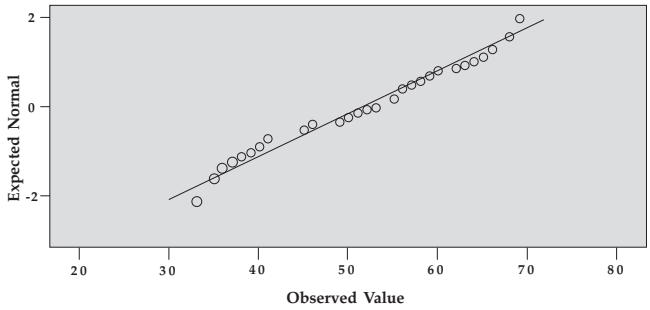
Normal Q-Q Plot of TVset

for WWS = non-working



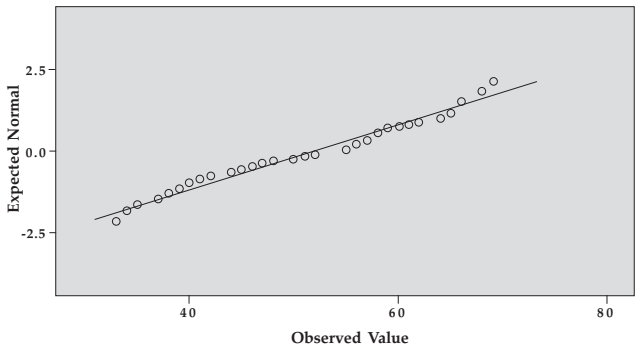
Normal Q-Q Plot of Refrigerator

for WWS = working



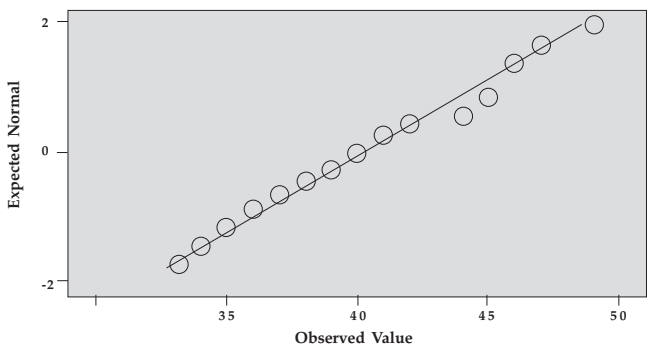
Normal Q-Q Plot of Refrigerator

for WWS = non-working



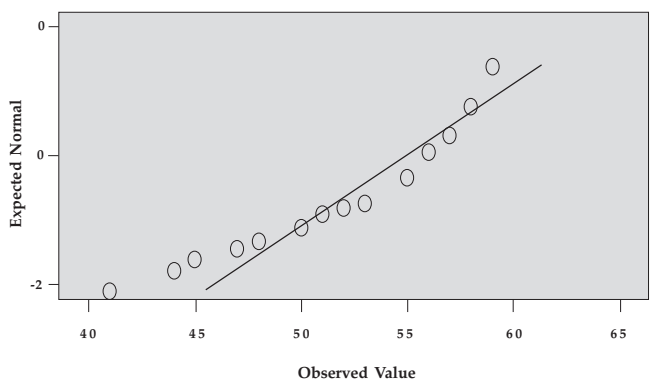
Normal Q-Q Plot of Refrigerator

for FLC = 5 years or below



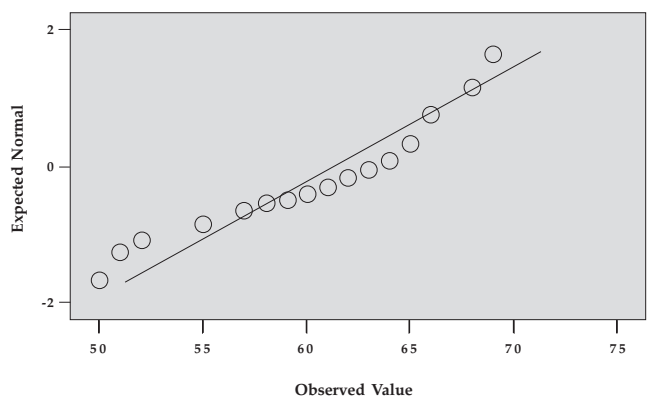
Normal Q-Q Plot of Refrigerator

for FLC= 6-10 years



Normal Q-Q Plot of Refrigerator

for FLC = Above 10 years

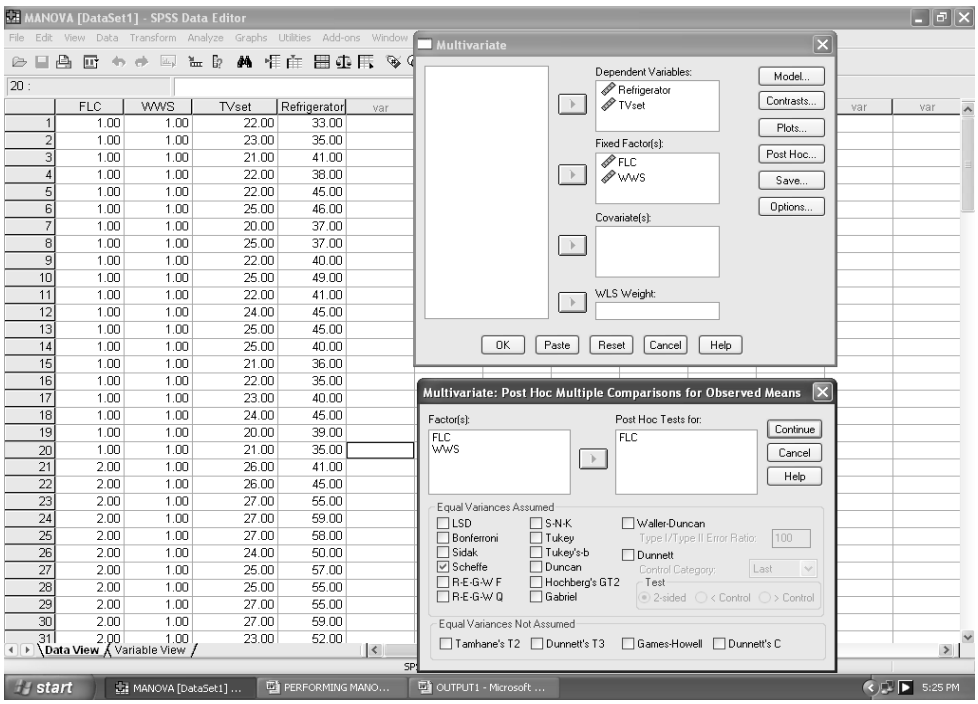


Stage 2: Assess the Homogeneity (Equality) of Variance-Covariance Matrices for the dependent variables through Levene's test and Box's M test statistics. Levene's statistic can be obtained for each dependent variable in the model. The level of significance should be greater than .05 to ensure the equality of variance-covariance matrices among the combined dependent variate for each level (category) of the predictor variable(s) in the model. In case the Levene's statistic is significant for a particular dependent variable indicating the violation of the assumption of equality of variance, then we need to set a more conservative alpha level for determining the significance for that variable in the univariate F-test which is .025 or .01 rather than the usual .05 level (Tabachnick and Fidell, 1996; p.80).

This stage involves the execution of MANOVA and is commenced by clicking Analyze General Linear Model Multivariate.

This opens the Multivariate dialog box as shown under. The dependent variables are to be selected from the variable list box in the left hand side and are to be moved over to the Dependent Variables box and the independent variables to the Fixed Factor(s). Clicking the Post Hoc pushbutton will produce Multivariate: Post Hoc Multiple Comparisons for Observed Means dialog box. Of the two factors used in the present study viz., FLC and WWS, the former has three levels or categories. Hence, it becomes necessary to perform post hoc evaluation. Therefore, the variable FLC is selected from the Factor(s) box and is moved to the Post Hoc Tests for box. As has been prescribed earlier, Tukey's HSD is used for multiple comparison tests. Therefore, check the Tukey box under Equal Variances Assumed portion.

Fig. 7: MANOVA Main Dialog Box and Post Hoc Multiple Comparisons for Observed Means Dialog Box

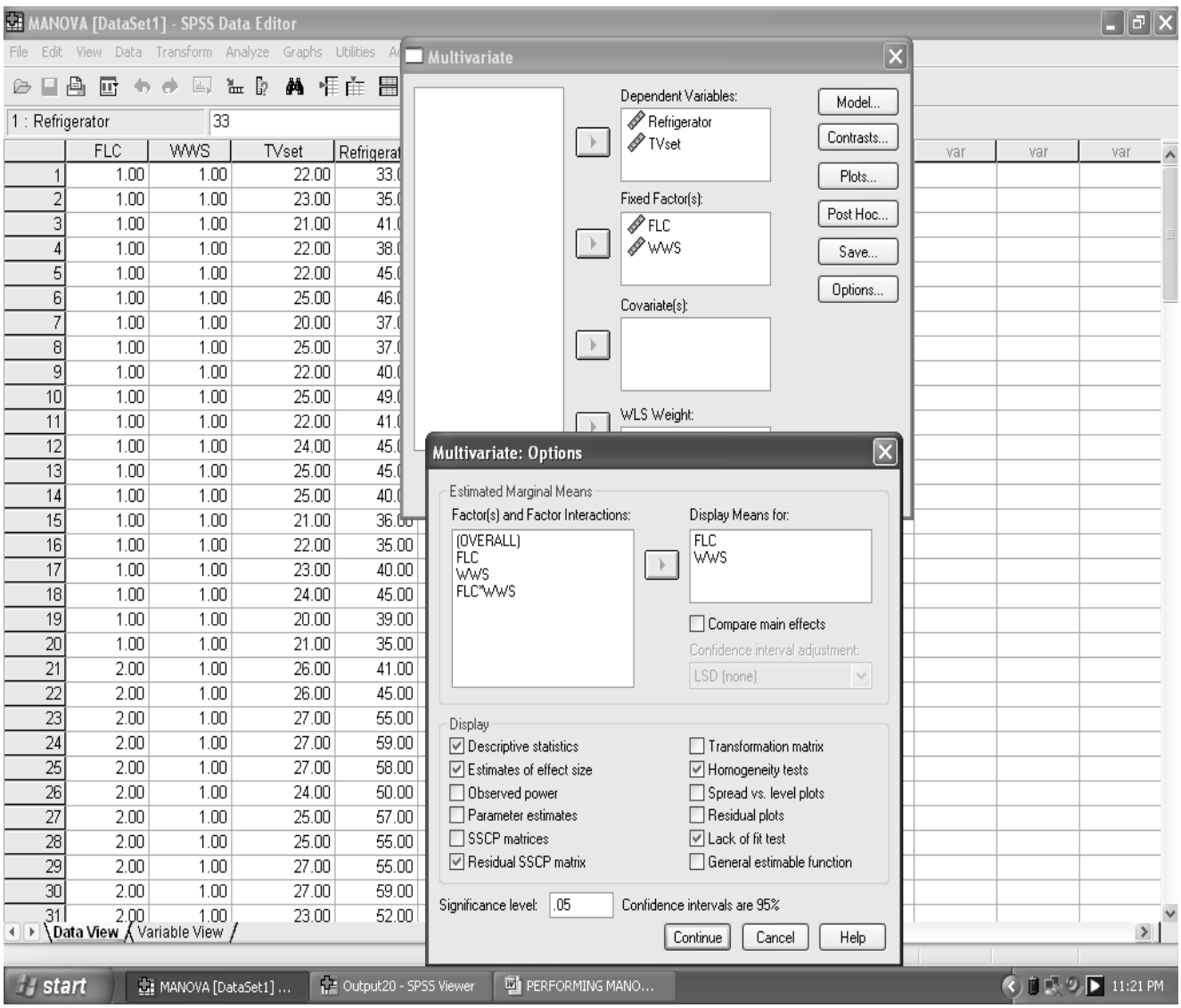


Stage 3: Ensure the Dependent Variables Share a Moderate Amount of Correlation between the pairs of dependent variables across categories of the independent variable(s) by examining Bartlett's test of sphericity whose level of significance should be less than .05. This gives a confidence to move forward toward performing MANOVA test. Please note that a high positive correlation of .8 or above for a pair of dependent variables merely indicate that these two variables are one and the same or reflect a same construct. In such cases, it is prudent to combine them into a single measure or remove one of them.

This requires us to press Options pushbutton from the Multivariate main dialog box. The Multivariate Options contains a box named Factor(s) and Factor Interactions in which the main effect of each factor (independent variable) and the interaction of the two independent variables (FLC*WWS) are displayed.

Here, we have moved FLC and WWS to the Display Means for box. Doing so will produce estimate marginal mean for that effect in the output. Also, we have to select four check boxes from the Display box of this dialog box. They are: Descriptive Statistics that gives means, standard deviations and counts for each treatment combinations, Estimates of effect size that gives the partial eta-squared value for each main and interaction effect, the Residual SSCP matrix that gives the computed Bartlett's test of sphericity and the Homogeneity tests that provides Levene's test statistic for assessing the homogeneity of variance assumption. Once done the appropriate selections, go back to the Multivariate main dialog box and press OK to obtain the Manova test results as shown below:

Fig. 8: Multivariate Options Dialog Box



General Linear Model

[DataSet1] C:\Program Files\SPSS\MANOVA.sav

Between-Subjects Factors

		Value Label	N
FLC	1.00	5 years or below	40
	2.00	6-10 years	40
	3.00	Above 10 years	40
WWS	1.00	working	60
	2.00	non-working	60

This table is a initial output produced by Manova test which gives the sample size for different level of each predictor in the model. It is observed from the table that the sample size is well above the minimum suggested size of 20 in each cell.

The Descriptive statistic output provides the mean, standard deviation and sample size for each combination of predictor variables. A perusal of total mean influence scores for the Refrigerator and TV-set purchases indicates that wife's influence is greater in later stages of the FLC. Wife's work status (WWS) seems to have only a meager influence in both purchases.

Descriptive Statistics

	FLC	WWS	Mean	Std. Deviation	N
Refrigerator	5 years or below	working	40.1000	4.48272	20
		non-working	40.4500	4.07140	20
		Total	40.2750	4.23046	40
	6-10 years	working	53.7000	4.56647	20
		non-working	54.5500	4.23612	20
		Total	54.1250	4.36881	40
	Above 10 years	working	61.3500	6.37656	20
		non-working	61.2500	5.82982	20
		Total	61.3000	6.03069	40
	Total	working	51.7167	10.23800	60
		non-working	52.0833	9.92393	60
		Total	51.9000	10.04143	120
TVset	5 years or below	working	22.7000	1.71985	20
		non-working	22.6500	1.13671	20
		Total	22.6750	1.43915	40
	6-10 years	working	25.5000	1.50438	20
		non-working	26.5500	1.27630	20
		Total	26.0250	1.47609	40
	Above 10 years	working	28.6500	1.63111	20
		non-working	29.5000	1.10024	20
		Total	29.0750	1.43915	40
	Total	working	25.6167	2.92327	60
		non-working	26.2333	3.05524	60
		Total	25.9250	2.99345	120

Box's Test of Equality of Covariance Matrices[a]

Box's M	18.092
F	1.152
df1	15
df2	71084.377
Sig.	.302

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept+FLC+WWS+FLC * WWS

Bartlett's Test of Sphericity[a]

Likelihood Ratio	.000
Approx. Chi-Square	163.253
df	2
Sig.	.000

Tests the null hypothesis that the residual covariance matrix is proportional to an identity matrix.

a. Design: Intercept+FLC+WWS+FLC * WWS

Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
Refrigerator	2.090	5	114	.072
TVset	2.505	5	114	.034

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+FLC+WWS+FLC * WWS

The Box's Test of Equality of Covariance Matrices, shown above indicates the dependent variables' covariance matrices are equal across different levels of predictor variables. Since the Box's M test statistic is not significant, we can be assured of the homogeneity or equality of variance-covariance assumption (Box's M=18.092; p<.302). Hence we have not violated the equality assumption of variance-covariance matrices.

The Bartlett's Test of Sphericity, which assesses the presence of sufficient correlation between the dependent variables is significant (Chi-square 163.253; p<.000) thus assuring that we have not violated the important assumption of correlation among the dependent variables. This finding makes us still more confidence in proceeding with the analysis.

The Levene's Test of Equality of Error Variances computed separately for each dependent variable is statistically non-significant for Refrigerator (p<.072) thus suggesting equality of error variances across different levels of the predictors in the model, in this case FLC. In case of significant Levene's statistic as found for the TV-set in the present case (p>.034), we can follow the criterion of more stringent alpha of .025 or .01 rather than the conventional .05 while assessing the statistical significance of that factor in the univariate analysis (Tbachnik and Fidell, 1996; p.80).

Stage 4: Once we are satisfied with the assumptions of normality, variance-covariance and correlation among the dependent variables, it is time to examine the main MANOVA test results. This is done by examining the four multivariate test statistics and their equivalent F values. The four multivariate test statistics are: Pillai's trace, Wilks' Lambda, Hotelling's T and Roy's Largest Root. A significant multivariate statistics (be it Pillai's trace, Wilks' lambda, Roy's largest root or Hotelling's T) is an indication that the mean value of dependent variate is not equal across different levels of that independent variable. However, Wilks' lambda is the widely reported multivariate test statistic. The Wilks' lambda is the ratio of within group variation to total variation. A smaller lambda provides more evidence of treatment effect (Stevens, 2002). A significant Wilks' lambda obtained for an independent variable is an indication that that specific independent variable got an effect on the set of dependent variables.

As shown in the Multivariate Tests result table, we find that the main effects of both FLC and WWS factors are statistically significant, though it is only marginally significant for WWS (p<.056). The Wilks' Lambda is superbly small (.159; p<.000) as compared to WWS (.950; p<.056). This signifies the fact that the family-life cycle (FLC) plays a vital role in the spousal influence in the purchase of durable goods. The absence of an interaction effect of FLC and WWS indicates us that each of these factors is unique in influencing the spousal power structure in the purchase decision making. Thus the statistically significant main effects lead us to reject the null hypothesis that the mean vectors of the dependent variables are equal for

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.997	20813.974[a]	2.000	113.000	.000	.997
	Wilk's Lambda	.003	20813.974[a]	2.000	113.000	.000	.997
	Hotelling's Trace	368.389	20813.974[a]	2.000	113.000	.000	.997
	Roy's Largest Root	368.389	20813.974[a]	2.000	113.000	.000	.997
FLC	Pillai's Trace	.891	45.832	4.000	228.000	.000	.446
	Wilk's Lambda	.159	85.290[a]	4.000	226.000	.000	.602
	Hotelling's Trace	4.982	139.492[a]	4.000	224.000	.000	.714
	Roy's Largest Root	4.918	280.302[b]	2.000	114.000	.000	.831
WWS	Pillai's Trace	.050	2.965[a]	2.000	113.000	.056	.050
	Wilk's Lambda	.950	2.965[a]	2.000	113.000	.056	.050
	Hotelling's Trace	.052	2.965[a]	2.000	113.000	.056	.050
	Roy's Largest Root	.052	2.965[a]	2.000	113.000	.056	.050
FLC * WWS	Pillai's Trace	.035	1.001	4.000	228.000	.408	.017
	Wilk's Lambda	.966	1.000[a]	4.000	226.000	.409	.017
	Hotelling's Trace	.036	.998	4.000	224.000	.409	.018
	Roy's Largest Root	.034	1.943[b]	2.000	114.000	.148	.033

a. Exact statistic b. The statistic is an upper bound on F that yields a lower bound on the significance level.

c. Design: Intercept+FLC+WWS+FLC * WWS

FLC and WWS factors. A perusal of the Partial Eta-squared for each of the main effects and the interaction effect gives us an idea about the amount of variance explained by the each factor on the dependent variable. Needless to say, FLC explains more variance (60 per cent) than the one explained by WWS which is a mere five percentage.

Stage 5: Once we have found significant multivariate effect, we have to examine the univariate F-statistics associated with each dependent variable. This univariate F-statistics is the ratio of between-group variance (variation due to treatment) and within group variance (variation due to measurement error). These univariate F-statistics are available in the same table in which we have obtained the main Manova results. It is recommended to perform a Bonferroni-Adjustment for each dependent variable for which the univariate F-statistic is found significant. The Bonferroni-Adjustment is done by dividing the alpha level (usually .05) by the number of levels or categories in the independent variable. Suppose, if the independent variable has got three categories, the Bonferroni-Adjusted alpha will be .05/3=.016. Now, we have to compare the old level of significance against this newly adjusted level of significance. If the old level of significance is less than the Bonferroni-adjusted level of significance, we can conclude that the mean score of the dependent variable is significant difference across the levels of the independent variable(s).

Accordingly the univariate F-statistic is significant for both the factors included in the model: the Bonferroni-adjusted F value of .016 is higher than the originally obtained level of significance of .000 for FLC on Refrigerator and Television set. This is an indication that FLC plays a vital role in the spousal influence on durables purchases. On the other hand, the Bonferroni-adjusted F-value of .025 is higher than the original level of significance of .019 for WWS on TV-set alone and not for Refrigerator. Like the multivariate test statistic, the univariate test statistic too, does not reveal any significant difference for the interaction of the factors viz. FLC and WWS, thus confirming our earlier observation of main effects only.

Stage 6: Perform a Post Hoc Test. If an independent variable has got three or more categories, then a *post-hoc* test should be performed to examine how the categories of that independent variable are different from each other. This is known as a *post hoc*

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Refrigerator	9146.600[a]	5	1829.320	73.116	.000	.762
	TVset	838.075[b]	5	167.615	83.716	.000	.786
Intercept	Refrigerator	323233.200	1	323233.200	12919.355	.000	.991
	TVset	80652.675	1	80652.675	40282.168	.000	.997
FLC	Refrigerator	9138.050	2	4569.025	182.620	.000	.762
	TVset	819.800	2	409.900	204.726	.000	.782
WWS	Refrigerator	4.033	1	4.033	.161	.689	.001
	TVset	11.408	1	11.408	5.698	.019	.048
FLC * WWS	Refrigerator	4.517	2	2.258	.090	.689	.002
	TVset	6.867	2	3.433	1.715	.185	.029
Error	Refrigerator	2852.200	114	25.019			
	TVset	228.250	114	2.002			
Total	Refrigerator	335232.000	120				
	TVset	81719.000	120				
Corrected Total	Refrigerator	11998.800	119				
	TVset	1066.325	119				

a. R Squared = .762 (Adjusted R Squared = .752) b. R Squared = .786 (Adjusted R Squared = .777)

test. For example, if there are three categories in an independent variable, then we need to perform n (n-1)/2 i.e. 3(3-1)/2 =3 pair-wise comparisons say, category 1 vs.2, 1 vs.3 and 2 vs.3. SPSS provides 18 such *post hoc* tests. Nonetheless, Scheffe's test is considered conservative and therefore recommended for the *post hoc* tests. If the level of significance is less than .05 for a pair of comparison, then it can be inferred that the groups in that pair are significantly different from each other. By studying the mean values of these groups, we can find out which group is greater or lesser on the dependent variable.

Estimated Marginal Means

1. F L C

Dependent Variable	FLC	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Refrigerator	5 years or below	40.275	.791	38.708	41.842
	6-10 years	54.125	.791	52.558	55.692
	Above 10 years	61.300	.791	59.733	62.867
TVset	5 years or below	22.675	.224	22.232	23.118
	6-10 years	26.025	.224	25.582	26.468
	Above 10 years	29.075	.224	28.632	29.518

Scanning through the Estimated Marginal Means table for each factor indicates that the wife's influence shows an increasing trend moving from one level to the next level of FLC hierarchy for both the products studied namely, refrigerator and television-set. As revealed in the Post Hoc Tests table, the perceived spousal influence is more of 'wife-dominance' in the purchases of both refrigerator and television-set as one move up in the echelon of FLC.

Post HOC Tests
FLC
Scheffe

Multiple Comparisons

Dependent Variable	(I) FLC	(J) FLC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Refrigerator	5 years or below	6-10 years	-13.8500*	1.11847	.000	-16.6241	-11.0759
		Above 10 years	-21.0250*	1.11847	.000	-23.7991	-18.2509
	6-10 years	5 years or below	13.8500*	1.11847	.000	11.0759	16.6241
		Above 10 years	-7.1750*	1.11847	.000	-9.9491	-4.4009
	Above 10 years	5 years or below	21.0250*	1.11847	.000	18.2509	23.7991
		6-10 years	7.1750*	1.11847	.000	4.4009	9.9491
TVset	5 years or below	6-10 years	-3.3500*	.31640	.000	-4.1348	-2.5652
		Above 10 years	-6.4000*	.31640	.000	-7.1848	-5.6152
	6-10 years	5 years or below	3.3500*	.31640	.000	2.5652	4.1348
		Above 10 years	-3.0500*	.31640	.000	-3.8348	-2.2652
	Above 10 years	5 years or below	6.4000*	.31640	.000	5.6152	7.1848
		6-10 years	3.0500*	.31640	.000	2.2652	3.8348

Based on observed means.

* The mean difference is significant at the .05 level.

Conclusion

The process of performing a factorial MANOVA test using a six-stage approach was illustrated for a study on investigating the impact of family life-cycle and wife's work status in the purchase of durable goods. As a robust technique, MANOVA reduces the risk of type-1 error by considering all the dependent variables together. This is the only technique that can be performed when the independent variables are measured on nominal scales and the dependent variables on continuous scale. While this technique is widely adopted by the researchers in all disciplines elsewhere its prevalence is almost a non-entity as far as Indian scenario is concerned. This article is plenary in nature in explaining the rudiments, assumptions, requirements and more importantly the sequences involved in performing this major multivariate test through a versatile software SPSS version 14.0. It is hoped that this article being an eye-opener, will enhance the readers' interest in furthering the applicability of this robust tool for data analysis.

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Norway Milieu:
Cops' Contentment and Well-Being

Ronald J.Burke and Aslaug Mikkelsen

This study compares work experiences, work satisfactions and psychological well-being of police officers in constable jobs across five career stages using age cut-offs: 32 years of age or younger, 33 to 37, 38-42, 43-47 and 48 years or older. Data were collected from 466 police officers in Norway using anonymously completed questionnaires. The five career stage groups differed on personal demographic and work situation characteristics (e.g., shift schedule, police tenure) related to age. Constables in early career stages reported more favourable work outcomes, greater social support, less exhaustion and cynicism, fewer subjective health complaints and better over-all health. There were also many areas where the career stage groups were similar (e.g., job demands, job satisfaction). The findings suggest the importance of particularly responding to the needs of constables in later career stages.

Hall (1986a) has written that a major deficiency in the literature on organizational careers centers on the career maintenance or mid-career stage. What happens to an individual who has successfully explored options and made an initial occupational choice, entered an organization, been tested and has not settled down and become established in a career field? Hall (1986a) and Bardwick (1986) identified the following themes in the mid-career experience; perceived constriction of career opportunity, a slower growing (or even declining) organization, ambiguity and uncertainty about one's future career role, mid-career change experienced as disjunctive and individualized, greater awareness of changes in the work role, the person or an awareness of lack of change, among others.

Dr.Ronald J.Burke, Professor-Schulich School of Business, York University, Toronto Ontario M3J 1P3, Canada, E-mail: rburke@schulich.yorku.ca.

Dr.Aslaug Mikkelsen, Faculty of Social Science, University of Stavanger, 4036 Stavanger, Norway, E-mail: aslaug.mikkelsen@uis.no

Although the specific ages used to define the various career stages vary, researchers have used age to establish career stages. Brooks and Seers (1991) considered five career stages (18–21, 22-27, 28-32, 33-40, 41 and older) whereas Reilly and Orsak (1991) considered four career stages (30 or under, 31–38, 35-44, 45 and older). The age

ranges used in the present study fit the typical cut-offs observed by Morrow and McElroy (1987).

There is also increasing evidence that individuals pass through a series of psychosocial stages as they develop. Fagan and Ayers (1982), in an interview study of 23 police officers having a mean age of 33.9, found they passed through a series of psychosocial stages. They observed that officers tended to split into two groups – an active (usually promoted) group and a resigned group in their early 30's.

There is also research support for the notion that not only do different factors increase or decrease in importance across various career stages, but the importance of various factors in predicting particular work outcomes also varies across career stages (Gould and Hawkins, 1978; Isabella, 1988; Jans, 1989; Hurrell, McLaney and Murphy, 1990; Cohen, 1991; Brooks and Sears 1991; Lynn, Cao and Horn, 1996).

Bedeian, Pizzolatto, Long and Griffeth (1991) review the writing on career stages. Career stage models build on three central assumptions: individuals progress through distinct career stages, each having unique and distinct developmental tasks; each stage is characterized by different work attitudes and behaviours; and individuals in the same career stage tend to behave and respond in similar ways.

Three operationalizations of career stages have been used: age ranges organizational tenure and job tenure. Unfortunately there is still little consensus on the actual ages/years that one should use to create the stages. It is also critical to select dependent variables that would be relevant to career stage theory (Slocum and Cron, 1985). It is also not clear the extent to which findings obtained in one occupation will generalize to the same career stages in another occupation.

Cooper (1982) described ways in which police officers' beliefs and feelings differ over the course of a career. How did police officers go from being newcomers to veterans? Some officers held positive views about policing throughout their careers; many did not, becoming jaded and cynical. The reality for most falls somewhere in between these two extremes; the situation of never-promoted constables can be particularly problematic however.

He gathered questionnaire and qualitative interview data from sixty police officers working in a large Canadian regional police force. The sample was deliberately diverse. Officers were assigned to six career stages: less than one year, one to two years, three to seven years, nine or more years as constables, sergeants and staff sergeants in patrol and traffic, and sergeants and staff sergeants in CID.

The first stage (first year) involved "breaking in" reality shock at this time took many forms. Officers at this stage learned from more experienced constables. Early views on promotion criteria were developed but these were coloured by uncertainty. The second stage involved "settling in." As officers got more experience, their views on promotion criteria changed, giving more weight to political factors. Conflicts about their role also increased. The third stage, "making out," showed greater interest in promotion by constables. Considerable effort was made to decipher the promotion decision-making process; visibility became a more important factor. The costs or toll of police work also increased at this stage.

Officers who were promoted and those who were passed over now began to view their careers differently. Those continually passed over became resigned; while still performing their duties, non-career areas rose in importance. And as they got older (45 to 50), it was more difficult to actually do the job. Some became bitter, blaming the system for failing to see their merits. Those who were promoted (sergeant level) faced other challenges as they now helped to develop more junior constables. Over time, constables became hardened, less willing to trust others (particularly the public) and more willing to give and receive support from other officers. Family problems increased over time. Job demands and stresses also increased, some demands stimulating and others debilitating.

McGinnis (1985a) reported the findings of a career development study conducted in a medium-sized Canadian police force. For most people, the notion of a career embodies upward mobility and advancement. The organization is the context, having both constraints and opportunities, in which careers unfold. Police forces may also have some unique career development issues. First, they have a steeply graded hierarchy with about 75 per cent of officers in constable rank. Promotions are now slower with a 15 year constable more common. Second, forces have little turnover; job security is high, transferability of skills is low and transfer across forces is low. Third, new recruits are better educated than previously and they have higher expectations of promotions more rapidly.

McGinnis collected questionnaire data from 253 officers as well as conducting interviews with 140 officers. He assigned respondents to one of ten career stages: from (1) constables, one to five years, to

(10) Senior Officers. Constables were placed into four groups: one to five years, six to ten years, 11-15 years, and 16 or more years. Several sergeant groups were also considered. These were based on police tenure (length of service), rank, and type of assignment. Lower ranked constables were more highly educated. Higher ranked officers were generally more satisfied with work, supervisors, pay, promotion and co-workers. Those in lower stages were also less motivated. Constables having 10-15 years experience indicated the lowest career satisfaction. Constables were dissatisfied with career planning opportunities, performance appraisal and promotion policies.

McGinnis (1985b), in the same study of Canadian police officers, reported that about half his respondents aspired to senior officer rank leading him to conclude that there will be great frustration and disappointment since few will achieve this goal. No one wanted to spend a career as a patrol constable – the backbone of a police force. Patrol work has low status. Policies and practices of personnel assignment and promotions downgrade the status of patrol and patrol constables. Uniformed patrol constables are the largest group in a police force.

He reported additional findings from interviews conducted with members of his larger questionnaire sample. Some major career issues were identified: favouritism, unable to plan a career or get desired assignments, lots of competition for others. Lower ranks (tenure and career stage) used less of their abilities; this was particularly low in the year one to five and 11-15 year groups, the latter being the lowest of the constables. Police personnel were oriented towards promotion. The probability of obtaining

Table 1: Demographic Characteristics of Sample

Year of Birth	N	%	Marital Status	N	%
1950 or earlier	16	3.7	Single	100	22.2
1951-1960	76	17.4	Married	350	77.9
1961-1970	190	43.6			
1971 and later	154	35.3	**Partner in Policing**		
			Yes	62	13.9
Education			No	385	86.1
13 years or less	40	9.0			
14-16	282	63.2	**Parental Status**		
17 or more	124	27.8	Children	368	69.8
			Childless	133	30.2
Location					
Rural	123	27.3	**Police Tenure**		
Urban	328	72.7	10 years or less	216	48.1
			11-20	148	37.0
Size of Department			31 years or more	85	18.9
1-19	106	24.0			
20-49	99	22.5	**Hours worked**		
50-99	65	14.7	35 or less	50	11.9
100 or more	171	38.8	36-39	358	85.0
			40 or more	13	3.1
Shift work					
Regular	43	9.7	**Overtime Hours**		
Sometimes	164	36.9	0-5	278	73.5
Around the Clock	238	53.5	6 or more	100	26.5
Gender					
Male	352	78.0			
Female	99	22.0			

another career move was lowest in constables with 11-15 years experience. This group was also low in numbers expecting promotion. Promotions were becoming less common and more career constables will result, so the job satisfaction of these officers became more important. The extent to which accomplishments were appreciated was lowest in 10-15 year constables among the three constable groups. McGinnis then divided his sample into: Patrol constables, one to five years, Patrol constables six to ten years and 11-15 years, Patrol constables 16 years and longer, and constables in administration. Constables with 11-15 years tenure were least satisfied; constables in administration were also dissatisfied.

The present research compares a variety of work experiences, satisfactions and health outcomes among a large sample of Norwegian police officers of constable rank across five age-based career stages. It replicates these earlier studies in another country using more current data.

Method

Respondents

Table 1 shows the demographic characteristics of the police sample (N = 451). Most respondents were married (78 per cent), had children (70 per cent), worked in urban areas (73 per cent), worked in large departments (100 or more, 39 per cent) worked between 36-39 hours per week (89 per cent), worked five or less hours of overtime per week (74 per cent), held fairly short police tenure (10 years or less, 48 per cent) and were born in 1970 or before (65 per cent).

Procedure

Data were collected from 766 police officers in 2003 using anonymously completed questionnaires, resulting in a sixty two per cent response rate. Questionnaires were mailed by the Police union and returned to an independent research institute. Some measures were translated from English to Norwegian for this study while other measures had already been translated into Norwegian (e.g. Maslach Burnout Inventory). Only police officers at constable rank were identified and included in this analysis of career stage differences.

Measures

Career Stages

Men and women serving in police constable jobs were divided into five career stages using age cut-offs that formed adequately sized groups. These groups are shown in Table 2. The youngest group was the largest (n = 154, 35 per cent), with each increasingly older career stage group becoming progressively smaller.

Table 2: Career Stages of Constables

Career Stage	N	%
32 years or younger	154	35.3
33-37	111	25.4
38-42	79	18.1
43-47	49	11.2
48 years or older	43	9.9
	436	**99.9**

Personal Demographic and Work Situation Characteristics

A number of personal demographic and work situation characteristics (e.g. age, marital status, organization size, police tenure) were measured by single items typical of those used by others.

Work demands

A number of work demands were measured by scales from the Copenhagen Psychosocial Questionnaire (COPSOC) developed by Kristensen and Borg (2001).

Quantitative demands were measured by a seven item scale (α = .83). Respondents indicated their agreement with each item on a five point scale (5 = Always, 3 = Sometimes, 1 = Never/hardly ever). A sample item was "Do you have to work very fast?"

Cognitive demands were assessed by an eight item scale (α = .82). One item was "Does your work require you to make difficult decisions?"

Emotional demands were measured by a three item scale (α = 80). An item was "Does your work put you in emotionally disturbing situations?"

Demands for Hiding Emotions were assessed by two items (α =.59). One item was "Does your work require that you hide your feelings?"

Sensorial demands were measured by a five item scale (α = .58). An item was "Does your work require a great deal of concentration?"

Responsibility was assessed by a three item scale (α = .58). One item was "Could it injure other people if you make mistakes in your work?"

Role clarity was measured by a four item scale (α = .76) anchored by (5) to a large extent, (3) somewhat, and (1) to a very small extent. One item was "Do you know exactly which areas are your responsibility?"

Role conflict was assessed by a four item scale (α - .71). An item was "Are contradictory demands placed on you at work?

Leadership quality was measured by an eight item scale (α = .94). A sample item was "To what extent would you say that your immediate superiors appreciate the staff and show consideration for the individual?"

Access to information was measured by two items (α = .79). One item was: Do you receive all the information you need to do your work well?"

Feedback was measured by two items (α =), part of COPSOQ. An item was "How often do you talk with your supervisor."

Work and Family

Work family conflict was measured by a five item scale (α = .83) developed by Torgen, Stenlund, Ahlberg and Marklund (2001). An item was "My work has a negative impact on my family."

Spouse/Partner concerns were also measured by a five item scale (α = .78) developed by Torgen, et al (2001). An item was "My spouse/partner worries that my job is affecting my health."

Work outcomes

Five work outcomes were included, all from the COPSOQ (Kristensen and Borg, 2001).

Job satisfaction was measured by seven items (α = .75). Respondents indicated how satisfied they were with each item on a four-point scale: (4) Very satisfied, (1) highly unsatisfied. One item was "How satisfied are you with your usual take home pay?

Organizational commitment was measured by four items (α = .58). An item was "Do you enjoy telling others about your place of work?" Responses were made on a five-point scale (5, to a large extent, 1 = to a very small extent)

Development was assessed by seven items (α =.76). An item was "Do you have the possibility of learning new things through your work?"

Freedom was measured by four items (α =.77). One item was "Can you decide when to take a break at work?"

Meaning was measured by five items (α = .79). One item was "Do you feel that the work you do is important?"

Influence was measured by ten items (α = .80). An item was "Do you have a large degree of influence concerning your work?"

Social Resources

Three coping and social resources were considered.

Social Support was measured by a four item scale (α = .79) from the COPSOQ (Kristensen and Borg, 2001). An item was "How often do you get help and support from your colleagues?" Responses were made on a five-point scale (5 = to a large extent, 1 = to a very small extent).

Social Relations were assessed by a two item scale (α =.58) developed by Kristensen and Borg (2001). An item was "Is it possible for you to talk to your colleagues while you are working?" Responses were made on a five point extent scale.

Sense of Community was measured by three items (α = .84). An item was "Do you feel part of a community at work?"

Psychological Well-Being Burnout

Three components of burnout were measured by the Maslach Burnout Inventory – General Survey (MBI-GS) developed by Schaufeli, Leiter, Maslach and Jackson (1996).

Exhaustion was measured by five items (α=.86). One item was "I feel emotionally drained from my work?"

Cynicism was also measured by five items (α=.78). "I have become less enthusiastic about my work."

Professional Efficacy was measured by six items (α=.80). "At my work, I feel confident that I am effective at getting things done." Respondents indicated how frequently they experienced each item on seven point frequency scale (0 = never, 6 = always).

Psychological Health

Five measures of psychological health were included.

Subjective Health Complaints were measured by a 29 item scale (α=.89) developed by Eriksson, Ihlebaek and Ursin (1999). Respondents indicated how frequently they experienced each complaint or symptom (e.g. headache, lower back pain dizziness) during the past month.

Medication use was measured by a five item scale (α=.39). Respondents indicated how frequently they had taken each medication (e.g. sleeping pills, pain killers) during the past year.

Post Traumatic Stress Symptoms (PTSS) were measured by a ten item scale (α =.92) developed by Knudsen, Weisaeth, Lerdal, Wahl, Rustoen and Hanestad (2002). Respondents indicated how often they experienced each symptom (e.g. depression, irritability) on a seven point scale (1=never, 7=very often).

Anxiety was measured by seven items (α =.83) developed by Zigmond and Snaith (1983). One item was "Worrying thoughts go through my mind." Responses were made on a four-point frequency scale (1 = Only occasionally, 4 = A great deal of the time).

Depression was assessed by six items (α =.82) also developed by Zigmond and Snaith (1983). An item was "I feel cheerful" (reverse scored). Responses were made on the same four point frequency scale used for Anxiety. Bjelland, Dahl, Haug and Neckelmann (2002) present more recent evidence of the validity of both the Anxiety and Depression scales.

Suicidal Ideation

Suicidal ideation was assessed by a four item measure (α = .84) developed by Paykel, Myers, Lindenthal and Tanner (1974) and used later by others (see Tyssen, Vaglum, Gronvold and Ekeberg, 2001). The items were: (1) Have you ever felt that life was not worth living? (2) Have you ever wished you were dead?" (3) "Have you ever thought of taking your own life even if you would not really do it?" (4) "Have you ever reached the point where you seriously considered taking your life, or perhaps made plans how you would go about doing it?" A fifth item then asked, "Have you tried to take your own life in the past year?" (yes/no). This question was not used in the analysis since so few police officers had attempted suicide (n = 1 male).

Physical Health

Respondents described their levels of physical health absenteeism and life style behaviours on eight single item measures.

"Generally how is your health?"
"Have you taken any sick leave during the past six months?"
"If yes, how many sick days have you taken?"
"How would you rate the level of your physical fitness?"

Lifestyle Behaviours

"Do you take part in regular physical exercise (over 30 minutes per day)?"
"Do you smoke?"
"How many alcoholic drinks have you had in the past 14 days?"
"How often do you drink alcoholic beverages?"

Results

Demographic Characteristics

Table 3 shows the comparisons of the five career stage groups on a number of demographic characteristics using one-way ANOVA; when the overall F-value was statistically significant ($p<.05$), all pair wise comparisons were undertaken. Some of the significant differences shown in Table 3 were expected as they were related to age.

Table 3: Demographic Characteristics over Career Stages*

Demographic Characteristics	Career Stages					
	1	2	3	4	5	P
Gender	.3[a]	.3	.2	.1	.0[a]	.01
Marital status	1.7	1.8	1.8	1.8	1.8	NS
Number children	.5[abcd]	1.6[aefg]	2.0[be]	2.2[cf]	2.4[dg]	.001
Education	16.5[abcd]	15.6[aef]	15.1[bg]	14.5[ce]	13.9[dfg]	.001
Rural/urban	1.7	1.7	1.7	1.9	1.7	NS
Age	29.6[abcd]	35.3[aefg]	40.2[behi]	45.1[cfhj]	50.5[dgij]	.001
Police tenure	3.9[abcd]	10.6[aefg]	15.8[behi]	21.8[cfhj]	25.4[dgij]	.001
Size of force	4.6	4.6	4.4	4.6	4.0	NS
Shift schedule	2.6[ab]	2.4	2.4	2.3[a]	2.2[b]	.01
Hours worked	36.4	37.0	36.0	35.3	37.3	NS
Overtime hours	4.9	5.3	3.5	3.8	3.7	NS

* Career stages having the same superscripts are significantly different ($p < .05$)

Table 4: Job Demands over Career Stages

Job Demands	Career Stages					
	1	2	3	4	5	P
Quantitative	48.9	51.5	51.4	52.2	47.5	NS
Cognitive	58.8	60.1	60.6	57.1	58.6	NS
Emotional	41.8	44.6	43.3	41.2	43.8	NS
Hide emotions	43.3	43.0	42.5	42.3	42.4	NS
Sensorial	72.0[a]	68.8	68.3	63.1[a]	67.3	.01
Responsibility	59.8[a]	56.0	53.7	50.8[a]	52.1	.01
Information	51.0	54.9	56.6	50.8	53.5	NS
Role clarity	70.3	72.0	75.6	73.3	75.0	NS
Role conflict	42.4	44.8	39.7	42.6	41.7	NS
Leadership	53.3	53.9	55.4	47.6	54.1	NS
Feedback	38.7[a]	40.7[b]	33.2	32.4	23.8[ab]	.001

* Career stages having the same superscripts are significantly different ($p < .05$)

The following comments are offered in summary. There were no career stage differences on marital status, urban vs. rural location, size of force, hours worked per week and overtime hours worked. Almost all of the other groups' differences were expected. There were more women in the first than last career stage reflecting the recent entrance of women into police work. Respondents in later career stages had more children reflecting their greater age. Respondents in early career stages were more highly educated reflecting the greater emphasis now being placed on formal education. Respondents in later career stages were older, and had longer police tenure reflecting their greater ages. Finally, respondents in later career stages were less likely to work continuous shifts reflecting their greater seniority.

Table 5: Work Outcomes over Career Stages*

		Career Stages				
	1	2	3	4	5	P
Work Outcomes						
Influence	49.4	51.2	51.9	50.7	49.5	NS
Development	67.9[a]	69.0[b]	66.8	62.2[ab]	66.7	.05
Freedom	55.3	56.2	54.4	54.0	55.7	NS
Meaning	84.9[a]	84.2[b]	85.4[c]	77.8[abc]	82.0	.05
Commitment	55.2	53.6	57.6	57.3	61.3	NS
Job satisfaction	45.4	45.5	46.6	41.9	44.3	NS
Work and Family						
Work-family conflict	12.8	13.5[b]	13.5[c]	12.6[d]	10.1[abcd]	.001
Spouse Concerns	10.3	10.1	10.3	10.8	10.1	NS

* Career stages having the same superscripts are significantly different ($p < .05$)

Table 6: Social Resources over Career Stages*

Social Resources		Career Stages				
	1	2	3	4	5	P
Social support	69.7[ab]	68.6[cd]	66.4[e]	57.3[ac]	54.5[bde]	.001
Social relations	82.1[abc]	75.7[d]	68.2[a]	64.1[bd]	71.4[c]	.001
Sense of Community	89.1	89.3	90.0	86.4	83.1	NS

* Career stages having the same superscripts are significantly different ($p < .05$)

Table 7: Psychological Well-being over Career Stages*

		Career Stages				
	1	2	3	4	5	P
Burnout						
Exhaustion	1.2[abc]	1.5[a]	1.6[b]	2.0[c]	1.5	.001
Cynicism	1.5[abc]	2.1[ad]	2.0[e]	2.7[bde]	2.0[c]	.001
Efficacy	4.7	4.7	4.5	4.3	4.4	.05
Work and Family						
Health complaints	5.6[a]	6.6	5.6	8.5[a]	7.3	.05
Medication use	5.6	5.8	5.6	6.2[a]	6.1	.05
Anxiety	3.6	3.9	4.0	4.6	4.1	NS
Depression	2.2[abc]	2.8[de]	3.3[af]	4.7[bdf]	4.3[ce]	.001
Post traumatic	16.2[a]	19.0[a]	16.5	18.8	17.9	.05
Suicidal ideation	.0	.1	.1	.2	.2	NS

* Career stages having the same superscripts are significantly different ($p < .05$)

Job Demands

The five career stage groups were generally similar on a number of measures of Job Demands. However, police officers in early career stages indicated greater Sensorial demands, greater Responsibility, and received more Feedback than one or more of the later career stage groups.

Work Outcomes

The five career stage groups were similar on Influence, Freedom, Organizational commitment and Job satisfaction. Police officers in early career indicated greater Development opportunities and greater Meaning (see Table 5).

Work and Family

Police officers in early stages indicated more work-family conflict than did officers in later career stages; the career stage groups did not differ on levels of spouse concerns (see Table 5).

Table 8: Physical Health and Lifestyle Behaviour over Career Stages*

	Career Stages					
	1	2	3	4	5	P
Physical Health						
Overall Health	3.8[a]	3.7[b]	3.6	3.4[ab]	3.6	.001
Taken sick days	1.6	1.6	1.5	1.4	1.5	NS
Number of sick days	3.0[a]	5.6	7.4	14.1[a]	9.8	.05
Physical fitness	3.4	3.3	3.2	3.2	3.3	NS
Lifestyle Behaviours						
Exercise	1.8	1.8	1.8	1.7	1.7	.05
Smoking	1.4[ab]	1.5[cd]	1.6	2.0	2.0[bd]	.001
Alcohol consumption	4.2	3.8	3.5	5.0	3.7	NS
Frequency drinking	3.2[a]	3.6	3.6	3.9[a]	3.6	.01

* Career stages having the same superscripts are significantly different ($p < .05$)

Social Resources

Officers in early career stages indicated higher levels of both Social support and Social relations than did officers in later career stages (see Table 6). The five groups indicated similar levels of Sense of community.

Psychological Well-being

There were substantial career stage differences on measures of psychological well-being (see Table 7). Police officers in early career stages indicated lower levels of emotional exhaustion, less cynicism, fewer health complaints, less medication use, and lower levels of depression than did officers in alter career stage groups. The career stage groups were similar on professional efficacy, anxiety, suicidal ideation (low in general) and posttraumatic stress symptoms.

Physical Health and Lifestyle Behaviours

Police officers in early career rated their overall health higher and had taken fewer sick days than officers had in later career stages (see Table 8). The two groups were similar on whether they had taken sick days, level of self-reported physical fitness and whether

they exercised regularly. Officers in early career were less likely to be smokers and to drink alcohol less frequently. Amount of alcohol consumption was similar across the career stage groups.

Discussion

This research compared the work experiences, satisfactions and psychological well-being of police constables in five career stages. The stages, based on constable age, were similar to those used by others (Morrow and McElroy, 1987). Previous research (Cooper, 1982; McGinnis, 1985a, 1985b) has indicated that constables in later career stages (e.g., older and with longer police tenure) are less satisfied with their work and careers. These issues were examined in a different country (Norway) and more recently (2003) making it possible to replicate the earlier research.

The career stage groups (Table 3) were found to differ on personal demographic and work situation characteristics related with age (e.g., number of children, police tenure) but was similar in other ways (size of force, hours worked, extra hours worked).

While the career stage groups were generally similar on job demands (see Table 4), the four significant career stage effects showed constables in early career reporting higher reported higher levels of Sensorial, Responsibility and Feedback – all likely associated with more positive reactions. And while the five career stage groups were generally similar or work outcomes (see Table 5), the differences that emerged on Development and Meaning favoured those constables in early career. Likewise, constables in early career indicated more support (see Table 6), a finding also reported by Cooper (1982).

These factors were also associated with more positive attitudinal responses (see Table 7) such as lower levels of exhaustion and cynicism among early career stage constables and perhaps account for the lower levels of depression and subjective health complaints and PTSS among early career stage constables as well. Finally, early career stage officers were less likely to be smokers and described their overall physical health more positively than did later career stage constables reflecting their younger years.

Taken together these findings suggest that constables in later career stages experience a less satisfying work experience, as others have also found (Burke, 1989; Cannizzo and Liu, 1995). There are suggestions of initiatives that organizations might undertake to support this valued human resource (Hall, 1986b; Hall and Mirvis, 1985).

McGinnis (1985b) sees dealing with the plateaued constable with many years of service as the biggest concern for Canadian police forces. Cooper (1982) suggests three areas of intervention to help officers more successfully navigate these career stages.

1. **Recruitment and Training** Providing applicants a more realistic picture of the job through talking with police officers, reading more realistic accounts of police work or viewing videos of police officers talking about their jobs or working would be helpful. Also, using more realistic training exercises and cases in recruit training is advised.

2. **Feedback and Supervision** More contact with managers and more feedback of work performance, realizing that this requires extra effort since supervisors do not have readily available opportunities to observe constable job performance.

3. **Promotion and Assignment Information** Forces can use peer information in decision-making and provide passed over constables with information as to what they need to do to improve their changes of future promotions.

Senior police managers need to deal with expectations of promotion among police officers. Officers are socialized to seek and expect promotions. No police officer expects to be a career constable but some will. It is important to share the numbers in a realistic way with force members.

Police officers need to consider various practices for coping with the plateaued constable: Police forces and police senior managers need to understand the mentality of the plateaued constable. It is important to keep constables growing, challenged, and feeling valued and respected by the force, to keep them from becoming dissatisfied, alienated, cynical and deadwood. Common practices to address this problem include:

Negative sanctions for low performance.

Performance appraisal – Provide feedback to control expectations

Retraining – for the force or outside of it

Symbolic rewards – recognizing contributions

External therapy – for alcohol problems

Also, some non-traditional practices are possible. These would include:

Lateral transfers within the force – this deals with content plateauing.

Moving to a flatter organizational structure – the use of team policing. These approaches have been found to increase decision-making scope.

Teaching people about the career plateau. Include material on career development in police training careers.

Career counselling provides career support and guidance to police officers at all career stages.

Footnotes

1 Preparation of this manuscript was supported in part by the Rogaland Institute, Norway and the School of Business, York University. We acknowledge the support of the Police Union in conducting the study and collecting the data. Lisa Fiksenbaum assisted with data analysis.

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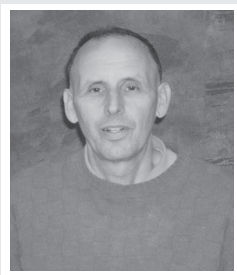
US Panorama:
Income Inequality

William R.DiPietro

Recently, income inequality has been increasing in the United States. Some people have attributed the rising U.S. income inequality to globalization. However, it is possible that the expansion of corporate business and its movement into the international arena could be a deciding factor. The paper uses annual regression analysis on data form from 1960 through 1998 for the U.S. economy to see whether greater corporate business is associated with higher U.S. income inequality and whether increased trade results in greater income inequality within the U.S. once the extent of incorporation of business is taken into account.

Corporate business is becoming more and more dominant. The nature of trade is not the same as it used to be. At one time, trade was almost exclusively between independent producers and traders residing within their own separate nations with their diverse goods flowing across national boundaries. Now a growing amount of trade occurs within corporations whose organizational boundaries span across different national borders. This new way in which trade is conducted is likely to alter the relationship between international trade and income inequality changing the relationship and making the relationship more complicated.

The purpose of this paper is to investigate and to attempt to disentangle the separate effects, of expanded corporate business, of greater international trade, and of greater incorporated international business on the U.S. income distribution. The paper uses annual time series regression analysis on data for the United States for the period 1960 through 1998 to empirically estimate the effect of the number of U.S. corporations (a proxy for the extent of U.S. corporate business), the U.S. trade share (a common measure of the degree of globalization), and the interaction of the two on several different income inequality measures. It is hypothesized that trade itself may not be a source of greater income inequality within the nation, but rather greater corporate business, whether it be greater corporate domestic business or greater corporate international business.



Prof.William R. DiPietro, Faculty, Business Administration Department, Daemen College, 4380 Amherst, New York, USA, Email: wdipietr@daemen.edu

The paper is divided into five sections. The first section gives a little background literature. The second section discusses the corporation, its characteristics, its spread, its importance, and the potential consequences of incorporation for inequality. The third section details the sources of the various variables used in the study. The results of regression runs on four different measures of inequality are shown in the fourth section. Finally, the fifth section concludes.

Background Literature

In general, it seems the recent decline in income inequality in the U.S. is taken as a fact but the explanations for its causes, both theoretically and empirically, are an open question.

Two areas of the existing literature are directly relevant to the present article. They are studies focusing on the relationship between globalization and U.S. income inequality, and studies looking at the overall nature and functions of the corporation.

In a conversation with Jasred Berstein conducted by the Multinational Monitor, Jared Berstein, co-director of research at the Economic Policy Institute, suggests that one of the reasons for the recent upsurge in inequality in the U.S. is the decline of U.S. manufacturing fostered by a trade policy that simultaneously encourages globalization while maintaining a strong American Dollar (Multinational Monitor 2003). Bernstein dismisses technological change as a major factor for the increased U.S. income inequality maintaining that the wage gap between the technologically skilled and the technologically unskilled has remained fairly steady over time.

In a short article in the Brookings Review, Gary Burtless, documents the recent increase in inequality of the United States and challenges the theory that proposes that the trade of developed countries with low wage developing countries reduces the wages of low skilled workers in developed countries (Burtless 1996). He theorizes that, if increased trade is responsible for the reduction in wages of unskilled workers in the U.S., then one initially might expect the reduction in the wages of the unskilled to be more pronounced in industries heavily engaged in trade compared to those that are not as heavily engaged in trade. However, looking at the data, Burtless finds that the reduction in the wages of the unskilled workers in the U.S. is as great for non-traded goods industries as it is for traded goods industries. To him, this finding indicates, instead of greater trade, other factors, such as reduced unionization, may be operating to reduce the wages of unskilled workers in the U.S.

Consistent with this Burtless' perspective, the present paper looks at the possibility that greater incorporated business, rather than greater trade, may be the prominent cause of higher income inequality in the U.S.

With regard to the nature of the corporation, Litowitz in his paper, "The Corporation as God," does a masterful job in revealing the resolutions of contradictions role of corporate myth in American culture (Litowitz 2005). Litowitz looks at the corporation as an untenable, schizophrenic, dualistic mixture of economic and social dimensions with unresolved and irresolvable tensions between its commitment to profit as an economic agent and its presumed obligation to justice as a social agent. Corporate law is seen as working primarily in the interest of the upper class in its mediating and legitimating functions. The legitimating function of corporate law is seen as merely providing a convenient smokescreen obscuring the reality of the corporation's enormous concentration of power in the hands of a small elite, its total domination of the culture, and its penchant to ignore responsible social behaviour in pursuit of profits. Although corporate law is made to look as though everyone is given equal treatment, as Litowitz sees it, the mediating function between the classes of corporate law cannot help but being heavily biased toward the elites, given the enormous discrepancy in power between these groups.

In the wake of what they perceive to be growing power of international corporations and of appropriation of power once reserved exclusively for states, in view of what they judge as a past poor performance of multinational corporations with regard to human rights, and of corporate activity leading to greater disparity between the rich and the poor, Monshipouri, Welch, and Kennedy advocate the establishment of a truly independent governmental organization to enforce appropriate human rights behaviour of corporations (Monshipouri, Welch, and Kennedy 2003). They maintain that what is needed to keep corporate behaviour in check and to enforce at least some degree of corporate accountability is an organization with real teeth that has true monitoring and sanctioning abilities. They feel that voluntary compliance by corporations to human rights standards is wishful thinking and ineffective. Even when corporations nominally adopt protocols for behaviour such as the U.N.

global compact on human rights, without outside enforcement, lip service to words on paper are not likely to alter corporate behaviour.

The Corporation

In the U.S. and elsewhere CEO pay has increased rapidly both in absolute terms and relative to the wages of ordinary workers within the corporation. The size of large corporations not only exceeds the GDP of entire countries but also the GDP of entire countries in combination with one another. The big corporations represent enormous concentrations of wealth, of economic, and of political power, and are the key determinants of both work relations and of everyday relations of human beings.

These huge concentrations of power are bound to have an effect, not only on the distribution of income, but on almost every aspect of human existence. These big corporations control the nature and character of work. They have legal rights that exceed those of citizens. Their oversized marketing and advertising departments create taste and are a primary instrument in framing the very identity of human beings, the who we are as individuals, the what it means to be human. Their research activity is responsible for establishing the form and the direction of technological change. They control production. They control capital and capital flows. Tons upon tons of money flow into the corporative bowels, and, under capitalism, money is power. They finance political campaigns, lobbying groups, and think tanks that push their agendas. Corporations wield enormous technological, cultural, and political power.

Corporations are hierarchical and hierarchies are by their very nature unequal, in power, in status, in prestige, and in income.

Just like a highly contagious disease, corporate business is spreading around the world. One of the most important things in society is how we are organized. Today, power is no longer vested in the government, in the aristocracy, or in the people but, more and more, it is concentrated in the hands of corporate enterprise. The inequalitarian corporation is reorganizing the activities of mankind (productive, political and cultural), and completely reforming man's life, man's view of himself, man's very identity.

Within the corporation, there is hierarchy. In the outside milieu, the corporation fosters a goods and money conscious consumer. It provides the goods that presumably satisfy, but never actually fulfill, the artificial wants it generates. People are dependent on the corporation to attain all aspects of their identity. They are dependent on corporations to obtain work, to obtain a livelihood, and to obtain the goods that define them.

Perhaps, it is not the trade or globalization that is the problem for income inequality, but the form of business organization in which the trade and globalization is conducted and orchestrated. The recent upsurge in inequality within countries and between countries attributed by some to globalization may not be due to globalization itself but rather to the increased incorporation of business. While increased trade, all other things being equal, may, on its own, tend to reduce inequality, increased trade accompanied by greater incorporation may end up fostering inequality. It may not be that globalization is the culprit with regard to increasing inequality, but rather the way business is being conducted, the incorporation of business, and, the recent incorporation of international business.

The position of this paper is that the greater the extent of corporate business in society the greater will be the inequality that prevails in society. The proposition holds equally true for international business which is merely a subset of all business. The greater the amount of international corporate business the greater will be the prevailing inequality.

The anti-Americanism prevailing in the world may not be so much anti-American per say as anti-incorporation. It is corporations that swallow up the old culture, the old identity of peoples. It just so happens that the corporate beast first took deep roots and spread in American soil so that a large number of multinational corporations are American and many of the original international corporations are American.

Data Sources

In order to empirically investigate the relationship between inequality, corporate business, and globalization, annual time series data set is collected and assembled. The period covered is from 1960 through 1998. The entire data set contains a total of six variables, a trade variable, the percentage share of U.S. trade to U.S. GDP, two corporate business variables, the number of U.S. corporations and the receipts of U.S. corporations, and four inequality variables, the U.S. Gini coefficient, and the concentration of U.S. income for the top one per cent, the top one tenth of one per cent, and the top one hundredth of a per cent, of households. The Gini coefficient is abstracted from Dollar and Kraay (Dollar and Kraay 2001). Their

data is an update of the original data from Deininger and Squire (Deininger and Squire 1996). The three other measures of inequality, the three income concentration ratios for highest income households, come from Piketty and Saez (Piketty and Saez 2001). The data on the number of U.S. corporations and on corporate receipts comes from the Statistical Abstract of the U.S. (Statistical Abstract of the U.S.). Finally, the percentage share of U.S. trade of U.S. GDP, in which trade is defined as U.S. exports plus U.S. imports, is taken from the 2002 World Development Indicators CD of the World Bank (World Bank 2002).

Regressions of Income Inequality on Incorporation and Globalization

Table I shows the simple regressions on annual data for the U.S. of four different measures of income inequality on the percentage share of trade, as measured by exports plus imports to GDP. The first three measures of income inequality are the concentration ratios for the very highest income groups. The first concentration ratio is the percentage of total income for the top one per cent of households, the second is for the top one tenth of one per cent of earners, and the third is for the top one one-hundredth of one per cent of households. The fourth and final measure is a measure of income inequality over the entire income distribution, the commonly used Gini coefficient. Note that higher values for all four measures of income inequality, the three income concentration ratios and the Gini coefficient, indicate greater inequality.

Table 1: Annual Simple Regressions of Inequality Measures on Percentage Trade Share of GDP

	(1)	(2)	(3)	(4)
	TOP 1%	TOP .1%	TOP .01%	GINI
Constant	5.770 (5.11)*	.419 (.885)	.022 (.003)	28.273 (18.99)*
Percentage Trade Share	.376 (5.69)*	.237 (5.77)*	.108 (5.28)*	.534 (5.95)*
RSQ	.466	.474	.430	.503
N	39	39	39	37
Years	1960-98	1960-98	1960-98	1960-1990

The first column of table I lists the independent variables. Each of the four subsequent columns show regression results for regression runs on the four different measures of income inequality. The top most numbers in the body of the table are the estimated coefficients. The parenthesized values under the estimated coefficients are the individual t-statistics for the estimated coefficients. The asterisks under the parenthesized t-statistics allow for quick identification of the statistical significance of a variable in an equation. A variable significant at the one per cent level of significance or better is marked with a single asterisk under the t-statistic, a variable significant at the five per cent level of significance or better is identified with two asterisks and a variable significant at the ten per cent level or better is labeled with three asterisks. The third to the last row shows the r-squared values for the various regression runs. The second to the last row gives the number of observations (years) contained in an equation, and the final row spells out the range of years covered by a particular equation.

Looking at the table, reveals that, regardless of the measure of inequality used, the share of trade is positively related to the share of trade in GDP. In every one of the four equations, the coefficient on the trade share is positive and significant at the one per cent level of significance or better. The findings of table I suggest, that, without considering the expansion of corporate business or the movement of corporate business into the international sphere, greater trade is associated with greater inequality in the distribution of income.

Table II portrays the results of simple regressions of the four inequality measures on the number of U.S. corporations. The set-up for table II is exactly the same as that for table I. As anticipated, the coefficient on the number of corporate business is positive, implying that greater extension of corporate business, as measured by the number of corporations, leads to greater income inequality. The coefficient on the number of corporations is significant at the one per cent level of significance or higher in every equation and, on its own, accounts, at the very minimum, for sixty nine per cent of the variation in income inequality. It appears that greater corporate business increases the concentration of income in the highest income groups and leads to greater overall income inequality in society.

Table 2: Annual Simple Regressions of Inequality Measures on the Number of Corporations

	(1)	(2)	(3)	(4)
	TOP 1%	TOP .1%	TOP .01%	GINI
Constant	6.408 (10.95)*	1.044 (2.87)*	.191 (1.01)	29.480 (34.94)*
Number of Corporations	.0021 (10.21)*	.0013 (10.24)*	.0006 (9.13)*	.0028 (9.33)*
RSQ	.738	.739	.692	.713
N	39	39	39	37
Years	1960-98	1960-98	1960-98	1960-1990

Table 3: Annual Multiple Regressions of Inequality Measures on Percentage Trade Share of GDP and Number of Corporations

	(1)	(2)	(3)	(4)
	TOP 1%	TOP .1%	TOP .01%	GINI
Constant	9.513 (14.09)*	2.909 (6.70)*	1.135 (4.90)*	31.701 (26.35)*
Percentage Trade Share	-.574 (-5.90)*	-.345 (-5.51)*	-.174 (-5.23)*	-.423 (-2.44)**
Number of Corporations	.0044 (10.41)*	.0027 (9.90)*	..0013 (9.02)*	.0046 (5.94)*
RSQ	.867	.857	.825	.756
N	39	39	39	37
Years	1960-98	1960-98	1960-98	1960-1990

Table III takes a look at the effect of trade on inequality within the U.S. after adjusting for the extent of incorporation. It shows multiple regressions of the four inequality measures on both the number of U.S. corporations and on the U.S. trade share.

The number of corporations is significant at the one per cent level of significance or higher in all four equations in table III. The trade share is significant at the one per cent level or better in the first three equations in table III in which the different concentration ratios are employed as measures of inequality. In the fourth equation, when the Gini coefficient is used as a measure of inequality the trade share is significant at the five per cent level of significance or better. The two variables together explain anywhere from around seventy-five to over eighty-six per cent of the annual variation in inequality in the U.S. over the entire period (close to forty years) that is covered.

As expected, the sign of the estimated coefficient on the number of corporations is, once again, positive. Looking at the coefficient on the number of corporations in equation one shows that an increase in the number of corporations in the U.S. by one thousand (the number of corporations is in thousands of corporations) leads to a four thousand per cent increase in the share of individuals in the highest one per cent of the income distribution.

The very most important thing to note in table III, however, is what happens to the sign of the trade share coefficient. The sign of the trade share coefficient changes from positive in table I to negative in table III. When the trade share is used in isolation to explain income inequality (table I), it looks as though international trade has a detrimental effect on inequality within the U.S., as, on the basis of the estimated trade share coefficient, increases in the trade share are predicted to lead to an increase in income inequality. However, once the extent of incorporation is taken into account (table III), trade appears to be beneficial to income inequality. The negative sign on the trade share coefficient in table III means that increases in trade lead to reduced levels of income concentration in the highest income groups and to lower levels of overall income inequality as measured by the Gini coefficient. What all this would seem to suggest is that greater trade or augmented levels of international business, is not bad for inequality per se, but, rather, the expansion of corporate business, greater incorporation, is.

In a rough attempt to try to isolate the separate effect of incorporated international business on inequality, that is, of corporate international trade (business), as distinguished from general international trade (business) on income inequality, a trade corporation interaction variable is constructed. The trade corporation interaction variable is simply the trade share, the percentage of trade to GDP, disregarding

Table 4: Annual Multiple Regressions of Inequality Measures on Percentage Trade Share of GDP and Interaction Variable between Number of Corporations and Percentage Trade share of GDP

	(1)	(2)	(3)	(4)
	TOP 1%	TOP .1%	TOP .01%	GINI
Constant	14.970 (15.79)*	6.080 (9.04)*	2.645 (7.21)*	39.230 (28.01)*
Percentage Trade Share	-.713 (-7.24)*	-.410 (-5.87)*	-.203 (-5.32)*	-.811 (-5.48)*
Trade Corporation Interaction Variable	.0002 (11.64)*	.0001 (9.74)*	.00005 (8.58)*	.0002 (9.48)*
RSQ	.898	.855	.813	.864
N	39	39	39	37
Years	1960-98	1960-98	1960-98	1960-1990

its percentage and treating it as an ordinary whole number, multiplied by the number of corporations (measured in thousands). The trade corporation interaction variable goes up when either the trade share or the number of corporations rises. The new trade corporation interaction variable is subsequently used as an explanatory variable in concert with the trade share in regressions on the four measures of inequality. Table IV shows the results of the new exercise using the interaction variable.

The results are fairly impressive. Both the trade share and the trade corporation interaction variable are significant at the one per cent level of significance or better in every one of the four equations. In concert, the two variables explain over eighty per cent of the annual variation of the four different inequality measures. While the sign of the trade share, the percentage of trade to GDP, is negative indicating that greater trade reduces income inequality, the sign on the trade corporation interaction variable is positive, suggesting that higher levels of incorporated trade lead to greater income inequality.

An alternative measure of the degree of corporate business to the number of corporations is corporate receipts. When the regression equations contained in tables II, III, and IV are re-run using U.S. corporate receipts in place of the number of U.S. corporations as the measure of the extent of U.S. corporate business, similar results are obtained.

Conclusion

The time series regression analysis for the recent decades of the U.S. economy undertaken in this study lends support to three basic propositions with regard to within nation income inequality. First, the expansion of corporate business leads to greater concentration of income in the highest income groups and to greater overall within nation income inequality. Second, the movement of the corporate organizational form into the international sphere is definitely not welcome news for within nation income equality. Third, globalization (trade openness) is favourable for within nation income equality, once, one adjusts for the pernicious effects of corporate business expansion.

With regard to allaying fears of potential undesirable effects of trade on income concentration of the upper income groups and on the entire income distribution, trade policy would seem to be misdirected and based on a fundamental misunderstanding of the root cause of the greater income inequality associated with higher trade. It looks as though the volume or extent of trade is not a problem for income inequality, but it is the *incorporation* of trade that appears to be the negative force in operation with regard to income inequality. The aim of trade policy should be to adjust, control, or change the corporation, its inequalitarian nature, and its behaviour. The focus of policy should not be on the amount of trade but on *how* trade is conducted, the way, the form in which trade is undertaken.

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Efficiency Mapping through Capacity Building Process

Sripirabaa B. and Krishnaveni R.

Organizations are competing for resources: men, materials, money and methods. Hence, they constantly engage in actions aimed at increased access to these resources and effective utilization of the available resources to compete in the changing environment. This necessitates assessment of resources utilization and organizational performance periodically to ensure achievement of goals. Among the plethora of tools and processes available for assessing organizational performance, Capacity Building has gained prominence in the last two decades. This paper brings out the results of Capacity Building Process extended to map the efficiency of the Performance Management System, in an Automobile component manufacturing company.

Market dynamics have created challenges for organizations, with the emergence of the global economy, advances in technology, increased societal demands, and the need to provide more social services with fewer resources. Hence a systematic process for creating and sustaining improved performance that reflects changes in the environment is the need of the hour. Hence an initiative is needed for organizations for effective and efficient utilization of its resources to be in line with technology advancements, meet societal needs and to ensure achievement of its goals. Consequently various tools that help organizations evaluate their performance with respect to time; benchmark their performance with industry standards are being put forth by management gurus. Apart from this, organizations need to align their activities with their mission in order to ensure achievement of goals. A plethora of tools and processes are available for assessing performance of organizations and its function. To mention a few Change management (Waterman, Peters and Phillips, 1980), value creation model (Porter, 1985), Five Tracks Barriers to Success Model (Kilman, 1986), benchmarking (Pryor, 1989), capacity building (McGuire, et al, 1994), business process reengineering (Harsh et. al), decision Trees, SWOT Analysis and PESTLE Analysis (Kachru, 2005), TQM, six Sigma and Balanced Scorecard (Pearce and Robinson, 2005). Among the above mentioned techniques capacity building process is one which is gaining importance in the past two

Ms.Sripirabaa B., Research Scholar, PSG Institute of Management, PSG College of Technology, Coimbatore – 641 004, Email: pirabaa@gmail.com

Dr.Krishnaveni R., Assistant Professor, PSG Institute of Management, PSG College of Technology, Coimbatore – 641 004. Email: rmkrishnaveni@gmail.com

decades among the non profit organizations (De Vita and Fleming, 2001; Blumenthal, 2003; Baumqarten, 2004; Sampson, 2004). An attempt has been made here to extend this concept of Capacity Building Process to map the efficiency of the performance management system in a profit organization.

Capacity Building Concept and Theoretical Base

Capacity Building Process is one among the methodologies extensively used by non-profit organizations, non-government organizations, community development agencies, civil society organizations, and funding agencies to assess the efficacy of the programs organized or funded by them by assessing their current level of capacities and consequently identifying strategies to improve their capacities.

Capacity Building Concept

It was World Bank in 1996 which first focussed on how the capacities of people, institutions and practices could be developed. Later in 1997 UNDP and others also started focussing on the process of Capacity Building (Table 1).

Table 1: Views regarding Capacity Building

Organization / Individual	Year	Definition
World Bank	1996	The combination of people, institutions and practices that permits countries to achieve their development goals
UNDP	1997	The process by which individuals, organizations, institutions, and societies develop abilities (individually and collectively) to perform functions, solve problems and set and achieve objectives
Wange	1997	Capacity Building is a continuous and multidimensional process of nurturing the ability of individuals and institutions to undertake quality policy analysis and economic management

Capacity building refers to activities that improve an organizations ability to achieve its mission. It is the process that increases the capability of organizations and individuals to produce or perform (Blumenthal, 2003). Capacity building could be carried out horizontally which focuses on building individual capacity and vertically which focuses on building organizational capacity. Organizational capacity building is the ability of an organization to influence its life and progress towards desired results. Organizational Capacity building looks in depth at where an organization stands in comparison to where it hopes to be in future and develops skills and resources to get there (Blumenthal, 2003).

Application of the Concept in International and Indian Scenario

In the last two decades Capacity Building activities have gained importance both in the international and Indian Scenario. The focus of such activities in the international scenario were community development (McGuire, et. al., 1994; Orozco and Lapointe, 2004), economy revival (Kirkpatrick, et al., 2005; Haugh and Rubery, 2005), address environment related issues (Cosio, 1998; Maosheng and Haites, 2006), enhancing competency of government organizations (Wescott, 1999; Tettey, 2002), enhanced competency of public sector and private organizations (Senge, 1997; Jones, 2001), solve cross cultural and diversity issues (Vreede, et. al., 1998/99; Jackson, 2003), strengthening non-profits (De Vita, 2001; Blumenthal, 2003), enhancing effectiveness of health care services (Gerry, et al., 2006; Birdsell, et. al.), corporate governance (Kaloumania, 2004; Armstrong, 2004), biosafety (Australia Biosafety), biotechnology (International Chamber of Commerce), poverty elimination (Vietnam), regulatory (Eldridge, 2004), health services (Weaver, et al, 2000), trade (Doha Development; Prowse, 2002), protection and improvement of water resources (Water shed program), capacity building of local government (Reddy, et al, 2000). Majority of these activities were initiated by NGO's, community development agencies, civil society organizations and the UN family. The focus of these activities was to solve issues related to nations/ nation or region/ community.

In the Indian Scenario majority of these activities were initiated by the Government of India in coordination with International agencies like UN family, the respective state governments, Institutions, Foundations, etc to address issues the nation is facing in the developing, globalized and liberalized scenario. The focus of these activities were in agricultural sector (Agri India-US Joint Statement; India - U.S. Agricultural Knowledge Initiative), community development (Charca; Nagaland; Leprosy; CAPART; MacArthur Foundation), empowering SME's and companies (Times Foundation; RMK; EDI Ahmedabad), e-Governance (Capacity Building – Madhya Pradesh; Capacity Building – Rajasthan), impart knowledge on design and construction of earth quake resistant structures (Earthquake Engineering Research Centre - IIIT Hyderabad; NPCBAERM), enhancing the literacy rate (Azim Premji Foundation; Akshaya Project; NCERT; Sarva Shiksha Abhiyan; TATA Institute of Social Sciences; DEME; NIAR), power sector (Energy Conservation Act; Capacity Building – Power Sector), environmental protection (Welcome Mapping; NCSA Project; Capacity Building for Climate Change), imparting IT education (Chhattisgarh – IT; Cameron Richards – ICT), Bioresource development and utilization (The National Bioresource Development Board), Biodiversity Conservation (Biodiversity Conservation and Rural Livelihood Improvement Project) and setting up a library consortium for e-journal subscription (Library - Capacity building).

Results of Capacity Building Exercise: The substantial increase in the application of the Process of Capacity Building is due to the significant benefits derived out of the Capacity Building exercise. Few results of such capacity building exercise that have been undertaken are discussed under. Use of machines has enhanced quick decision making in businesses, which has paved way for more learning thereby needing less control and consequently making the organization successful in its activity (Senge, 1997). The twinning project of SIDA in Sweden, has established partnership between the organizations in Sweden and similar organizations in developing countries to overcome deficiencies in its organizations, by focusing on learning at individual and organizational level (Jones, 2001). Enhancing Capacity grants for projects, developing partnership with other organizations to gain technical expertise for current projects and training employees in preparing structured programs for current and future projects were the typologies identified and developed from in-depth study of thirty capacity building programs for nonprofit organizations (Blumenthal, 2003). Capacity of small communities could be enhanced through community wide strategic development planning (McGuire, et. al., 1994). Leprosy eradication measures in India have been successful, by partnering with International Federation of Anti Leprosy Association and enhancing the capacity of the existing Health Care Staff in diagnosis and management of leprosy affected persons (Leprosy). Capacity Building through imparting knowledge to construct earthquake resistant structures to masons, bar benders, engineers, consultants and faculty members through workshops and training programs were found to be successful (Earthquake Engineering Research Centre – IIT Hyderabad). The technique of information sharing, improving skills and increased access to quality reproductive health services were the strategies used for creating awareness and building the capacity among the young women's in India to STIs and HIV infection and thereby reducing the same (Charca). The issue of unemployment in Nagaland was controlled by providing self employment opportunities to unemployed youth thereby enabling them generate sustainable income (Nagaland).

The above studies reveal that there lies no restriction in the area of application of the concept of Capacity Building and could well be extended to profit organizations. Further the commonality among all these studies were that focus was on assessing the current level of capacities and devising strategies to enhance the lacking capacities than building up new capacities. This may be due to the fact that organizations feel building new capacities is a daunting challenge.

Tools for Assessment: Diverse tools have been developed for assessing the capacity of organizations based on their requirements. Research indicated that among the tools developed for capacity assessment few tools like Discussion Oriented Organizational Self Assessment (DOSA), Participatory Organizational Evaluation Tool (POET) and A Simple Capacity Assessment Tool (SCAT) appear as the baseline tools. With these tools as the base few other tools were developed to assess the strengths and weakness of the organizations in all functional aspects (Participatory Capacity Assessment, The McKinsey Capacity Assessment Grid, Marguerite Casey Foundation Organizational Capacity Assessment Tool and SVP Organizational Capacity Assessment Tool) and to assess the efficacy of their services and programs to serve their clients better (Self assessment tool developed by Southern Minnesota Initiative Foundation, Benefits Planning, Assistance and Outreach Performance Excellence Instrument and Organizational Assessment Tool).

Indicators for Assessment: Research indicates that a range of indicators are used for assessing the capacity of organizations. An in depth analysis of the diverse tools that are being used for assessing the capacity of organizations reveal that Human Resource Management, Financial Resource Management, Equitable Participation, Sustainability of Program Benefits, Partnering, Organizational Learning and

Strategic Management/Governance (POET, DOSA, Marguerite Casey, McKinsey, SVP, BPA and O, OAT, SCAT, SMI, PCA) were the prime indicators used. These indicators could be grouped in to two categories, group 1 includes indicators which assess the capacity of the Organization in the program/project that it is involved in, and could be termed as specific indicators. The indicators are Human Resource Management, Equitable Participation, Sustainability of Program Benefits and Organizational Learning. Group two comprises indicators that would enhance the functioning of the program/project that is being assessed and hence could be termed as general indicators. They include Partnering, Financial Resource Management and Strategic Management/Governance. Overall, all these indicators serve as the areas to be concentrated upon for capacity assessment of the organization.

Purpose of the Study

The above literature reveals that the concept of capacity building is pervasive and could be applied to all areas. Consequently, the concept could well fit for profit organizations too, as the competitive environment presses organizations to meet positive and negative challenges globalization has posed whereby they strive to maximize the utilization of the organizational resources and thereby excel in all functional areas. From the previous discussion it can be inferred that successful attempt has been made by UN family and NGO's in applying the concept of capacity building in the global scenario in varied areas and by the Government of India in the Indian scenario. The prime area of the application of the concept was among the non profit organizations to identify the areas where they lack the capacity to perform and for effective and efficient utilization of the limited resources. Since the competitive environment presses organizations for increased access to resources; men, material, money and methods and also effective and efficient utilization of the resources, organizations engage themselves in planning and designing activities for successful accomplishment of organizational objectives. The process of capacity building could be applied to the organization as a whole or for few of its functions. Hence this paper attempts to extend the capacity building concept to profit organizations. For the purpose of study a medium size organization engaged in the manufacturing of Automobile components, in Coimbatore City was selected and the capacity building process was tried for one activity of HR function namely Performance Management System.

Theoretical Model for the Study

Performance management system could be thought of as the crown among the HRM activities. It encompasses diverse activities, key among which is the performance appraisal process. Performance management system starts with determining the effectiveness of the recruitment and selection practices of the organization and moves in determining the performance of the employees on their job which in turn helps in administrative decisions, promotions, demotions, pay rises etc. and finally in determining ways to enhance the performance (DeNisi, and Pritchard, 2006). Choice of an appropriate technique for appraising the employees is the heart of the appraisal process. Performance appraisal reports serves as the platform for career planning and management activities and design and development of training programs which aims in strategically orienting the system to achieve the organizational objectives. Hence the study attempts to apply the process of Capacity Building to the Performance Management System activity.

Table 2: Research Studies in Performance Management System

Practices	Research Study
Performance Management System	Roberts, 2001 (quoted by Hartog, et.al., 2004); Hartog, et.al., 2004; Soltani, et. al., 2005; DeNisi, and Pritchard, 2006.
Performance Appraisal	Taylor, et. al., 1995; Wood, 1999; Viswesvaran and Ones, 2000; Simmons and Eades, 2004; Hartog, et. al., 2004; Boyd and Kyle, 2004; DeNisi and Pritchard, 2006.
Methods of Performance Appraisal	Hoffman, et. al., 1991; Welbourne, et. al., 1998; Randall, et. al., 2000; Viswesvaran and Ones, 2000; Wallace, et. al, 2001; Bartram, 2004; Boyd and Kyle, 2004; Brown and Heywood, 2005.
Compensation, Rewards, Administrative Decisions	Landy and Farr 1983; Cleveland, et al., 1989; Townley, 1990; Pilbeam and Corbridge, 2002.

Consequently in depth analysis was done in the form of literature reviews with regard to the various practices adopted in industries that were brought out by researchers and the analysis revealed the following practices were commonly adopted for the Performance Management System activity (table 2).

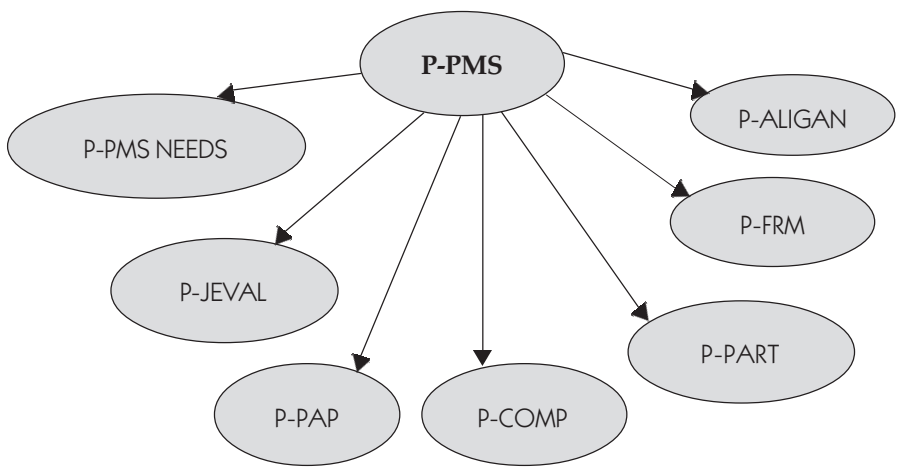
In our earlier discussions in Section 2.5, Human Resource Management, Financial Resource Management, Equitable Participation, Sustainability of Program Benefits, Partnering, Organizational Learning and Strategic Management/Governance were the prime indicators used by Non profit organizations for assessing their capacity levels. These indicators were viewed as program specific and general indicators. In line with that the indicators for the current study were derived. Along with the specific indicators derived from the reviews reflecting the common practices, the general indicators namely Partnering, Financial Resources Management and Alignment that would enhance the effectiveness of the performance management system activity HR were included. Among the general indicators Partnering tends to assess the effectiveness of the linkages the organization has established with other organizations and consultants for enhancing the effectiveness of its activities, Financial Resources

Table 3: Indicators and their focus

Performance Management System Practices
Identification of Performance Management System Needs (P-PMS NEEDS) – Identification of the need, frequency and uses of the Performance Management system.
Job Evaluation (P-JEVAL) - Identification of performance standards for the jobs.
Performance Appraisal Process (P-PAP) – Identification of the method, process and uses of Performance appraisal process.
Compensation Rewards and Incentives (P-COMP) – Identification of the compensation, rewards and incentives offered to the employees.
Partnering (P-PART) - Collaboration with other organizations, external consultants for enhancing the effectiveness and efficiency of Performance Management System function.
Financial Resource Management (P-FRM) - Extent of financial support with respect to budgeting, forecasting, fund raising and cash management for Performance Management System function.
Alignment of Performance Management System Goals with Organization strategy (P-ALIGN) - Board practices, planning practices and commitment of Performance Management System goals to organization goals, mission and philosophy.

The Theoretical model hence deduced in depicted in figure 1.

Figure 1: Theoretical Model for Performance Management System



Management assesses the extent of financial support the organizations extends to the various functions and Strategic Management / Governance assesses the extent of alignment of these activities to the goals, mission and philosophy of the organization. Consequently the indicators derived and the focus of these indicators is depicted in table 3.

Objectives

Though the concept of capacity building could be applied to the entire organization and to all the functions, an initiative of the application of this measure was tried out in an Automobile component manufacturing organization in Coimbatore, pertaining to one activity of Human resources namely Performance Management System. The Primary objective of the study is to apply the Capacity Building Process as a tool to enhance the functions of Performance Management System.

The secondary objectives includes:

- Ø Measure the capacity of Performance Management System activity
- Ø Map the Capacity of Performance Management System activity and identify the low capacity / low consensus areas
- Ø Develop strategies for building the capacity in the above identified areas.

Methodology

The methodology adopted for measuring, mapping and building the capacity of the Performance Management System activity is briefed under.

Capacity Measurement:

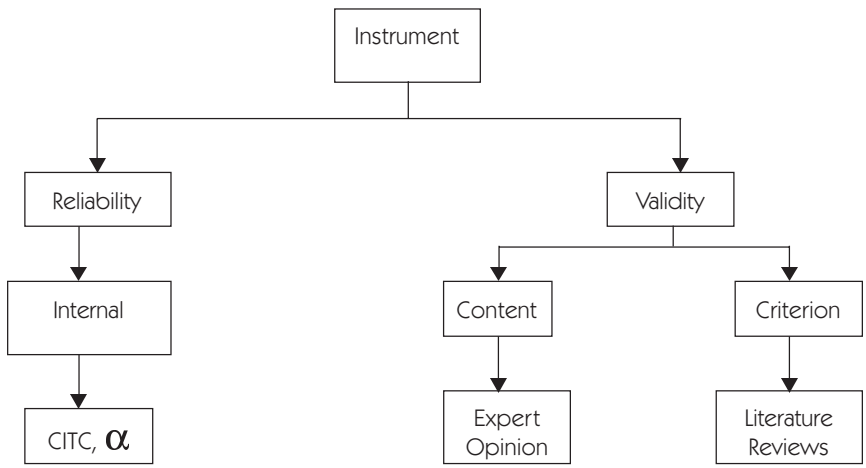
Indicators Identified: As discussed earlier in section 4.0 the specific indicators for the study were derived from the literature reviews and the general indicators that would enhance the functions were included and consequently the indicators that were derived for the study are depicted in table 3.

Tool / Instrument adopted: POET appears to be pervasive, extensively and repeatedly used tool by Non profit organizations for assessing and building their capacity. Hence POET was modified to include the indicators mentioned in table 3 specific to the area of application. These indicators are the constructs in the instrument that was developed for capacity assessment.

Instrument Validation: The developed instrument was tested for their reliability and validity using SPSS. Figure 2 depicts the procedure adopted for instrument validation.

The items in the construct were tested for their validity (content and criterion) and reliability. Expert opinion was obtained to test the content validity of the instruments. Literature reviews ensured the criterion validity of the constructs. Reliability of the items in each construct was tested using the corrected-item total correlation (CITC) scores and purification of the construct was done by deleting the items if their CITC scores were below 0.5 (Cronbach, 1951). The reliability (internal consistency) of the items for each dimension was examined using Cronbach's alpha (a) and an alpha score of higher than 0.70 was considered to be acceptable (Nunnally, 1978). For the present study all the constructs in the models for the three functions hold construct

Figure 2: Instrument Validation



enhancing the effectiveness of its activities, Financial Resources reliability, as the Cronbachs Alpha was found to be greater 0.7.

Data Collection: The population comprises the middle level employees of the organization chosen for the study. The population size was 181. Hence the sample constituted 36 middle level employees equally distributed among the following departments: finance, marketing, production, quality control, Human resources and information technology.

Calculating the Capacity and Consensus Score: The data was analyzed using the methodology given in the POET (refer Appendix 1). The raw capacity and consensus scores are calculated based on which the standardized capacity and consensus scores are calculated. The Scaled Capacity and Consensus scores are arrived from the standardized capacity and consensus scores.

Mapping the Capacity areas on the GRID: Using the Scaled Capacity and Consensus Scores the GRID is plotted to map the capacity areas. This helps to identify the various capacity areas that fall in the four quadrants.

Capacity Building: Having mapped the capacity areas in the GRID the final step is to enhance the capacity in the areas that have either low capacity or low consensus i.e. bridging the capacity gaps by moving all the capacity areas to the High Capacity – High Consensus quadrant. This is done through

Figure 3: Process of Capacity Building

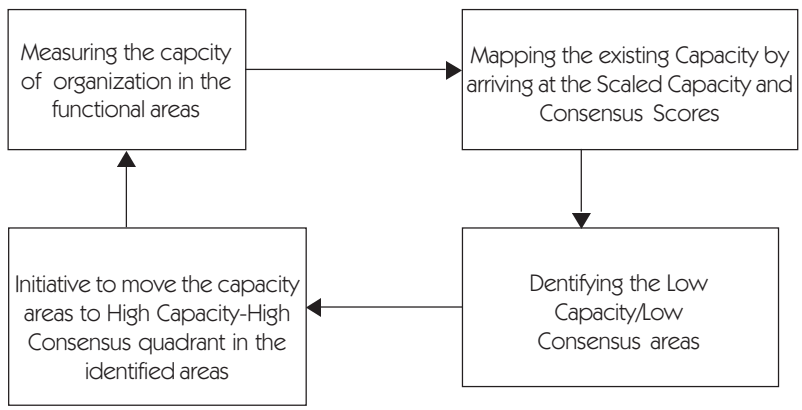


Table 4: Capacity and Consensus Scores of Performance Management System Activity

Area	Capacity Score			Consensus Score		
	Raw	Standardized	Scaled	Raw	Standardized	Scaled
P-PMS NEEDS	56	87	80	0	100	100
P-JEVAL	22	72	55	0	100	100
P-PAP	85	85	75	0	100	100
P-COMP	8	79	65	0	100	100
P-PART	18	51	30	0	100	100
P-FRM	18	73	55	0	100	100
P-ALIGN	28	81	65	0	100	100

brain storming session conducted with the executives of HR department and major functional department representatives to devise strategies to bridge the capacity gaps thereby enhancing the capacity of the Performance Management System activity.

From the above discussion the process of Capacity Building could be deduced as depicted in figure 3.

Analysis - Measuring and Mapping the Capacity areas of the HR functions: The analysis of the questionnaires that were administered and collected was carried out by arriving at the raw, standardized and scaled capacity and consensus scores (refer Appendix 1) and plotting the GRID for the various capacity areas of Performance Management System activity Table 4 gives the above scores for Performance Management System activity.

Table 5: Symbols depicted in the GRID for the Various Capacity Areas

Area	P-PMS NEEDS	P-JEVAL	P-PAP	P-COMP	P-PART	P-FRM	P-ALIGN
Symbol	£	□	♣	♦	♥	/	✖

Figure 4: GRID for Performance Management System Activity

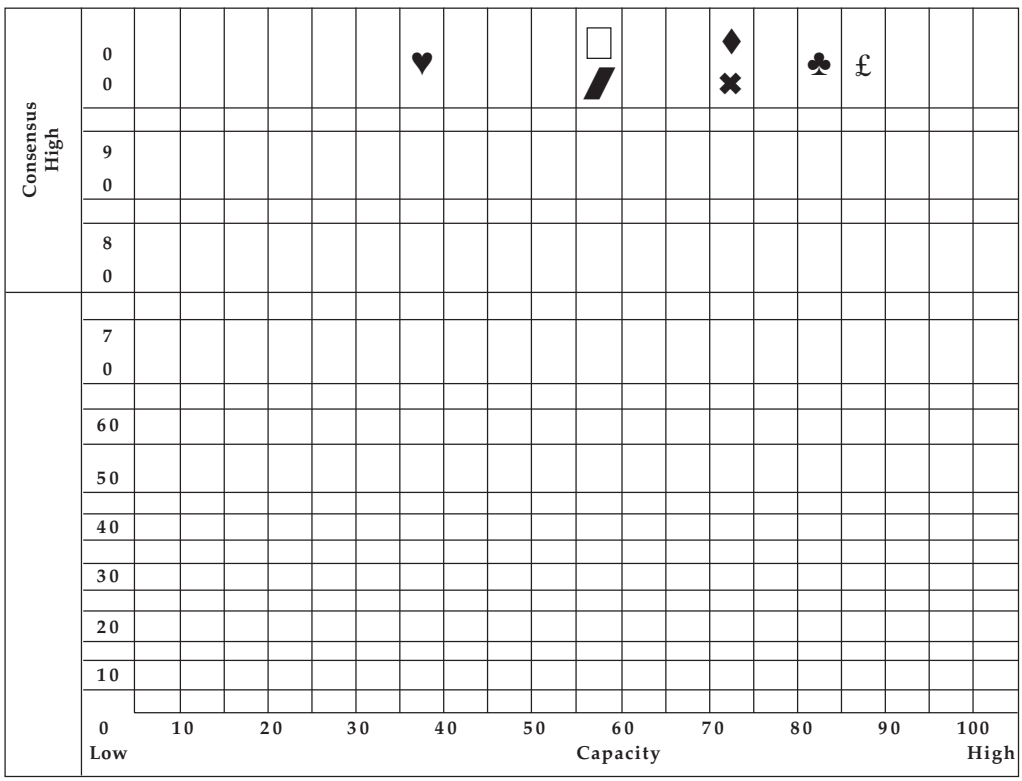
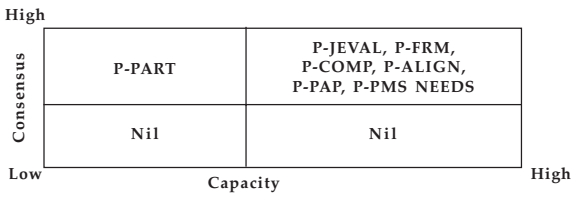


Figure 5: Mapping the Capacity Areas in the Four Quadrants



The above capacity and consensus scores are plotted on a GRID to map the capacity of Performance Management System activity. Figure four depicts the plotted GRID and figure five depicts the capacity mapping of the areas that fall in the four quadrants. Table 5 gives the symbols that depict the different capacity areas.

Discussions for Capacity Building

From the above figure we infer that only one capacity area Partnering, in Performance Management System activity falls in the low capacity – high consensus quadrant. This indicates that the employees have high agreement that they lack the effectiveness with respect to the above functions. This degree of high consensus and low capacity that they have could be viewed in two angles i) the organization lacks the ability and efficiency to perform those activities ii) the organization is performing effectively and efficiently in those areas but lack transparency. The remaining capacity areas fall in the high capacity – high consensus quadrant indicating adequate capacity and consensus in the above areas. Partnering turned to be low capacity area indicating that the organization is not involving in partnerships with consultants or other organization for enhancing its effectiveness and efficiency.

Having identified the low capacity/low consensus area adequate strategies are to be devised to move these areas to the high capacity high consensus (HC-HC) quadrant. The reasons for the low capacity profile and the strategies to overcome them were identified through brain storming session conducted with the executives of HR department and major functional department representatives. The team comprised twelve members. The discussions were carried out in two stages. In the first stage the reasons for the low capacity areas were identified and then in the second stage the strategies that are to be adopted to move the capacity areas to the HC-HC quadrant were arrived (table 6).

Table 6: Strategies derived through the Brain storming session for Capacity Building

Area	Reason for Low capacity / Low consensus	Strategy to move to HC – HC
P-PART	Partnering has not been engaged with external organization / consultants to organize and conduct performance appraisal programs	Develop partnership with consultants for identifying and preparing job specific appraisal criteria

Conclusion

The above discussion reveals that with regard to partnering the organization has a low capacity profile. Since the organization has not engaged itself in partnership with other organizations or consultants for enhancing its performance management system activity the capacity profile turned to be low. Currently performance appraisal programs are conducted by the members of the HR department. Employees feel that the criteria fixed up for appraisal process does not reflect their respective job positions and professionalism is needed with regard to identifying and fixing up job specific appraisal criteria. Hence by hiring consultants who hold professionalism, criteria for individual job positions could be arrived at which would make the appraisal process more effective and efficient, which on the other hand is the motivational point for employees as the pattern of compensation and career development holds its base in these performance appraisal reports. This would help the organization move the Partnering area to the HC-HC quadrant, where by it would excel in its performance management system activity, which implies that the employees are appraised and rewarded appropriately. This could be viewed as stage I in capacity building process. Once the organization reaches this stage it can move to stage II. Stage II could be viewed as functional capacity enhancement. In this stage organizations can extend the above capacity building process to all the activities of HR function, thereby excelling in that function. Once the organization has accomplished stage II, it can move to stage III, which could be thought as organizational capacity assessment, whereby the organization would excel in all its functions. Then it can move to stage IV, where in organizations belonging to the same sector in the region can join together and form cohort and carry out the capacity building exercise in their respective organizations. Once the capacity areas have been mapped, the organization that has the highest capacity and consensus score in each area can be identified. The practices that have been adopted by the organization in that particular activity could be taken up for discussion. This would facilitate other members of the cohort to compare their practices with that organization enabling them to enhance their

current practices. Few cohorts that exist in Coimbatore are South India Textile Research Association (SITRA), Coimbatore Foundry and Industry Owners Association (COFIOA), Coimbatore Tiny and Small Foundry Owners Association (COSMOFAN), Southern India Engineering Manufacturer's Association (SIEMA). This would help capacity enhancement among all the organizations in that region thereby enabling them meet the challenges posed by the globalized scenario.

Appendix 1: Key words and Terminologies

1.	**Raw Capacity Score**	The raw capacity score is the average team response to a given capacity area.
2.	**Standardised Capacity Score**	The standardized capacity score uses an index to allow different POET capacities to be compared meaningfully. The standardized score is tabulated by dividing a capacity area's raw score by the area's maximum number of points and then multiplying by 100 to get an indexed score.
3.	**Consensus Score**	The consensus score measures the degree to which team members agree with one another concerning their assessment of a given capacity area. The consensus score is obtained by taking the standard deviation to measure the spread of answers, and then tabulating the coefficient of variance.
4.	**Standardised Consensus Score**	Standard deviation and the coefficient of variance are measures of dispersion. The raw consensus score expresses disagreement hence it is inverted and converted to a 1-100 scale in order to be graphed in the same way as the capacity dimension.
5.	**Scaled Capacity and Consensus Score**	To plot in the grid the Standardized Capacity and Consensus Scores are converted in to scaled Capacity and Consensus Scores.
6.	**Procedure for calculating Raw and Standardised Capacity and Consensus Score**	1. The raw capacity score is the average team response to a given capacity area. The score is tabulated by obtaining each respondent's total score for the section and then obtaining an average score for the section. 2. The standardized capacity score is tabulated by dividing a capacity area's raw score by the area's maximum number of points and then multiplying by 100. 3. The raw consensus score is obtained by taking the standard deviation as a percentage of the raw capacity score. 4. The standardized consensus score is obtained by multiplying the raw consensus score by 2 and subtracting the value from 100.
7.	**GRID**	GRID stands for Guided Reflections for Institutional Development gives a plot of the capacity and consensus scores in each area to explore the relative strengths and weaknesses of the individual organization. The standardized capacity and consensus score are converted into scaled capacity and consensus score and then plotted in the GRID.
8.	**Gohort**	A cohort is composed of organizations that want to improve performance, want to engage in deep organizational learning, and are open to change. Cohorts are comprised of organizations in related fields and cohort members agree in general terms issues they intend to focus. Cohort concept enables users to benchmark their organization's performance against a wider group of like entities in order to accelerate progress toward goal achievement.
9.	**CITC**	Corrected-item total correlation: Purification is carried out by examining the (CITC) score of each item with respect to a specific dimension of a construct. The correlation of each item with the total score was calculated and items with correlations near zero would be eliminated.
10.	**Cronbach's Alpha (a) co-efficient**	Measures how well each item contributes to the internal consistency of a particular construct.

11. Key for converting the standardized capacity and consensus scores into Scaled Capacity and Consensus Scores

Standardized Score	0 - 22	23 - 32	33 - 39	40 - 45	46 - 50	51 - 55
Scaled Score	5	10	15	20	25	30

Standardized Score	56 - 59	60 - 63	64 - 67	68 - 71	72 - 74	75 - 78
Scaled Score	35	40	45	50	55	60

Standardized Score	75 - 78	79 - 81	82 - 84	85 - 87	88 - 89
Scaled Score	60	65	70	75	80

Standardized Score	90- 92	93 - 95	96 - 98	99 - 100
Scaled Score	85	90	95	100

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Weibull Deterioration and Delay in Payments

Sudhir K.Sahu and Gobinda Chandra Panda

This paper derives a production model for the lot-size inventory system with finite production rate taking into consideration the effect of weibull deterioration and the condition of permissible delay in payments, in which the restrictive assumption of a permissible delay is relaxed to that at the end of the credit period, the retailer will make a partial payment on total purchasing cost to the supplier and payoff the remaining balance by loan from the bank. Numerical examples are also presented to illustrate the results of the proposed model.

In recent years, inventory problems for deteriorating items have been widely studied. The first attempt to describe the optimal ordering policies for such items was made by Ghare and Schrader (1963). They presented an EOQ model for an exponentially decaying inventory. Recently, Goyal and Giri (2001), Sahu, Samal and Kalam (2006) provided an excellent and detailed review of deteriorating inventory literatures.

Furthermore, in deriving the traditional EOQ inventory model, it was tacitly assumed that the payment must be made to the supplier for the items immediately after receiving the consignment. However, in practice, for encouraging the retailer to buy more, the supplier allows a certain fixed period for settling the account and does not charge any interest from the retailer on the amount owed during this period. Goyal (1985) first derived an EOQ model under the conditions of permissible delay in payments. It was assumed that the unit purchase cost is the same as the selling price per unit. Aggarwal and Jaggi (1995) then extended Goyal's (1985) model to consider the deteriorating items. Next, Jamal, Sarker and Wang (1997) generalized the model to allow for shortages. Hwang and Shinn (1997), Liao, Tsai and Su (2000), Chang and Dye (2001), Ouyang, Chen and Chuang (2002), Chang, Ouyang, and Teng (2003), Huang and Chung (2003), Shinn and Hwang (2003), Chang (2004), Shah (2004), Ouyang, Teng, Recently, Teng (2002) amended Goyal's (1985) model by considering the difference

Dr.Sudhir Kumar Sahu, Lecturer in Statistics, Sambalpur University, Jyotivihar, Burla-768019, Orissa, India, Email: drsudhir1972@gmail.com

Mr.Gobinda Chandra Panda, Lecturer in Mathematics, University College of Engineering, Burla-768019, Sambalpur,Orissa, Email: gobinda1900@gmail.com

between unit price and unit cost, and found that it makes economic sense for a well-established buyer to order less quantity and take the benefits of permissible delay more frequently. There were several interesting and relevant papers related to the trade credits such as Sahu, Kalam, Sukla and Chand (2005), Davis and Gaither (1985), Sahu, Acharya and Tripathy (2002), Shah (1993), ARCelus and Srinivasan (1995), Khouja and Mehrez (1996), Sahu, Dash and Sukla (2007), Chen (2005), Sahu and Dash (2006) and Sahu, Samal and Kalam (2007) and so forth.

The restrictive assumption of a permissible delay is relaxed to that end of the credit period; the retailer will make a partial fulfillment on the purchasing cost and payoff the remaining balance by loan from the bank. The main purpose of this paper is to show that there exists an optimal cycle time to minimize the total variable cost per unit time. Numericals examples are also presented to illustrate the results of the proposed model.

Notation

D	Annual demand rate
P	Annual replenishment rate, $P > D$
A	Cost of placing one order
c	Unit purchasing price per item
s	Unit selling price per item of good quality
h	Unit stock holding cost per item per year excluding interest charges
I	Interest, which can be earned per rupee per year
I^e	Interest charges per rupees investment in inventory per year
$I_1^p(t)$	The inventory level that changes with time t during production period
$I_2(t)$	The inventory level that changes with time t during non-production period
M	The trade credit period
T	The optimal cycle time
$\alpha\beta t^{\beta-1}$	weibull deterioration rate

Assumptions:

- Demand rate is known and constant.
- Replenishment rate P is known and constant.
- Shortages are not allowed.
- Time period is infinite.
- $s \geq c$, $I_p \geq I_e$ and $cI_p \geq sI_e$.
- If the credit period is not longer than the cycle length, the retailer can sell the items, accumulate sales revenue and earn interest throughout the inventory cycle. At the end of the credit period, the retailer will make a partial payment *cDM* on total purchasing cost to the supplier and pay off the remaining balance by loan from the bank. The retailer does not return money to the bank until the end of the inventory cycle.

Model Formulation

A constant production rate starts at $t=0$, and continues up to $t=t_1$ where the inventory level reaches the maximum level. Production then stops at $t=t_1$, and the inventory gradually depletes to zero at the end of the production cycle $t=T$ due to deterioration and consumption. Thereafter, during the time interval $(0,t_1)$, the system is subject to the effect of production, demand and deterioration. Then, the change in the inventory level can be described by the following differential equation:

$$\frac{dI_1(t)}{dt} + \alpha\beta t^{\beta-1} I_1(t) = P - D, \quad 0 \leq t \leq t_1 \tag{1}$$

with initial condition $I_1(0) = 0$.

On the other hand, in the time interval (t_1,T), the system is affected by the combined effect of demand and deterioration. Hence, the change in the inventory level is governed by the following differential equation:

$$\frac{dI_2(t)}{dt} + \alpha\beta t^{\beta-1} I_2(t) = -D, \quad t_1 \leq t \leq T. \tag{2}$$

with ending condition $I_2(T) = 0$.

The solution of the differential equation (1) and (2) are represented by

$$I_1(t) = (P-D)\left(t - \frac{\alpha\beta t^{\beta-1}}{\beta+1}\right), \quad 0 \leq t \leq t_1$$

$$I_2(t) = D\left(T - t - \alpha t^{\beta} T + \frac{\alpha T^{\beta+1}}{\beta+1} + \frac{\alpha\beta t^{\beta+1}}{\beta+1}\right), \tag{3}$$

$$t_1 \leq t \leq T$$

For the moment, the individual costs are now evaluated before they are grouped together.

(1) Annual ordering cost $= \frac{A}{T}$, (4)

(2) Annual stockholding cost (excluding interest charges)

$$HC = \frac{h}{T}\left[p\left(\frac{t_1^{\,2}}{2} \quad \frac{\alpha\beta t_1^{\,\beta+2}}{(\beta+1)(\beta+2)}\right) + D\left(\frac{\alpha\beta T^{\,\beta+2}}{(\beta+1)(\beta+2)} - \frac{\alpha t_1 T^{\,\beta+2}}{(\beta+1)} + \frac{\alpha t_1^{\,\beta+1} T}{(\beta+1)} - Tt_1 + \frac{T^2}{2}\right)\right] \quad (5)$$

(3) There are two cases to occur in cost of interest charges for the items kept in stock per year

Case I: $M \le T$

Interest payable per year $= \frac{cIpD}{T}(T-M)^2$ (6)

Case II: $M \ge T$

In this case, no interest charges are paid for the items kept in stock.

(4) There are two cases to occur in interest earned per year:

Case I: $M \le T$

Interest earned per year $= DIe\left(\frac{sT}{2} \; cM + \frac{cM^2}{T}\right)$. (7)

Case II: $M \ge T$

Interest earned per year $= DsIe\left(M \; \frac{T}{2}\right)$. (8)

(5) Annual cost due to deteriorated units

$$DC = \frac{c}{T}\left[p\left(t_1 \; \frac{\alpha\beta t_1^{\,\beta+1}}{\beta+1}\right) - D\left(T \; \frac{\alpha\beta t_1^{\,\beta+1}}{\beta+1}\right)\right] \quad (9)$$

Therefore, the total variable cost function per unit time TVC (T) is

$$TVC(T) = \begin{cases} TVC_1(T), & if \quad M \le T, \quad (a) \\ TVC_2(T), & if \quad 0 < T < M, \quad (b) \end{cases} \quad (10)$$

where

$$TVC_1(T) = \frac{A}{T} + \frac{h}{T}\left[p\left(\frac{k^2T^2}{2} - \frac{\alpha\beta k^{\beta+2}T^{\beta+2}}{(\beta+1)(\beta+2)}\right) + D\left(\frac{\alpha\beta T^{\beta+2}}{(\beta+1)(\beta+2)} - \frac{\alpha k T^{\beta+2}}{(\beta+1)} + \frac{\alpha k^{\beta} T^{\beta+1}}{(\beta+1)} - kT^2 + \frac{T^2}{2}\right)\right]$$

$$+ \frac{cIpD(T-M)^2}{T} - DIe\left(\frac{sT}{2} - cM + \frac{cM^2}{T}\right) + \frac{c}{T}\left[p\left(kT - \frac{\alpha\beta k^{\beta+1}T^{\beta+1}}{(\beta+1)}\right) - D\left(T - \frac{\alpha\beta k^{\beta+1}T^{\beta+1}}{(\beta+1)}\right)\right] \quad (11)$$

and

$$TVC_2(T) = \frac{A}{T} + \frac{h}{T}\left[p\left(\frac{kT^2}{2} - \frac{\alpha\beta k^{\beta+2}T^{\beta+2}}{(\beta+1)(\beta+2)}\right) + D\left(\frac{\alpha\beta T^{\beta+2}}{(\beta+1)(\beta+2)} - \frac{\alpha\beta k T^{\beta+2}}{(\beta+1)} + \frac{\alpha k^{\beta} T^{\beta+1}}{\beta+1} - kT^2 + \frac{T^2}{2}\right)\right.$$

$$\left. - DsIe\left(M \quad \frac{T}{2}\right) + \frac{c}{T}\left[p\left(kT - \frac{\alpha\beta k^{\beta+1}T^{\beta+1}}{(\beta+1)}\right) - D\left(T - \frac{\alpha\beta k^{\beta+1}T^{\beta+1}}{(\beta+1)}\right)\right]\right. \quad (12)$$

The objective in this paper is to find an optimal cycle time to minimize the total variable cost per unit time .For this, the optimal cycle time T_1^*, obtained by setting the derivative of equation. (11) with respect to T equal to 0, is the root of the following equation:

$$f_1(T) = -A - h\left[p\left(\frac{k^2T^2}{2} - \frac{\alpha\beta k^{\beta+2}T^{\beta+2}}{(\beta+2)(\beta+1)}\right) +\right.$$

$$\left[D\left(\frac{\alpha\beta T^{\beta+2}}{(\beta+2)(\beta+1)}-\frac{\alpha k T^{\beta+2}}{(\beta+1)}+\frac{\alpha k^{\beta} T^{\beta+1}}{(\beta+1)}-kT^{2}+\frac{T^{2}}{2}\right)\right]$$

$$+hT\left(p(k^{2}T-\frac{\alpha\beta k^{\beta+2}T^{\beta+1}}{(\beta+1)}\right)+$$

$$D\left(\frac{\alpha\beta T^{\beta+1}}{(\beta+1)}-\frac{\alpha(\beta+2)kT^{\beta+1}}{(\beta+1)}+\alpha k^{\beta}T^{\beta}-2kT+T\right)$$

$$+\frac{DsIe}{2}-c\left[p\left(kT-\frac{\alpha\beta k^{\beta+1}T^{\beta+1}}{(\beta+1)}\right)-D\left(T-\frac{\alpha\beta k^{\beta+1}T^{\beta+1}}{(\beta+1)}\right)\right]$$

$$+cT\left[p\left(k-\alpha\beta k^{\beta+1}T^{\beta}\right)-D\left(1-\alpha\beta k^{\beta+1}T^{\beta}\right)\right]=0$$

(15)

Then both $f(T)$ and $TVC_1(T)$ have the same sign and domain. We also have

$$f_2'(T)=hT\left[p\left(k^{2}-\alpha\beta k^{\beta+2}T^{\beta}\right)\right.$$

$$\left.+D\left(\alpha\beta T^{\beta}-\alpha k(\beta+2)T^{\beta}+\alpha k^{\beta}\beta T^{\beta-1}-2k+1\right)\right]$$

$$-cT\alpha\beta^{2}k^{\beta+2}T^{\beta-1}(p+D)$$

(16)

Numerical Examples:

In order to illustrate the above solution procedure, we consider the following examples.

Example 1.

Given an inventory system with the following parameter =1000 units/year, A=50units.

h=Rs4/unit/year,Ie=0.13/Rs/year,Ip=0.15/Rs/year,c=Rs5 /unit/ per order, S=Rs6/unit/per order α =. 00001, β =2,k=. 5,P=Rs 5000 per unit and M=0.0411years.Here we have taken M $\leq$ T, so the optimal value is T_1^* =. 16155 and t_1^* =. 080775 and the total annual relevant inventory cost $TVC_1^*(T)$ = 8237.645329.We can find various replenishment policies under different values of all the parameters, which are present in table-1.

Example 2

Given an inventory system with the following parameter=1000 units/year, A=50units h=Rs4/unit/ year,Ie=0.13/Rs/year,Ip=0.15/Rs/year, c=Rs5 /unit/ per order, S=Rs6/unit/per order =. 00001, =2, k=. 5, P= Rs.5000 per unit and M=0.0411years.Here we have taken T<M, so the optimal value is =. 131533 and =. 065767 and the total annual relevant inventory cost =8228.205089.We can find various replenishment policies under different values of all the parameters, which are present in table-2.

Table -1

Parameter A=50	% change in A	t_1^*	T_1^*	$TVC_1^*(T)$
	+10%	.084839	.169678	8275.482957
	+20%	.088698	.177397	8331.597031
	+30%	.092378	.184756	8346.196773
	+40%	.095898	.191797	8379.454310
	+50%	.099275	.198555	8411.512090
A	-10%	.076475	.152949	8197.819254
	-20%	.071896	.143791	8155.663527
	-30%	.066985	.13397	8110.732582
	-40%	.061669	.123338	8062.415277
	-50%	.055841	.111682	8009.837880

Parameter P=5000	% change in P	t_1^*	T_1^*	$TVC_1^*(T)$
	+10%	.075809	.151618	9517.487214
	+20%	.71643	.143287	10796.638192
	+30%	.068089	.136178	12075.074488
	+40%	.065011	.130023	13352.800255
	+50%	.062315	.124629	14629.836277
P	-10%	.086822	.173644	6957.194057
	-20%	.094378	.188756	5676.316285
	-30%	.104127	.208255	4395.384418
	-40%	.117208	.234417	3115.096302
	-50%	.135569	.271137	1836.627176

Parameter D=1000	% change in D	t_1^*	T_1^*	$TVC_1^*(T)$
	+10%	.082058	.164116	7742.646163
	+20%	.083463	.166926	7248.253265
	+30%	.0849221	.169843	6754.360958
	+40%	.086463	.172927	6261.070592
D	+50%	.088095	.176191	5768.439156
	-10%	.079534	.159069	8733.054063
	-20%	.078356	.156712	9228.883958
	-30%	.077235	.154471	9725.100488
	-40%	.076169	.152337	10221.671243
	-50%	.075152	.150304	10718.568256

Parameter c=5	% change in c	t_1^*	T_1^*	$TVC_1^*(T)$
	+10%	.081203	.162406	8997.247595
	+20%	.081641	.163282	9757.016906
	+30%	.082088	.164177	10516.957417
	+40%	.082546	.165092	11277.075570
c	+50%	.083014	.166028	12037.378179
	-10%	.080356	.160713	7478.203739
	-20%	.079947	.159894	6718.917047
	-30%	.079546	.159092	5959.779705
	-40%	.079154	.158308	5200.787695
	-50%	.078770	.15754	4441.935221

Parameter s=6	% change in s	t_1^*	T_1^*	$TVC_1^*(T)$
	+10%	.081639	.163277	8232.932014
	+20%	.082530	.165059	8228.204484
	+30%	.08344	.166898	8223.462474
	+40%	.084399	.168797	8218.706579
	+50%	.085380	.17076	8213.938211
s	-10%	.079938	.159876	8242.344440
	-20%	.079125	.15825	8247.026663
	-30%	.078336	.156672	8251.693765
	-40%	.077569	.155139	8256.344650
	-50%	.076825	.15365	8260.980010

Parameter h=4	% change in h	t_1^*	T_1^*	$TVC_1^*(T)$
	+10%	.075809	.151618	8267.487220
	+20%	.071643	.143287	8296.638202
	+30%	.068089	.136178	8325.074502
	+40%	.065011	.130023	8352.80027
h	+50%	.062315	.124629	8379.836296
	-10%	.086822	.173644	8207.194050
	-20%	.094378	.188756	8176.316268
	-30%	.104127	.208255	8145.384386
	-40%	.117208	.234417	8115.096249
	-50%	.135569	.271137	8086.6270

Parameter β=2	% change in β	t_1^*	T_1^*	$TVC_1^*(T)$
	+10%	.080775	.16155	8237.645306
	+20%	.080775	.16155	8237.645315
	+30%	.080775	.16155	8237.645320
	+40%	.080775	.16155	8237.645323
β	+50%	.080775	.16155	8237.645326
	-10%	.080775	.16155	8237.645273
	-20%	.080775	.16155	8237.645243
	-30%	.080775	.16155	8237.645200
	-40%	.080775	.16155	8237.645141
	-50%	.080775	.16155	8237.645067

Parameter α=.000001	% change in α	t_1^*	T_1^*	$TVC_1^*(T)$
	+10%	.080775	.16155	8237.645290
	+20%	.080775	.16155	8237.645286
	+30%	.080775	.16155	8237.645283
	+40%	.080775	.16155	8237.645279
α	+50%	.080775	.16155	8237.645275
	-10%	.080775	.16155	8237.645297
	-20%	.080775	.16155	8237.645300
	-30%	.080775	.16155	8237.645304
	-40%	.080775	.16155	8237.645308
	-50%	.080775	.16155	8237.645311

Parameter k-5	% change in k	t_1^*	T_1^*	$TVC_1^*(T)$
	+10%	.081934	.148971	9526.307307
	+20%	.082510	.137516	10819.444341
	+30%	.082707	.127241	12116.403002
k	+40%	.082663	.11809	13416.582663
	+50%	.082473	.109964	14719.465891
	-10%	.078751	.175002	6954.121413
	-20%	.075502	.188756	5676.316297
	-30%	.070642	.201833	4404.636583
	-40%	.063858	.212859	3139.245393
	-50%	.055077	.220308	1880.098117

Table-2

Parameter A=50	% change in A	t_2^*	T_2^*	$TVC_2^*(T)$
	+10%	.068976	.137953	8265.312653
	+20%	.072044	.144088	8330.768484
	+30%	.074985	.149971	8334.775287
	+40%	.077816	.155632	8367.497413
A	+50%	.080547	.161095	8399.070312
	-10%	.062392	.124784	8189.190896
	-20%	.058824	.117647	8147.941981
	-30%	.055024	.110049	8104.013739
	-40%	.050943	.101885	8056.839261
	-50%	.046504	.0930082	8005.529191

Parameter P=5000	% change in P	t_2^*	T_2^*	$TVC_2^*(T)$
	+10%	.063094	.126189	9510.406485
	+20%	.060723	.121447	10791.349528
	+30%	.058601	.117202	12071.171133
	+40%	.056687	.113373	13349.985055
	+50%	.054948	.109897	14627.887024
P	-10%	.068810	.13762	6944.578063
	-20%	.072319	.144639	5659.317421
	-30%	.076427	.152854	4372.159072
	-40%	.081325	.16265	3082.759032
	-50%	.087304	.174608	1790.654833

Parameter D=1000	% change in D	t_2^*	T_2^*	$TVC_2^*(T)$
	+10%	.065327	.130655	7730.111903
	+20%	.064897	.129794	7231.984791
	+30%	.064475	.128949	6733.824420
	+40%	.064061	.128121	6235.631435
D	+50%	.063655	.127309	5737.406460
	-10%	.066215	.13243	8726.263660
	-20%	.066672	.133345	9224.286904
	-30%	.067140	.13428	9722.274082
	-40%	.067617	.135234	10220.224432
	-50%	.068104	.136209	10718.137161

Parameter c=5	% change in c	t_2^*	T_2^*	$TVC_2^*(T)$
	+10%	.065767	.131533	8978.205086
	+20%	.065767	.131533	9728.205083
	+30%	.065767	.131533	10478.205077
	+40%	.065767	.131533	11228.205077
	+50%	.065767	.131533	11978.205074
c	-10%	.065767	.131533	7478.205092
	-20%	.065767	.131533	6728.205095
	-30%	.065767	.131533	5978.205097
	-40%	.065767	.131533	5228.205100
	-50%	.065767	.131533	4478.205103

Parameter s=6	% change in s	t_2^*	T_2^*	$TVC_2^*(T)$
	+10%	.065327	.130655	8230.111902
	+20%	.064897	.129794	8231.984788
	+30%	.064475	.128949	8233.824416
	+40%	.064061	.128121	8235.631430
	+50%	.063655	.127309	8237.406453
s	-10%	.066215	.13243	8226.263661
	-20%	.066672	.13334	8224.286906
	-30%	.067140	.13428	8222.274086
	-40%	.067617	.135234	8220.224437
	-50%	.068104	.136209	8218.137168

Parameter h=4	% change in h	t_2^*	T_2^*	$TVC_2^*(T)$
	+10%	.063094	.126189	8260.406489
	+20%	.060723	.121447	8291.349535
	+30%	.058601	.117202	8321.171143
	+40%	.056687	.113373	8349.985067
h	+50%	.054948	.109897	8377.887039
	-10%	.068810	.13762	8194.578059
	-20%	.072319	.144639	8159.317411
	-30%	.076427	.152854	8122.159055
	-40%	.081325	.16265	8082.759007
	-50%	.087304	.174608	8040.654796

Parameter β=2	% change in β	t_2^*	T_2^*	$TVC_2^*(T)$
	+10%	.065767	.131533	8228.205098
	+20%	.065767	.131533	8228.205104
	+30%	.065767	.131533	8228.205107
	+40%	.065767	.131533	8228.205109
β	+50%	.065767	.131533	8228.205111
	-10%	.065767	.131533	8228.205074
	-20%	.065767	.131533	8228.205051
	-30%	.065767	.131533	8228.205016
	-40%	.065767	.131533	8228.204967
	-50%	.065767	.131533	8228.204902
Parameter α=.000001	**% change in α**	t_2^*	T_2^*	$TVC_2^*(T)$
	+10%	.065767	.131533	8228.205086
	+20%	.065767	.131533	8228.205084
	+30%	.065767	.131533	8228.205082
	+40%.	.065767	.131533	8228.205079
	+50%	.065767	.131533	8228.205077
α	-10%	.065767	.131533	8228.205091
	-20%	.065767	.131533	8228.205094
	-30%	.065767	.131533	8228.205096
	-40%	.065767	.131533	8228.205098
	-50%	.065767	.131533	8228.205101
Parameter k-5	**% change in k**	t_2^*	T_2^*	$TVC_2^*(T)$
	+10%	.068589	.124708	9519.814779
	+20%	.070809	.118015	10815.290772
	+30%	.072536	.111594	12114.044633
k	+40%	.073869	.105527	13415.570574
	+50%	.074888	.0998503	14791.440827
	-10%	.062202	.138227	6941.129371
	-20%	.057856	.144639	5659.317427
	-30%	.052585	.150244	4383.524443
	-40%	.046402	.154672	3114.471190
	-50%	.039381	.157524	1852.764808

Sensitivity Analysis

On the basis of the results of table-1, the following observation can be made.

Increase in the value of ordering cost A and purchase cost c, increases the values of t_1^*, T_1^* and $TVC_1^*(T)$, decrease in the value of ordering cost A and purchase cost c, decreases the values of t_1^*, T_1^* and $TVC_1^*(T)$, Increase in the value of annual replenishment rate P and holding cost h, decreases the values of t_1^*, T_1^* and increases in $TVC_1^*(T)$ and decrease the value of annual replenishment rate P and holding cost h, increases the values of t_1^*, T_1^* and decreases in $TVC_1^*(T)$. Increase in the value of demand rate D and selling cost s, increases the values of t_1^*, T_1^* and decreases in $TVC_1^*(T)$ and decrease the value of demand rate D and selling cost s, decreases the values of t_1^*, T_1^* and increases in $TVC_1^*(T)$. Increase in the value of α and β, values of t_1^*, T_1^*, remain same. When α increases, $TVC_1^*(T)$ decreases and When α decreases, $TVC_1^*(T)$ increases. When β increases, $TVC_1^*(T)$ increases and When β decreases, $TVC_1^*(T)$ decreases. Increase in the value of k, increases the values of t_1^*, $TVC_1^*(T)$ and decreases in T_1^* and decrease in the value of k, decrease the values of t_1^*, $TVC_1^*(T)$, and increases in T_1^*.

On the basis of the results of table-2, the following observation can be made.

Increase in the value of ordering cost A, increases the values of t_2^*, T_2^* and $TVC_2^*(T)$, decrease in the value of ordering cost A, decreases the values of t_2^*, T_2^* and $TVC_2^*(T)$. Increase in the value of annual replenishment rate P and holding cost h, decreases the values of t_2^*, T_2^* and increases in t_2^*, T_2^* and decrease the value of annual replenishment rate P and holding cost h, increases the values of t_2^*, T_2^* and decreases in $TVC_2^*(T)$. Increase in the value of demand rate D, increases the values of t_2^*, T_2^* and $TVC_2^*(T)$ and decrease the value of demand rate D , decreases the values of t_2^*, T_2^* and $TVC_2^*(T)$. Increase in the value of α and β and the purchase cost c, values of t_2^*, T_2^* remain same. When α increases, $TVC_2^*(T)$ decreases and When α decreases, $TVC_2^*(T)$ increases. When β and purchase cost c increases, $TVC_2^*(T)$ increases and When β and purchase cost c decreases, $TVC_2^*(T)$ decreases. Increase in the value of k, increases the values of t_2^*, $TVC_2^*(T)$ and decreases in T_2^* and decrease in the value of k, decrease the values of t_2^*, $TVC_2^*(T)$ and increases in T_2^*. Increase in the value of selling cost s, decreases the values of t_2^*, T_2^* and increases $TVC_2^*(T)$ and decrease the value of selling cost s, increases the values of t_2^*, T_2^* and decreases $TVC_2^*(T)$.

Conclusion

This study presents a production inventory model for weibull deterioration items under permissible delay in payments. In this proposed model numerical examples shows that there a exist a optimal cycle time to minimize the total variable cost per unit time. Briefly, results in this study not only provide a valuable reference for decision makers in planning the production and controlling the inventory but also provide a useful model for many organizations that the use the decision rule to improve their total operation cost in real world. Finally, a future study will incorporate more realistic assumption in the proposed model such as variable deterioration rate, stochastic nature of demand and production rate which depends on the both on-hand inventory and demand.

Keywords: Inventory, Permissible delay in payments, Deterioration, Demand, Trade credit.

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Tourism:
Inexhaustible Revenue Source

Hory Sankar Mukerjee and Vedha Balaji

Tourism in India is the least discussed subject in the Indian planning scenario. Although the travel and tourism industry is growing at a very rapid pace across the world, here we have not been able to generate enough revenue, through this industry. The problems are very basic and addressable. Not only that, definite actions are not taken. It is the subject matter least discussed. It is also not that there is no attraction within our country. We are one of the countries in the world, wherein we have evidences from the earliest civilizations to modern day history. But the apathy is that we still have less than one percent of market share of world tourism and more Indians are heading towards offshore destinations for their holidays.

India is a land of beauty, art, culture, heritage, and people. It has been attracting the rich, poor, knowledge seekers, tourists, from the very early years. We also do have substantial evidence in history to prove that. Over the years India became the seat of power, intelligence, economic strength and it was the envy for all foreign rulers. Today the scenario has changed. We have lost to the foreign nationals in terms of tourism inflows. Our country was a source of attraction to the west from the medieval times and we have been at the pinnacle of success in all ages. There was a lot of glory that was attached to India.

This gives a great challenge to the country, because our economic backwardness can be removed through better tourism management. Tourism is an industry which is non-polluting and does require investment, not as high as other industries. However somewhere down the line we have lost focus in tourism, as this is one of the sectors which is concentrated the least in the governmental affairs. What is required in tourism is the willingness of the government, and "substance" within a country for people to enjoy. We have "substance" in plenty. No Indian would ever accept the fact that we have comparatively lesser number of destinations. What now is essentially required is aligning the strategies, and channelising the force to one direction for better prospects.

Mr.Hory Sankar Mukerjee, Faculty-Al-Ameen Institute of Management Studies, Hosur Road, Opposite to Lal Bagh Main Gate, Bangalore -560027, Email: hsm123in@yahoo.com

Ms.Vedha Balaji, Faculty-Al-Ameen Institute of Management Studies, Hosur Road, Opposite to Lal Bagh Main Gate, Bangalore -560027, Email: vedhabalaji@gmail.com

There has been a dramatic change in the way tourism is viewed today. Our holidays are not confined to the domestic destinations, but an increasing number of people are opting for overseas destinations. In India, the people moving out of the country for offshore destinations are huge in number. What surprises me that although we have a plethora of destinations to be seen and covered across India, but still the fascination have been towards global destinations?

But why is that fading off? There are serious concerns that we should have as many countries generate a lot of revenue from tourism activities which we are not being able to do. Tourism just requires resources and good planning for its success.

Our failure to create a global brand "India" does not lie in the fact that the governmental plans has been very insufficient for the tourism success, but in the fact that our people has lost their faith in the brand called "India." We look into tourism as a means of earning quick revenue, rather than treating it as a service industry, where the objective is to "spread the word of mouth" and create "repeat visitors."

This article looks into the current scenario in Indian tourism and how should we brand India.. What is it that we need to do, to create a global tourism brand "India"?

Where are we in Tourism?

If we see the tables below, we would see that the revenue generation through tourism is very dismal. Our percentage share of the total world tourism is dismally low. South Asia as a percentage of the total tourist flows accounts for about 1.2 per cent. India's share to world tourist flows is less than one per cent. Does not this call for tremendous improvements? We are however quite large spenders in tourism, but still it has not been able to generate us the required returns. Countries spending less than us have better tourist inflows than us. All the south Asian nations have a higher inflow than India.

As per the World tourism Organisation reports "Asia and the Pacific recorded another strong year in 2005, with growth averaging eight per cent, following the exceptional post-SARS rebound in 2004 (+27 per cent). The 2005 results are impressive, not only coming immediately after such a strong performance the previous year, but more significantly even as the region was still suffering the lingering impact of December 2004's Indian Ocean tsunami and seaquake, which dealt a severe blow to tourism in the Maldives and also seriously affected the other destinations involved – Sri Lanka, Thailand and Indonesia. Although it certainly weakened growth, South and South-East Asia still both advanced by five per cent. The most successful subregion in 2005 was North-East Asia, up ten per cent, while Oceania's arrivals increased by a more modest four per cent.

Table 1: International Tourism Expenditure (US $)

Rank	Countries	2004	2005	Inc %	Popln 2004
1	Germany	71	72.7	2.4	82
2	United States	65.8	69.2	5.2	293
3	United Kingdom	56.5	59.6	5.5	60
4	Japan	38.2	37.5	-1.8	127
5	France	28.6	31.2	9.1	60
6	Italy	20.5	22.4	9.3	58
7	Netherlands	16.4	16.2	-1.2	16
8	Canada	15.9	18.4	15.7	33
9	Russia	15.7	17.8	13.4	144
10	China	19.1	21.8	14.1	1299
25	India	5.1	5.8	13.7	1065

Table 2: Share of Indian Tourism in the world

Year	World Tourist Arrivals (Millions)	Tourist Arrival to India (Millions)	Share of India in World Tourism (In %)
(1)	(2)	(3)	(4)
1995	550	2.12	0.39%
1996	597	2.29	0.38%
1997	618	2.37	0.38%
1998	627	2.36	0.38%
1999	652	2.48	0.38%
2000	687	2.65	0.39%
2001	684	2.54	0.37%
2002	703	2.38	0.34%
2003	694	2.73	0.39%
2004	763	3.46	0.45%
2005	808	3.92	0.49%

As at 19 October 2006, 40 destinations within the Asia Pacific region supplied year-to-date figures on international inbound arrivals and collectively they showed an increase of 4.3 per cent year-on year.

Sub-Region	Year		% Change
	2005	2006	
The Americas	48,730,753	48,874,704	0.3
South Asia	3,270,445	3,824,144	16.9
Northeast Asia	117,909,424	123,881,534	5.1
Southeast Asia	29,836,339	32,299,642	8.3
The Pacific	11,966,028	11,888,085	-0.7
Asia Pacific Grouping Total	**211,712,989**	**220,768,109**	**4.3**

Specifically by country/destination, the year-to-date results were:

Top Tier: > Ten per cent year-on year Growth

Country/Designation	Period	Year		% Change
		2005	2006	
Maldives	Jan-Sep	263,467	434,987	65.1
Vanuatu	Jan-Jul	66,789	87,541	31.1
Bhutan	Jan-Jul	5,882	7,546	28.3
Tonga	Jan-Mar	6,738	8,025	19.1
Thailand (air arrivals in Bangkok)	Jan-Sep	6,096,142	7,188,802	17.9
Cambodia	Jan-Jul	794,547	936,439	17.9
Macau SAR	Jan-Aug	12,321,130	14,146,971	14.8
Chile	Jan-May	929,560	1,062,839	14.3
India	Jan-Aug	2,454,352	2,785,328	13.5
Samoa	Jan-Aug	62,084	69,681	12.2
Sri Lanka	Jan-Aug	362,049	405,487	12.0
Hong Kong SAR	Jan-Aug	15,165,923	16,741,787	10.4
Myanmar	Jan-Sep	158,454	174,824	10.3
Lao (PDR)	Jan-Jun	552,863	608,073	10.0
Singapore	Jan-Aug	5,877,182	6,462,157	10.0

(Source: Pacific Asia Travel Association:http://www.pata.org/patasite/index.php?id=111)

In 2005, global Travel and Tourism activity (Total Demand) grew by 5.7 per cent on top of 2004's rebound of 6.9 per cent and for 2006 with Total Demand growing 4.6 per cent. It seems like Travel and Tourism is doing quite well considering the growing list of natural and man-made disasters it has had to contend with over the past few years as well as macroeconomic forces such as the increasing price of oil, which is making all forms of travel more expensive.

Demand

Encompassing all components of Travel and Tourism consumption, investment, government spending and exports is expected to grow 4.6 per cent (real terms) and total US$6.5 trillion in 2006. The ten-year annualized growth (2007-2016) forecast is 4.2 per cent per annum illustrating the outlook for strong long-term growth.

Visitor Exports

The continued strength of international tourism is expected to push Visitor Exports to nearly US$900 billion in 2006 or real growth of 6.5 per cent..

GDP

Travel and Tourism's contribution to the world economy is illustrated by the direct industry impact of 3.6 per cent of the total GDP.

Employment

The global Travel and Tourism industry is expected to produce 2.5 million new jobs in 2006 over its 2005 level to total 76.7 million jobs or 2.8 per cent of total world employment. The broader perspective of the Travel and Tourism economy (direct and indirect) is expected to create nearly 10 million new jobs for the world economy for a total of 234.3 million jobs dependent on Travel and Tourism or 8.7 per cent of total employment.

India has the potential to become the number one tourist destination in the world with the demand growing at 10.1 per cent per annum, the World Travel and Tourism Council (WTTC) has predicted. China spends more of its budget on tourism and rates fifth in receiving the largest tourist arrivals (31.2 million) after France, U.S., Spain and Italy. India gets only 2.6 million tourists on an average per annum.

The earlier setbacks in global tourism have strengthened the Department of Tourism's resolve to promote India's tourism through aggressive marketing strategies. The campaign under the banner of 'Incredible India' includes a wide ranging advertisement campaign in all prime print publications besides a global television campaign encompassing prominent English, French, German and Italian channels and an innovative online campaign on the world's most popular websites. The 'marketing mantra' for the Department of

India	INR (Billion)	% of Tot 2006	Growth*	INR (Billion)	% of Tot 2016	Growth**
Personal Travel and Tourism	935.4	3.8	6.9	2,857.1	4.0	6.7
Business Travel	260.8	-	8.3	822.1	-	7.0
Government Expenditures	41.2	1.0	7.7	119.0	1.0	6.1
Capital Investment	681.5	7.2	8.3	2,314.2	7.5	7.8
Visitor Exports	302.2	3.3	10.9	1,031.3	1.3	7.8
Other Exports	121.5	1.3	14.6	984.6	1.3	17.6
Travel and Tourism Demand	2,342.7	-	8.4	8,128.2	-	8.0
T&T Industry GDP	713.8	2.1	7.2	1,881.9	1.7	5.1
T&T Economy GDP	1,827.6	5.3	7.8	5,542.3	5.0	6.6
T&T Industry Employment	10,679.6	2.4	0.8	10,591.8	2.0	-0.1
T&T Economy Employment	24,349.2	5.4	1.4	27, 015.8	5.1	1.0

* 2006 real growth adjusted for inflation (%), ** 2007-2016 annualized real growth for inflation (%)

Source: WTTC (Adapted from http://www.indiainbusiness.nic.in/industry-infrastructure/service-sectors/tourism.htm)

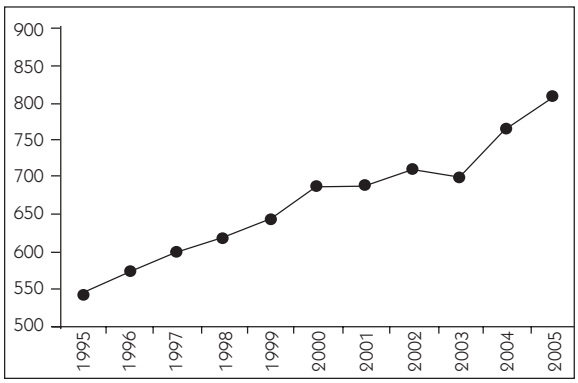
Tourism is to position India as a global brand to take advantage of the burgeoning global travel and trade and the vast untapped potential of India as a destination. Most of the Indian lands are still virgin, unexplored lands. However the above figures still remain dismal. The fact still remains we are way behind in tourism and can create tremendous opportunity for the people and the industry.

For 2006 the current pattern of gradually slowing growth is expected to continue. In cooperation with the Fundación Premio Arce of the Universidad Politécnica de Madrid a short-term forecast has been elaborated according to which international tourist arrivals worldwide are expected to grow between four to five per cent in 2006. Growth is projected to be around one percentage point lower than in 2005 but still somewhat above the forecast long-term annual growth rate of 4.1 per cent. This outlook is supported by the continued good shape of the world economy in most parts of the world and the improved prospects for the eurozone economies, in particular it's most important source market Germany.

Three major uncertainties remain for 2006. First, it is likely that terrorism will continue to be present. However, experience shows that its impact lately has been rather limited and short-lived. Travellers overall have assumed the risk and have been undeterred by external threats. Secondly, rising energy prices, inflation and interest rates might finally change the economic scenario. This has not been much of a problem until now, as the price hike has mostly been an expression of the strong economic growth and the corresponding demand for energy. Should this situation continue and affect economic growth in Asia, the tourism industry could start feeling the impact.

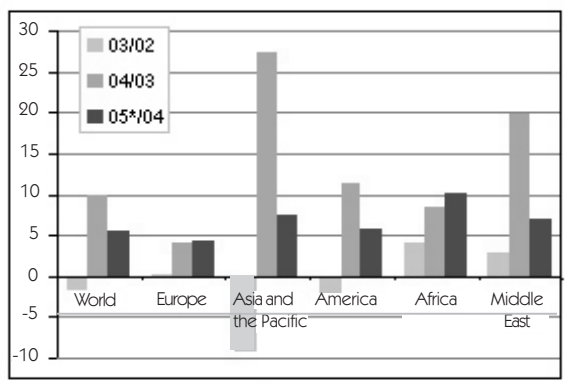
Finally, the further spread of avian flu could be a serious threat for the tourism sector. Avian flu has been present in the world for several years now and it is currently limited to birds and isolated cases of people living in very close contact with infected animals. As yet no transmission of the virus between humans has been detected and it is hard to say whether, when and where such a mutation will occur. For the moment there is no reason to change travel plans as long as recommendations issued by national and local health and veterinary authorities are respected.

World: Inbound Tourism
International Tourist Arrivals (million)



Source: World Tourism Organization (WTO) O

World and Regions: Inbound Tourism
International Tourist Arrivals **(change, %)**



Source: World Tourism Organization (WTO) O

Introspection into Indian Tourism- The Key Challenges

Although we are slow but still we are growing in tourism. There has been some interest that has been generated in brand India. However that is not enough. What is needed is a clear cut strategy and plan to market India as a tourism destination. However Indian tourism industry is posed with multiple challenges, which must be overcome before we look into the plan of action.

Marketing of tourism is highly specialised and Indian tourist operators and the government must take this up with due responsibility.

International Tourist Arrivals by (Subject) Region

	Full year											Average	Share	
	2000	2001	2002	2003	2004	2005*	03/02	04/03	05*/04	05*/04	05*/00	2000-2005*	2000	2005*
	abe.(million)						change (%)			abe.(million)		change (%)	(%)	
World	689	688	709	697	766	808	-1.7	10.0	5.5	42.3	119.2	3.2	100	100
Europe	396.2	395.8	407.4	408.0	425.6	443.8	0.3	4.2	4.3	18.3	47.7	2.3	57.5	54.9
Northern Europe	44.6	42.3	43.8	44.5	48.4	51.8	1.8	8.6	7.1	3.4	7.2	3.0	6.5	6.4
Western Europe	139.7	135.8	138.0	136.1	138.7	141.1	-1.4	1.9	1.7	2.3	1.4	0.2	20.3	17.5
Central/Eastern Europe	71.2	74.0	78.1	80.3	89.1	92.3	2.8	11.0	3.6	3.2	21.1	5.3	10.3	11.4
Southern/Mediteranean Europe	140.8	143.7	147.6	147.7	149.6	158.8	0.1	1.2	6.2	9.3	18.0	2.4	20.4	19.6
Asia and the Pacific	111.4	118.8	126.1	114.2	145.4	156.2	-9.4	27.3	7.4	10.8	44.8	7.0	16.2	19.3
North-East Asia	58.3	61.0	68.2	61.7	79.4	87.5	-9.6	28.6	10.2	8.1	29.2	8.5	8.5	10.8
South-East Asia	37.8	40.7	42.8	37.0	48.3	50.2	-13.6	30.3	4.1	2.0	12.5	5.9	5.5	6.2
Oceania	9.2	9.1	9.1	9.0	10.2	10.6	-0.9	12.4	3.9	0.4	1.3	2.7	1.3	1.3
South Asia	6.1	5.8	5.8	6.4	7.6	7.9	10.2	18.1	4.5	0.3	1.8	5.4	0.9	1.0
Americas	128.2	122.2	116.7	113.1	125.8	133.1	-3.1	11.2	5.8	7.3	4.9	0.8	18.6	16.5
North America	91.5	86.4	83.3	77.4	85.9	89.4	-7.1	10.9	4.1	3.5	-2.1	-0.5	13.3	11.1
Caribbean	17.1	16.8	16.0	17.0	18.2	19.2	6.5	6.7	5.4	1.0	2.1	2.3	2.5	2.4
Central America	4.3	4.4	4.7	4.9	5.8	6.6	4.2	17.8	13.6	0.8	2.2	8.6	0.6	0.8
South America	15.2	14.6	12.7	13.7	16.0	18.0	7.9	16.2	12.7	2.0	2.8	3.4	2.2	2.2
Africa	28.2	28.9	29.5	30.7	33.3	36.7	4.1	8.4	10.1	3.4	8.5	5.4	4.1	4.5
North Africa	10.2	10.7	10.4	11.1	12.8	13.6	6.6	15.5	6.1	0.8	3.4	5.9	1.5	1.7
Subsaharan Africa	18.0	18.2	19.1	19.6	20.5	23.1	2.8	4.5	12.6	2.6	5.1	5.2	2.6	2.9
Middle East	25.2	25.0	29.2	30.0	35.0	38.4	2.9	19.8	8.9	2.5	13.2	8.8	3.7	4.8

Source: world Tourism Organization (WTO) (Data as collected by WTO January 2006)

Foreign collaborations and entry into Indian markets should be encouraged. Also, at most of the tourist places clean and cheap hotels must be set up to cater to budget tourists. This is one of the biggest challenges to foreign tourists. Other infrastructural facilities, such as information kiosks, and reservation counters for rail, air and road transport need to be made available. In an article of "The Hindu," it is quoted that "the Government has been perfecting its role as a facilitator and catalyst. I am keen that we carry forward this spirit of cooperation through continuous consultation and dialogue with private players. Ultimately, the success of tourism depends on the receptiveness of the host community. People of each tourist locale have a role in tourism development. The perceived returns should be extended to the host community by procuring commodities from them, providing employment opportunities etc... ." This was said by Kerela tourism minister Kodiyeri Balakrishan.

Government has taken some steps towards developing this public private partnership. The Marketing Development Assistance Scheme (MDA), administered by the Ministry of Tourism, Government of India, provides financial support to approved tourism service providers (i.e. hoteliers, travel agents, tour operators, tourist transport operators etc., whose turnover include foreign exchange earnings also) for undertaking the following tourism promotional activities abroad:

(A) Sales-cum-study tour,

(B) Participation in fairs/exhibitions, and

(C) Publicity through printed material.

However such policies are very miniscule by its nature and how far does its success lie remains a very big question.

India today offers not only forests or heritage site, but modern and sophisticated facility. With India's acknowledged medical expertise, and advantages of costs, medical tourism is emerging a major area. New areas of tourism, which can provide better returns and societal developments, like rural tourism are not properly encouraged. We are a conservative culture. However we have also failed to become flamboyant when it comes to market ourselves. We have failed to market our set of expertise, to others.

The tourism industry is impacted by currency fluctuations. With the rupee getting stronger, it is feared that visitors bound for India

would wait. The government will also have lesser pie of the US dollars as taxes.

India has to do much to improve its tourism related infrastructure aggressively. Good infrastructure not only will aid economic growth, but also will aid growth in tourism. Offshore flights which are still a highly reserved sector in the Indian aviation industry should be left free. Faster coverage on land, facilities given to tourists will also need to be dramatically improved, which probably is in its worst stages today. Although India has progressed a lot, it is way behind the developed, even the developing countries. The development depends upon an integrated infrastructure of national and international highways, railways, ports, civil aviation, telecommunication, hotel accommodation and allied services.

As per a report of the United Nations on HRD requirements of the tourism sector in India, there are about 121 airports maintained by the Airport Authority of India and about 139 airports are maintained by state governments and other agencies, but only ten airports have runway lengths, over 10,000 feet. This includes the five international airports, although none have the latest Instrument Landing Systems (ILS) and other equipment to facilitate safe and secure landing in all weather conditions. The quality of maintenance and management of services at the airports also needs much improvement. A survey of 2,126 tourists showed that only 24.8 per cent of them found the airport facilities very good, 45 per cent considered them average and 30 per cent found them poor. International air seat capacity for India is about 5.3 million, which is just enough to cover the current level of passenger traffic. A number of tourist-generating countries do not have direct connections to India by air. International air seat capacity would have to be increased by at least two million in order to receive 3.2 million tourists by 2000. In the event that the target is five million tourists, an additional increase in air seat capacity by five million would require. The distance to India from the Americas and Europe is considered as a long haul, and this discourages tourists from these areas. The lack of air seat capacity further compounds the problem and blocks the increase in international tourists. While there is some expression of interest in an opensky policy, it has yet to happen in practice. Foreign airlines still do not have free access to India.

Another serious impediment to tourism in India is the scarcity and high cost of hotel accommodation. In 1997, the number of approved hotel rooms available was about 64,500 and about 36,000 rooms were under construction. Demand by 2000 is estimated to be 125,000 rooms, but there will be a shortfall of 27,000 hotel rooms. A report in The Hindustan Times on 10th June writes that "The Federation of Hotel and Restaurant Associations of India estimates that there are at present 97,000 hotel rooms in the country. It says if foreign-tourist arrival grows at eight to ten per cent over the next three years, India will need 30,000 additional rooms in various categories.

The Planning Commission estimates that India will need 1.6 lakh rooms more to accommodate the projected 58 lakh tourists by 2010, and three lakh rooms by 2020 to meet the projected tourist arrivals of 89 lakh.

The current growth of hotel rooms is less than 2,000 rooms a year, forcing hoteliers to double room tariffs in the past two years. Also owing to high land prices, there are more five-star hotels than budget hotels, making India a high-cost destination. Tarun Thakral, chief operating officer of Delhi-based Le Meridien hotel, says the land for hotel construction should be given on long-term lease as in countries like China and Malaysia."

The lack of accommodation during the tourist season is cited as a reason why tourists do not choose India as a holiday destination.

There is also a dire requirement of the government to look into the tax aspects of the hotel industry: high tax structures, burden on forex,and little choice to the hoteliers. Moreover double rates for room and discriminatory pricing for foreigners leave them to be treated with differentiation. Another thing that bugs me no end is the differential pricing scheme that they have for entry into tourist places in India. Atanu Dey (http://www.deeshaa.org/2004/12/13/) speaks on the issues of differential pricing. At the Golconda Fort, an Indian is charged Rs.5 (about $0.10) as entry fee but for foreigners it is Rs.100 (about $2.) It makes you wonder. Are the people who make up these schemes stupid or are they zenophobic or are they racist or all of the above? Surely, ripping foreigners off cannot amount to welcoming them. Besides, how do they enforce this sort of blatant discrimination? Technically I am a foreigner because I don't have an Indian passport anymore. So unless they ask people to produce passports, the only way for them to suspect that one is a foreigner is by the colour of their skin. Basically it boils down to this: if you don't look Indian, you are required to pony up 20 times what an Indian-looking person would pay to have the same privilege.

It is morally repugnant to discriminate against people, even if the discrimination is against those who are presumed rich. Not just

that, it is commercially short-sighted because people notice this sort of blatant double-standards and it affects the overall tourist traffic into the country.

Taxes — like luxury, service and transport tax — which total about 25 per cent do not help either. On one hand we say "Athithi Devo Bhava" on the other hand such practices would subdue the essence of the culture from which we originate.

Granting visa-on-arrival to the foreign tourists at the airports can certainly give a boost to the foreign tourist arrivals in the country. Visa-on-arrival for tourists from friendly countries, countries which do not pose a security threat to our country and is tourism generating markets. While countries like Malaysia, Thailand, and Sri Lanka have initiated visa-on-arrival scheme, a foreign tourist to India has to wait for a month to get an Indian visa. "If we do not implement a similar scheme foreign tourists with a South Asia itinerary will skip India," says Subash Goyal, president of the Indian Association of Tour Operators (The Hindustan Times).

Safety and security of the foreign tourists is a cause of great concern. There is a dire need of setting up a special force specifically for the tourists visiting the country. Deployment of Special Tourism Police Force can be an effective tool for ensuring safety and security of the tourists.

Areas like Lakshadweep and Andaman and Nicobar Islands have not been explored. Although it can generate huge foreign tourism traffics but still government permit required to visit these places have acted as a bottleneck. A study by Rajavel (1998) reports various problems which are deterrents in the expansion of tourism in the islands, like, most of the accommodations do not have proper catering facility, and some guest houses have canteen facilities but charge exorbitant prices for the meals. This problem is more acute in inter islands. There is a lack of accommodation in other islands. Most of lodges do not have laundry, protected drinking water, proper ventilation, lavatories, mosquito net and these lodges are in an unhygenic condition. Summers witness low rainfall and thus water scarcity. There are also parking problems, and narrow roads. There are also issues relating to environmental degradation. (From Sunita Reddy-Mega tourism in Andaman and Nicobar islands-Some concerns).

The action taken by the states is very poor. Poor website content, details regarding the individual states act as a barrier. If everything is left to the central government with no initiative from the respective state governments, the whole exercise is of waste. It seems only governments of Kerala and Rajasthan are interested in developing their tourism markets.

Two major challenges of India as a tourism destination is the lack of basic education amongst the people to handle tourists. Unnecessary harassment of Indian as well as foreign tourists leaves many of them with bad tastes, especially religious places. Cab drivers, rickshaw pullers, or the sales guy from the travels acts very roughly and does not have the basic consideration for the tourists. There is also no live forum where the tourists can discuss their travel information required on India. Atanu Dey (http://www.deeshaa.org/2004/12/13/) speaks on the issues of cleanliness at some of our heritage sites. It says something about the culture of the people and I am ashamed of the Indian acceptance of filth and squalor. I assume that at least some Indian tourists are put off by the filth and I suppose most foreign tourists find it unappealing as well, which would explain at least in part that India gets about three million tourists a year while neighbouring China gets about 60 million tourists.

The hotel and catering sector is now highly personalized. Customer satisfaction is the prerequisite for a smooth and successful operation in the hotel industry, requiring professionally trained and highly skilled personnel. According to estimates of requirements for additional hotel rooms, the number of personnel who will need formal training in the hospitality and catering sector would increase by about 400 a year, from 16,000 to 20,000 people a year by 2010. The existing training facilities currently produce only about 5,000 to 6,000 trained personnel a year.

Although we have progressed a lot, we are still way behind the developing countries. The development depends upon an integrated infrastructure of national and international highways, railways, ports, civil aviation, telecommunication, hotel accommodation and allied services.

Inadequacies of such infrastructural facilities have adversely affected our tourism industry. The sluggish growth arises from India's inability to sell effectively its rich tourist potential.

India should market itself as a value added destination stressing its variety and cost effectiveness. Satisfaction of the tourist, thereby ensuring repeat visits should be the top priority of the tourist industry. Apart from infrastructural development, the industry requires an environment of peace and stability where the tourist is sure of his safety and security.

Building the Brand "INDIA"- The Road Ahead

Every tourist destination in the world has a "brand image." The brand should be able to differentiate a destination from competing destinations. However some destinations do not have a brand strategy, and are supported by inconsistent advertising campaigns, creating a confused image to prospective customers. Image must be controlled by a clear projection of brand identity.

When consumers decide on a destination for a holiday or a business conference, several "brands" compete for their attention. A strong brand is differentiated from others, has several strong advantages when compared to others, and has an attractive appeal to consumers. In tourism, while factors such as cost of travel, convenience, and quality of facilities are important, the strongest motivator is "image." Image puts a destination on the consumer's "shopping list" and creates an emotional appeal, which enhances that destination's chances of being chosen over others. Every country has been able to create an image with lot of difference. China's dominant image and attraction was "culture." Malaysia was seen as "multicultural with many beaches." Thailand had a brand image of "exotic, fun, and friendly people."

Promotion campaigns affect the image as of a country as a tourist destination. If that image is unfocused or not clear, the destination will have difficulty competing with images created by competing countries. Advertising, PR and promotion must complement informal information obtained through word of mouth and personal recommendations, by either building upon the latter or correcting negative perceptions that may be incorrect.

Developing a strong image for any brand requires a carefully planned brand strategy based on:

1. A unique brand personality,
2. Correct positioning strategies,
3. Product development, and
4. Advertising and promotional activities.

The basic consumer needs must be understood. The success will only come across when consumers have a strong and favourable image about destination India and the consumers believe that it is different from the competing destinations.

Natural and Physical Environment Protection

If the Indian tourism industry is to attract and retain capital, the country must first pass this first test of physical environment and natural environment. The need to have a strong infrastructure is very basic need to get the fundamental structure in place. Destroying of the natural heritage, flora and fauna, has caused a very poor image amongst visitors.

The Need for more Hotels and Better Infrastructure

The infrastructure has always put us to shame specially safety, water, sanitation, roads, railways and airports, bus and railways. These are the major reasons why a tourist would not like to visit India. Planning months in advance also creates problem. Facilities are not provided to meet the travellers' needs. Hotels to suit all pockets, and products to satisfy all kinds of travellers should be available.

Focus on Customers, Products and Promotion

Customers – The challenge is to target new and emerging markets that can be targeted.

There are many other niche markets that could be offered, like medical tourism, adventure tourism, festival tourism, ecotourism, MICE, culinary tourism and rural tourism.

Promotion–The usage of the internet is at least in the Indian tourism industry. A simple experiment would do. Visit the site of Singapore tourism or Srilanka tourism board and compare it with the kind of Information that our web sites contain. We should have the right prices, words, images, movies, and sounds to put into both digital and traditional channels so that individual customers can assemble their experiences on line in real time.

Products- There is a split in the tourists: people who want to enjoy new experiences and who spend a lot on tourism, and tourists who have a relatively small budget but who still want to travel. The tourist industry will accordingly have to develop target group specific packages for both groups, to a greater extent than it now does.

Promoting Tourism starts from us

The practice of sound tourism starts from the people within India. The product needs to be promoted amongst the local people and it would generate the word of mouth that is necessary. It is also very essential that we as citizens believe in the product first, before we promote it to others.

We are too slow in our Tourism Policy- The Need of Good Planning

The first ever Tourism Policy was announced by the Government of India in November 1982. It took ten long years for the Government to feel the need to come up with a possible improvement over this. Thus the National Action Plan for Tourism was announced in May 1992. Between these two policy statements, various legislative and executive measures were brought about. It took ten years to make most of the States to fall in line and accord the same status within their legislative framework. This shows nothing but apathy. We have failed in planning and in the unnecessary delays caused due to multiple reasons.

(In) Security, Risks and Crisis in Tourism

A safe country with little or no political economic and social risk is always more preferred. Conflicts within India, international terrorism, new diseases and epidemics and the increasing number of natural disasters and extreme weather conditions have resulted in a current increase in attention to the need for security has hampered the tourism structure of the country. It is reasonable to assume that new security risks and crises will take on a new scale, because of the growing shift in wars from the state level to, for example, ethnic and religious armed conflict.

Tourism is one of the industries particularly affected by climate change and natural disasters, specifically because these ultimately lead to a change at different levels in the pattern of "most favoured" and "least favoured" tourist areas.

We must realign ourselves in the branding exercise that we do. Some of the steps enlisted here to the branding Indian tourism exercise would be helpful. They are:

- Tourism is a revenue-generating industry, non-polluting and investing money in developing it is quite necessary.
- Segment, targeting and positioning brand "India" to distinguish and to stand out from the competition. It is also essential to have a strong image with the brand.
- Study your customer; develop focused communication channels for reaching them.
- Building customer loyalty is important. Like any other service industry, repeat visitors and positive word of mouth is very essential.
- Educate the people. Treating visitors with respect and hard selling to tourists should be avoided. We require getting it right.
- Faster actions by the central and state governments shall be initiated.

Conclusion

The need for a successful brand of the country can only be built if there is sustained effort from the people and the government. It is very essential to understand that the success will depend upon the participation of the state, central and the local governments. The belief in the Indian destinations has to be increased amongst the citizens. The challenge is marketing to our people because we have not done that job to the very best. The dynamics of global tourism and the increasing demands from tourists also require realignment of our products. Flexibility in our policies, faster actions, better infrastructure, are essential for the Indian tourism industry.

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Work-Force Indexation: Kerala Scene

Rajagopal N. and Poornima Narayan R.

The study has made a comparative analysis of different types of workers such as cultivators, agricultural labourers, workers in household industry and other workers based on Census of India 2001. The states that have high and low ranks with respect to the different categories of workers were compared with Kerala. A workers' index has also been developed for an effective comparison of distribution and concentration of workers of states in India. The study gives some indication about the changing development equation of the state, Kerala i.e. a shift from a production-orientated society to consumer-oriented one.

The total population can be categorized into workers[1] and non-workers[2]. According to 2001 Census 39.10 per cent of the population are 'workers' and 60.90 per cent are 'non-workers.' All the main workers[3] and the marginal workers[4] have been classified under one or other of the four main categories of economic activity during 1981, 1991 and 2001 Census. They are cultivators, agricultural labourers, workers in household industry and other workers. A person is classified as a 'cultivator' if he or she is engaged in cultivation of land owned or held from government or held from private persons or institutions for payment in money, kind or share. 'Agricultural labourers' are those persons who work on other person's land for wages in money or kind or share. A 'household industry' is defined as an industry conducted by one or more members of the household at home or within the village in rural areas and only within the precincts of the house where the household lives in urban areas. A majority of workers in the household industry should consist of members of the household. It should be smaller in scale than a registered factory and should be engaged in manufacturing, processing, servicing or

Dr.Rajagopal N., Associate Professor - Economics, SCMS School of Technology and Management, Prathap Nagar, Muttom, Aluva-683 106, Ernakulam, Email: rajagopalraju@rediffmail.com

Dr.Poornima Narayan R., Asstistant Professor - Economics, SCMS School of Technology and Management, Prathap Nagar, Muttom, Aluva-683 106, Ernakulam, Email: purnimaraju@yahoo.co.in

repairing or making and selling of articles or goods. Mere selling of goods or articles is not considered as household industry. All workers who have been engaged in some economic activity during the last one-year, but are not cultivators or agricultural labourers or in household industry are 'other workers.' All government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trade, commerce, business, transport, banking, mining, construction, political or social work, priests, entertainment artists etc. will come under the category of other workers.

A comparison of the Census data of 1991 and 2001 shows that, when the total population increased by 21.20 per cent (from 837 million to 1,015 million), the number of workers increased by 27.20 per cent (from 314 million to 399 million). Corresponding increase in the total male population was 20.80 per cent and that of the male workers was 21.80 per cent. The most interesting finding when the comparison is made is that, when the total female population increased by 21.70 per cent between 1991 and 2001, the percentage increase in the female workers was 40.60 per cent. The shift in the labour distribution pattern – from the agricultural sector to the non-agricultural sector is quite evident from the above comparison. Of the four categories mentioned above, the 'agricultural labourers' category and the 'cultivators' category are directly linked with the agricultural sector. When the Census data for 1991 and 2001 are compared, one can observe that the share of workers in the agricultural sector decreased from about 67.00 per cent (39.71 per cent 'cultivators' and 27.34 per cent agricultural labourers) in 1991 to about 58.0 per cent (31.7 per cent cultivators and 26.5 agricultural labourers) in 2001. One striking feature is in the case of 'cultivators' - there is a decline in male workforce by 7.00 per cent. Out of the 85 million accretions in the total workforce the largest contribution of 63.00 per cent is from the category of 'other workers' followed by an addition of 25 per cent from the category of 'agricultural labourers,' 10.12 per cent from workers in the household industry and 1.7 per cent from the 'cultivators' side (Chart 1).

Over 10 years there has been significant improvement in the female workforce. In 1991, 22.30 per cent of the total female population was working, whereas in 2001 the corresponding figure is 25.60 per cent. However there is not much of a change in the male workforce (Chart 2).

This study is conducted in two sections. The first phase compares the actual distribution of different categories of workers—All India, Kerala and Tamil Nadu. The pattern of distribution of workers among the states in India and the comparative position of Kerala are considered. The selection of Tamil Nadu is considered for comparison, because its contribution of 'workers' to the total 'workers' of India is ahead (6.93%) the neighbouring state of Karnataka (5.85 per cent). In the second phase of this study, a 'workers' index' is computed to find out the position of different states according to the workers' categories.

Results and Discussions

Section I

According to the 2001 Census, the total number of workers in India is 402,234,724, of which 68.37 per cent are males and 31.63 per cent are females. Among the total workers, the contribution of 'other workers' tops with 37.60 per cent, followed by cultivators (31.70 per cent), agricultural workers (26.50 per cent) and household industry workers (4.20 per cent). Females dominate in all the categories of workers except in 'other workers' category. In the 'other workers' category there are 44.90 per cent male workers as against 21.7 per cent of females (Table 1).

Uttar Pradesh shares 13.42 per cent of the total workers in India, and remains at the top (Table 2). Sikkim has the lowest contribution of 0.07 per cent. The share of workers in Kerala is only 2.56 per cent of India's total labour force and that of nearby Tamil Nadu (6.93 per cent). The position of Kerala is 12th among the states in this regard.

Uttar Pradesh has also got the highest share of cultivators in India (17.41 per cent). Males dominate with 20.46 per cent of the total male cultivators in India. On the other hand, Goa has the lowest share of cultivators (0.04 per cent). Kerala's share of total cultivators is less than 0.57 per cent. Unlike the general trend, the share of male cultivators is higher than the female cultivators in Kerala. Tamil Nadu contributes 4.02 per cent (Table 3).

Andhra Pradesh has the largest share of agricultural workers in India and Sikkim the lowest (12.95 per cent and 8.09 per cent of the total agricultural workers respectively). The corresponding figure is 1.58 per cent for Kerala. It is interesting to note that contradictory to the all India picture, in Kerala male workers dominate in the agricultural sector. Tamil Nadu shares 8.09 per cent of the total agricultural workforce in India. Females outnumbered males in both Andhra Pradesh and Tamil Nadu. However, in this regard the share of male and female is 50:50 in Sikkim (Table 4).

Table 1: Distribution of Workers in India

Category	Total Workers	Cultivators	%	Agriculture Workers	%	Household Industry Workers	%	Other Workers	%
Persons	402,234,724	127,312,851	31.70	106,775,330	26.50	16,956,942	4.20	151,189,601	37.60
Male	275,014,476	85,426,498	31.10	57,329,100	20.80	8,744,183	3.20	123,524,695	44.90
Female	127,220,248	41,896,353	32.90	49,446,230	38.90	8,212,759	6.50	27,664,906	21.70

Source: Calculated from the Censes. Note: Percentages are the share of each category of workers in the total workers in India.

Table 2: Distribution of Total Workers

Category	Kerala	%	Uttar Pradesh	%	Sikkim	%	Tamil Nadu	%
Persons	10,283,887	2.56	53,983,824	13.42	263,043	.07	27,878,282	6.93
Male	7,765,645	2.82	40,981,558	14.90	165,716	.06	18,100,397	6.58
Female	2,518,242	1.98	13,002,266	10.22	97,327	.08	9,777,885	7.69

Source: Same as table 1. Note: Percentage represents the share of each category of workers in the total of the respective category of workers in India

Table 3: Distribution of Cultivators

Category	Kerala	%	Uttar Pradesh	%	Sikkim	%	Tamil Nadu	%
Persons	724,155	0.57	22,167,562	17.41	50,395	0.04	5,116,039	4.02
Male	602,038	0.70	17,479,887	20.46	25,708	0.03	3,262,489	3.82
Female	122,117	0.29	4,687,675	11.19	24,687	0.06	1,853,550	4.42

Source: Same as table 1. Note: Percentage represents the share of each category of workers in the total of the respective category of workers in India

Uttar Pradesh has the largest share of household industry workers among the states, and offers 17.88 per cent to the total 'workers in the household industry' category. The share is the lowest in Sikkim (0.02). Kerala's share comes to 2.18 per cent and nearby Tamil Nadu has a share of 8.84 per cent. In Tamil Nadu female workers dominate male (10.36 per cent female and 4.2 per cent male workforce in the sector). The male-female ratio is very wide in Uttar Pradesh compared to other states. Males constitute 22.26 per cent of the total male workforce and females constitute only 13.21 per cent of the total female workforce in the country (Table 5).

The distribution of 'other workers' in India shows that the percentage share of men is more than double compared to women (44.91 per cent and 21.71 per cent respectively). Maharashtra is dominant in this respect; its female workforce shares 10.03 per cent of the total female workforce in the 'other workers' category. The relevant figures are 9.73 per cent in Tamil Nadu and 6.06 per cent in Kerala. Sikkim shares only 0.07 per cent of the 'other workers' category. The corresponding shares of Maharashtra, Tamil Nadu and Kerala are 11.55 per cent, 8.35 per cent and 2.78 per cent respectively (Table 6).

The above results reveal that Uttar Pradesh has got the highest share of total workers in the country. The state dominates in cultivators and household industrial workers. On the other hand agriculture workers are predominant in Andhra Pradesh. The category of 'other workers' are found more in Maharashtra. The contribution of Sikkim is the lowest in India. In the case of cultivators, Goa shares the lowest percentage. The position of Kerala is not impressive even compared with Tamil Nadu in these respects. However it could be noticed that in Kerala the contribution of 'other workers' takes a lead. Section II explains the position of different categories of workers with 'workers index.'

Table 4: Distribution of Agricultural Labourers

Category	Kerala	%	Andhra Pradesh	%	Sikkim	%	Tamil Nadu	%
Persons	1,620,851	1.52	13,832,152	12.95	17,000	0.02	8,637,630	8.09
Male	1,078,354	1.88	6,453,741	11.26	8,762	0.02	4,256,360	7.42
Female	542,497	1.10	7,378,411	14.92	8,238	0.02	4,381,270	8.86

Source: Same as table 1. Note: Percentage represents the share of each category of workers in the total of the respective category of workers in India.

Table 5: Distribution of Household Industry Workers

Category	Kerala	%	Uttar Pradesh	%	Sikkim	%	Tamil Nadu	%
Persons	369,667	2.18	3,031,164	17.88	4219	0.02	1,499,761	8.84
Male	191,637	2.19	1,946,545	22.26	2849	0.03	648,589	7.42
Female	178,030	2.17	1,084,619	13.21	1370	0.02	851,172	10.36

Source: Same as table 1. Note: Percentage represents the share of each category of workers in the total of the respective category of workers in India.

Table 6: Distribution of Other Workers

Category	Kerala	%	Maharashtra	%	Sikkim	%	Tamil Nadu	%
Persons	4,199,374	2.78	17,455,496	11.55	110,566	0.07	12,624,852	8.35
Male	5,893,616	2.19	14,680,504	6.48	26,568	0.10	9,932,959	7.42
Female	1,675,598	6.06	2,774,992	10.03	83,998	0.03	2,691,893	9.73

Source: Same as table 1. Note: Percentage represents the share of each category of workers in the total of the respective category of workers in India.

Section II

Workers Index

A workers' index has been developed for a useful comparison of distribution and concentration of workers. For calculating workers' index for the 28 states[5], an intra-category comparison of the four categories of workers is made. This will help in positioning the different states according to their worker distribution and thereby locating the position of Kerala.

The study follows a mechanism to calculate index value (Iyengar et al, 1982) for total workers for the different states of India and compare the position of Kerala with the rest of India.

Let Xid represent the value of the i^{th} worker category in the d^{th} state (i=1, 2, 3.....m: d=1, 2, 3....., n)

$$\text{Index Value (Xid)} = \frac{Xid\text{-}Min\ (Xid)}{(Max\ (Xid)\text{-}Min\ (Xid)}$$

Where Min (Xid) and Max (Xid) are, respectively, the minimum and maximum (Xi1, Xi2, ...Xin). The composite index is the simple average of all the indices. The states are ranked in descending order based on the indices calculated. Uttar Pradesh gets the highest rank and Sikkim the lowest.

The workers' index shows that the state of Uttar Pradesh ranks first (Tables 7 and 8). However, the state is second in the case of 'other workers' and third in the case of 'household industrial workers.' On the other hand, Sikkim, which has the lowest workers' index, holds the lowest position for all categories except cultivators. In the case of cultivators Goa holds the lowest position. Kerala holds the 12^{th} position in the calculated index. Here the status of 'other workers' is comparatively favourable compared to other categories. The state holds 8^{th} position in the case of 'other workers.' The ranks in the categories of 'household industries' and 'agricultural labourers' are 13 and 14 respectively. The state fares badly with 20^{th} rank for 'cultivators.' The position of the neighbouring state of Tamil Nadu is much better compared to Kerala. The state ranks 5^{th} in the workers' index for the states. Except for the 'cultivators' category, the state's position falls on or below 5^{th} (5^{th} position for agricultural labourers and 4^{th} position for household industries and other workers). In the case of cultivators the state ranks ten. The index value shows that the position of Kerala is far below than Tamil Nadu in all the cases. Table 9 compares the index value of Kerala with the lowest and highest ranked states.

The scatter diagram clearly shows the distribution of the various states according to the workers' index. The performances of the states of Sikkim, Mizoram, Manipur, Arunachal Pradesh, Nagaland, Tripura, Meghalaya and Goa are comparatively low. The mediocre position of Kerala is also plotted clearly in Chart 3.

Distribution of Workers in Kerala

The share of Kerala's total workers (both male and female) in India is marginal at 2.56 per cent. This itself could be interpreted as the major reason for Kerala's economic backwardness. The share of cultivators, agricultural labourers and household industry workers are low compared to other states. The distribution of the workforce among the four categories in Kerala reveals that 'other workers' emerge as the major segment, 62.00 per cent (Chart 4). Agricultural workers contribute 23.00 per cent and cultivators 10.00 per cent. The household industrial workers share only a marginal 5.00 per cent.

Table 7: Workers' Index

State	Cultivators	Agriculture labour	Workers in household industry	Other workers	Average Index
Jammu & Kashmir	0.069680	0.016606	0.076068	0.090565	0.063230
Himachal Pradesh	0.086108	0.005586	0.015957	0.044989	0.038160
Punjab	0.091091	0.106612	0.108872	0.295660	0.150559
Uttaranchal	0.068712	0.017566	0.022541	0.064643	0.043365
Haryana	0.134177	0.091336	0.069554	0.216508	0.127894
Rajasthan	0.591833	0.181447	0.222591	0.421697	0.354392
Uttar Pradesh	1.000000	0.968785	1.000000	0.880581	0.962342
Bihar	0.368186	0.970003	0.362149	0.297047	0.499346
Sikkim	0.003656	0.000000	0.000000	0.000000	0.000914
Arunachal Pradesh	0.010350	0.000133	0.000603	0.003929	0.003754
Nagaland	0.022537	0.001007	0.005832	0.007818	0.009298
Manipur	0.014889	0.006994	0.030625	0.014090	0.016650
Mizoram	0.009311	0.000708	0.000952	0.003827	0.003700
Tripura	0.011887	0.018757	0.010265	0.024461	0.016343
Meghalaya	0.018837	0.011197	0.005618	0.011511	0.011791
Assam	0.166404	0.090229	0.112553	0.235735	0.151230
West Bengal	0.253356	0.531732	0.716184	0.817655	0.579732
Jharkhand	0.173581	0.205159	0.140982	0.162970	0.170673
Orissa	0.189774	0.360626	0.230379	0.243160	0.255985
Chhattisgarh	0.192644	0.222535	0.064247	0.113470	0.148224
Madhya Pradesh	0.496787	0.534462	0.339978	0.358091	0.432329
Gujarat	0.260082	0.372392	0.140559	0.562178	0.333803
Maharashtra	0.531844	0.781625	0.358480	1.000000	0.667987
Andhra Pradesh	0.353080	1.000000	0.541102	0.660107	0.638572
Karnataka	0.308966	0.449502	0.315647	0.539279	0.403349
Goa	0.000000	0.001361	0.003478	0.017950	0.005697
Kerala	0.030463	0.116094	0.120732	0.430019	0.174327
Tamil Nadu	0.229037	0.623998	0.494076	0.721495	0.517152

Note: Index is calculated based on a standard formula as mentioned in the text.

Table 8: Ranking of Workers' Index

State	r1	r2	r3	r4	WI
Uttar Pradesh	1	3	1	2	1
Maharashtra	3	4	6	1	2
Andhra Pradesh	6	1	3	5	3
West Bengal	9	7	2	3	4
Tamil Nadu	10	5	4	4	5
Bihar	5	2	5	11	6
Madhya Pradesh	4	6	7	10	7
Karnataka	7	8	8	7	8
Rajasthan	2	13	10	9	9
Gujarat	8	9	12	6	10
Orissa	12	10	9	13	11
Kerala	**20**	**14**	**13**	**8**	**12**
Jharkhand	13	12	11	16	13
Assam	14	17	14	14	14
Punjab	16	15	15	12	15
Chhattisgarh	11	11	18	17	16
Haryana	15	16	17	15	17
Jammu & Kashmir	18	20	16	18	18
Uttaranchal	19	19	20	19	19
Himachal Pradesh	17	23	21	20	20
Manipur	23	22	19	23	21
Tripura	24	18	22	21	22
Meghalaya	22	21	24	24	23
Nagaland	21	25	23	25	24
Goa	28	24	25	22	25
Arunachal Pradesh	25	27	27	26	26
Mizoram	26	26	26	27	27
Sikkim	27	28	28	28	28

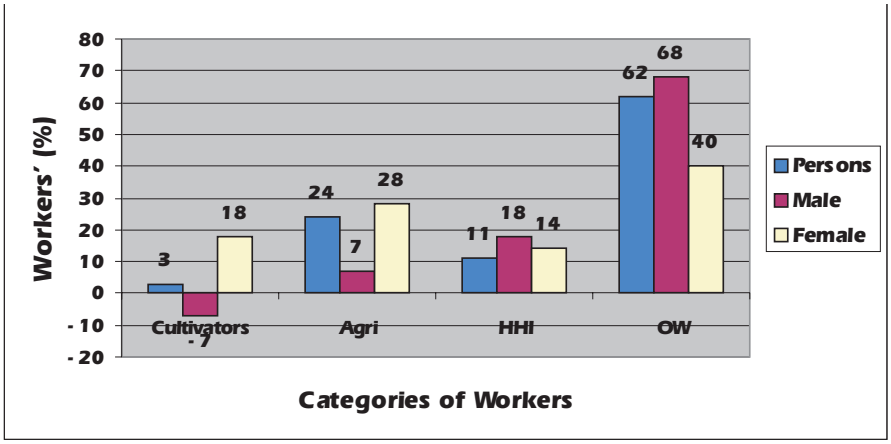
Source: Ranking is based on index numbers. r1 rank for cultivators; r2 rank for agriculture labourer; r3 workers in household industry; r4 for other workers; WI workers index.

Table 9: Summary of Workers' Index

	Cultivators	Agricultural Labourers	Workers in House-hold Industry	Other Workers
Highest	1.00 (UP)	1.00 (AP)	1.00 (UP)	1.00 (Maharastra)
Lowest	0.00 (Goa)	0.00 (Sikkim)	0.00 (Sikkim)	0.00 (Sikkim)
Kerala	0.03	0.12	0.12	0.43
Tamil Nadu	0.23	0.62	0.49	0.72

Source: Figures represent the index value corrected at two decimal.

Chart 1: Category and Sex-wise Distribution of Workers (1991-2001)



Source: Derived from census data of 1991 and 2001.

Chart 2: Sex-wise Distribution of Workforce 1991-2001

Source: Derived from census data of 1991 and 2001.

Chart 3: Mapping of States according to WI

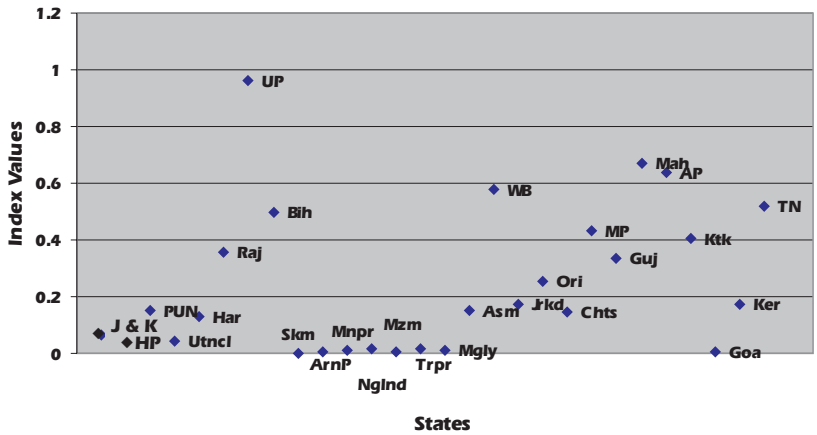
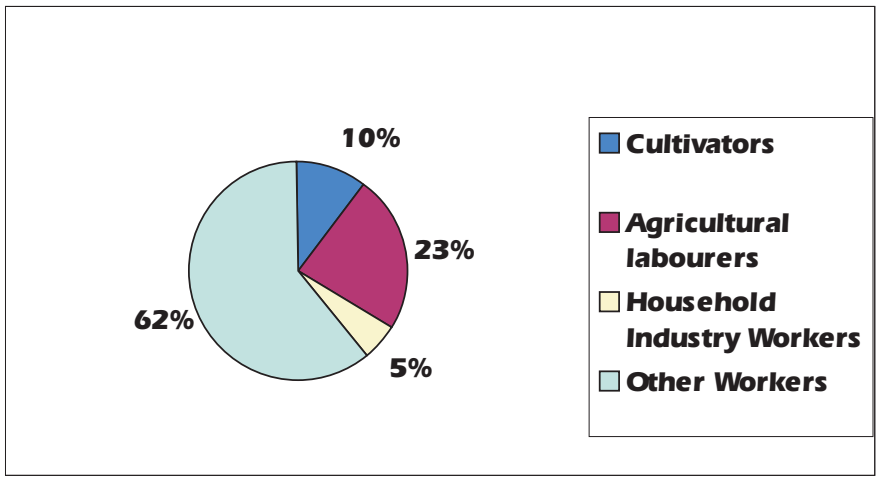


Chart 4: Distribution of Workers in Kerala - 2001



Source: Derived from Census data 2001

The rank of workers' index reflects the comparative position of Kerala in the workers' distribution in the country. Kerala gets 12th position in the index, which is much lower than the fifth position of the neighbouring state of Tamil Nadu. The comparative ranking of the various categories are 20 (cultivators), 14 (agricultural labourers), 13 (household industries) and 8 (other workers). This clearly proves that the state is not a primary producer and asserts that the development of the state mainly depends on the service sector (which includes all government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trade, commerce, business, transport, banking, mining, construction, political or social work, priests, entertainment artists etc). The pattern of Kerala's distribution of Kerala's workforce is skewed and is in favour of the skilled labour force of the state.

Conclusion

The percentage change of workforce over a decade (1991-2001) in Kerala was only 11.06 per cent. The contribution of female workers (6.76 per cent) to the total workers during this period represents only half of the contribution of male (12.46 per cent). The growth rate of agricultural workers and cultivators are found to be negative over the decade (-.31 and -.40). This is a clear indication that the development equation of the state is shifting very fast from a production-orientated society to a consumer-oriented one. This is an alarming situation where the state is forced to depend on other states even for basic consumption goods. The implication of this must be analysed deeply and intervention strategies must be planned.

Notes

1. Census of India defines 'work' as participation in any economically productive activity with or without compensation, wages or profit. All persons engaged in 'work' as defined above are 'workers.'
2. A person who had not participated in any economic activity even for a day during the last one year preceding the day of enumeration was considered as non-worker.
3. Those working for a period of six months or more during the reference period.
4. Those who had worked for less than six months during the reference period.
5. Union territories are not included in calculating the index.

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Six Sigma Process:
Quality Enhancement

Gunmala Suri and Puja Chhabra Sharma

Six Sigma incorporates a pivotal process to aggressively pursue a campaign that boosts customer satisfaction, increases capability, improves profitability and generates higher yields. Six Sigma involves use of statistical tools within a structured methodology for gaining the knowledge required to deliver better and cost effective services and products than the competition. A continually satisfied customer is a true foundation for profitability, bottom line results and global competitiveness. Six Sigma methodologies are practised at corporate business and support units to deliver better values in products and services in terms of size, schedule and quality. Researcher has attempted to find out how Six Sigma is implemented at Select IT Companies in India. Case studies of WIPRO, SATYAM and TATA CONSULTANCY SERVICES are presented.

Six Sigma (6σ) is a high performance and metric driven methodology conceptualized in early 80's for breakthrough improvements in processes and product designs leading to higher monetary benefits and customer delight. Six sigma success stories involve drastic improvements in bottom line by designing and monitoring everyday business activities that minimize waste and resources while increasing customer satisfaction. The methodology has been successfully implemented in many companies as diverse as Motorola, Allied Signal, Ford, General Electric, Honda, Sony, Texas Instruments and has become a way of life for others.

Six Sigma incorporates a pivotal process to aggressively pursue a campaign that boosts customer satisfaction, increases capability, improves profitability and generates higher yields. Six Sigma involves use of statistical tools within a structured methodology for gaining the knowledge required to deliver better and cost effective services and products than the competition. This quantified and objective process enables decision-making easier and faster. Repeated and consistent application of Six Sigma recreates the process so the defects and errors never arise in the first place. The list of tools and techniques encapsulated in Six Sigma may be largely familiar. The methodological framework into which they fit and the overall structure of a Six Sigma effort distinguishes it from other approaches.

Dr.Gunmala Suri, Faculty -University Business School, Panjab University, Chandigarh -160014, Email: g_suri@yahoo.com

Dr.Puja Chhabra Sharma, Faculty -Ansal Institute of Technology (AIT), Sector 55, Gurgaon, Haryana - 122003, India, Email: pujachhabra@yahoo.com

The term 'Sigma' (s) describes the variability in projects/processes and explains how often defects are likely to occur. A higher sigma quality level indicates a process that is less likely to create defects. A Six Sigma quality level is said to equate to 3.4 defects per million opportunities (DPMO). The reliance on performance metrics coupled with statistical analysis has made practitioners adopt Six Sigma over other quality tools/programs.

Six Sigma, as it evolved with time acquired multiple interpretations by practitioners. Precisely it is a disciplined and relentless pursuit for higher levels of quality, customer delight and lower levels of total cost.

Six Sigma core purpose is to leverage knowledge, information and technology to enhance human endeavour through an intelligent and relevant application of technology/knowledge in varied situations. In line with core purpose, companies have embraced Six Sigma into businesses to achieve heights of excellence and optimize strengths to achieve goals. World class companies believe that quality is a culture, expressed in the way we interact, identify and cater to the needs of clients, and in the products and services delivered to them. The primary focus is on 'Customer,' as a continually satisfied customer is a true foundation for profitability, bottom line results and global competitiveness. Six sigma methodology is practised at corporate business and support units to deliver better value in products and services in terms of size, schedule and quality.

To make a product defect-free, it is essential to target zero-variation and minimize the variation of a process. The main objective of quality management is to eliminate defects in every input, process and output. This is possible by controlling variations. The first step to do so is to make a measurement of variability of a process.

Every quality feature has its own unit of measure. Variability is measured statistically in terms of standard deviation and denoted by the Greek alphabet σ (Sigma).

The sigma value indicates how often defects are likely to occur. The higher the sigma value, less likely a process will produce defects. Consequently, product reliability improves as sigma increases and need for testing and inspection decreases. Cost and inventory reduces and profit and customer satisfaction go up.

The average product has a quality performance value of Four Sigma. Today, world-class companies have improved their business processes to a level of excellence, where they are able to have as few as 3.4 defects in a million opportunities to make defects. This is called the Six Sigma Quality. The Six Sigma strategy measures degree to which any business process has deviated from its goal.[1]

To explain the sigma concept, Table No.1 presents various levels of sigma capability and the implications of each level.

Table No.1 Levels of Six Sigma

Sigma	Defects Per Million	Cost of Poor Quality	Product Status
6- Sigma	3.40	<10% of sales	World class
5-Sigma	233.00	10-15% of sales	
4-Sigma	6,210.00	15-20% of sales	Industry average
3-Sigma	66,807.00	20-30% of sales	
2-Sigma	3,08,537.00	30-40% of sales	Non-competitive
1-Sigma	690,0000.00	40-50% of sales	

Practical Impact of Process Capability of Quality

Six Sigma is aimed at reducing defects at the breakthrough level through a disciplined and practical application of statistical methods by reducing variations. The application of Six Sigma begins with translating a practical problem into a statistical one. Statistics then helps in finding an optimal solution, which is implemented as a practical solution in a real life situation.

The main focus of Six Sigma, like most other quality initiatives, is the reduction of waste and cost, improvement in yields, increased capacity utilization, reduction in cycle time with an ultimate objective of satisfying customer needs.

Six Sigma breakthrough strategy involves a series of five basic steps that are specifically developed for making the above improvements. These steps are: Define Measure, Analyze, Improve, and Control. The implementation stresses effective leadership at the highest level of the company. When these five steps are completed for all the key processes within a business, breakthrough improvement occurs in profitability and customer satisfaction.[2]

Six Sigma quality programme combines the following key ingredients:

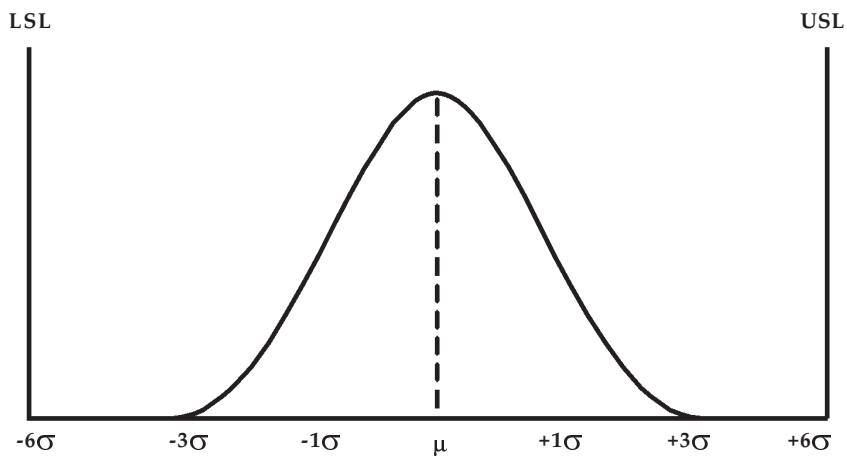
- A super ordinate goal of total customer satisfaction.
- Common and uniform quality metrics for all areas of business.
- Identical improvement rate goals for all areas of business, based on uniform metrics.
- Goal-directed incentives for both management and employees.
- Coordinated training in 'why' and 'how' to achieve the goal.

Review of Literature

In 1999, M. Harry and R. Schroeder published Six Sigma: The Breakthrough Management Strategy Revolutionizing the World's Top Corporation. Since then, there has been considerable interest in the subject.

According to James Harrington, "Six sigma was simply a TQM process that uses process capability analysis as a way of measuring progress. Sigma (σ) is the Greek symbol for statistical measurement of dispersion called standard deviation. It is the best measurement of process variability, because the smaller the deviation value, there is less variability in the process. Figure 1 shows a process that is normally distributed and centered with the upper and lower specification limits (USL and LSL) established at $\pm$ 6 σ. For this situation, 99.9999998 per cent of the products or services will be between specifications, and the non-conformance rate will be 0.002 parts per million, or 2.0 per billion. The situation diagrammed represents a process capability index (C_p) of 2.0 AC_p of 1.33 has been a de-facto standard.[3]

Figure - 1



None of the case studies in the literature have indicated a shift as great as 1.5σ. The automotive industry recognized the concept in the mid-1980's, evaluated it and deemed it unacceptable. In fact, the original work, Six Sigma was based on only a few empirical studies of a single process.[4]

The statistical aspects of Six Sigma tell us that we should reduce the process variability, σ, and try to keep the process centered on the target, μ_i. These concepts are not new. They have been long advocated by Shewhart, Deming, and Taguchi.

Harry and Schroeder use a methodology called DMAIC, which stands for define, measure, analyze, improve and control. This approach is somewhat similar but not as comprehensive as the seven phases of the problem-solving method. Their methodology features a breakthrough strategy using the project approach, which is similar to the same strategy advocated by Juran. Projects are identified by the amount of savings they can generate, which is simply good business sense and is one of the duties of quality council. Six Sigma has little to offer that is not already available through other approaches.[5]

The Harry and Schroeder approach, however, does introduce an infrastructure of trained personnel to ensure that projects have necessary resources to make improvements. A small group of individuals in the organization has a full-time job of making improvements. Competency levels of these individuals use Karate designations of Green Belts, Black Belts, and Master Black Belts. Green Belts are project leaders and have five days of classroom training. Black Belts help Green Belts define their projects, attend training with their Green Belts, and assist them with their projects after the training. Black Belts receive 160 hours of classroom instructions and one-on-one project coaching from Master Belts. Master Black Belts provide the technical leadership and much of the training for the programme.[6]

There are a number of problems associated with the Six Sigma methodology. It would be very difficult and not cost effective for a small business to develop the required infrastructure. Even a medium sized business would have difficulty paying for the high cost of the training. General Electric has spent over two billion dollars to develop their infrastructure.

In large companies, there is a great danger that the infrastructure will become a bureaucracy. At one flagship Six Sigma Company, a technical employee was admonished by a Black Belt for fixing several processes rather than turn them into Six Sigma projects. It is possible that operating personnel who know most about the process will be outside the improvement loop.[7]

According to Stamatis, Six Sigma presents absolutely nothing new to the quality field of defect prevention. It is little more than an old appraisal methodology that focuses on problems after they have already occurred.

Iomega, maker of Zip drives, began the implementation of its six-sigma program in 1998. The infrastructure of over 400 Master Black Belts, Black Belts, and Green Belts out of 3400 employees made impressive improvements. However, by May 2001, the company was losing money, the share price went from $4.00 to $1.75 and the CEO, a former General Electric Manager, was fired along with many employees. It should also be pointed out that Motorola, where the Six Sigma concept originated, has lost a considerable amount of market share of its wireless business and did not show a profit in 2001 for the first time in many years.[8]

Some experts believe that there is no real difference between Six Sigma and TQM. Six Sigma employs some of the same tried-and-true tools and techniques of TQM. Both Six Sigma and TQM emphasize importance of top down support and leadership. Both approaches make it clear that continuous improvement of quality is critical to long-term business success. The PDCA cycle used in TQM is not fundamentally different from the Six Sigma DMAIC cycle.

However, there are differences and critical differences. These differences explain why popularity of TQM has waned, while Six Sigma's popularity continues to grow.

The difference, in short, is management. TQM provides only very broad guidelines for management to follow. Guidelines are abstract and general that only the most gifted leaders are able to knit together a successful deployment strategy for TQM. Business magazines and newspapers reported widespread failure of TQM efforts. Research showed that organizations, which succeeded in successfully implementing TQM, reaped substantial rewards. The low probability of success deterred many organizations trying TQM. Instead, many organizations opted for ISO 9000. ISO 9000 promises not world-class performance levels, but 'standard' performance. It provides a clear criteria and a guarantee that meeting these criteria will result in recognition. In contrast, TQM offered a set of philosophical guidelines and no way to prove that one had accomplished quality goals.

Six Sigma was created by some of America's most gifted CEOs. People like Motorola's Bob Galvin, Allied Signal's Larry Bossidy, and GE's Jack Welch. These people had a single goal in mind: to make their business as successful as possible. Once they were convinced that the tools and techniques of the quality profession could help they developed a framework to make it happen, ie. Six Sigma.[9]

The CEOs could visualize the problems and evolved an approach that fixed them. Six Sigma addressed the following issues:-

1. Six Sigma extends to a use of the improvement tools to cost, cycle time and other business issues.
2. Six Sigma discards majority of the quality toolkit. It keeps a subset of tools that ranges from basic to the advanced. Six Sigma discards esoteric statistical tools and completely ignores such staples of quality professional as ISO 9000 and Malcolm Baldrige criteria. Training focuses on using tools to achieve tangible business results.
3. Six Sigma integrates goals of the organization as a whole into an improvement effort. Six Sigma creates top-level oversight to assure that interests of the entire organization are considered.
4. Six Sigma strives for world-class performance. Six Sigma standard is 3.4-DPM_failures per million opportunities. It goes beyond looking at errors. The best of the Six Sigma firms try to meet or exceed their customer's expectations 999,996.4 times out of every million encounters.
5. Six Sigma creates an infrastructure of change agents who are not employed in a quality department. These people work full and part-time on projects in their areas or in other areas. Six Sigma Black Belts do not make careers in Six Sigma. Instead, they focus on Six Sigma for two years and then continue their careers elsewhere. Green Belts work on Six Sigma projects while holding down other jobs. These subject matter experts are provided with training to give the skills they need to improve processes. Six Sigma 'belts' are not certified unless they demonstrate that they have effectively used the approach to benefit customers, shareholders and employees.

Methodology

A Six Sigma Project consists of the following phases:

Define: The product of process to be improved is identified. Customer needs are identified and translated into Critical to Quality characteristics (CTQs). The problem/goal statement, the project scope, team roles and milestones are developed. A high level process is mapped for the existing.

Measure: The key internal processes that influence the CTQs are identified and the defects generated relative to the identified CTQs are measured.

Analyze: The objective of this phase is to understand why defects are generated. Brainstorming and statistical tools are used to identify key variables that cause defects. The output of this phase is the explanation of the variables that are most likely to affect process variation.

Improve: The objective of this phase is to confirm the key variables and quantify the effect of these variables on the CTQs. It includes identifying the maximum acceptable range of the key variables, validating the measurement systems and modifying the existing process to stay within these ranges.

Control: The objective of this phase is to ensure that the modified process now enables the key variables to stay within the maximum acceptable ranges, using tools like Statistical Process Control (SPC) or simple checklists.

Six Sigma project on the improvement of product quality compliance, gives a better understanding of approach, methodology and benefits of Six Sigma.

Case Study- I

Six Sigma at WIPRO

In 1997, the Rs.3,468 crore Wipro Limited started implementing the Motorola developed Six Sigma process in its businesses ranging from toilet soaps to computer peripherals.[10]

Wipro has initiated more than 1,000 projects, trained more than 200 Black Belts and generated savings of approximately Rs.110 crore.

This was not achieved overnight. In the first year Wipro achieved no gains. Six Sigma has benefited Wipro across businesses. In its hardware business installation failures were brought down to one per cent from 4.5 per cent in the past. The instances of having to rework software dropped from twelve to five per cent. Productivity

in toilet soaps increased by 100 per cent and in the printers business by 50 per cent.

Most importantly, it has taken the Sigma level of the company to 5.1 Sigma from three Sigma over the past five years. This means the number of defects per million opportunities (DPMO) has dropped from more than 66,807 (which is the average of a company at the 3 Sigma level) to 233 DPMO.

This also worked at the customer end. The company provides the NAMP 3.0 software to a large Indian telecom services provider, software links, GSM networks to the Internet. When cell-phone users wanted to access a service like a cricket score update, the service provider's requirement was 30 pull per second.

When daily updates like weather had to be relayed to cell-phone users then the requirement was 30 pull and 30 push per second. Wipro claims to have managed to provide 38 pull per second and 45 push per second to the service provider.

Wipro also saves on the cost of poor quality. For an average company operating at Three Sigma, the cost of poor quality could be as high as 30 per cent of sales. For a Four Sigma company, it could be between 15 and 25 per cent and for a Five Sigma company between five and ten per cent of sales. As a company gets closer to Six Sigma levels, the cost of poor quality falls below one per cent. In Wipro's case, the cost of quality is on par with Six Sigma standards.

According to C.R.Nagaraj, corporate vice president, Mission: Quality, Wipro Limited, "When liberalization started in the early 1990s, Wipro was suddenly confronted with two challenges. First, competition came right up to their doorstep and the beginning of the software business boom made it seek clients abroad."

As a result, says Nagaraj, 'Customer focus became the key and so did the efficiencies of internal operations. The urge to differentiate ourselves and add value to the customer led us to embark on a quality journey.'

Wipro started offering Six Sigma consulting services to other companies. The company claims to have already bagged one major client and negotiations with more clients are in the final stages.

Unlike ERP, EVA, TQM and all the other management solutions that have at one time or the other raised in popularity, Six Sigma is harder to implement. Six Sigma is a much more rigorous methodology. Closely linked to business metrics, it produces breakthrough results by the use of statistics.

Wipro has one of the most mature Six Sigma programs in the industry ensuring that 91 per cent of projects are completed on schedule, much above the industry average of 55 per cent. Six Sigma provides tools for continuous improvement on existing processes thereby helping sustain the SEI-CMM Level 5 and CMMI certifications.

As the pioneers of Six Sigma in India, Wipro has put in more than five years into process improvement through Six Sigma. Along the way they have scaled Six Sigma ladder within Wipro, while helping to roll out 1000 projects. Wipro has built up a Six Sigma skill base of over 200 blacks belts. Wipro's Six Sigma consulting experience has peaked with indigenous development of new methodologies that go to their customers.

DSSS (Development of Six Sigma Software) Methodology

At Wipro, they employ DSSS methodology for software development. The methodology uses rigorous in-process metrics and cause analysis throughout software development life cycle for defect free deliveries and lower customer cost of application development.

- Six Sigma brings in customer focus, measuring all deliverables with respect to customer CTQs.
- Defect reduction (software defects reduced by 50 per cent) and cycle time reduction (rework in software down from twelve per cent to five per cent) leading to improved product quality.
- Waste elimination and increased productivity up to 35 per cent.
- Cost of failure avoidance (Installation failures down from 4.5 per cent to one per cent in hardware business).
- Tangible cost savings due to lower application development cost for customer.

Wipro is the first software services organization in the world to be assessed at SEI CMM level 5 – the highest maturity level for any

software process. Company achieved CMM level five certification in June, 1999. As part of CMM level 5 initiatives, their process capabilities focus on defect analysis; cause identification and defect prevention and technologies incorporation- tools, methods and process so as to facilitate continuous improvement in software quality and productivity.

Case Study –II
Organization

Satyam Computer Services Ltd. (Satyam) is a diverse end-to-end IT solutions provider, engaged in application development and maintenance, systems integration, and engineering services. Satyam specializes in providing customized IT solutions for industries in the areas of manufacturing, financial services, insurance, transportation, telecom, healthcare, power etc. Satyam is one of the first ten companies in the world achieving the Quality credential SEI CMM level five, in March 1999. Satyam is the first organization in the world, certified by BVQI, complying with ISO 9001:2000 International Standards, under the Tick IT scheme. Satyam has won the prestigious IMC Ramakrishna Bajaj National Quality Award for the year 2001. Satyam's core values emphasize a strong belief in people, pursuit of excellence, entrepreneurship and customer orientation.

Six Sigma initiatives are drawn from LIFE (Leading Initiatives for Excellence) model. It facilitates creation, integration and leadership of initiatives to achieve and sustain strategic and operational excellence. From a strategic perspective, Six Sigma Model for Business Support Process has been developed.

Six Sigma is defined as a methodology to achieve operational excellence and to delight three key dimensions of business-Customers, Investors and Employees. The vision statement of Six Sigma initiatives is:

Vision

To achieve operational excellence by monitoring and improving key business process through defect prevention and reduction in cost of poor quality.

Six-sigma initiative provides methodology for Quantitative Process Management.

Six-Sigma approach has several goals as listed below:-

- Delighting Employees, Investors and Customers.
- Metrics drive decisions and actions.
- Business units operate at their peak performance levels.
- Six Sigma skills are a pre-requisite for leadership positions.

Company has a strong foundation with synergistic combination of strategic planning, leadership and technology. All key systems and processes are compliant of ISO 9001: 2000, and key practices of SEI-CMM level five and people processes. These processes churn-out vital business performance metrics status and direction. This is an input for performance metrics indicating existing status and direction. This is also an input for performance excellence initiative - 'Measure and Lead.' Six Sigma methodologies reinforce this initiative in commitment towards delighting the three basic components-Customers, Investors and Employees.

Data-> Information-> knowledge->Actions

At SATYAM Six Sigma improvements are realized through continuous

- Measurement process performance through data
- Analysis to extract meaningful information
- Achievement of better process knowledge
- Initiation of positive actions to effect breakthrough improvements.

As part of integrating the best-in-class practices, Six Sigma methodologies is tailored to suit industry practices and is merged with optimizing and continuous improvement aspects of quality system. Six Sigma methodologies reinforce Measure and Lead paradigm. The model is unique that the project delight parameters (PDPs) are derived out of the expectations of three main stakeholders of business-Customers, Investors and Employees. The business support processes constantly meet the changing market requirements and must ensure value creation. The time taken for analysis and improvement of deficiencies or issues in a business support process influence the business results drastically. Business support processes are those processes, which enable value creation. They include visioning, payroll process, recruitment process, procurement, invoice and systems support. Business support processes are critical to business existence and to realize set objectives. Considering these merits, a unique model is developed and is supported by detailed step-by-step activities/tasks and respective tools and techniques for measuring and enabling decision-making.

Six Sigma Model for Business Support Processes

It is a continual improvement model developed with the perspective of business support processes. The methodology covered in this model, implements systematic data gathering and statistical analysis to pinpoint the sources of variation/error, thereby helping to draw plans to eliminate them. In pursuit of excellence, resource optimization and defect prevention forms the key for the continuous improvement. This is possible only by understanding variability in processes and determining the process capability. This is done to continuously reduce process variability by aligning the process/ product delight parameters with the customer targets. This model helps build the capability within the organization and not just limit itself to eliminating the product/service defects.

Six sigma projects are chosen with their bearing on customer feedback and potential cost savings. The model defines a methodology that is easy to implement and provides ample guidance to project teams applying Six Sigma. The model embodies the philosophy that centers on the themes of Employee-Investor-Customer needs, careful measurement of facts rather than opinions and fixing the process rather than the product-and also defines an implementation support system.

It improves ability of the team towards defining the process specifications meeting customer expectations and satisfying the investors and employees involved. Six sigma quality of 3.4 defects per million opportunities may not necessarily be the right goal for all business support process, for some, it may be too low while for others it may be too high.

It envisages identifying a problem precisely along with expectations setting the right project delight parameter (PDP) with targets, defining process variables and assuring measurement system capability; track the process base lining the PDPs; review process data to identify causal factors and problem's root cause; improve the process by establishing the solution matrix; validate results through new process sigma and control system to prevent problem recurrence; and execute the new process. The model incorporates clear exit criteria for each phase with decision points to ease the implementation process.

Rigorous implementation of the model makes quantum difference in, business outputs resulting in optimal use of resources with reduction in Cost of Poor Quality (COPQ) and improving customer satisfaction.

Phases of Six Sigma Business Process Model

- Identify : Project, Employees-Investor-Customer (E-I-C) involved and their needs and expectations.
- Set : Project Delight Parameters (PDP), Goals, Benefits and Cost
- Track : Frequency of defects and process variables
- Review : Process analysis and causal hypothesis
- Improve : Proposed solution to fix the process
- Validate : Pilot the solution and confirm results
- Execute : Sustainable benefits and integrate systems

In the model, the project team identifies the delight parameters that cover E-I-C's latent requirements; properties of a product/ service that are most essential to satisfying the E-I-C's expectations. The delight parameters should be at high-level having significant impact potential and not the trivia. Goals are set for these delight parameters and the main thrust is to control and reduce variations. The delight parameters are derived from the voice of E-I-C and the most relevant and critical ones are known as project delight parameters (PDPs).

Six Sigma Problems

Six Sigma is aimed towards improving both performance and design problems. It addresses all performance-related problems arising out of either non-compliance issues and/or improving efficiency of existing business support processes. While the model addresses process re-engineering problems as part of efficiency/productivity improvements, it is necessary to keep a balanced perspective towards the project time limitations, resources, management continued support and efforts towards change management.

Deployment Process

Projects with significant importance are identified and assigned to Black belts/Green Belts as six-sigma projects. Each six-sigma project is assigned a leader trained in six sigma methodology and respective tools and techniques. Senior Leadership is responsible for strategic plan and selecting potential Six Sigma project areas.

Companies need to have internal goals on number of people to be

trained in Green Belt (GB) and Black Belt (BB) aspect of Six sigma implementation and sponsorship criteria. The size and scope of projects and their duration are also defined.

Green Belt training on Six sigma methodology and requisite statistical and analytical tools is imparted to the selected employees. The training span is five days and conducted in two waves. In Course – I participants undergo a two-day training; they are exposed to concepts, advantages of Six Sigma and are introduced to the model with focus on the first three phases and the relevant tools and techniques. In Course - II advanced statistical concepts; statistical software and other phases are covered. The time gap between these two courses is maintained around six-eight weeks to enable participants initiate project work and act. Participants are encouraged to take-up two individual projects, where the project performance is reviewed on a regular basis. Six Sigma initiative group from Quality facilitates and periodically reviews these projects.

Upon successful completion training management recognizes efforts with certification.

Satyam has created a web site on Satyam Intranet where all the Six Sigma related information is made available for employees. Success stories and lessons learnt are highlight of this website, which to a larger extent work towards change management to push for quantitative process management and gain the buy-in from all employees.

A Balanced Perspective of Six Sigma at SATYAM Envisages:

- Six Sigma is not a universal answer to all business problems, and it is not an end in itself.
- It is not just a tool kit but is a methodology with problem solving approach.
- It is not a replacement for process knowledge.
- It can not be a substitute for human actions.

Action Points for going forward:

- Improve/re-engineer/simplify current processes to drive productivity and cost reductions.
- Incorporate quality standards and measurements in all process/project implementations.

Satyam began its Six Sigma deployment journey in year 2000. All Satyamites are playing a vital role in the success of this initiative. Business support processes are constantly revisited to produce higher levels of quality, as per the expectations of employees, investors and customer and reducing costs.

Case Study – III

TQM – The Six Sigma Way:

Six Sigma provides an effective mechanism to focus on customer requirements, through improvement of process quality. In the Global Engineering Development Center of TATA Consultancy Service (TCS-GEDC) at Chennai, India, Six Sigma projects are carried out with the objective of improving on time delivery, product quality and in-process quality.

This describes an application of the Six Sigma methodology comprising five phases-Define, Measure, Analyze, Improve and Control.

The Global Engineering Development Center of Tata Consultancy Services (TCS-GEDC) located at Chennai, India, has been executing projects for various businesses of General Electric Company (GE) since 1995. The project spans the areas of Engineering design, Computer Aided Design, Finite Element Analysis, Software Development for Engineering Management Solutions. TCS-GEDC has a number of initiatives in quality and process management and is on its journey to Level five of the Capability Maturity Model (CMM) enunciated by the software Engineering Institute of Carnegie Mellon University. TCS-GEDC's long association with GE has influenced it to adopt the Six Sigma approach for making disciplined and rigorous progress in quality improvement. TCS-GEDC learns and leverages from the experience of GE in the implementation of Six Sigma initiatives.

Six Sigma Quality quantitatively means that the average review process generates 3.4 defects per million units-where a unit can be anything ranging from a component to a line of code or an administrative form. This implies that nearly flawless execution of key processes is critical to achieve customer satisfaction and productivity growth.

The Six Sigma initiatives in TCS-GEDS started in 1995, and, since then, ten Six Sigma projects have been completed. These include Improvement of Schedule Compliance, Quality compliance,

Input Quality, Error Reduction, Cycle Time Reduction and Design Improvement.

Six Sigma Approach focuses on:

- Customer needs,
- Data-driven improvements, and
- The inputs of the process.

This results in:

- Reducing or eliminating defects,
- Reducing process variation, and
- Increasing process capability.

In this context, the customer requirements are:

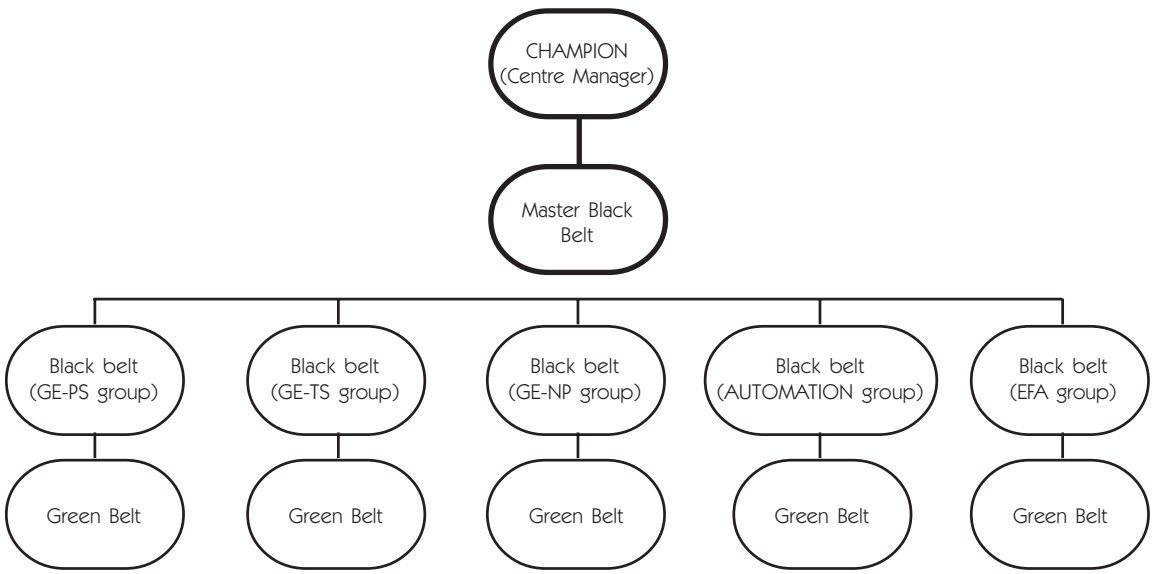
- On-Time Accurate and Complete Customer Deliverables,
- Customer Responsiveness, and
- Marketplace competitiveness.

To achieve these goals Six Sigma approach is adapted to pinpoint sources of error and ways eliminating them.

All employees are trained on Six Sigma Quality to increase their awareness, understanding, and the day-to-day use of Six Sigma tools and processes, and their application to projects.

Six Sigma projects are chosen, based on customer feedback and analysis of process metrics. Projects that have a significant customer impact and financial savings are given top priority.

Figure 2: Organization Structure for Six Sigma



To successfully execute these Six Sigma projects and organization structure as shown in Figure 2 has been formulated.

The criteria for a successful Six Sigma project at TCS is any one of the following:

- There is an improvement of one sigma in the process capability, if the project has started the process with less than one Sigma.
- There is a 50 per cent reduction in defects, if the process has started with more than three Sigma.
- There is a Return of Investment of 20 per cent.

Conclusion

Key highlights of Six Sigma program at WIPRO are:

- WIPRO is the first company in India to adopt the Six Sigma TQM methodology for continuous improvement and 'defect and cycle' time reduction.
- Six Sigma program spreads right across verticals and

impacts multiple areas such as project management, market development and resource utilization.
- They have over 4000 employees trained in Six Sigma with 150 certified black belts.

They have more than 500 on going Six Sigma projects and an expected financial return is ten per cent of PBT.

At SATYAM Six Sigma improvements are realized through continuous
- Measurement process performance through data,
- Analysis to extract meaningful information,
- Achievement of better process knowledge, and
- Initiation of positive actions to effect breakthrough improvements.

Six Sigma Initiatives at TCS started in 1995, and, since then, ten Six Sigma projects have been completed. These include Improvement of Schedule Compliance, Quality compliance, Input Quality, Error Reduction, Cycle Time Reduction and Design Improvement.

A thrust on Six Sigma Quality has helped in creating and sustaining customer focus in the TCS, leading to improved customer satisfaction as indicated in the feedback from the customers. At the same time, active participation of the team members from all levels in the Six Sigma projects has evolved a culture of effective and creative teamwork. The goal is to achieve Six Sigma level not only in product quality, which is currently at 5.85 Sigma, but also in other client specified metrics of on-time delivery and estimate compliance.

As part of integrating the best-in-class practices, Six Sigma methodologies are tailored to suit industry practices and are merged with optimizing and continuous improvement aspects of quality system. Six Sigma methodologies reinforce Measure and Lead paradigm. The model is unique that the Project Delight Parameters (PDPs) are derived out of the expectations of three main stakeholders of business-Customers, Investors and Employees. The business support processes constantly meet the changing market requirements and ensure value creation.

Six Sigma Quality quantitatively means that the average review process generates 3.4 defects per million units-where a unit can be anything ranging from a component to a line of code or an administrative form. This implies that nearly flawless execution of key processes is critical to achieve customer satisfaction and productivity growth and it will eventually result into following benefits:
- Defect reduction (software defects reduced by 50 per cent) and cycle time reduction (rework in software down from twelve per cent to five per cent) leading to improved product quality,
- Six Sigma bringing in customer focus, measuring all deliverables with respect to customer CTQs,
- Waste elimination and increased productivity up to 35 per cent,
- Cost of failure avoidance (Installation failures down from 4.5 per cent to one per cent in hardware business), and
- Tangible cost savings due to lower application development cost for customer.

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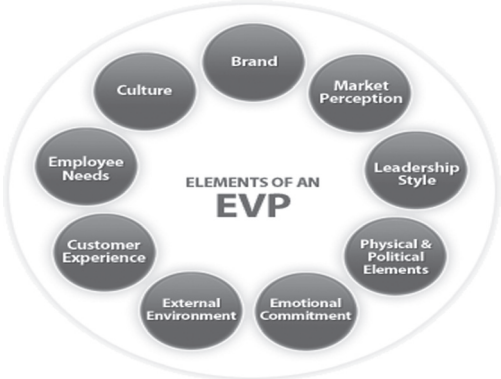
Possession:
Most Prized

Seema Bhatt and Mukesh Bhatt



With the advent of globalization, there has been a sea change in the working conditions in Indian organization. The old reality in which people needed companies has been replaced with the new reality where companies need people. With the rising attrition rate maintaining the correct talent pool has gained paramount importance in the IT/ITES sector. The new age "Generation Y," the hallmark of IT/ITES sector is techno savvy and highly aware of the market realities and the opportunity that they have. This has placed a heavy demand on the organizations that vie for the same talent pool. In order to succeed the organizations today have to attract and retain the key talent by offering unique and innovative employee proposition to its potential and present employees. Those organizations, that are able to evolve a culture that satisfies generation "Y," provide them a career path and align the current and the future programs around the EVP, will be able to win the war in which the talent is the most prized possession.

The globalization and the opening of the Indian economy in 1990s coupled with the favourable government policies have given a boost to India industry. India saw a phenomenal growth in the service sector especially in information technology. The development of computer and information technology is perhaps one of the most dominating factors in the ever-changing working life of today. The IT/ITES sector continues to record a strong growth rate. The NASSCOM-McKinsey Report 2006 states that the Indian IT industry is targeting exports worth US $60 billion by 2009-10. As per NASSCOM, Indian IT-ITES industry showed a record growth of 31 per cent to reach $29.6 billion, in FY 2005-06 with the domestic market revenues growing at 24 per cent. Indian IT software and services industry is poised to register a growth of around 25-28 per cent in FY 06-07. Also, the industry has recorded export revenues of US $23.6 billion in FY 2005-06, an increase of 33 per cent growth in exports from FY 2004-05, of which the export of IT software and services grew by 33 per cent to reach $13.3 billion, the export by ITES-BPO amounted to $6.2, engineering services and product exports reached $4 billion and the revenues from the domestic market amounted to $6 billion. This translates to an estimated demand of 43 lakh professionals (The Hindu, 2006). Thus there is a huge upsurge for the demand for the IT/ITES personnel. This

Ms.Seema Bhatt, Faculty-NIILM-Centre for Management Studies, NIILM-CMS B-II/66, Mohan Cooperative Industrial Estate, New Delhi-44, India, Email: seemabhatt11@gmail.com, sbhatt@niilm.com

Mr.Mukesh Bhatt, Manager-Transitions, Equinox Global Services (I-Flex Company), 3rd Floor, Infinity Towers A, DLF Phase-II, Gurgaon-122002, Harayana, Email: mukesh_bhatt@rediffmail.com

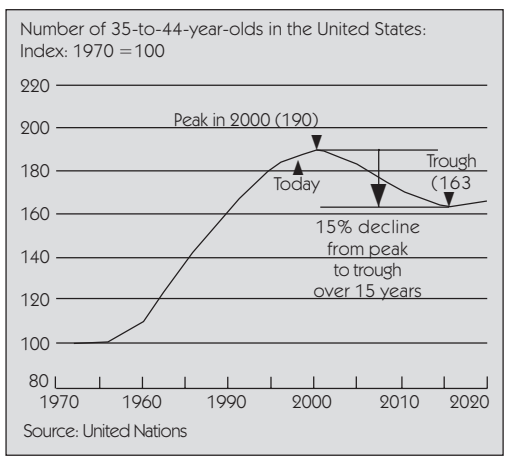
has cascaded into providing huge opportunity to the present generation. Between April 2006 and December 2006, IT industry's top five companies namely TCS, Infosys, Wipro, Satyam and HCL have stated an average top line growth of 40 per cent and average manpower growth of 28 per cent (Thanuja B.M, 2007). Yet, this industry is plagued by high attrition of with the average attrition rate of 30 per cent in the IT and 40 per cent in the ITES industry at the junior level. In call centres and BPO companies the attrition rate can reach to around 30-35 per cent. A large part of attrition is due to individuals moving to higher-level jobs in other companies (Runa Mukherjee, 2006).

This industry has emerged as one of the fastest growing industries and is being referred to as the sunshine industry. The human resource is seen as the biggest resource in this industry. As Narayana Murthy, Chairman and Chief Mentor of Infosys Technologies Limited has stated "Our assets walk out of the door each evening. We have to make sure that they come back the next morning." With high attrition rate this has become a mammoth task and has places a huge demand on HR.

Talent Shortage: An Alarming View

In USA until now, the executive population has grown roughly in line with GDP. This means that an economic growth rate of two per cent for 15 years would increase demand for executives by about a third. But *supply* is moving in the opposite direction: the number of 35 to 44 year-olds in the United States will decline by 15 per cent between 2000 and 2015 (Elizabeth et al, 1998).

Declining Supply of Future Executives



Source THE McKINSEY QUARTERLY 1998 NUMBER 3 Page No.47

India with 54 per cent of population under 24 years (Goyal, M. 2006) has large workforce, which is young and is poised to take advantage of this opportunity. But, with the rise in demand the shortage of talent is soon making its presence felt in India too. There has been a cut throat competition for the talent leading to a dynamic and volatile demand-supply equation which has resulted in the high attrition trends which is now no longer restricted to local or regional boundaries and has become a global phenomenon.

Early observations by AC Nielsen extracted from a regional CEO Vision Study, that Korn/Ferry has conducted in Asia Pacific show that 72 per cent of executives in India cite "gaining and retaining talent and people" as the main hurdle they will have to face in the next two years. 'The War for Talent' by Mckinsky goes on to explain how the old reality in which people need companies has been replaced by the new reality where companies need people. Today machines or capital or geography are no longer the competitive advantage rather its people and the talent that they possess which is becoming more and more scarce. According to a survey by Hewitt Associates (Leadership and Talent in Asia, (2004) pg.168) acquisition and retention of talent has the highest impact on the business results.

Organizations are fast realizing this change. They are trying to evolve so that employee views their organization as best place to work. The pay package has become more generous along with the other benefits. Organizations are emphasising on training and development and are imparting employees' necessary skills for development. Yet, attracting and retaining the employees is becoming difficult.

In recent years, there has been a paradigm shifts in the way human resource is viewed, in terms of its acquisition, maintenance, utilization, development and retention. The business process outsourcing (BPO) industry is facing the challenge of finding quality human resources given the current attrition rate of around 50 per cent. (www.bpoindia.org).

The New Age Workforce: Opportunities Galore

The present workforce in IT and ITES, is relatively younger comprising around 83 per cent of the workers which are below 30 years of age (Goyal, M. 2006). This younger generation is techno-savvy and is very much aware of market realities and the opportunities that they

have. They have high aspirations and expectations and coupled with a flexible mind-set about job and careers.

They are ready to take risk and relocate anywhere. They keep an eye on the market and are ready to face challenges, take risk and explore new opportunities.

Today's generation 'Y' employees are more self-aware want a workplace that promises to relate to them and their needs. In the winter 1998 issue of Organizational Dynamics, Hall and consultant Jonathan Moss said that employees now-a-days pursue a "protean career" rather than the "organizational career." The employees today want to manage their own careers and want to have a career choice based on their own self-direction. Job hopping for them have become an easy way of collecting experience and skills for enhancing their employability. Therefore the firms need to provide opportunities to the employees to enable them to develop skills and adaptability to enable to manage their own career. Those organizations that can make a strategic decision to proactively fulfill the needs of employees will become the dominant players.

This new age workforce has placed a heavy demand on the organizations that vie for the same talent pool. Organizations are today expected to analyze, conceptualize, innovate and implement relevant strategies for building the correct talent pool. There is a need for having an effective sensing mechanism, which can gauge the environment and conjure up mechanism that can attract and retain key talent in the organization. Attracting and retaining have become vital for the company's very survival and growth. For this they have to create a brand image for them to attract, inspire, cultivate and retain the employees amidst a cut throat competition for the talent. A properly constructed Employee Value Proposition will help organizations in acquiring and retaining the valuable talent.

Employee Value Proposition: A New Age Mantra

Nowadays, a lot of companies are adopting Employee Value Proposition (EVP). The term 'employee value proposition' is heavily used in recruitment circles to describe a job's full worth. But it's more than just a fancy word. It is a management style that tries to retain talent rather than repel it. "An Employee Value Proposition is the summation of everything the employees in the company experience and receive while they are a part of the organization; from the intrinsic satisfaction of the work, to the environment, leadership, colleagues and compensation. Employee Value Proposition is a combination of challenges, growth, prospects, self-dignity, job satisfaction and much more. It's about how well the company fulfills people's needs, expectations and dreams (Drue De Angelis, 2004). EVP is an employer's stated promise to the employees and delivery of which satisfies employee needs. It is a measurement of the balance created between what employee receives from the organization and in return for their performance on the job.

An EVP of any organization should be able to answer the five W's – 'Who,' 'What,' 'Where,' 'When' and 'Why.'

- Who describes the company, its brand, its position in market and the image of the organization.
- What' describes the various aspects of the job like job description, job responsibilities and reporting relationships?
- Where and when describes the location of the job and the timings.
- 'Why' answers the most important question as to why an individual should join this organization. It describes the unique, credible and compelling advantages or the promise of the employer to the employees over what its competitors are offering.

EVP establishes a two-way relationship between the organization and its employees. It is an understanding of employees' expectations and their key needs and of providing them with a career path helps them to face new challenges and opportunities. Nokia describes its EVP as "a concrete employment offering for each employee from the very first day onwards." It comprises Nokia's way and values, performance - based rewards, professional and personal growth and work life balance (David Pollitt, 2004).

According to Hewitt survey the key to successful Employer Branding is collaboration and contribution from other departments like Marketing and Corporate Communications. In TCS, which is focused on creating a global organization that is multi-cultural and diverse, a cross-functional team with communication, HR branding and logistic specialists, handles the Employer branding (HR Connect, 2006).

Employer Branding

With so much churn and war of the talent taking place, companies are now focusing on employer branding. Employer branding refers to the perception that present and potential employees have of the organization. Willingly or unwillingly every organization has an

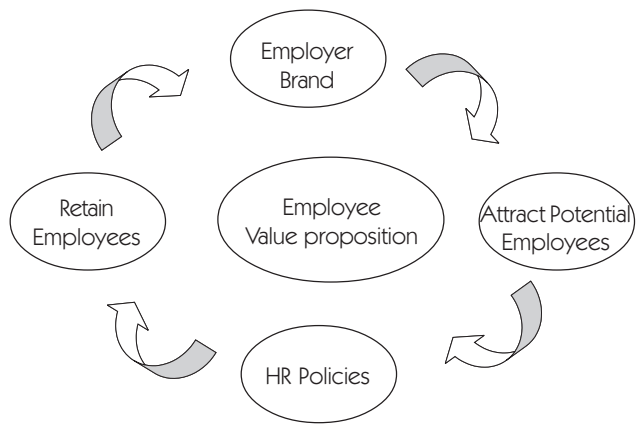
employment brand whether it is conscious of it or not. Employer branding presents a challenge to the organization to articulate, shape, manage and influence the perception of the brand in such a way as to attract and retain the right attitude, capabilities and talent of people that are essential for the success of the organization.

Companies that have strong brand image have the natural advantage to attracting and hiring the best employees as; there is always a sense of pride and social status attached to them. Especially in India where the decision to join an organization is influenced by socio-culture environment, peer group, family and friends. Yet, there is a need for the Employer Brand even when there is a strong Organization/Customer Brand present. Employer Branding Survey conducted by Hewitt Associates and Accor Services which covered a 105 small, medium and large IT/ITES organizations in India found that only 38 per cent of managers strongly agree that their organization has the right Employer Brand to attract the talent they need and 85 per cent of surveyed managers feel that Employer Branding will become more important in the future. This also results in communicating the EVP of the organization. One of the most effective ways for the organizations to create their Employer Brand is through the company website. On an average 25 per cent of employees apply to a company through the career website. In a few companies this percentage was higher than 75 per cent. However presently, only 25 per cent of organizations feel that their communication of employment information (employee benefits, workplace culture etc.) to potential recruits through the career website is very good (Employer Survey 2006, Hewitt Associates and Accor Services). Therefore, maintaining a career website can also become one of the importance aspects of employer branding.

Organizations need to realize that all interactions of potential or present employees with the organization result in developing an image of the organization in the mind of theses people. TCS has one of the lowest attrition rates which is below ten per cent and is a much sought after brand among potential employees. They have ensured that in TCS, Employer Brand is consistently communicated in all their external interactions. Some of them include the campus presentation, recruitment advertisements, client presentations, and organizing IT quiz concept for schools across the nation for students of 8th to 12th standard. They chose Quiz as medium to enhance the IT awareness and provide a window to the world of IT. The event has also helped them in brand building besides extending "IT for Schools" (HR Connect, 2006).

Along with the employee branding for potential employees, there should be an internal branding for the employees. Southwest created an internal tagline for the emotional part: "Freedom begins with me," to capture the personal commitment they want each employee to make to themselves, customers, and the company. Internal branding starts from the induction itself. During the induction, organization expectations regarding performance management, professionalism and other values expected from the employees should be communicated as well as inductees' expectations should also be captured. New employee should be introduced to the organization culture. At TCS the branding exercise is well connected with their internal processes. Their efforts at consistent branding message are communicated across the organization. This higher brand awareness is attracting talented people to the company, which is increasingly being recognized as the preferred employer in key world markets (HR Connect, 2006).

In fact, employer branding and attracting and retaining correct talent pool are the two sides of the same coin and aim to achieve the same purpose. Employer branding helps to attract the correct talent pool. For organization engaged in employer branding, its easier to get the requisite number and kind of employees but, with multiple job opportunities available retaining them becomes difficult. So, even if the employee joins an organization, he/she will not stay onboard until and unless he/she finds that the organization is catering to his/her needs. For having more satisfied employees and increased retention it is necessary that employees' perceive that they "get"



rewards equal to or exceeding what they "give." If a company ignores the employee's value, it will lose its most talented people. For this organization needs to have favourable HR policies that provide employee flexibility and growth and makes consistent efforts for retention of the talent. High retention rate helps to build a strong employer brand. Thus, a favourable employer branding is possible only when the organization is committed towards the welfare of the employees.

Culture

Organizational culture plays an important part in improving the perception of the company especially when there are a lot of fundamental changes taking place. EVP helps bridge the individual values and the culture of the organization. Today there is no dearth of free flow of information causing a phenomenal change in the organization culture. Culture is what bind the organization in a single thread and drives the organization and its actions. It conditions the employees to think, act, feel and bring in sense of belongingness to the organization. Some aspects of culture are visible and tangible and others are intangible and unconscious. A culture that is open, trusting, nurturing, authentic as well as empowering can make the difference in attracting and retaining top talent. With the emergence of new technology, networking and virtual organizations are becoming a reality leading to changes in the organizational structures. The workplace environment is changing with new management processes emerging and more and more employees opting for flexi-timing and flexibility in the work itself. IBM is offering this flexibility as a part of the value proposition for the employees. In IBM employees can start working in the technical services division, and later shift to software group or could potentially go into the business-consulting group (David Creelman, 2005).

Career Path

The employee should be able to see and visualize their career path and feel that the organization is investing and helping them gear for their future responsibilities. According to a survey of the HR heads of 22 IT companies conducted by HR Connect, 'Lack of career development opportunities' is one of the top three reasons for the talent to leave the organization (HR Connect, February 2006). Thus, an organization with inadequate career opportunities is not able to retain its talent and encourages employees to leave. The present generation 'X' will stay in the organization as that as long as they find it challenging and furthering their career goals. For them it's not disloyalty but the way of managing their career (Bova B. et al 2001). Therefore, the organization should be able to build and communicate career plan for each and every employee. The career paths that IBM offers are huge and there is opportunity to work on projects around the world, without necessarily having to travel. The organizations offer to their employees the opportunity to expertise in supporting solutions for the European financial sector and at the same time work on software solutions in their Asian market or in New York. It's has its unique and a very valuable proposition for the right people (David Creelman, 2005).

Aligning the current and the future people program: The Road Map EVP basically aims at aligning the current and the future people program around the proposition, which helps in creating reasons for an employee to join or stay in the organization. With attrition rate increasing there is a mammoth task for the HR manager to attract and retain the people needed and for this it is necessary to create and perpetually refine an employee value proposition (EVP) so that it explains to a smart, energetic and ambitious individual the benefits of working in the particular organization than with someone else. EVP involves information gathering mechanisms for understanding why people stay or leave and take suitable actions on it. This stronger employee value proposition translates into a stronger pull on talent. Developing the right EVP strategy will build the positive brand for the company. It also means creating innovative strategies to attract and retain strong performer. Managing and Creating an attractive EVP means to tailor the company's "brand" and the jobs to appeal to the specific talent pool it wants to attract, maintain and retain. According to Mckinsey, the following six characteristics make a 'great job.'

- Provide enough room for maneuvering to executives.
- Allow them to make decisions without seeking constant approval from above.
- Have a clear link between daily activities and business results.
- Provide opportunities and position that stretches the individual.
- Provide something new to work on as often as possible.
- Provide an atmosphere, which encourages colleagues to work with, above, around, and below.

If we talk about some best practices in the industry, TCS with its vision of being one among the global top 10 companies by 2010 has focused on creating a global organization. Their EVP includes world class training aimed at enhancing learning and development capabilities, right from the initial years as well as an opportunity to work across technology platforms, domains and various geographies opportunities. They provide an exposure to the international environments with their world-wide presence. They offer careers in more than five streams. Their reward and recognition program is a unique mix of monetary and non monetary benefits which tries to engage with the employees beyond the work space with initiatives like Maitree, which aims to create professionals with

a global mindset. Also ongoing engagement in the work and life space enables employees to have long term careers. In short the TCS employee brand stands for Global opportunities, world's best training ground and employee friendliness (HR Connect, June, 2006).

Conclusion

For having a robust EVP that can comprehend, conceptualize sustain and implement strategies that can attract, create and maintain the relevant talent pool it is necessary to first understand the present EVP which the organizations are offering. They need in-depth understanding of the complete package that they are offering. Second they need to understand the value drivers for their present or potential employees. Organizations need to know what exactly attracts candidates to the organization and the job. Also they need to know what part or attribute of the employment experience have the maximum impact on the present or the potential employees. They need to analyze what influences the employees the most. Is it the future promises of learning and growth, providing technical or business leadership, rewards or recognition or any other incentive. Sometimes, there can be discrepancies between HR professional or recruiter, in understanding the drivers that constitute the EVP. For this the HR manager has to get input from various stakeholder groups such as ex-employees, clients, suppliers and senior management team as well as current employees. This can help him to gain insights. Otherwise focus groups with a mix of participants both internal and external to the organization can be set up. This can be done either by HR Manager or any consultant. Thirdly after analyzing and understanding this gap between what is being offered and what drives the employees a new value proposition needs to be designed. After creating a new or a unique EVP organization needs to message it across the target audience. This message should be reinforced by the actions taken.

Creating an EVP is not enough. For ensuring that it is effective and serves the purpose, it is necessary to periodically review it. Instead of relying on standard questionnaires or other data, the organization needs to have its own data collected through a tailor-made questionnaire which emphasizes on organization's EVP. Creating a unique and effective EVP that revolves around the employees, taking care of their needs and aspirations and provides them with challenges and opportunity they want will help the organization in winning the war in which talent is the most prized possession.

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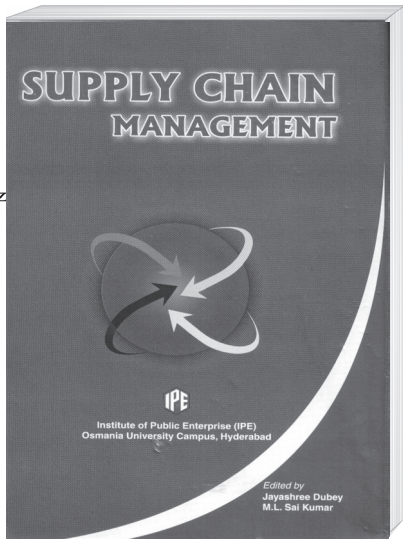
Skimming and Scanning



Book Title : ***SUPPLY CHAIN MANAGEMENT***
Edited by : **Jayashree Dubey and M.L.Sai Kumar**
Edition : **2007**
Price : **Rs.670/-**
ISBN : **81-7708-142-X**
Pages : **294**
Publisher : **New Century Publications, New Delhi.**

The book *Supply Chain Management* edited by Dubey and Sai Kumar, is a collection of articles on various dimensions of SCM, as varied a fare as can be compiled into a single volume. The book consists of 28 articles authored by different scholars, on topics starting from Basics of Supply Chain Management and ranging through different applications of SCM practices in various sectors such as food, finance, health care, pharmaceutical sector, Public Sector Enterprises, Government, and mobile industry and also includes interesting chapters on reverse/ green logistics, role of ethics and Value Stream Mapping. The chapters are not laid out in any particular sequence.

The bulk of the chapters naturally cover the general topics of SCM, viewed from different perspectives. Chapter 1 - "Basics of Supply Chain Management" is a useful reading which touches upon the elements of SCM, logistics integration and measurement of supply chain performance. Chapter 5, "Developing Supply Chain Competencies" stresses on the importance of SCM in the successes of businesses through a few live case illustrations of successful adoption of SCM practices. In Chapter 6, the authors touch upon the E-Choupal supply chain initiative of ITC and how it has benefited both the farmers and the company and how the company has successfully combined a social mission with a commercial venture. Chapter 7 – "Supply Chain Management Operations under Sales Tax/Value Added Tax" is perhaps an antiquated article, which focuses on the impact of VAT regime in Supply Chain Management, particularly with the then different status of implementation of VAT in various States.

Chapter 8, "Efficiency of Supply Chain: A Study of the Food Sector in India" is a relevant and useful article. In the introductory part of the paper, the authors highlight the significance of the food sector and also give a brief but useful insight in supply chain concepts such as Efficient Consumer Response (ECR), the Bullwhip Effect and Burbridge Effect. In the main part of the paper, the authors analyze various aspects of supply chains in food sector including the cold chain and conclude with a few illustrations of some leading supply chain players in the field in India. Chapter 13 - "Contemporary Issues in Supply Chain Management" gives out a brief but interesting genesis of the evolution of the concept of SCM and touches upon the contemporary issues in SCM, with an illustration of implementation of ERP solutions in Marico followed by a few examples of SCM initiatives in Mahindra and Mahindra, Whirlpool, Dell Computer Company and LG Electronics India. Chapter 14 - "Reinventing the Supply Chain" highlights the consequence of SCM on giving the ultimate value to the customer and describes how SCM can be re-engineered by disintegration of existing sub-processes and then restructured through business process reengineering, to be ultimately integrated to deliver maximum customer value. Chapter 15 – "Promotional Strategies of Mobile Telephone Services" gives out the application of Markov Brand Switching Model in assessing consumer behaviour with respect to competing mobile services providers offering promotions. The authors have also very wisely included the limitations of such models. Chapter 22 – "Outsourcing in Supply Chain Management" is a short but useful article on the 'whys' and 'hows' of outsourcing and includes the result of a survey conducted on the topic by the author. Chapter 23 –

"Supply Chain Management: An Integrated Approach" attempts to identify common supply chain performance areas and benefits of SCM, as well as explains the four major decision areas in SCM viz., location decisions, production decisions, inventory decisions and transportation decisions. Chapter 24 – "Technical Training of Employees and Supply Chain Management" discusses the effect of technical training on the capabilities of the employees, which considerably improves the supply chain management. The authors give out the results of a survey conducted by them on the subject.

A few chapters cover the Government, Public and Cooperative Enterprises. Chapter 16 is a study of the existing inventory control model in Hindustan Latex Ltd., a public sector enterprise which ends with recommendations albeit simple, to optimize inventory of their production processing materials such as chemicals and packing material. Equally simplistic is Chapter 19 "Supply Chain Management in Carpet Industry in Erode," which appears to be a straight and simple study of a localized industry. The chapter is characterized by poor drafting and editing. Chapter 21, "Government Procurement in Supply Chain Management" is a short chapter which touches cursorily on a few aspects of Government procurement, again concluding with a few remedies and a suggested code of ethics for Government service. Chapter 26 – "Logistics Management in Central Public Enterprises in India," is an analytical article which highlights the point that reduction in logistic costs in public enterprises can unlock huge resources for development. The author suggests that intensive application of e-commerce, elimination of red tape and delay in decision making, transparency and participative decision-making to bring about much higher rates of return.

The book incorporates a few chapters on health care and pharmaceuticals viz., Chapters 3, 10 and 12. Chapter 3 - "E Healthcare: Transforming Hospital Supply Chain" is an interesting article which emphasizes the role of internet in transforming healthcare, and expounds on the roles of E-Commerce and SCM in modern healthcare. Chapter 10 – "Radio Frequency Identification in Redefining the Global Pharma Value Chain," brings out the emergence of RFID in pharmaceutical supply chain management and brings out the benefits including its use as an anti-counterfeiting device. Chapter 12 "Supply Chain Management Practices in Pharmaceutical Industries" focuses on the SCM practices in vogue in the pharmaceutical companies of Hyderabad including the extent of outsourcing of SCM functions.

The chapters on IT in SCM are useful additions to the volume and enables the non IT reader to grasp the nuances of the least understood dimension of Supply Chain Management. Chapter 2 – "Supply Chain Management and ERP" gives a useful insight into the evolution of ERP and how it became important to SCM. It goes further in analyzing the aspects of reinforcing ERP in Supply Chain Management and extending ERP through logistics automation. Chapter 4 - "IT in Supply Chain Management" gives an in-depth understanding of the relationship between ERP and SCM. It also highlights the importance of supply chain collaboration through real time information sharing and illustrates the same through examples of the success of Wal-Mart - P & G collaboration. The author also covers briefly the emerging technologies such as RFID and concludes with the dictum that the battleground of the future is going to be e-enabled supply chain versus e-enabled supply chain instead battle between firms. Chapter 9 "E-Payments in E-Financial Supply Chain" is another useful chapter which gives insights into various dimensions of e-financial supply chain to include e-payments, electronic currency and e-payment mechanism. The author also highlights the fact that the major impediment to universal acceptance of e-payments is security concerns. Chapter 20 "Modern ERP Systems vis-à-vis Orientations In Modern Manufacturing and Operations" highlights the evolution pattern of modern industries from the past, lists out the 34 modern manufacturing systems and production modes proposed in the last decade or so and agent & agent based manufacturing. In the context of the foregoing, the author proposes few design changes including incorporation of artificial intelligence in the ERP systems of the future. Chapter 27 – "Role of E Business in Supply Chain Management" is another article which amplifies the potential of enhanced supply chain efficiencies through e-business. The author has expounded upon the benefits of e-business in supply chain related functions and has illustrated the same through examples of Federal Express, Dell and Amazon.com enhancing revenues through e-business and cost reduction opportunities there-in.

The book aptly covers the aspects of reverse logistics in Chapters 17 and 25. In Chapter 17 - "Green Logistics," the author presents an overview of *reverse logistics* from the perspective of ecology and environment. A fairly new and relevant concept, the author gives the reader a fresh perspective on 'returns,' undoubtedly, this will be more and more relevant in the years to come in Supply Chain Management. Chapter 25 – "Turning Returns Management into a Competitive Advantage" also touches upon current flaws in returns management and recommends

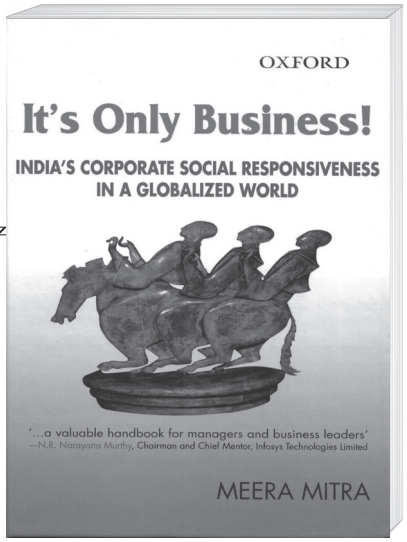
extensive use of web services for effective return management.

The varied fare that the volume offers includes a chapter: Chapter 11 – "Protein Photosynthesis Based on Bi-Mimetic Framework of Supply Chain Management" – a very interesting article (though a little complex for the lay reader) draws the parallel between the highly developed and sophisticated Supply Chain Management in nature and an ideal conventional SCM. The author very vividly illustrates the supply chain processes involved in protein biosynthesis process viz., its components, distribution networks, inventory management, warehousing, information flows, reliability, quality management, organization and packaging, logistics management and outsourcing. The author contends that the supply chain components observed in conventional supply chains when integrated with supply chain innovations noticed in protein biosynthesis process can lead to supply chain excellence. Chapter 18 "Role of ethics in Supply Chain Management" emphasizes the necessity of pursuing SCM through sound and proper value system. It covers the attributes of attitude, openness, integrity, understanding and empowerment. The last Chapter, Chapter 28 – "Value Stream Mapping as a Tool of Effective Supply Chain Management," illustrates the concept of value stream mapping in analyzing the current state, visualizing the desired future state and crystallizing the means to achieve the end desired future state. A live example of the Study carried out in KFCL (Karnataka Fertilizers and Chemicals Limited) has been covered in some detail concluding with viable recommendations.

Overall, the book is a useful addition to any library and will help to serve the stated objective of the editors in contributing to the existing body of literature available on SCM. The quality of the book however has been slightly marred by a couple of articles which could well have been omitted out. In parts, poor editing has left its marks and tables referred to in the articles have been edited out without removing the references to them (pages 156 and 252). Poor syntax marks a couple of chapters (Chapters 16 & 19).

Brig. Ashok Kumar M.C.
Head - Supply Chain
Reliance Retail Ltd.,
Cochin - 682019
E-mail: ashok.m.kumar@ril.com

Skimming and Scanning



Book Title	:	***It's Only Business!* India's Corporate Social Responsiveness in a Globalized World**
Author	:	**Meera Mitra**
Edition	:	**2007**
Price	:	**Rs.395/-**
ISBN	:	**0-19-568433-8**
Pages	:	**192**
Publisher	:	**Oxford University Press, New Delhi.**

The issue of Corporate Social Responsibility (CSR) has become a topic of intense discussion and debate in India of late. Post-liberalization, the private corporate sector has acquired a new-found status which has brought them to the forefront of the Indian economy. Business in India has become a major institution influencing every facet of life. This has also given rise to the growing expectations of the role the business can play in social development of the country. And corporate India has taken concrete and creative steps to respond to this expectation by the society. Meera Mitra's book narrates the current state of affairs on the corporate social responsibility front by having a serious look at how the corporate in India have been responding to what she terms as "market force of social expectation."

Ms.Mitra does this by briefly describing the various stages of evolution of CSR in India, liberally quoting from Vedas and Puranas to how the system operates in India today, an era of unprecedented euphoria of economic growth. She provides hands-on account of the practices of some of the companies like Wipro, Infosys, Hindustan Unilever, Companies in the Tata Group, Hewlett-Packard India etc.

The author goes through the philosophies and political aspects of the CSR, the historical backdrop of CSR in India, how some of the companies or groups have been proactive and doing a good job even beyond the statutory requirements, how the IT companies embarked on programs for using IT for preparing and managing change at grass root levels, how corporate look at doing business itself in a socially responsible way by embracing a market driven CSR making it more sustainable as against the conventional philanthropic approach through the role of government and the NGOs to what future holds for CSR in India.

The author goes into great detail the specific role the market plays and how a market orientation has been happening in the CSR scenario in India. As an example the author cites the proactive step taken by Ashok Leyland to be ahead of environmental legislation by introducing CNG (Compressed Natural Gas)-run buses as early as 1997 in the National Capital Region (NCR) to reduce vehicle emission levels which helped the company to be ahead of competition. Also dealt in greater detail is the role of NGOs play in a civil society to further the scope of CSR. Many corporate in India like NIIT, Wipro, Infosys etc have entered into working partnerships with NGOs to further the cause of CSR.

The author also discusses about the various codes and standards like Global Reporting Initiative (GRI), UN Global Compact, SA 8000 etc which provide corporate an opportunity to adhere to certain standards when it comes to CSR and its reporting and stakeholders to evaluate a company in terms of its execution of CSR. This provides

readers with necessary insight regarding the various guidelines and standards that are available in the area of CSR. Also dealt is the role played by industry chambers like FICCI, CII etc.

While the author has dealt with the CSR evolution and progress in India and with some of the specific issues in the BPO segment in a host country like India, it is felt that the author should have addressed some of the current issues causing serious concerns like outsourcing by developed economies from developing economies, dumping of waste by developed countries into developing nations on the pretext of helping those economies to grow and overuse of resources by developed countries and over-consumption by the rich leaving lesser resources available for the developing countries and lesser consumption opportunities for the less privileged. While the liberalization of and reforms in the economy are aimed more at bringing a market mechanism to the forefront, the pertinent question that needs to be addressed today is whether the market mechanism favours the corporations and the economically powerful, widening the already existing gap between the privileged and the underprivileged and CSR interventions can help in reducing or bridging the gap.

The author seems to be overwhelmed by the growth and contribution of IT to the economy and the role played by IT and IT companies in bringing about social changes by devoting maximum number of pages to the subject. While IT can be an enabler, CSR has been happening and still can happen devoid of IT. Tatas did their pioneering works on the CSR front when IT was not heard of. True, today IT industry hogs the limelight as one of the most profitable and top paying industry in India. It is only natural that the companies and those working there allocate the highest amounts towards the cause of CSR. And, may be matters of coincidence, the leadership of the industry has also shown serious inclination for CSR.

It was very shocking and astonishing to find a number of mistakes in the text like spelling mistakes, sentence construction mistakes, and wrong usages. For example, on page 65, a sentence reads like "A significant aspect of this programme was that it was closely watched and monitored results." On page 72 the mistake appears in the sentence. "This national alliance is led Prof.M.S.Swaminathan." Then on page 132 "plant" is given in place of 'planet'('The triple bottom-line refers to what is popularly called the "people, plant, and profit" approach…….'). A word "unbundelling" appears on page 133, which hopefully should have been "unbundling." Page 134 depicts one of the worst mistakes of using "peoples." And on the index page 189, the name of the company Hindustan Lever Limited is shown as "Hindustan Levers Limited." One wouldn't expect these kinds of mistakes in a book published by Oxford University Press. I wanted to point out these mistakes because the two earlier books by OUP (Governing The Modern Corporation by Roy C. Smith and Ingo Walter and Stock Market Capitalization and Corporate Governance by Lalita Som) which I read in the recent past also contained number of such mistakes.

Despite the shortcomings and mistakes, by and large a commendable effort has been taken by Ms.Mitra in dealing with the CSR issues in India in the current context. The crisp forward by Mr.Narayana Murthy will definitely kindle interest in the minds of discernible readers.

About the Author

Dr.Meera Mitra is an independent consultant working with corporate and development sectors. She has had the experience in teaching, research and consultancy both in India and abroad. She was involved in designing and managing numerous projects in different sectors like health, education, poverty alleviation and governance in different parts of the country in her capacity as Senior Director of ACORD (Agency for Cooperation and Research in Development). She was also actively involved in implementing a CSR Reporting for NTPC, and is currently involved in consultancy and research on the role of governance and labour in public sector reforms.

Prof.Satheesh Kumar T.N.
Faculty-ICFAI Business School,
Palarivattom, Kochi - 25,
Email: satheeshkumartn@rediffmail.com

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Title of Newspaper	:	*SCMS JOURNAL OF INDIAN MANAGEMENT*
Language (in which it is to be published)	:	English
Registration Number of the Newspaper	:	
Periodicity of the publication and the day on which it is published	:	Quarterly 1 January, 1 April, 1 July, and 1 October
Retailing Selling price of the Newspaper	:	Rs.1000/- (One Year Subscription)
Publisher's Name	:	Dr.G.P.C.Nayar
Nationality	:	Indian
Address	:	SCMS House, Alfia Nagar South Kalamassery, Cochin-682 022
Place of publication (with complete Postal address)	:	Prathap Nagar, Muttom Aluva-683 106, Ernakulam District, Kerala
Printer's Name	:	Mr.George P.A.
Nationality	:	Indian
Address	:	Jomini Nivas, Alexander Gardens Kalamassery, Cochin-683109
Name of the Printing Press (with complete address where printing is to be conducted)	:	Maptho Printings, Kalamassery, Cochin-683104
Editor's Name	:	Dr.D.Radhakrishnan Nair
Nationality	:	Indian
Address	:	25/74, Ambady, Kothamangalam-686 691, Ernakulam
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Phone: 91-484-262 3803 / 262 3804 / 262 3885 / 262 3887 Fax: 91-484-262 3855
Website: www.scmsgroup.org E-mail: editor@scmsgroup.org / scmseditorcochin@yahoo.com

SCMS
JOURNAL OF
INDIAN MANAGEMENT

VOLUME IV, NUMBER IV
OCTOBER - DECEMBER 2007

Listed in Cabell's Directory

ISSN 0973-3167

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E-mail: editor@scmsgroup.org / scmseditorcochin@yahoo.com
Website: www.scmsgroup.org

SCMS Journal of Indian Management
a quarterly publication
of
SCMS-COCHIN

Dates of Release: -

Number I	–	**January-March on 1 April**
Number II	–	**April-June on 1 July**
Number III	–	**July-September on 1 October**
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SCMS Journal of Indian Management Volume IV, Number IV, October - December 2007, Pages 1-125