Selected Readings on Sustainable DEVELOPMENT

Edited by
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TEERTHANKER MAHAVEER UNIVERSITY
MORADABAD

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Foreword

In the last half of the 20th century, twin issues of development and protection of environment emerged from the collective concerns and aspirations of people. The development policy as it evolved emphasised different approaches at different times. Initially emphasis was on promoting more productive agriculture and industrialization, which in late 1970's shifted to education, health, nutrition, sanitation and employment for the poor. Focus in 1980's shifted to structural adjustment which essentially means market-oriented reforms and less involvement of government in economic decisions. Globally most countries made significant progress both in GDP and HDI measures, but the overall development record faces two major criticisms, first, the benefits of development have been distributed unevenly with number of extremely poor and malnourished people remained high, and in some areas have increased. Second, the world is facing the negative impact of development on environment and the on existing social structures. Decline of forests, water systems and rural resource bases have caused hardships to people in general and traditional societies in particular. Pollution, traffic congestion, poor quality of water and sewer infrastructure has become the common problems of big cities throughout the world. Therefore, the development which protects environment and that advances social justice has emerged a new paradigm which essentially is Sustainable Development.

Sustainable Development is a development that satisfies the needs of the present without comprising the ability of future generation to satisfy theirs. The essence of sustainable development is to define viable schemes combining the economic, social and environmental aspects of human activity. These must be taken care of by individuals, corporate and communities for long-lasting balance between the three. Development to be sustainable must ensure people access to water, education, health, employment and freedom from hunger and malnutrition and social services to the common man. It is the rational management of human, natural and economic resources that aims to satisfy the essential needs of humanity in the long term.

The stress on natural resources and environment damages if unchecked may result in collapse of the essential eco-system. The Uttrakhand tragedy explains to what extent the eco-system has become fragile and what harm the misplaced development strategies can cause to the environment. Innovations in use and exploration/search for new resources like new form of renewal energy such as wind, solar and geothermal is the need of the day.

Hence through research, debate and discussions, the rational management of human, natural and economic resources which aims to satisfy the essential needs of humanity in the long run needs to be emphasised upon.

The present book is one such initiative of Teerthanker Mahaveer University. The book has weaved together the thoughts and ideas of prominent academicians, industrialists and

government officials. We are indeed grateful to all of them for contributing their valuable thoughts towards this academic endeavour. The research papers have covered the different dimensions of the theme of Sustainable Development, which I am sure will generate interest in the readers of book.

Prof. R. K. Mittal

Professor, University School of Management Studies &
Director - Development, GGS Indraprastha University, New Delhi
Former Vice Chancellor, Teerthanker Mahaveer University, Moradabad

Preface

It is not the strongest of the species that survive, nor most intelligent, but the one that is most responsive to change.

– Charles Darwin

Talking about resilient eco system is not a utopian thinking or a figment of imagination as such. After all, the key concern of all the governments, publics, and institutions is to leave a legacy for our future generations wherein they are not deprived of the natural resources mandatory for sustenance of life on this mother earth. For this, we need to be adaptive to innovation, foresight, and adaptability. Sustainability is not an overnight job or a defined quantitative objective. Rather, it is an ongoing process and every actor of the environment has to assume responsibility to change and even more, become responsive to change.

The thought to bring out this edited book was promoted by Prof. R K Mittal, the then and founder Vice Chancellor of Teerthanker Mahaveer University, which emerged from an International Conference on "Sustainable Development - Challenges, Issues and Practices" on 22-23 March 2013 organised by the university. The enthusiastic response towards this topic further solidified the notion that people in general are concerned about the health of the planet and well-being of its inhabitants.

Subsequent to this conference, myself and my colleague Vaishali Dhingra were entrusted to compile the book on the subject. Having done focused research in the area of green supply chain management, I got impetus to weave together thought-provoking papers on the topic of this global concern from a wide spectrum of contributors. My own perspective of the topic is presented in the form of an article "Towards Sustaining Sustainability: An Overview" attempting to detail the nitty-gritty of various perspectives and tools of sustainable development for a wider understanding of the subject.

Teerthanker Mahaveer University being aware of its corporate and social responsibility of spreading concern and awareness about such issues of pertinence, patronised the compilation and publication of this book. The book also reflects the vision of the Founders of the University, their orientation and commitment towards creating and sustaining a better society.

I am sure that writings in the book shall be of larger interest to the society.

PROF. RAKESH KUMAR MUDGAL
Vice Chancellor
Teerthanker Mahaveer University

About the Editors

Rakesh Kumar Mudgal *presently is the Vice Chancellor of Teerthanker Mahaveer University, Moradabad. Previously, he held the position of Professor in Management, Registrar and Pro Vice-chancellor in the same university. In a professional career spanning over 28 years, he has served in various positions of responsibility in industry and education; especially in Process Engineering, Industrial Engineering, Project Management, Manufacturing, and Training & Development. His areas of teaching and research include Operations and Supply Chain Management, Strategic Management, Green Business Strategies, Environmental Benign Manufacturing, TQM, Entrepreneurship, Ethics & Values, and Manufacturing Technology.*

Prof. Mudgal, a graduate in Mechanical Engineering, postgraduate and doctorate in Management, has received specialised training on productivity management in Japan, is also an IRCA-certified auditor for ISO 9000 Quality Management System. He regularly conducts seminars and workshops in the areas of engineering, human engineering and system engineering for industry and academia. He has published 9 research papers in International and Indian Journals and has presented 8 papers at various conferences focusing on contemporary issues in management and technology.

An avid reader and inspiring teacher, he strives to enhance the quality of life of his students and colleagues and makes them feel special by extending individual care and attention, and is adored by entire university fraternity for his value-driven leadership, life and living.

Vaishali Dhingra *is an Associate Professor and Head, Department of Management at Teerthanker Mahaveer University, Moradabad. She has extensively contributed in the area of strategic management and entrepreneurship through her teaching since past 15 years at undergraduate and postgraduate levels as also research and consultancy. She has been regularly conducting entrepreneurial development programs for students giving them live exposure at the college level and has been instrumental in setting up the Departmental Entrepreneurial Cell.*

She is an editor of the in-house management journal entitled "View Point" for the last four years. She is also a regular faculty at various entrepreneurial forums such as EDI, Export Promotion Council for Handicraft, and has contributed to various seminars and workshops as a resource person as well as session chair within and outside the university.

Sensitive towards the social issues, she has taken up her PhD research work on "A study of perception on quality of work life of manpower in handicraft industry in India", which intends to examine inter- relationships between quality of work, quality of wok life and quality of life for workers. The research findings are expected to make significant contribution towards sustaining a better living for Indian workmen.

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Towards Sustaining Sustainability: An Overview

Prof. Rakesh Kumar Mudgal*

Human life works in wonderful ways; wherein at some point of time, it works just for survival, or looks for support, thereon aims at stability, success and superiority, subsequently works for sustaining of superiority, and then comes a stage it strives for sustainability. Joseph Epstein once said, "We do not choose to be born. We do not choose our parents, or the country of birth. We do not, most of us, choose to die; nor do we choose the time and conditions of our death. But within this realm of choicelessness, we choose how we live." In all these perspectives, from survival to sustainability, the consequences of human endeavours mostly emanate from 'how' we make choices while creating and consuming products and services, whether aiming at conservation or exploitation of resources. Nature and its systems mostly aim at conservation thus supporting sustainability. To emphasize on the point, we can rely upon the words of Albert Einstein who said, "Look deep into nature, and then you will understand everything better."

Keywords: *Zero-waste, Sustainable Development, Green Technologies*

INTRODUCTION

The first building block of any endeavor towards achieving sustainability has to be that of zero-waste. Zero-waste implies that we make efforts to recycle everything that we can and compost the entire organic fraction of the waste produced. This makes it imperative for all levels to focus on waste management. By and large, it is seen that a state that effectively manage its waste is able to provide services such as health, education or transportation in better manner. Believing and practicing the Indian Ethos of *'Conservation of Resources'*, most Indians the moment they got off from bed in the morning used to do the prayer "O mother earth forgive me for the waste I am going to impose on you today." It was practiced to promote sustainability and to believe that such initiatives empower all to make giant strides towards sustainability in their own lives and communities. However, today's consumption oriented economic development has casted its shadow on mother earth through the way communities are imposing their footprint on the ecosystem. At the same time, adoption of

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cleaner technologies and techniques that are leveraged collectively with the kind of intellectual resources we have, offer hosts of opportunities through which we can really design, develop and deploy models of sustainable development.

SUSTAINABLE DEVELOPMENT

In recent years, sustainable development has occupied an important place in discussions, debates and decision making at international, national and individual levels in communities and corporates. The concept of Sustainable Development was first brought in active deliberations at the World Commission on Environment and Development in 1987, while setting the agenda for mitigating the risk associated with the climate change and global warming. An integrated concept of sustainable development emerged in the report *'Our Common Future'* issued by the World Commission on Environment and Development. This included systems and effective citizen participation in decision making, providing solutions for the tensions arising from disharmonious developments, respecting the obligation to preserve the ecological environment, and fostering long-term stability of business (WCED, 1987). At the same time, the Commission also called for industry action to accept social responsibility, establish company policy and comply with the laws and requirements of the country in which they operate. This concept was crystallized as an integrated approach to policy and decision making in which environmental protection and long-term economic development were seen not as incompatible entities, but complementary to one another. Accordingly, for any business to be sustainable, it must aim for the pursuit of economic prosperity, ecological/environmental quality and social equity simultaneously. This calls for a paradigm shift from the traditional business model of single bottom line (where businesses are run solely for profits) towards the Triple Bottom Line Model (Elkington, 1999), wherein long term maintenance of systems requires balancing environmental, economic and social considerations.

In the present scenario, industrial activities are perceived as major contributors to fast deteriorating state of our natural environment. Almost all aspects of commercial endeavors under the cover of so called economic growth have incalculably shadowed the very concept of equality and social development.

Adoption of cleaner manufacturing technologies and techniques that support sustainable development will not only help to maintain an efficient and effective management of natural resources but also re-use of used resources. Since very focus of sustainable development implies economic growth coupled with social development and environmental protection, which essentially calls for maintaining a harmonious balance between meeting human needs to raise the standard of living and improved lifestyles with a feeling of well-being on one hand and preserving natural environment and ecosystem on the other hand, ensuring the existence of the present as well as future generations.

Sustainable development has been defined in many ways, such as:

1. Sustainable development is the development that meets the needs of present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987);

2. Sustainable development is an economic policy, which teaches that society can make the appropriate allocation of resources between environmental maintenance, consumption and investment. (Duncan, 1992).

3. This umbrella term is not limited to physical values, economic development, material flows and physical environmental improvements, but also includes the social well-being and quality of people's lives (Elkington, 1999).

4. Sustainability has been defined as the goal of sustainable development, which focuses on economic and social developments that protect and enhance the natural environment and social equity (Diesendorf, 2000).

5. The concept of sustainable development provides a framework for the efficient use of resources, effective development of infrastructure, protection and enhancement of quality of life, economic or business development along with protecting the environment (Atkisson and Hatcher, 2001).

6. Energy consumption, substitution of polluting fuels by eco-friendly energy sources, reduction of packaging and other wastes, green cover, effective water harvesting and use, eco-friendly agriculture, re-use of wastes of manufacturing, protection of endangered species, etc., are some of the dimensions of sustainable development (Khandwalla, 2008).

From the above definitions it is clear that sustainable development is a multifaceted subject, bringing together diverse issues and implies different things to different people. For some, sustainability and sustainable development are about collective values and related choices, and therefore may be considered as a political issue. Others say sustainability is about water and food, shelter and energy. It is about how people hope to become rich and secure prospects of good health. Also, it is about the decisions and agreements of world leaders and their actions on what needs to be done for prosperity, peace and the planet. It is also about how to make business decisions that consider the long term future of the economy, ecology and equity, i.e. social wellbeing of all communities. Converting all these needs into plans, policies, practices, procedures, plants, and products and services poses great challenge for businesses. Protection of bio-diversity in terms of fauna and flora, species and genetic diversity, all of which are the vital foundation for life, also forms an important aspect of sustainable development. Hence, capacity and culture building for such an integrated and futuristic thinking is a key task for business community in general and manufacturing in particular. Appropriate technological interventions and innovations can greatly help in this direction. It is an established fact that technology is a critical agent of transformation in terms of changing lifestyles, preferences, consumption pattern, attitudes and behavior, and has its increased role in envisioning and realizing a sustainable world. Essentially, technologies for sustainability must live and work in a way that protects the environment, enhances social fairness and promotes economic equality for present as well future generations. It should be able to resolve conflict and create product and services that are instrumental in creating a caring society.

SUSTAINABLE DEVELOPMENT APPROACHES

Several approaches and frameworks have been developed to help achieve sustainable development, each of which aims to find superior ways and means for efficient use of resources, minimize pollution and waste. A brief review on some of them is discussed below.

Green Technologies

Green technologies are most appropriate framework for environmental protection, disaster prevention and mitigation of associated risks, since these are core environmental issues. Technologies are interdisciplinary, which give prime consideration to natural resources, relationship between societies and the environment, economy and culture. Green technology promotes critical thinking and problem solving approach that are essential to conservation of natural resources and consequences of climate changes. Green Technology seeks to focus on local issues employing such an approach that maximize benefits and minimize risks.

Lean Production

Lean production is a system that is devoted to enhance competiveness through continuous improvement and elimination of all forms of waste, consequently reducing environmental footprints of business processes and thus supports sustainable development. Lean production systems can safely be considered as complementary to environmental performance as they help in lowering the marginal cost of pollution reduction. Further, good housekeeping practices, which are integral part of lean production systems, hold great potential to improve environmental performance of the firms if implemented properly.

Cleaner Production

Cleaner production as introduced by UNEP in 1989, is an integrated approach for reducing environmental impacts from processes, products and services by using better management strategies, methods and tools. As opposed to the end-of-the pipe solutions, which have resulted from the philosophy of clean up, whereas clean production seeks to prevent the pollution at its source itself. Introduction of cleaner production into the companies' management systems is vital to alleviate the environmental problems. For successful introduction and effective implementation of cleaner production management tools and techniques, training of manpower in their application would help in making desired progress in environmental improvement. It is quite pertinent to state that inadequate technical expertise of a domain as vital as environment results only in limited participation by stakeholders in the conservation and improvement initiatives.

According to Fresner (1998), cleaner production is an interdisciplinary approach that offers wide range of options, such as:

- good housekeeping with materials and energy
- training of employees

- better logistics
- improvement in data availability and the communication between departments
- substitution of raw and auxiliary materials with less harmful ones or ones that can be used more efficiently or can be recycled internally or externally
- modifications of products to eliminate production steps with large environmental impact
- process modifications to minimize waste and emissions
- internal recycling
- introduction of waste into external recycling networks

Eco-labeling

Eco-labeling is a regulatory scheme supported by governments to increase consumer awareness and promote the use of eco-friendly products in the country. The scheme basically encourages a cradle-to-grave approach. It has some potential for aiding buyers identify organizations, materials and products that are environment friendly. Various countries have their own specific labeling schemes such as EU Ecolabel for the European Union, Blue Angel and Green Dot in Germany, and Ecomark in India and Japan.

An earthen pot has been chosen as the logo for the 'Ecomark' scheme in India. Under this scheme, incentives are provided to manufacturers and importers to reduce adverse environmental impact of products; reward genuine initiatives by companies to reduce adverse environmental impact of their products; assist consumers to become environmentally responsible in their daily lives by providing information that would incorporate environmental factors in their purchase decisions; encourage citizens to purchase products which have less harmful environmental impacts; improve the quality of the environment and encourage the sustainable management of resources (Jain and Kaur, 2004).

Eco-efficiency

Eco-efficiency means producing more goods and services with less energy and fewer natural resources. This approach primarily aims at the conservation of the resources. OECD (1998) defined eco-efficiency as the efficiency with which ecological resources are used to meet human needs.

Mickwitz *et al.* (2006) reported that as a concept, eco-efficiency has its roots in business world, where it has been described as a combination of economic and ecological efficiency expressed by the ratio:

$$\text{Eco-efficiency} = \frac{\text{Economic Value (added)}}{\text{Environmental impact (added)}}$$

This equation suggests that eco-efficiency can be improved by reducing the environmental impact added while maintaining or increasing the value of output produced.

Also, Schmidheiny (1992) expressed eco-efficiency as:

$$\text{Eco-efficiency} = \frac{\text{Value}}{\text{Resource use + Pollution}}$$

Interpreting the above equation, it is clear that the eco-efficient businesses are better able to simultaneously meet cost, quality, and performance goals, reduce environmental impacts, and conserve valuable resource. Hence, eco-efficient businesses get more value out of their raw materials as well as produce less waste and less pollution.

Total Quality Environmental Management (TQEM)

TQEM is a key theme that has evolved within green manufacturing area, emphasizes waste minimization and process efficiency through empowerment of employees, continuous improvement, customer focus and supplier involvement. It is a managerial philosophy, rather than a hard core technology or program, with a number of tenets. TQEM is considered to be similar to Enterprise Resource Management (ERM), which focuses on an integrated approach to the reduction and elimination of all wastes associated with the design, manufacture and/or disposal of goods (Rao, 2004).

Closed-loop Manufacturing

Closed-loop manufacturing is one of the internal measures that intends designing and developing the manufacturing processes such that there is no negative environmental impact while manufacturing of products, thereby improving the environmental performance of the internal supply chain. It is an essential part of source-reduction and remanufacturing philosophy.

Reverse Logistics

Reverse logistics stands for all the operations related to the reuse of used products. It entails return of materials, components and products back into the forward logistics chain. In other terms, it is a way to get the most out of the residual assets, thus making it as one of the most environmentally conscious approach. Reverse logistics can also be termed as the systematic process of collecting products or parts from the point of consumption for capturing value, possible recycling, remanufacturing or disposal. Reverse logistics practices enable organizations to take a cradle-to-grave approach to their products and help them to move away from one-time use and throw philosophy to identification of value in used products. These practices are also the components of eco-efficiency. Concern of sustainability demands

vast reduction in resource use and waste generation, for which focus on the following ***R[11] Approach*** is required:

1.	***Recycle:*** Recovering resource from the waste streams and reutilizing them in the manufacturing process.
2.	***Reuse:*** Packaging material and some products that can be reused after repair or modification.
3.	***Redesign:*** Redesigning a product or a process in ways that improve performance, resource use efficiency, and reduce wastes.
4.	***Remanufacturing:*** When products are designed to be easily dismantled at end-of-life so as to re-utilize components that have a life longer than the product itself.
5.	***Reprocess:*** Processing waste material in order to recover valuable resources or to convert these into valuable by-products.
6.	***Recover:*** Processing waste, during the process, to recover valuable raw materials and energy, which can be recycled or sold in open market.
7.	***Reincarnate:*** Converting a discarded product into a new product through appropriate processing.
8.	***Relocate:*** Safe disposal of waste in a manner that serves some productive propose.
9.	***Replace:*** Products, processes, sources of energy, raw materials with more eco-friendly ones.
10.	***Reduce:*** Consumption of raw material, energy, and utilities (increase resource use efficiency).
11.	***Return to Nature:*** Treatment of waste to render it bio-degradable and benign

ISO 14000 – Environmental Management System

In order to improve the environmental performance of businesses, industries in particular and others in general, the International Organization for Standards (ISO), has come out with a series of international standards on environmental management known as ISO 14000. Some of the critical areas this standard addresses are:

- Framework and guidelines for environmental management systems
- Environmental aspect and impact assessment of products and processes
- Environmental auditing
- Evaluation of environmental performance of products and processes
- Eco-labeling
- Life Cycle Assessment

Extended Producer's Responsibility

Extended Producer's Responsibility is an approach in which original manufacturer, and not the customer, is responsible for the safe handling, dumping and disposal of returned products, as used products come to be recycled or remanufactured. Original manufacturers

adopt this approach not only due to legal compulsions but also owing to variety of economic, environmental, or competitive reasons, and possibly it will become a competitive necessity soon.

Design for Environment (DfE)

Meeting out the growing demand for improving environmental performance calls for efficient designing of products for effective environmental management over the product life cycle. Some of the strategies for 'Design for Environment' are:

- To reduce the amount of raw materials
- Design the product to accommodate multiple future users
- Design the product to enable easy repair
- Design the product for easy disassembly
- Design the product to enable ease in recycling
- Design for energy efficiency (Reduce the energy that will be necessary to use/operate the product)
- Design for ease in re-manufacturing
- Hazardous material use minimization
- Design for ease for disposability

Environmental Performance Indicators (EPI)

In order to improve the environmental performance, it is essential to identify the indicators and bring about improvement adopting appropriate strategies. An indicative list of some of the EPIs is given below, whose regular measurement; monitoring and continual improvement shall help in achieving sustainable development.

- Air pollution
- Consumables consumption including auxiliary materials
- Consumption of other sources of energy
- Eco-literacy of employees
- Electricity consumption
- Fuel consumption
- Hazardous waste generated
- Noise pollution
- Packaging material cost
- Quantity of used oil generated

- Quantity of water harvested
- Quantity of water treated
- Quantity of water used
- Raw material consumption
- Recycling and reuse levels (Use of recycled and renewable materials)
- Solid waste generated
- Volume of other types of waste produced
- Wastewater generated

Supplementary Green Business Practices

Some other business practices that have great potential for achieving sustainable development are:

- Assignment of roles and responsibilities with respect to environmental programs
- Balanced scorecard approach for environmental performance measurement
- Benchmark environmental performance
- Carbon trading initiatives
- Eco-labeling of products
- Engage in continuous improvement of its environmental performance
- Enhancing eco-literacy of workforce
- Environmental accounting
- Establishment of recycling/waste disposal procedures
- Inclusion of environmental criteria in the performance reviews of employees
- Integrated usage of information and communication technologies
- Internal and external environmental audits
- Life Cycle Assessment (LCA) to prevent pollution over the entire life of the products
- Proactive environmental policy beyond compliance to minimum legislative requirements
- Public environmental reporting
- Recovery of the company's end-of-life products
- Safe handling and storage of products and materials
- Setting of environmental improvement plans and quantifiable environmental objectives

- System of segregating garbage at source
- Use of renewable and alternative sources of energy
- Use of waste material of other companies

CONCLUSION

It is a hard fact that a nation in order to satisfy its economic and social needs has to depend on natural resources that are not only limited but also depleting very fast. However, adoption of policies and practices of sustainable development in thought, action and spirit across cultures and continents really holds the key for providing dignified living conditions wherein the principle of equity among and between present and future generations is ensured while using environmental, economic and social resources. Furthermore, it has enormous potential to guarantee that the plants, *pashu-pakshi (animals and birds),* people and planet do not suffer as a result of economic activity.

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2

Renewable Energy for India's Energy Security

Dr PC Maithani*

Human activities have a major impact on nature. Environmental externalities of energy production and consumption irrespective of production technologies can be broadly summed up in two categories of costs, first, the damage caused to health and the environment by emissions of pollutants having local and/or regional impacts and the second, costs resulting from the impact of climate change attributable to emissions of greenhouse gases. The major source of environment externalities in fossil fuel-based power generation is environmental damage from fossil fuels extraction and use. European Union has defined fuel cycle externalities as "the costs imposed on society and the environment that are not accounted for by the producers and consumers of energy, i.e. that are not included in the market price. They include damage to the natural and built environment, such as effects of air pollution on health, buildings, crops, forests and global warming; occupational disease and accidents; and reduced amenity from visual intrusion of plant or emissions of noise. Traditional economic assessment of fuel cycles has tended to ignore these effects." As an example, pollution emitted by fossil fuel-fired power plants during power generation is known to result in harm to both people and the environment. In this background, renewable energy has a major role to play in moving towards creating a sustainable energy base that is environmentally benign. It not only protects nature from human induced interferences but also helps in achieving sustainable development.

INTRODUCTION

Energy has always been an important ingredient for the economic and social progress of human society. There exists a strong two-way relationship between economic development and energy consumption, as the growth hinges on the availability of cost-effective energy sources. Now the supply of energy has become more global in nature, with massive supply chains and huge investments.

* Director, Ministry of New and Renewable Energy

1. http://externe.jrc.es/overview.html

ENERGY REQUIREMENTS OF INDIA

An important aspect of India's energy future is its heavy dependence on imported energy in the medium term. As per the projections made in the Integrated Energy Policy (IEP), India's primary energy supply will need to increase by 4-5 times and its electricity generation capacity by 6-7 times to their 2003-04 levels to deliver a sustained growth rate of 9% through 2031-32. Commercial energy supply would need to grow faster at about 6.8% annually. Power generation capacity would need to increase to 9,60,000 MW by 2031–32. Imports are projected to increase to about 58–67% for difference types of energies by 2031–32 as per the IEP (Table 1).

TABLE 1: ENERGY REQUIREMENT FOR 9% GROWTH UP TO 2031-32

Fuel	Energy Use in 2009-10	Range of Requirement in Scenarios	Assumed Domestic Production	Range of Imports	Import (%)
Oil (Mt)	149	397-555	35	362-520	91-94
Natural Gas & CBM (Mtoe)	55	125-235	100	25-135	20-57
Coal including Lignite (Mote)	263	860-1296	560	300-736	35-57
Total Energy supplies (Mtoe)	467	1667-2077	695	972-1382	58-67

MTOE = Million tonnes of Oil Equivalent

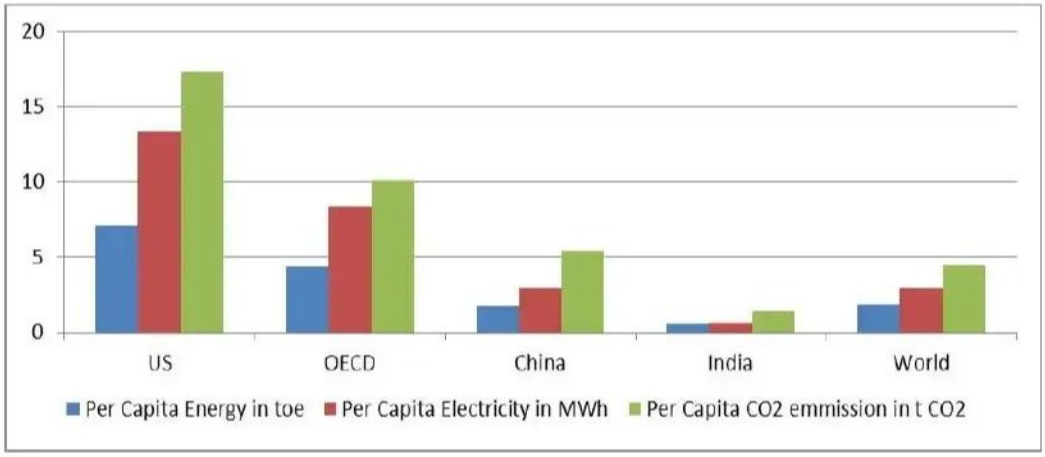
As is evident, the import levels are likely to be a multiple of the present total energy supply and in all major fuels. This implies exposure to supply and price risk.

In this background energy security concerns have become paramount for India. The World Energy Assessment (IIASA 2012) report defines a nation's energy security as "protection from disruptions of energy systems that can jeopardize nationally vital energy services." Literature review provides numerous definitions and interpretations of energy security. World Energy Assessment (UNDP 1999) report defines energy security as – the continuous availability of energy in varied forms in sufficient quantities at reasonable prices. Broadly energy security is elaboration of "protection from disruptions" and "vital energy systems." The planning commission of India in the integrated energy policy report has defined energy security as: "The country is energy secure when we can supply lifeline energy to all our citizens as well as meet their effective demand for safe and convenient energy to satisfy various needs at affordable costs at all times with a prescribed confidence level considering shocks and disruptions that can be reasonably expected."[2]

Energy services have always remained in focus of successive Indian governments that has resulted in the expansion of the energy infrastructure within the country. India has seen a steady expansion in total energy use during the past six decades, with a sufficient shift taking place from non-commercial to commercial energy sources. India's commercial energy

2. Planning Commission of India "Integrated Energy Policy report".

use increased 21 times and the power generation capacity went up by 87 times during the past 60 years. In 2011-12, the total commercial energy supply (TCES) was 537 million tons of oil equivalent (mtoe)[3] as compared to about 26 mtoe in 1953-54.[4] Similarly, the installed capacity at the beginning of the first five year plan was 2.3 GW which increased to 223.4 GW by March 2013.[5] However, energy deficit levels have remained consistently high in recent years with supply trailing requirement by an estimated 8-10%.[6] It may be mentioned that while supporting around 16% of the world population, India's share in world energy use and electricity consumption is only 4.2% and 3.5% respectively.[7] The per capita energy use at around 0.58 toe is far below that of industrialized countries, and, more importantly, is almost only a third of the world average (figure 1).[8] Further, even with the huge growth in energy consumption projected over the next two decades, per capita consumption in 2032 is seen as being only 74% of the world average in 2003.[9] India has very low per capita energy and electricity consumption, and also CO2 emission (Figure 1).



Source: IEA Key World Energy Statistics 2012

FIGURE 1: ENERGY STATISTICS

Renewable energy assumes significant in the context of national energy security. There are a number of concerns. Hydroelectricity generation is facing difficulties on various fronts including financial, social, and environmental. Nuclear power programme is falling behind schedule due to various reasons including anti-nuclear protests. Energy services never had actual pricing policy, it was rather governed by various considerations and huge energy subsidies have always remained a matter of concern for successive governments. These apart, India has already made voluntary commitments of reducing emission intensity of its GDP

3. Planning Commission 2013 http://planningcommission.nic.in/plans/planrel/12thplan/pdf/vol_2.pdf
4. Planning Commission 2002: http://planningcommission.nic.in/plans/planrel/fiveyr/10th/volume2/v2_ch7_3.pdf
5. Ministry of Power
6. Central Electricity Authority, All India Electricity Statistics , General Review 2012.
7. BP, BP Statistical Review of World Energy (June 2012) and IEA Key World Energy Statistics 2012.
8. IEA Key World Energy Statistics 2012.
9. As estimated in the Integrated Energy Policy Report 2006.

by 20-25% from 2005 levels by 2020. In this background renewable energy is considered central to the future energy system that is secure and sustainable.

RENEWABLE ENERGY

Renewable energy is an important part of India's plan not only to add new capacity but also to increase energy security, address environmental concerns, and lead the massive market for renewable energy. Development of indigenous and distributed renewable energy sources increase energy security by diversifying supply, reducing import dependence, and mitigating fuel price volatility. Further, renewable energy is the obvious choice for meeting commitments to reduce its carbon intensity. The core drivers of development and deployment of new and renewable energy in India include: (a) lesser dependence on energy imports through a diverse and sustainable fuel-mix; (b) augment energy supply; (c) fuel switching to reduce fossil fuel consumption; and (d) provide access to energy services in unelectrified rural areas. The positive environmental impact of renewable energy is also a key consideration.

India is endowed with significant renewable energy potential. There have been a number of estimates about renewable energy potential in the country. In the year 2010 a world Bank report had estimated that around 70 GW of renewable energy in wind, biomass, and small hydro power can be harnessed at a price of less than ₹ 6 / kWh.[10] This price is competitive with the marginal cost of electricity generation. In addition, India is receiving solar radiation sufficient to generate 50 MW/ Sq. Km. using solar photovoltaic and solar thermal energy. The potential is expected to significantly increase with technological and efficiency improvements combined with cost reduction. This apart, there exists vast potential, yet to be quantified, for harnessing ocean energy including off-shore wind.

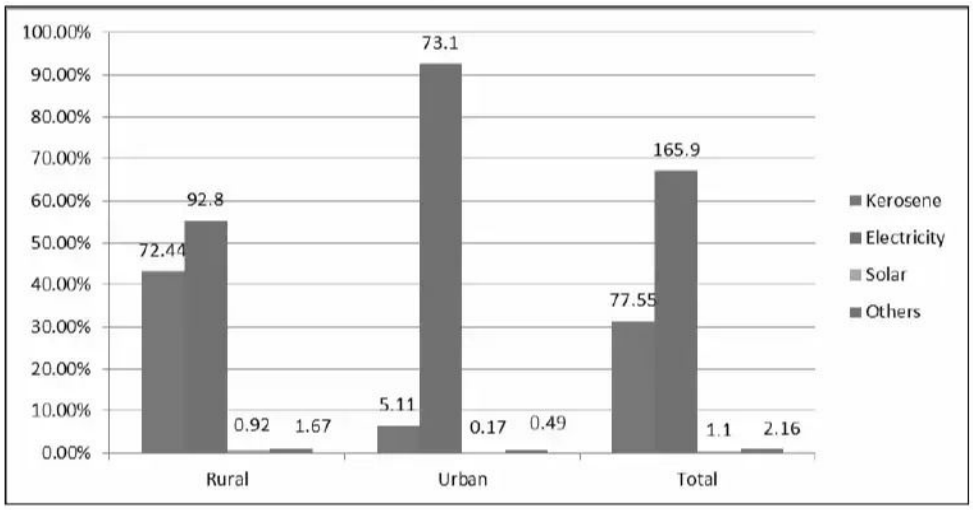
The most important legislative development which has stimulated the recent growth in renewable power is the Electricity Act of 2003.[11] The Act requires state electricity regulatory commissions to specify Renewable Purchase Obligations (RPOs) and also fix renewable resource specific feed-in-tariff. In line with the Act, all major States have notified RPOs ranging from 1% to 10% of total electricity consumption. In addition solar specific renewable purchase obligations, starting with 0.25% in the first phase of the Mission and leading to 3% by 2022 have also been introduced for creating a nationwide renewable energy market. Further, a market based instrument '*Renewable Energy Certificate*' has also been introduced to assist states in meeting their RPO obligations in a cost effective manner.

Renewable energy has done well. In the last few years there has been a tremendous growth in renewables capacity, up from 3% in 2006 to 13% in 2013, primarily led by wind, but solar has now made its presence felt. There is optimism for the future for both. The projections made in the 12th Five Year Plan document suggests that by 2030 the share of renewable

10. Unleashing the Potential of Renewable Energy in India | A World Bank Study: online: http://www.esmap.org/sites/esmap.org/files/India-Study_WEB_Final.pdf
11. Electricity Act 2003: online http://www.powermin.nic.in/acts_notification/electricity_act2003/preliminary.htm
12. Planning Commission, 12 Five Year Plan: online http://planningcommission.nic.in/plans/planrel/12thplan/pdf/12fyp_vol2.pdf

energy in installed capacity and electricity mix will be around 33 percent and 16 percent respectively.[12] The document does not mention the absolute numbers, however, from the perspective of reaching around 750 GW installed capacity by 2030, the renewable energy installed capacity by then could be pegged at around 250 GW. Going by the trends and also global surge for technology improvement, renewable energy share as projected in 12th Five Year Plan document appears not only to be achievable, but could be surpassed.

Disparity in electricity access is a major concern. Still around 78 million household uses kerosene for meeting lighting requirement (figure 2). There are great disparities in electricity access among the states. For instance, while in states like Bihar, Assam, Uttar Pradesh, Odisha, and Jharkhand, the household electrification level is strikingly low at under 40 percent, in states like Delhi, Chandigarh, Tamil Nadu, Punjab, and Andhra Pradesh, the household electrification level is over 90 percent.



Source: Census of India 2011

FIGURE 2: HOUSEHOLDS BY MAIN SOURCE OF LIGHTING

Over the period, decentralized distributed renewable energy based initiatives of communities have started making profound impact in some of the areas. There exists a variety of options. If a beginning is made to meet the basic lighting energy needs only, the task in hand would be to provide lighting energy services at the subsistence level to around 75 million rural households which at present are dependent on kerosene. Suppose an amount of ₹ 10,000 is spent on providing a reasonably good-quality solar home lighting system with 2-3 lighting points plus additional points for occasional fans and mobile charging, the total investment required for covering 75 million un-electrified households will be around ₹ 75,000 crore. In case the government provides 30% financial support, the total financial burden on the government will be ₹ 22,500 crore. If compared with the normative under-recovery on around 9 million tonnes of kerosene per year distributed through the Public Distribution System, onetime investment on providing solar energy-based basic lighting service is less than the total subsidy out go in a year. Thus with three year of kerosene subsidy it would be possible to saturate the country with solar home lighting systems, even if these were provided

free of cost. This also will have economic spill over in terms of developing a robust domestic industry, and a network of skilled manpower for repair and maintenance. If instead of only solar, other renewable energy based options such as biomass, hydro etc are also deployed, total investment in achieving universal lighting and also electricity generation for productive economic activity in rural areas would be much less.

The long term agenda for renewable energy development in India should undoubtedly be fostering competition, private investment, and power for all. Alongside renewable energy regulation in India is comparatively a recent phenomenon, and in fact only six years have passed since the comprehensive framework for renewable power under the *Electricity Act 2003* was put-in place. The present stage can be termed take-off stage, and the growth of around 20% per year can be termed excellent, as it is higher than the current growth of the power sector in the country.

Globally, renewable energy policy domain is not seen in isolation. Its large scale penetration depends on the mainstream energy policies. Think tanks across the world suggests policy directions that include: (a) phasing out all subsidies for fossil fuels and nuclear energy; (b) internalizing the external (social and environmental) costs of energy production through 'cap and trade' emissions trading; (c) establishing legally binding targets for renewable energy and combined heat and power generation; (d) reforming electricity markets by guaranteeing priority access to the grid for renewable power generators; and (e) increasing research and development budgets for renewable energy.

Historically, India has initiated systematic programmes for renewables including research and development. However, the fast progress across the world has melted the national boundaries in terms of technology adoption and implementation. Currently, renewable energy is experiencing vibrancy all across. Formulation of appropriate policies, technological innovations and human skills development programmes are under way. While policy and budgetary support for renewable energy has progressively increased over the years, particularly for large scale grid connected power, some critical gaps remain in the areas of decentralized distributed generation, access to capital, technology development & adaptation, innovation induction, and strategies to up-scale deployment. Apart from budgetary resources, private investment, the National Clean Energy Fund, has created an opportunity to think beyond the budget, and to create new instruments, strategies and pathways for renewable energy.

On India energy future, the following observations could be made:

1. Growing energy requirement coupled with high level of government expenditure will push energy sector reform and will lead to higher level of private participation;
2. Over the period with increasing energy import, energy related interests will become of paramount important in India's foreign policy and diplomacy. Climate change may also be another such area;
3. Efforts will be directed towards reducing dependence on global energy markets and the focus would be on overseas energy asset creation in the form of buying oil & coal field. Government of India's policies will progressively encourage her citizens to increase their overseas presence in energy asset holding;

4. Despite of best efforts, right intentions and also unconditional support from government, the share of nuclear energy may not increase significantly in the country's energy mix. This will be primarily due to international geo-political conditions that may put one or another kind of barriers for India;
5. Setting up of large hydro power plants would remain a difficult choice, primarily due to environmental considerations; and
6. In end all roads and efforts towards fuel diversification will lead to renewable energy development. Were the trends continue renewable energy will become financially competitive in many of the areas and economically competitive for broad spectrum renewable.

CONCLUSION

In any scenario, renewable energy development will remain strategic from the point of view of long-term energy supply security, decentralization of energy supply particularly for the benefit of the rural population, environmental benefits and sustainability.

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3

Sustainable Development†

Dr Promode Kant*

INTRODUCTION

Sustainable development is perhaps the most used term today. Almost every world leader talks of sustainable development. Listen to any speech by the UN Secretary General and you would find this term repeated at least a dozen times. Newspapers are full of it. Planners present everything they design as a key to sustainable development. Foresters and environmentalists swear by sustainability. On any given day in Delhi you may count at least a score of conferences that highlight the need for sustainability. Indeed we are steeped in it. It is something Indian culture has always emphasized. What does this really mean? Before we go further let us see what development is.

DEVELOPMENT

At its very core, development is the satisfaction of human needs and aspirations. This is the key objective of development. There are, of course, other aspects of development but they centre around these fundamentals. In our country the basic needs of almost two third of our countrymen – for food, clothing, shelter, jobs – are not being met. Besides these essentials, people aspire for an improved quality of life. Meeting these needs and aspirations is what development is all about.

Human beings are, however, also not very smart at drawing lines when it comes to aspiring higher quality of life. Living standards that go beyond the basic minimum are sustainable only if our consumption standards take long-term sustainability into account. But most of us live beyond the ecological means, for instance in the manner in which we use the fossil energy. What we call our needs are often only perceived needs which are socially and culturally determined rather than truly the needs of individuals, the self. Sustainable

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† On the onset of the International Conference on 'Sustainable Development - Challenges, Issues and Practices' on March 22, 2013 in TMU in his keynote address

development requires the promotion of values that limit our needs, and hence consumption, within the bounds of what is ecologically possible, and something to which not only the entire humanity but the entire living world can hope for. You may have noticed that I speak not just of the needs of human beings but of the entire living world on this planet. There are philosophical reasons for it and some of the greatest philosophers have spoken of this space being not just for us but for all manifestations of life. But today I will speak not of philosophy but of practicality. All life forms are connected to each other in an extraordinary complex web, the web of life, and there is simply no existence of human life outside this web. For human society to survive and prosper, the entire web of life has to survive and prosper.

SUSTAINABLE LIVING AND DEVELOPMENT

Sustainable living was a key message to the households by Lord Mahaveer – what we know as the Fourteen Pledges for the Households. In their material essence these pledges act to limit the consumption by individuals of almost everything imaginable, limiting the consumption of plants, of food items, of milk products and of jaggery, of cloths and of shoes, of vehicles and of unnecessary travel, even of excessive bathing. Easily it is one of the finest and most refined examples of demand side sustainability.

In those days gone by demand-side management would generally force supply-side management to fall in line because both demand and supply were limited geographically. But today we would need to ensure sustainable supplies also separately even if we somehow make our demands sustainable by following the ideal path of Lord Mahaveer because of deep and intense interconnectivity across markets, big and small unless, of course, the entire world begins following these ideals of sustainable living. And this is where your role as future managers and future leaders come in the forefront. You are now expected to lead not only through your personal conduct by limiting your consumption as much as possible but also through making the production processes sustainable. So you have a duty towards self as consumer and a duty towards the society for whom you are going to produce goods and services to consume.

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Its two key concepts are:

1. The concept of 'needs', and
2. The concept of limitations on the environment's ability to meet present and future needs.

Development involves a transformation of both the economy and the society but it can only be sustained over long periods if our policies ensure greater equity in access to resources and in the distribution of costs and benefits within and across generations.

Meeting essential needs depends in part on quickening our pace of growth, and sustainable development clearly requires economic growth in places where such needs are not being met and not merely where such growth is possible for reasons of access to resource, skills

and finances. But growth by itself is not enough. High levels of productive activity and widespread poverty can coexist, and can endanger the environment. Hence sustainable development requires that societies meet human needs both by increasing productive potential and by ensuring equitable opportunities for all.

An increase in population would inevitably increase pressure on resources and slow the rise in living standards in areas where deprivation is widespread. Sustainable development can, therefore, only be pursued if population increases do not exceed the increases in the productive potential of the ecosystem. A society may also compromise its ability to meet the essential needs of its people in the future – by overexploiting resources, for example. The direction of technological developments may solve some immediate problems but could lead to even greater ones. Large sections of the population may also be marginalized by such developmental activities.

Technology is often a critical input in enhancing sustainability through increased productivity. Enhancing food productivity in food deficient countries is one example which often overrides all other considerations. Genetic manipulation is an example of human intervention in natural systems for a positive purpose but it can have negative consequences. In the past such interventions were slow, small in scale and hence their impact limited. Today's interventions are more drastic in scale and impact, and more threatening to life-support systems both locally and globally. This need not happen. At a minimum, sustainable development must not endanger the natural systems that support life on Earth: the atmosphere, the waters, the soils, and the living beings.

Growth has no pre-set limits in terms of population or resource use beyond which we know for sure that we cannot proceed. Different limits hold for the use of energy, materials, water, and land and these limits are highly dependent on a range of locality factors. In other words, these limits are geographically defined. Many of these limits will manifest themselves in rising costs and diminishing returns, rather than in the form of any sudden loss of a resource base. You may continue to see the resource base around you and feel that the limits are far away. Fossil fuel is one example. In the 1970s there was a feeling that the fossil fuel resources would vanish by the end of the 20th century. But with new discoveries of petroleum and natural gas, those limits have been pushed forward by decades or even more. But, obviously, from this one cannot, and should not, surmise that there are no limits to the use of fossil fuels. Its extraordinarily dangerous outcome in the form of climate change is for us to see already.

The accumulation of knowledge and the development of technology can enhance the carrying capacity of the resource base. Sustainability requires that long before these limits are reached, we must act to reduce their consumption so that the resource never vanishes and its advantages are available to our succeeding generations, too.

Economic growth involves changes in ecosystems and all ecosystems everywhere cannot be preserved in virgin condition. We may have to sacrifice forests in several places to mining, road and habitat infrastructure, ports and airports. The damage done could be managed if we are able to create similar resources, not just trees alone, elsewhere. Harvesting trees is not a crime. It has its place if it is planned and the effects on soil and moisture conservation

and on biodiversity have been incorporated in decision making. Renewable resources need to be harvested so that the harvest is always less than the growth and regeneration. Also these resources renew themselves not in isolation but as part of the overall web of life and therefore in harvesting the ecosystem needs should also be kept in focus.

In the case of non-renewable resources like coal, petroleum, natural gas and other minerals the existing stocks are finite and their discoveries in various parts of the earth are not inventions, they do not change the overall availability and any exploitation is going to reduce the stock. But this should not imply a complete ban on their use. In this case their sustainable use means using these resources judiciously so that their use benefits not only the current generation but also enriches the beneficial capital stock for the succeeding generations. Technological advances should also be focussed in a direction that reduces the need for these resources in future and developing alternatives as in the case of renewable energies. What is popularly called the three R of environmental protection – reduce, reuse and recycle should be the governing principle for ensuring the sustainability of non-renewable resource utilization.

As all of you must be well aware the international treaty on biodiversity conservation, called the Convention on Biological Diversity, is a very important step in the direction of making development less painful for the future of this world. This came into existence at the same time as the UNFCCC – the treaty on climate change – at Rio de Janeiro and has evolved consistently since then. Development tends to reduce their diversity of species in surrounding ecosystems. And species, once extinct, are not renewable. The loss of plant and animal species can greatly limit the options of future generations; so sustainable development requires the conservation of plant and animal species.

CONCLUSION

All over the world development has taken a toll of the air we breathe in and the water that flows in our river. We do not have to go far to see what we have done to our rivers. Most resemble sewage drains more than life giving rivers ancient India was so celebrated for. Sustainable development requires that the adverse impacts on the quality of air, water, and other natural elements are minimized so as to sustain the ecosystem's overall integrity.

Sustainable development is a transformative process that should look at not merely the resources but bring deep changes in the way in which we think of our surroundings, not as something to take away from but as someone who is deserving of our gift of concern. For in showing concern for our environment we actually show concern for ourselves first and foremost.

Dr Promode Kant *is the Foundation Member at FAO's Asia Pacific Forest Policy Think Tank and Director at Institute of Green Economy. Institute of Green Economy (IGREC) has been set up with the aim of helping evolve a path of economic development that leaves as little negative impacts on the earth and its environment as possible, even as it brings the humanity quickly out of the vicious circle of poverty. IGREC has been registered as a Non-profit Society in order to promote research and development of projects and programmes in the field of climate change mitigation &*

adaptation and it works in close collaboration with international organisations like UNEP, FAO and ITTO as also with the central and state governments of India.

Dr Kant has served Indian Forest Services, Government of India for 31 years and was educated at FRI University, Dehradun. He has done Doctor of Philosophy (PhD on, Climate change and forestry).

He is also the founder member of FAO's Asia Pacific Forest Policy Think Tank. His areas of expertise and concern include Climate Change, Sustainability, REDD Plus Sustainable Forest Management, Environmental Laws and Policy, Mentoring young professionals in climate change and forestry, Ecological economics, Ecological Restoration, Ecological Assessment, Carbon Biodiversity, Natural Resource Management, Forest Carbon Sustainable Development, Forestry Carbon Management, Environmental Awareness, CDM and Carbon Footprinting.

The above article is the key note address delivered by him in the two day International Conference in Teerthanker Mahaveer University on "Sustainable Development- Challenges, Issues and Practices" held on March 22-23, 2013

4

Uttarakhand– Sustainable Development Need of the Hour

Prof. Krishna Kumar Pande*

INTRODUCTION

The recent disaster in the higher catchment area of Uttarakhand resulting in loss of life and damage to valuable natural resources has indeed been shocking to one and all. While the news was flooded with the rescue operation of the tourists, what remains thereafter is a great task difficult to be completed alone; the rehabilitation of local residents.

At this moment, it is important to work as a team and share responsibilities to re-build the important region with an immediate aim of rehabilitating the local people to ensuring connectivity to the remote villages for movement of goods, food and other material. Also important from a strategic reason is the way we look at alternate roads to reach our border in case of a conflict; the present situation shows that we are ill prepared to face any untoward incidents on this border.

Case of Uttarakhand

The country and the world was witness to how the people were helpless in front of nature and therefore it brings into focus the need of a balance between nature and human beings, between need and greed, between development and protection of nature.

One common picture was that of the temple escaping unscratched while constructions in the surrounding region being wiped out in the fury of nature. The temple could escape with little damage because of its location which was strategic as it was at a point between the two sides through which the glacier lines passed. It could be that when the temple was first located the glaciers might have been beyond the temple location. One question that

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comes to the mind is when the temple could be constructed at the location when there were no construction equipments and no roads why were no houses built in the region. This question needs to be debated thoroughly while the reconstruction of Uttarakhand is planned. Lessons from the present calamity should be kept in mind while rebuilding the region and should be a point of reference for all Himalayan states- the Himalayan region should be developed, on sustainable basis not following the present model as in the rest of the country.

The case of Uttarakhand can be considered as a warning from nature to the destruction that has been done which brings into front the significance of sustainability of the Himalayan ecosystem to ensure ecological security of the entire Indian sub-continent.

Most of the hill stations were developed during British period, located at elevations of over 2000 m above mean sea level. The hill stations were developed as places for recreation, leisure, education and summer capital to take advantage of the climate and scenic beauty. Majority of them were planned for pedestrian use. I remember my childhood in Nainital when we would walk miles to reach school or go from place to place as public transport was limited. Unfortunately this changed with time and there has been a massive unplanned construction, especially after the formation of the State when many of the set rules were changed locally. The hill stations became focal points of administration increasing the pressure on the limited land holdings that the hill stations have.

With the formation of the State of Uttarakhand, the increasing pressure for development through tourism as a source of livelihood makes sustainable development of hill areas more imperative. The need therefore is to preserve the natural beauty and spectacular landscapes, and re-plan the complete development with a long term perspective of reducing the stresses in natural as well as built environments.

Though sustainable development was accepted as the key objective of development strategies since the seventies environmental degradation has been witnessed in large scale with increased construction activity more so after the formation of the State.

When Nainital witnessed the landslide in 1880 burying around 150 people the British officials took a complete study of the reasons behind the landslide and a handbook was published for maintenance of Nainital including the danger zones where construction was banned. Unfortunately the same has been forgotten with time. However we need to revisit the detail evaluation done and need to draw strategies from the present loss of lives.

Preventing the Calamity

It is important to remember the myth *of Ganga coming down to earth from the heavenly world. King Bhagiratha, anxious to restore his ancestors, undertakes rigorous penance and is eventually granted the prize of Ganga's descent from heaven. However, since her turbulent force would also shatter the earth, Bhagiratha persuades Shiva in his abode on Mount Kailash to receive Ganga in the coils of his tangled hair and break her fall. Ganga descends, is tamed in Shiva's locks, and arrives in the Himalayas.* The myth hides an important lesson-falling water needs cushion.

While planning any construction in a water catchment region the design is carried out taking into consideration a 1 in 100 year flood data. The present flood information, as available, does not show that the flood was a one in 100 years, which means that there would be a higher level of calamity if we get a rainfall/discharge of a one in 100 year flood. A point to note is that if this cloudburst over Uttarakhand resulted in the devastation what will happen if we get a one in 100 year flood discharge. Compare this with the Ganga getting lost in the cushion like Shiva's matted hair.

For the Himalayas, it is important to build the natural cushion with mighty trees which may grow several hundred feet tall, have their roots spreading deep into the soil and keeping the soil intact. This is important to keep holding the earth together like a mesh. Had there been thick forest along the route the devastation would have been lesser.

The calamity brings into fore the issues of sustainable development in Uttarakhand which should include conserving the precious natural resources, the fragile ecology, impose constraints on uncontrolled construction and uncontrolled mining in river stream near habitats, while at the same time improvement in the quality of life of people with controlled tourism activities.

Therefore the first act of reconstruction must start with widespread aforestation. A special task force should be developed to carry out massive aforestation, should be carried out with local people made responsible for the activities which will also give them a source of livelihood. Though, the benefit of the aforestation would take decades, but that has to be the focal point for the sustainable rebuilding of Uttarakhand. Already villagers have started their effort in the past with some forests being handed over to their local GODs thus ensuring no felling of trees in their neighborhood, since the survival of the local people is dependent on the land, forest and water.

Being strategically located we need to keep people in the region and not allow the migration to comfortable regions at the foothills. The static and floating population should be fixed and there should be no increase in the population in the sensitive region as also the movement of vehicles which have been affecting the hills due to heavy loads being carried which are creating pressures not measureable in real time.

A complete rethink therefore has to be done. To meet the needs of the day hill stations also need to be developed for increased economic activity. However, we should plan the region for leisure with nature, good educational institutes, and health hubs in addition to religious tourism in real sense with road not reaching every point. Also important would be to reopen and manage the old trekking routes. Had these routes been open and maintained lot of rescue operation could have been done through the routes that were traditionally used by the local population and whenever there were road blocks.

At the same time, it is important to take steps to prevent future re-occurrence of such calamities for which the following is suggested:

- Undertake a complete survey of the catchment and use remote sensing data and GPS to resurvey all catchments for prevention of such occurrence in the future.

- Plot critical points needing prevention or action and ensure the work starts immediately after monsoon and is completed before next monsoon and make this an annual event.
- To accomplish the rehabilitation and restoration a high powered task force on the pattern of the Delhi Metro with resourceful construction companies be employed to ensure work is done in a time bound manner.
- Demarcate danger zone and no construction zones in the entire state to ensure future safety of human life.
- Immediately take a Zero tolerance policy on construction, etc. along and within the rivers and rivulets.
- Take a complete re-think on all works under progress in the national interest. Where they need to be stopped the loss is less as compared to the loss of human life.

CONCLUSION

Lets rethink to rebuild a sustainable Uttarakhand and remember the works of Mahatma Gandhi *Earth provides enough to satisfy every man's need, but not every man's greed.* Let us take lessons from the present calamity and rethink how best use nature for our needs and let go our greed.

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5

Is India on a Sustainable Development Path?

Prof. Surender Kumar*

This study provides estimates of the growth rate of per capita comprehensive wealth for the Indian economy. It considers air, water and soil degradation along with energy, minerals and forests depletion. It estimates resource depreciation allowances on the basis of hotelling rent; adjusts education expenditure for depreciation in human capital. It suggests that Indian economy is barely sustainable; growth rate of per capita comprehensive wealth was only 0.15 percent per year over 1970-2006. The growth rate was negative till 1983; it was less than one percent in 1980s and 1990s. In recent years, the growth rate was about 4 percent.

Keywords: *Sustainability, Development, Comprehensive Wealth, Hotelling rent*
JEL Classification: Q01, E01

INTRODUCTION

Indian economy is growing at an average rate of 8.7 percent per year since 2003–04 and per capita income is increasing at the rate of about 7.5 percent. Tireless efforts to accelerate economic growth had kept environmental considerations as secondary objectives in policy making. It has been a tough trade-off decision between economic growth and environmental protection. For example, damage caused by pollution in India is estimated to cost $ 14 billion annually; amounting to close to 4.5% to 6% of GDP (Government of India, 1999). This indifference towards environmental protection has been threatening the sustainability of growth trajectory.

Modern growth theories suggest in a world of finite resources environmental sustainability is potentially not compatible with continuous economic growth. Failure to achieve environmental sustainability even becomes an obstacle in achieving long-term economic growth. Given the trade-offs between environment and development, the issue is not to

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achieve the maximum economic growth or total maintenance of environment, but is one of arriving at optimality both in economic progress and environmental protection, and the concept of sustainable development may be the guiding force.

The Brundtland Report defines sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs". This definition requires that future generations should at least get as much resources as we have, to meet their needs, but the question is how to judge whether a generation is bequeathing behind adequate resources for their successors. That is, it lacks tractability as it embeds many complex economic ideas, especially when one is interested in measuring whether an economy is on a sustainable growth path (Vouvaki and Xepapadeas, 2008).

In order to make the definition of sustainable development operational and useful for developing indicators of sustainability and designing policies that make the growth trajectory sustainable many attempts have been made in the literature.[1] According to Partha Dasgupta (2007a) "Economic development is sustainable if, relative to its population, a society's productive base does not shrink". Productive base can be defined in terms of stock of capital assets and institutions. Capital assets include manufactured capital, human capital and knowledge, and also natural capital. Sustainability, thus, can be equated to non-declining value of the productive base. To get an idea of whether India's development has been sustainable over a period of time, estimates of the changes that took place over the period in its productive base, relative to its population are required. This is precisely the purpose of this paper.

A large number of studies have tried to measure genuine investment or savings[2] in various countries[3]. Hamilton and Clemens (1999) estimate genuine savings for large number of countries for 1998. Arrow et al. (2004) using the World Bank framework estimate growth rate of per capita genuine wealth[4] over the period 1970-2000 for sub Saharan Africa, South Asia, China, UK and US. Similarly, World Bank (2006) provides assessments of changes in comprehensive wealth for nearly every county of the world.

The present paper aims to advance genuine wealth accounting in several ways. First, it offers a comprehensive measure of natural resource accounting. To measure the value and composition of investment in natural capital, it accounts for the extraction of fossil fuels and minerals, depletion of forest resources and agricultural soils. It takes into consideration the degradation of atmospheric environment by measuring the values of particulates, CO_2 emissions, and industrial water pollution. Second, it presents estimates of resource

1. Solow 1974, Hartwick 1977, Pearce et al. 1989, Dasgupta and Mäler 2000, Pezzy 2004, Arrow et al. 2003, among others.
2. The term genuine investment refers to change in productive base. The term is more formally defined in equation (2). Hamilton and Clemens (1999) use the term genuine domestic saving and Arrow et al. (2004) use genuine investment. We follow Arrow et al. because in India, domestic investment is largely funded by the domestic saving (Mohan, 2008).
3. Pearce and Atkinson, 1993, Hamilton and Clemens, 1999, Arrow et al., 2004, 2007 among others.
4. We use the terms genuine wealth and comprehensive wealth interchangeably.

depreciation allowances based on the Hotelling rents, not total rents; provides a theoretical sound base for evaluating the long run impacts of natural resource depletion and degradation on welfare and sustainability. Thirdly, it offers an improved approach for measuring changes in human capital; it adjusts education expenditure for depreciation in human capital. Fourth, to account for the changes in knowledge base and institutions; it adjusts the estimates of the growth rate in per capita genuine wealth by total factor productivity (TFP) estimates that take into account some indices of the use of natural capital.

The paper is organized as follows: Section 2 outlines, in brief, the theoretical linkages between well-being, sustainability and productive base of an economy. Section 3 describes the estimation procedure. The empirical application is discussed in Section 4. Section 5 offers some concluding remarks.

WELL-BEING, SUSTAINABILITY AND PRODUCTIVE BASE

Generally the performance of an economy is measured in terms of growth in GDP (gross domestic product) or per capita GDP. GDP may provide some hint about the performance of an economy but it does not capture many important aspects of well-being. As the term 'gross' suggests GDP ignores the depreciation of capital assets. It is common to find a positive relationship between the growth rates of GDP and capital assets, if so the country is no doubt on a development path, but it is also possible that during the periods when the GDP is growing capital assets (e.g. natural capital) may be shrinking which is not immediately obvious and if the capital assets are shrinking then sooner or later economic growth will stop and reverse sign (Dasgutpa, 2007b).

Hicks (1946) suggests measuring well-being in terms of income which is available for consumption without consuming the stock of capital, and Net National Product (NNP) is considered as a proxy for the national income. Samuelson (1961) argues that the rigorous search for meaningful welfare concept leads to a rejection of all current income concepts like NNP and end up with something closure to a 'wealth like magnitude', such as the present discounted value of future consumption. Weitzman (1976), using linear social welfare function, shows that NNP is a proxy for the present discounted value of future consumption. Mäler (2007) demonstrates that the linear social welfare function implies reduction in consumption to zero in an optimal situation which may last for considerable time. This entails higher present consumption at the costs of future consumption. Moreover, the linear social welfare function requires that income elasticities for all goods and services must be equal to one which is empirically not observed. Mäler suggests the use of Ramsey-Koopmans (R-K) formulation as a basis for national income accounting.

Arrow et al. (2003) demonstrate that the time derivative of R-K social welfare function, at a given time t measures the rate of change of current social welfare. If the derivative is positive, it implies that current social welfare is positive and genuine investment is increasing. Negative derivative implies that the productive base is in decline and the development is unsustainable.

Arrow et al. (2004) define intertemporal social welfare function in terms of consumption and utility. Intertemporal social welfare function V_t at time t is the present discounted value

of flow of utility at a positive constant discount rate *ä*. More formally, assuming continuous time,

$$V(t) = \int_{s=t}^{\infty} U[C(s)]e^{-\delta(s-t)}ds \qquad \ldots(1)$$

where *C(s)* denotes aggregate consumption function and *U[C(s)]* is the flow of utility at time *t*. *s* and *t* variously denote time ($s \geq t$) and marginal utility is assumed to be positive.

Current productive base determines both the flows of consumption and future capital stocks. Let K_t denote the productive base which is a vector of stocks of all capital assets at *t*. If *V* is stationary, then $V_t = V(K_t)$; the time derivative of *V* is

$$dV / dt = \sum_i (\partial V / \partial K_{it})(dK_{it} / dt) = \sum_i p_{it} I_{it} = \text{ Genuine Investment} \qquad \ldots(2)$$

where K_{it} is the stock of the i^{th} capital at time *t*; p_{it} ($\equiv \partial V / \partial K_{it}$) is the shadow price of capital K_{it}; and I_{it} ($\equiv dK_{it} / dt$) is the rate of change in K_{it}. Equation (2) shows that intertemporal social welfare is non-decreasing if and only if genuine investment is non-negative. Genuine investment is defined as the change in society's productive base.

To express the sustainability criterion in terms of rate of change in genuine wealth, take the manufactured capital assets as numeraire and assume that the marketed price of manufactured capital is equal to its shadow price. The stock of genuine wealth then is simply $W = \sum_{i=1} p_i K_i$ and the rate of growth of genuine wealth is $\sum_i p_i I_i / \sum_i p_i K_i$ and this has to be non-negative for sustainable economic development in a constant population economy and in an economy where the population is growing the per capita genuine wealth must not decline overtime (Arrow et al. 2004).

The maintenance of productive base does not necessarily imply that a particular type of capital asset to be maintained. For example if exhaustible natural resource base is declining, equation (2) could nevertheless be satisfied if other capital assets were accumulated sufficiently to offset its decline.[5] Note that though equation (2) allows substitution between different forms of capital, the substitutability is not perfect since the shadow prices don't remain constant overtime. The dynamics of the shadow prices of different forms of capital assets can take care of the degree of substitution between the capitals and their essentiality. If a particular asset is essential and lacks substitutes in welfare function, the shadow price of the

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5. In the literature the maintenance of aggregate capital stock is known as the condition of weak sustainability. Pearce et al. (1989), in the Blueprint for a Green Economy, define the weak sustainable development as "...that the next generation should inherit a stock of wealth, comprising man-made assets and environmental assets, no less than the stock inherited by the previous generations", and strong sustainable development is defined as "that the next generation should inherit a stock of critical environmental assets no less than the stock inherited by the previous generation".

asset will rise fast and sustainable development will not be feasible with a continued depletion of the asset (Mäler, 2007).

ESTIMATION PROCEDURE

Change in genuine wealth or productive base is equal to the value of genuine investment at time *t*. Genuine wealth includes manufactured capital, human capital, natural capital and knowledge base, and evaluates them at their shadow prices. The World Bank data is used for estimating change in value and composition of genuine investment. Since 1999, the World Bank provides estimates of adjusted net savings, known as genuine savings, for a large number of countries starting from 1970 through the World Development Indicators (WDI).[6] Gross savings are adjusted for depreciation of manufactured capital, depletion of energy[7] and mineral resources[8], change in forest stock, CO_2 emissions and particulate matters[9]. To account for change in human capital, the World Bank makes adjustment in gross saving for public education expenditure. Note that the estimates are based on some crude assumptions.[10]

Valuing Natural Resource Depletion

Hartwick rule states that the hotelling rent received from the extracting of natural resources should be invested in manufactured and human capital so that the current consumption level in a country could be sustained over the period to time. If a country wants higher consumption level, in order to expand the economy's total capital stock, it is necessary that more than hotelling rent be invested in manufactured and human capital. Hotelling rent is measured as the product of marginal rent (price minus marginal cost) times quantity extracted in the case of exhaustible resources and marginal rent times net quantity extracted (quantity extracted minus resource growth) in the case of renewable resources.

Estimation of the hotelling rent is core of the analysis for valuation of depletion of natural capital. First step in estimating the hotelling rent is to estimate total rent received from the extraction of a resource. World Bank publishes figures for total rent for energy, minerals and roundwood.[11] Total rent is equal to price of the resource times quantity extracted (total revenue) minus total extraction cost. Resource accounting requires use of shadow prices and in imperfect economies market prices deviate from the shadow prices. The study uses border prices (international prices) as proxies for the shadow prices. Generally the international prices are higher because only better quality commodities tend to be traded. Total rent figure for each of the energy and mineral resource are obtained by multiplying

6. http://devdata.worldbank.org/dataonline
7. Energy resources include oil, natural gas, coal and lignite.
8. Minerals include bauxite, copper, lead, nickel, phosphate, tin, zink, gold, silver, and iron ore. For India data is available for 8 minerals, i.e., it is not available for nickel and tin.
9. The net adjusted savings estimates for particulate matters for India are available only since 1990.
10. For the World Bank methodology of computing adjusted net savings and data sources see Bolt et al. (2002).
11. http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTEEI/0,contentMDK:20502388~menuPK:1187778~pagePK:148956~piPK:216618~theSitePK:408050,00.html as accessed on July 30, 2008

the figures of extraction with average rent (price minus average extraction cost). Next step is to convert the total rent figures into the Hotelling rent. Vincent (1997) shows that in a standard model of optimal resource depletion, the Hotelling rent is equal to:

$$HR = TR \times (1+\beta) / [1+\beta(1+i)^{T}] \qquad \ldots(3)$$

where HR and TR stand for the Hotelling and total rent respectively, β is the elasticity of marginal cost curve, i is the discount rate, and T is the number of years until resource exhaustion. Equation (3) shows the relationship between the Hotelling- and total rent. As the resource approaches exhaustion the Hotelling rent approaches to total rent, but in the beginning of resource exploitation the Hotelling rent is only a fraction of total rent. The formula also shows that a country has to invest more in manufactured and human capital to offset the economic depreciation of natural capital as the resource approaches exhaustion.

To use formula, estimates of elasticity of marginal cost curves, discount rate and reserve to production ratios as a proxy for the life that the resource in question are needed. Marginal cost curves are estimated using the World Bank data of total extraction costs[12] and are given in Table 2. Discount rate is assumed equal to 12 percent. This discount rate is commonly used by the Planning Commission for project evaluations. It is assumed that in 1970 all the resources had a life of 50 years, implying that all the natural resources will be exhausted by 1919 if current extraction rates continue.

Valuation of Land Degradation

Land degradation is a serious environmental problem in India. It occurs through the natural and man-made processes of wind erosion, water erosion, and water-logging. It is estimated that about 57 percent of the total land is under some form of degradation. Under a business as usual scenario, it is estimated that India loses about 40 million tones of major soil nutrients annually (Pachauri, 2004).

The value of economic depreciation of land quality is equal to the change in the discounted sum of agricultural rents that arise in the presence of land degradation. If land markets are working efficiently and all other factors that determine current and future agricultural land rent remain constant except land quality, then the economic depreciation of land is equal to the change in land values between time periods. In India, land markets are too distorted. Therefore, following Vincent and Castaneda (1997), productivity change method is used. According to productivity change method the depletion value of a unit of soil equal to the capitalized value of future agricultural revenue that is forgone due to the loss of that unit. The economic depreciation of land degradation is computed as a product of the following three items: (i) value added in the agriculture sector, (ii) the percentage of degraded agricultural land, and (iii) the ratio of capitalized value of foregone future agricultural revenue to current value added.

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12. The estimated marginal cost elasticity of gold extraction is statistically insignificant and the fit is very poor, therefore we assume unit marginal cost of extraction for the resource.

For item (i) data is taken from WDI. In India about 57 percent of the total land area is degraded in mid 1990s (item ii). This figure refers to all vegetated land degraded due to all causes, not just agricultural land degraded by human actions. Therefore in the absence of data on land degraded by human actions, it is assumed that percentage of agricultural land degraded by human actions is equal to the percentage of degraded vegetated land; though it is a very strong assumption.

The estimates of degradation of land do not indicate the severity of degradation that strongly affects item (iii). In the computation of item (iii), following Vincent and Castaneda (1997), it is assumed that about 39 percent of the total degraded land is 'lightly' degraded, about 45 percent land is 'moderately' degraded and another 15 is 'severely' degraded. It is also assumed that lightly degraded soil was equivalent to 10 percent of current value added, moderately degraded soils to 40 percent, and severely degraded soil to 100 percent. Thus the value of item (iii) is equal to 36.9 percent (39% times 10% plus 45% times 40% plus 15% times 100 percent).[13]

Valuation for Air and Water Pollution

To value the atmospheric degradation, damages caused by CO_2 emissions generated in the economy and particulate matters are accounted. Existing convention followed by the World Bank in accounting for CO_2 and particulates emissions is adopted. World Bank values the emissions of CO_2 at a rate of US$ 20 per tone of emissions at 1995 prices. The valuation of damages due to particulates is based on the various estimates of willingness to pay. Note that the World Bank provides estimates of damages caused by particulates since 1990; the study extrapolates for the earlier period using the average damage estimates of the later period for which data is available.

Untreated water from urban settlements and industrial activities, and run-off from agricultural land carrying chemicals are primarily responsible for the deterioration of water quality and the contamination of lakes, rivers, and groundwater aquifers, and causing enormous damages to the economy. The water quality of surface and ground water has deteriorated significantly over the last two decades. The water quality of most of the rivers in India is not even fit for bathing, recreation and other social uses that Indians have been using for thousands of years.

Murty and Kumar (2004) estimate shadow cost of untreated industrial water pollution using distance function approach. They estimate marginal abatement cost for three major water pollutants: BOD, COD and SS for the 17 major polluting industries for the years 1995-96 and 1996-97. They find that these costs are about 2.47 percent of the value added in the industrial sector. Note that these abatement costs relate to the water pollution that is above the MINAS (minimum national standards) and remains untreated. Water pollution abatement cost borne by the industry is already accounted in the national accounts.

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13. Vincent and Casataneda (1997) estimates concerning the severity of land degradation are based on a WRI (1992) study. WRI classified about 39 percent of the total degraded land is lightly degraded, about 45 percent land is moderately degraded, another 15 is severely degraded and zero percent as extremely degraded by human activities in Asia.

The study uses these cost estimates of water pollution for producing the estimates of genuine investment.

Valuation of Accumulation in Human Capital

Measuring human capital formation is a complex issue as there are complementarities between expenditures made on different sectors. For example, there are strong complementarities between the expenses made for primary health care, nutrition and primary education. It is very difficult to locate which expenses are towards the maintenance of human capital or formation of new human capital. Arrow et al. (2003) suggest using estimates of expenditures on health and education as expenditure towards human capital formation. However, in a developing country like India, most of the expenses in the health sector are curative; therefore the study instead concentrates only on the education sector and takes the view that net investment in human capital can be approximated up to a point by expenditure on formal education. Arrow et al. (2004) indicate that using expenditure on education as a proxy for increases in human capital neglects depreciation of human capital due to morbidity, mortality and retirement form the workforce, and overstates the increase in human capital.

In the literature some attempts have been made for estimating depreciation of human capital. Rosen (1976) is, perhaps, the first attempt towards this direction. Recently, Groot (1998) estimates the rate of depreciation of education for Great Britain and the Netherlands and it ranges between 11 to 17 percent.[14] Following Groot, it is assumed that the rate of depreciation of educational expenditure for India is 17 percent and accordingly the public expenditure on formal education is adjusted for estimating per capita genuine wealth.

Accounting for Change in Knowledge Base and Institutions

Growth accounting literature shows that the growth rate of income or output is generally higher than the growth rate of inputs, i.e., there is some residual which Solow terms as total factor productivity (TFP). Dasgupta (2007a) argues that the growth rate in TFP occurs due to improvements in the existing body of knowledge and the working of institutions. Alternatively it can be said that the growth in TFP occurs due to technological- innovations and diffusions.[15]

Arrow et al. (2004) demonstrate how changes in TFP alter the assessment of social welfare function. They show that if TFP growth rate is $\bar{a}$ and output elasticity of capital is α, it raises the growth rate of intertemporal social welfare function in terms of genuine wealth by γ/α.[16] Following Arrow et al. (2007), it is assumed that the elasticity of output with respect to all forms of capital is one. Adjustment in the growth rate of per capita genuine wealth is

14. Arrazola and De Hevia (2004) found the depreciation of educational expenditure vary between 10-30% for Spain using the Groot model.

15. In the efficiency and productivity literature these terms are known as technological change and efficiency change respectively and these are analogous to innovation and diffusion (Kumar, 2006). Acquiring new knowledge and making its use is known as innovation and better or more use of what people already know is termed as diffusion of knowledge.

16. Elasticity of output with respect to capital can be obtained from the production function estimates. For example if the production function is Cobb-Douglus form: , then ? is the elasticity of output with respect to capital.

made by adding the Hicks-neutral technological progress to the rate of growth of the aggregate of all forms of capital.

The conventional productivity studies consider the production of marketed output as a function of manufactured capital and labor (sometimes adjusted for education). In these studies the estimates of TFP are biased since they do not account for the contribution of natural capital in the production of marketed commodities. Murty and Kumar (2006) using data for Indian industry observe that the marginal productivity of natural capital is positive. Kumar and Managi (2008) estimate TFP for a large number of countries using three inputs, viz. labor, manufactured capital and energy use, for producing GDP and the emissions of CO_2 and SO_2. Kumar and Managi observe significant difference in the estimates of TFP when natural capital is taken into account.

EMPIRICAL APPLICATION

The application proceeds in two steps. First, it estimates change in the natural capital by estimating the hotelling rent for exhaustible and renewable natural resources. It also estimates value of environmental degradation for soil, air and water pollution. It then adjusts for changes in net investment in human capital formation. In the second step, it considers the changes in genuine wealth on per capita basis and makes adjustment for changes in TFP growth.

Table 1 places the economic significance of total minerals, energy and roundwood rents in net domestic saving/investment and GDP.[17] It shows that natural resource extraction was about 4 percent of GDP in 1970s which increased to 5 percent in 1980s, though in 1990s a declining trend was observed, but soon it reversed. In 2006, the share of total rent earned from the extraction of natural resource was 6 percent of GDP. This table also shows that the total rent amounted to two-fifth of net domestic investment in the 1970s and increased to about 47 percent in 1980s. Thereafter, the share of natural resource earning in investment has declined, it was about 27 percent in 2006. It shows that though total rents are small in absolute term and small relative to GDP, they provide a significant source of net domestic investment. Regarding energy and minerals, the depletion relative to GDP is increasing suggesting that the resource use intensity of the economy is increasing. It is interesting to note that the depletion in forest resources relative to GDP is declining and it gets momentum in 1990s. Per se, this may be attributed to judicial intervention and subsequent governmental alertness.

TABLE 1: ROLE OF NATURAL RESOURCES IN GDP AND INVESTMENT (%)

Year	Total Rent to Net Domestic Investment	Total Rent to Gross Domestic Product
1970-1980	40.33	4.00
1981-1990	46.59	5.02

Contd...

17. Note that in India the capital formation is to a large extent financed by the domestic savings, therefore there is no major difference between the figures of genuine saving and genuine investment (Mohan, 2008).

1991-2000	33.88	4.14
2001	32.18	4.45
2002	25.26	3.81
2003	21.72	3.70
2004	25.62	5.24
2005	26.06	5.60
2006	27.22	6.00

Table 2 shows the ratio of Hotelling rent to total rent for energy, minerals and roundwood. As predicted by theory, the ratio is increasing at increasing rate over time. It was about one percent in the 1970s and increased to about 28 percent by 2006. These trends suggest that the need for investing to offset resource depletion is increasing. It appears that the country is entering into a period when the economic depreciation of natural resources is likely to escalate rapidly.

TABLE 2: RATIO OF HOTELLING RENT TO TOTAL RENT (%)

Year	Energy (1)	Minerals (2)	Forests (3)	Resource Depletion (1+2+3)
1970-1980	1.00	0.97	0.87	0.94
1981-1990	3.13	3.14	2.82	3.04
1991-2000	9.62	9.45	8.61	9.31
2001	16.82	16.47	15.02	16.47
2002	18.47	18.34	16.75	18.05
2003	20.48	20.39	18.66	20.10
2004	23.15	22.65	20.78	22.80
2005	25.37	25.12	23.13	25.10
2006	28.04	27.85	25.72	27.80

Table 3 provides the estimates of environmental damages relative to net domestic investment. Column 1 of the table shows that the ratio of hotelling rent to net domestic investment overtime; it is about 8 percent in 2006 indicating that the net investment has been much more than adequate to offset natural resource depletion. But as damages from environmental degradation (soil, air and water pollution) are included, it is found that in 1970s the net investment was just equal to total environmental damages. Overtime, a declining trend in economic depreciation of the environmental assets relative to net investment is observed, per se indicating that the net investment is enough to offset the environmental damages.

The most important cause of economic depreciation of environmental resources appears to have been soil degradation. In Table 4, column 4 shows that agricultural soil losses relative to GDP were more than 8 percent in 1970s and declining onwards. The relative decline in the soil losses occurs due to structural changes in the economy; share of agriculture in GDP is continuously declining. It was more than 42 percent in 1970 and has declined to 17.5 percent by 2006. Nevertheless, the soil degradation is a serious problem in India. The ratio

of water pollution damages relative to GDP is increasing, but the ratio for air pollution damages was increasing till 2002 and is declining in recent years. Similar trend are observed with respect to the damages from CO_2 emissions.

TABLE 3: RATIO OF ENVIRONMENTAL DAMAGES TO NET DOMESTIC INVESTMENT (%)

Year	Hotelling Rent (Resource Depletion) (1)	Environmental Degradation (2)	Total Environmental Damage (3) = (1) + (2)
1970-1980	0.41	99.93	100.34
1981-1990	1.30	80.12	81.42
1991-2000	2.94	69.10	72.04
2001	5.30	56.40	61.70
2002	4.56	48.86	53.42
2003	4.37	42.17	46.54
2004	5.84	32.97	38.81
2005	6.54	30.52	37.06
2006	7.57	29.02	36.59

Table 4 shows the various estimates of investment in India since 1970. Gross investment in the 1970s was about 17.5 percent of GDP and the estimates of genuine investment were only about 2 percent. Though, there is an increasing trend in both gross and genuine investment, genuine investment was far below the gross investment. By 2006 gross investment reached at the level of 31 percent of GDP and genuine investment was just about its half. Downward trend in the difference in gross and genuine investment rates may be attributed to various factors such as structural changes, change in the development strategy in 1991, increase in education expenditure, complete ban on green felling in 1996 by the Supreme Court of India, declining carbon intensity of the economy, improvements in environmental regulatory performance and increasing environmental awareness. But the issue of concern is the increasing resource and energy use intensity of the economy. Ayres (2008) calls for a radical change in the development trajectory. He says that nations should concentrate on increasing resource productivity; "…goods must be converted as much possible into services, and services must be delivered with the minimum possible requirement for material and energy inputs" (p11).

Figure 1 scatters genuine investment against growth rate of per capita GDP. First point to note it that India never observed negative genuine investment. Second, there is a clear upward trend in the scatter; as the economy's health improves genuine investment increases. This result is very striking given the fact that many countries under US$ 1000 per capita income have negative genuine saving/investment rates (Hamilton and Hassan, 2003).

Growth rate of unadjusted genuine wealth is computed by dividing the figures of genuine investment by the incremental capital output ratio (ICOR). Increasing populations are considered as a major reason for the destruction and depletion of natural resources, and thereby introduce the Malthusian aspect to the environmental accounting. If populations are increasing at higher rate than aggregate genuine wealth, the wealth is shared between

TABLE 4: GENUINE INVESTMENT AND COMPONENTS (% OF GDP)

				Environmental Degradation (4)				Natural Resource Depletion (5)			
Year	Gross Investment (1)	Net Domestic Investment (2)	Human Capital Formation (3)	Damages from CO_2 Emissions	Damages from Particulates	Damages from Water Pollution	Soil Losses	Energy Depletion	Mineral Depletion	Net forest Depletion	Genuine Investment (6)
1970-1980	17.48	10.07	2.23	0.57	0.80	0.56	8.12	0.02	0.004	0.02	2.15
1981-1990	20.65	11.12	2.85	0.87	0.80	0.65	6.59	0.10	0.01	0.04	4.77
1991-2000	22.74	12.53	2.99	1.45	0.86	0.65	5.69	0.25	0.02	0.10	6.12
2001	23.56	13.83	3.28	1.48	0.82	0.63	4.88	0.56	0.05	0.12	7.84
2002	24.58	15.08	3.28	1.49	0.83	0.65	4.39	0.47	0.06	0.15	9.61
2003	26.16	17.06	3.28	1.33	0.81	0.65	4.40	0.53	0.07	0.14	11.65
2004	29.16	20.46	3.28	1.33	0.78	0.68	3.95	0.95	0.11	0.14	14.60
2005	30.39	21.50	3.28	1.29	0.74	0.68	3.85	1.03	0.25	0.13	15.40
2006	31.06	22.03	3.28	1.28	0.74	0.69	3.69	1.20	0.33	0.14	15.58

more people. To compute the figures at per capita level, from the figure of growth rate of unadjusted genuine wealth the growth rate of population is subtracted. The figures of per capita growth rate of unadjusted genuine wealth are adjusted for the growth rate in total factor productivity (TFP).

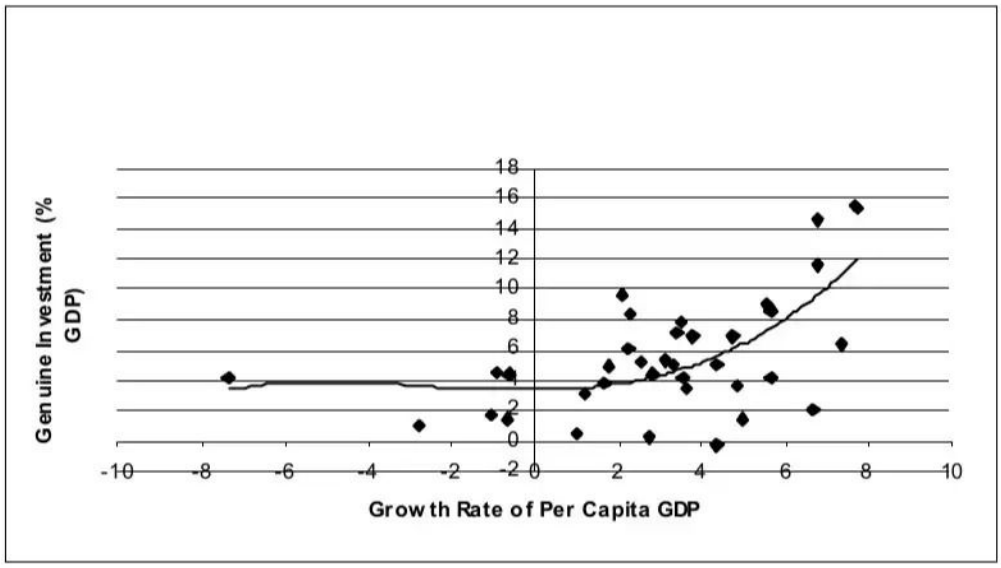

FIGURE 1: GENUINE INVESTMENT VS GROWTH RATE PER CAPITA GDP

In India, except for the decade of 1970s, the ICOR has been hovered around 4.[18] This measure of capital intensity does include only manufactured capital, and to account for human and natural capital, therefore, the observed ICOR is increased by one. The estimates of TFP growth rate are available until 2000; therefore, it is assumed that in the later years TFP growth rate is constant and equal to the growth rate of 2000. This assumption may bias the estimates of growth rate of per capita genuine wealth downward for the corresponding period. TFP growth accounts for about 48 and 40 percent of per capita GDP in 1980s and 1990s, respectively.

Table 5 presents the trend in the growth rate of per capita genuine wealth and per capita GDP. These figures provide some important insights on the question of sustainability of Indian growth trajectory. First, both per capita- GDP and genuine wealth are continuously increasing since 1970. Second, in the growth rate of per capita- GDP and genuine wealth, the contribution of technological changes is substantial. During 1981-2000, it is the TFP growth rate that converted per capita genuine wealth rate into positive figures. TFP growth accounts for about two-third of the estimated 3.14 percent growth rate of comprehensive wealth in later years.[19]

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18. ICOR figures are generated using the formula, where g is the growth rate of GDP, s is the gross saving rate measured a ratio of GDP and c is the incremental capital output ratio.
19. Average of per capita genuine wealth over the period of 2001-2006.

TABLE 5: GROWTH RATE OF PER CAPITA GENUINE WEALTH

Year	Genuine Investment	Observed ICOR	Growth Rate of Unadjusted Genuine Wealth	Growth Rate of Population	Growth Rate of Unadjusted Per Capita Genuine Wealth	Growth Rate of TFP	Growth Rate of Per Capita Genuine Wealth	Growth Rate of Per Capita GDP
1970-1980	2.15	8.28	0.30	2.28	-1.97	-0.35	-2.32	0.95
1981-1990	4.77	4.24	0.94	2.12	-1.18	1.62	0.44	3.35
1991-2000	6.12	5.08	1.14	1.79	-0.65	1.45	0.81	3.61
2001	7.84	4.24	1.50	1.62	-0.12	2.14	2.02	3.52
2002	9.61	5.89	1.40	1.55	-0.16	2.14	1.98	2.13
2003	11.65	4.06	2.30	1.49	0.81	2.14	2.95	6.79
2004	14.60	3.83	3.03	1.43	1.60	2.14	3.73	6.79
2005	15.40	3.69	3.28	1.37	1.92	2.14	4.06	7.75
2006	15.58	3.69	3.32	1.38	1.94	2.14	4.08	7.70

Third, during the study period of 37 years, per capita GDP increased at the rate of 3.1% per year and the growth rate of per capita genuine wealth was virtually near zero, it was only 0.15% per year. For the period 1970 to 2000, the growth rates of per capita GDP and genuine wealth were 2.58% and -0.42% per year respectively, however, Arrow et al. (2004) observed that the growth rate in per capita genuine wealth was 0.34% per year. The difference in these two estimates may be attributed to the comprehensiveness of genuine investment and use of different parameters for manufactured capital intensity and TFP growth rate. The growth rate of per capita genuine wealth reveals that during the period of 1970-2000, economic development was not sustainable. These figures reveal that an assessment of long term economic performance of Indian economy would be significantly off the mark if it were to look at growth rate of per capita GDP.

Fourth, the growth rate of genuine wealth was negative till 1983 (Figure 2). It was also negative in 1991. These estimates reveal that the development trajectory followed by the country before mid-1980s was not sustainable. Though the country observed positive growth rate in GDP, the growth rate of decline in natural assets was more than enough to offset the positive growth rate of manufactured and human capital. During the second half of 1980s and in 1990s, economic development in the country was barely sustainable. Only in recent years the productive base of the economy is improving.

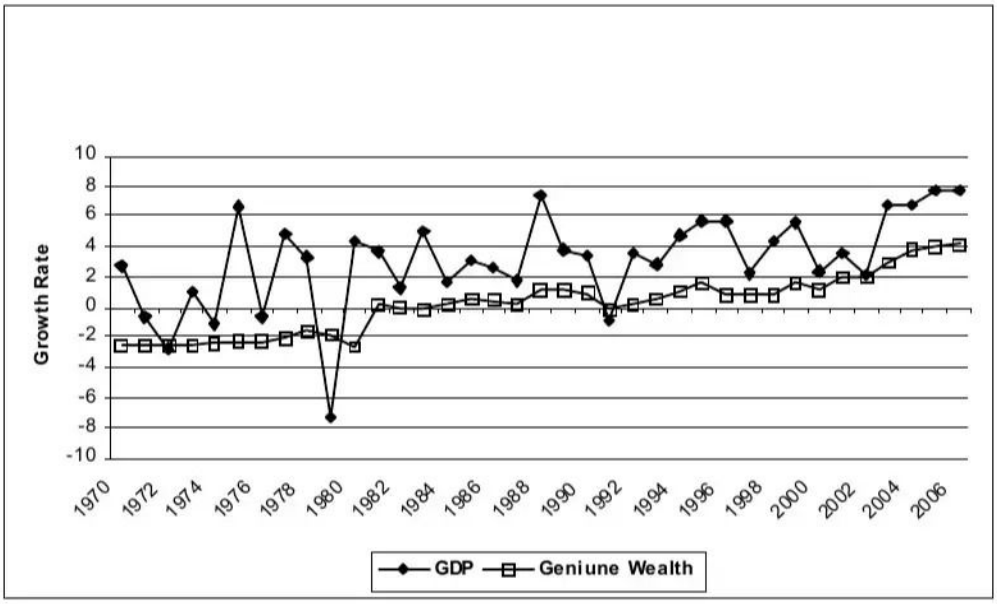

FIGURE 2: GROWTH RATE OF PER CAPITA GDP AND GENUINE WEALTH IN INDIA

Preceding discussion on the sustainability of income or welfare should be read with some utter caution. In the estimates of genuine investment all the natural resources are not accounted for. For example, these estimates do not account for biodiversity losses. India is recognized as one of the 17 "Mega Diversity Regions" of the world, which accounts for 67 percent of the world biodiversity. A large number of species are either endangered or on the verge of extinction. According to SACEP, India has about 12 percent of the recorded world's flora.[20] Similarly, as indicated, the analysis focused on onsite- and ignored offsite- impacts of land degradation such as sedimentation of reservoirs which might be economically more important. The analysis also does not account for depletion in water resource and waste generation.[21]

In the estimation of growth rate of per capita genuine wealth, it is assumed that there is substitutability between different forms of assets. These estimates miss critical bottlenecks that limit the substitution possibilities, i.e., substitution possibilities may be constrained by space and time. For example, in rural India for the people it is often not possible to find an appropriate substitute if their water holes vanish and the local woodlands recede (Dasgupta, 1993).

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20. http://www.sacep.org/html/mem_india.htm as accessed on July 14, 2008
21. The availability of fresh water is going to be the most pressing problem in India over the coming decades. India receives an average annual rainfall equivalent of about 4,000 billion cubic meters (BCM). This only source of water is unevenly distributed both spatially as well as temporally. Similarly, increasing amounts of untreated hazardous waste is becoming a serious environmental issue in India. Daily waste generation in India vary between 0.45 - 0.89 kg/capita.

Though environmental degradation is taking place throughout the country; the regional distribution of natural resources and the level economic development is not even across states. The poverty distribution in India coincidently is linked with the distribution of ecosystems and their health in the country (ESPASSA, 2008). Regional disparities in the post-liberalization regime are increasing. Most of the manufactured capital formation is taking place in those states which are economically in a better situation than those states that are poor and houses most of the natural resources.

CONCLUSION

This paper has tried to examine the question whether India's development has been sustainable over a period of time using the sustainability criterion. Sustainability is defined in terms of productive base of the economy which includes manufactured, human, and natural capital, knowledge base and institutions. The criterion of sustainability is satisfied if productive base is increasing on a per capita basis.

Though the paper follows Arrow et al. (2004) framework, it offers further methodological improvements and provides more comprehensive estimates of the growth rate of per capita genuine wealth for the Indian economy by considering soil losses and water pollution along with energy, minerals and forests depletion and air pollutants. To measure the value and composition of investment in natural capital, it estimates resource depreciation allowances on the basis of the hotelling rents, not total rents; it adjusts education expenditure for depreciation in human capital; and uses the estimates of TFP that takes into account natural capital in the production of commodities and services.

It is observed that the deprecation of natural resources is a significant source of net domestic investment. Though carbon intensity of GDP is declining but the issue of concern is the increasing resource and energy use intensity of the economy. The ratios of Hotelling rent to total rent are increasing exponentially overtime suggesting the need for investing more to offset the increasing resource depletion. Though overtime both gross investment and genuine investment are increasing, genuine investment was far below the gross investment. In 2006, genuine investment was just half of the gross domestic investment. However, note that India never observed negative genuine investment and there is positive association between the per capita GDP growth rate and genuine investment rate.

The empirical application suggests that Indian economy is barely sustainable. Both per capita- GDP and genuine wealth are continuously increasing since 1970; over the study period, former increased at the rate of 3.1 percent per year and the growth rate of later was virtually near zero, it was only 0.15 percent. The growth rate of per capita genuine wealth was negative till 1983. Thereafter it became positive; it was about 0.5 percent during the 1980s and about one percent during the 1990s. In recent years, the growth rate was about 4 percent. This reveals that long term assessment of economic performance of Indian economy would be significantly off the mark if it were to look at growth rate of per capita GDP only.

These results must be viewed as preliminary and tentative. During the study period, the life expectancy at birth has increased; under-5 mortality has declined significantly. Ignoring improvements in the health sector biases our estimates downward. Many significant natural

resources damages such as biodiversity losses, depletion of water resources, offsite losses of land degradation, which may bias the estimates in opposite direction, are ignored. Note that the estimates are based on the assumption that market prices are equal to the shadow prices of natural assets. Market prices don't reflect social costs of the consumption of natural capital, the use of market prices could bias the estimates of genuine investment in the upward direction. It is also, implicitly, assumed that damages from carbon emissions are linked to the emissions generated within the economy, whereas in fact the damages are linked to global level of CO_2 emissions.

The substitutability between different forms of capital is based on their relative shadow prices which signal social scarcity of different forms of capitals. The shadow prices are surrounded by many uncertainties regarding non-linearities in ecosystem dynamics, technological changes, etc. Despite these limitations, the study suggests for the need for vigorous public policies that help in bringing efficiency in consumption and production and reducing distortions, and thereby preventing excessive resource depletion and promoting higher genuine investment.

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6

Reinterpreting Sustainability†

Environment, Viability and Organization Design in Urban Transport

Dr Margie Parikh*

According to a report on Urban Development in India, whether India leverages its rapid urbanization to its advantage depends on how well its urban transport is managed – among other things. As increasing percentage of India's population prefers to live in cities, the problems of pollution and congestion are set to intensify in coming years. In the absence of reliable public transport, more people tilt towards two- and three-wheelers, making the problem worse. This paper reviews the changing context of urban transport, presents opportunities and challenges from the management perspective and observes that currently the efforts are devoted to creation of physical infrastructure. However, in light of the imminent need to make cities sustainable, a sustainable public transport would be needed badly. Making public transport a preferred mode of commute for the urban population would necessitate creation of institutional infrastructure, which would highlight the importance of organization design that supports as well as initiates the needed change so that the organizations engaged in public transport are financially sustainable. This paper is based on the author's study of the Ahmedabad Municipal Transport Service.

Keywords: *Sustainable Urban Transport, Organization Design, Sustainability, Viability*

INTRODUCTION

According to the McKinsey Global Institute, nearly 590 million people will be living in cities in India by 2030 (Sankhe et al. 2010: 37-58). Effective Public Urban Transport

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† This paper is based on the author's study that was a prerequisite to her major research project as part of her doctoral study at the CEPT University. The paper uses a version accepted at the final review of her work guided by Prof. G. Raghuram, IIM (A). The data collected for this paper is based on analysis of internal documents and reports and interviews of key managers at AMTS, conducted after approval. Last available data in some cases were from March 2012, but most data was up to March 2010. The most recent data are used in all cases.

(PUT) can reduce the menace of environmental pollution and congestion if more people use public transport. However, the current users of PUT are mostly from lower income groups in India. The report asserts that India's ability to leverage rapid urbanization to strategic advantage depends on the effectiveness of services such as PUT. In that case, the share of PUT as a mode of commute used by the people should reach a level that reduces the pollution and congestion significantly while allowing the economically less advantaged people to access employment and other opportunities at affordable costs. When would people of all classes prefer PUT for their commute? The National Urban Transport Policy (NUTP)[1] mentions the following qualities: safe, affordable, reliable, comfortable and sustainable. It is argued that achieving and retaining the qualities mentioned by NUTP would require confrontation of technical, physical, organizational and social issues, creating a challenge for the managers within the organizations that provide PUT.

CONCERN FOR SUSTAINABILITY IN PUT SECTOR

Sustainability was defined by the Brundtland Commission as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (1987: 8)[2]. This notion serves as a broad directive, but more specific understanding of sustainability is needed in the PUT sector in India. Apparently, PUT in India must confront contradictory goals: have adequate fleet of buses in good condition and running at high frequency for reliable service, and at the same time, keep the fares low so that the lower income groups can afford PUT. Large fleet of buses requires greater operation and maintenance costs even if fares of the PUT are not designed to recover initial investment in buses. How can the service earn low revenue and be able to spend more on operation and maintenance?

Using the urban growth productively requires adequate power, telecom, roads, water supply and mass transportation, coupled with civic infrastructure, such as sanitation and solid waste management. As suggested by Pucher, Korattyswaroopam and Ittyerah (2004), poverty afflicts not only individuals but also cities and public sector bodies in India, too. The transport systems lack financial resources for investment in infrastructure, vehicles, new technologies, and fare subsidies. The financial problems are not the only ones: inefficiency, traffic accidents, lack of planning, overcrowding, and lack of coordination [among various authorities and agencies]. While we take a serious note of the problems, as managers these facts should be used for finding solutions. As we do that, it appears that amid the changing context of PUT in India, sustaining effective service requires managerial effectiveness.

CONTEXT OF PUT: CHALLENGES INTENSIFY AND OPPORTUNITIES APPEAR

According to Pucher and Colleagues (2004), most Indian cities rely on buses for PUT. According to the Constitution of India, municipalities are not obliged to provide PUT. Hence, commuters in many cities use contracted or private buses and other hired vehicles

[1] http://urbanindia.nic.in/policies/TransportPolicy.pdf

[2] http://conspect.nl/pdf/Our_Common_Future-Brundtland_Report_1987.pdf

such as rickshaws or taxis. In many cities where PUT is available, its share has been declining. The commuters need reliable, regular, safe and comfortable commute. When those needs are not satisfied, they turn to private vehicles - especially two-wheelers aggravating problems, of noise, pollution, congestion and road accidents (World Bank 2002 quoted in Pucher and colleagues 2004). Indian commuters link vehicle ownership to status and prestige, but for many others, PUT is inefficient, unproductive, overstaffed, incurring excessive operating costs, and needing large subsidy. With the rising costs of fuel and components, operating deficits have been rising rapidly. Baring one service in Bangalore that is actually profitable, all other organizations providing PUT, make losses in the range of 20 to 40 percent.

Along with the issues and challenges, opportunities have appeared, too. Urban Transport Policy at the national level has been articulated with the vision that puts people and their well-being at the centre stage in an effort to make Indian cities among the most livable. The specific objectives of NUTP place PUT at the stage of urban planning rather than being an afterthought and offer financial assistance from the central government. It can be seen that the efforts are afoot to turn the PUT sector around by recognizing the areas in which help is needed. The central government has initiated the measures of financial help as indicated. Jawaharlal Nehru National Urban Renewal Mission (JnNURM) gave help to cities for improvement of urban infrastructure and purchase of buses. In this paper we use the case study of the Ahmedabad Municipal Transport Service (AMTS) to analyse the extent to which it stands to benefit by such initiatives, the challenges to its sustainability that remain and the measures that can help.

The changing PUT context in Ahmedabad has not displaced the traditional buses from their key position. In 1941, buses were a key element of the city's decongestion plans and they remain so. The bus routes of Ahmedabad span 3,345[3] kilometres and the city continues to expand every year. AMTS buses are often the only means of transport for the people in the lower income groups estimated to be more than two million in the urban population of 6.3 million[4]. With the average fleet of 984, AMTS operates 674 buses on road to carry 12.49 Lakh passengers every day. Its fleet will soon expand to 1153, but the JnNURM benchmark, a four million-plus city requires 500 buses per million of population. Ahmedabad would have 3,000 buses by that standard. AMTS is also expected to coordinate services with the new modes of public transport such as the Bus Rapid Transit System (BRTS) and the Metro, which is under construction. Optimal utilization of the 125 kilometres of the BRTS routes and the upcoming Metro is contingent upon a good feeder service, which better be AMTS.

An average AMTS bus, however, is 7.3 years old, runs for 212 kilometres per day and carries 1180 passengers to serve one of the 166 routes operated. Is AMTS adequately prepared for its changing context? Can it sustain its service? Such questions require us to put AMTS performance in perspective. In its best times, AMTS won awards for being the best among transport services offered across India. It would appear that AMTS has put its best behind it. Around mid-to-late sixties, AMTS was the daily carrier to more than one-third of the

[3] As per the internal documents and interview data available up to March 2012

[4] An estimate provided by the ex-commissioner of Ahmedabad Municipal Corporation

city's population. However, by the end of 2010, that share declined to a little over five percent. The routes offered by AMTS were also on decline since 1990.

Since 2005, however, the AMTS has encountered new opportunities through getting of new buses through JnNURM for sustainable, safe and affordable transport to increasing percentage of the country's population. AMTS has also been allowed to use cooperation with private operators of buses. As a result, again some indicators have improved, conveying that if the best was behind AMTS, perhaps even its worst is also now behind it. The fleet size, age of the fleet, the passengers carried every day, the number of routes – these are all improving. Apparently, AMTS is in transition again to a different phase as indicated in Figure 1comparing the routes, fleet, break-downs and passengers carried daily Figure 1).

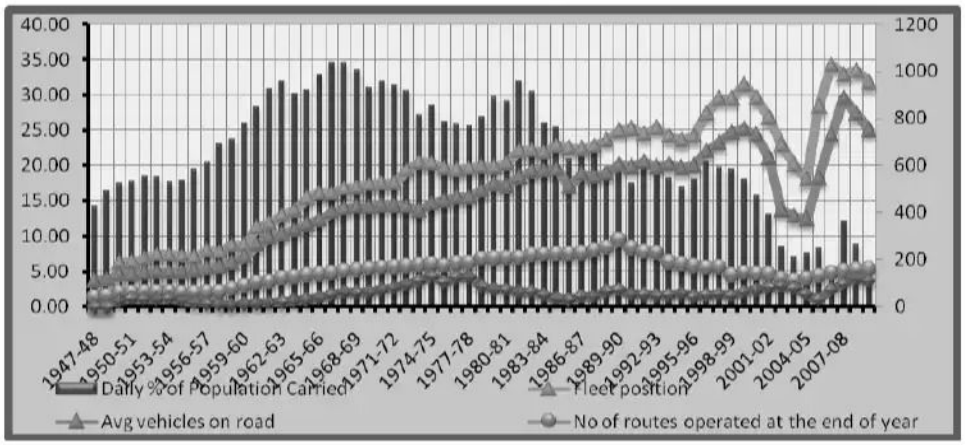

FIGURE 1: AMTS ROUTES, FLEET, DAILY BREAK-DOWNS AND % POPULATION CARRIED DAILY

In the face of new developments, AMTS presents an interesting opportunity to explore whether the new events adequately meet some of the persistent challenges and what measures would enhance the effectiveness of AMTS further. Figure 2 provides a comparison of the percentage of population carried daily, daily passengers per bus, and the population of the city including suburban population.

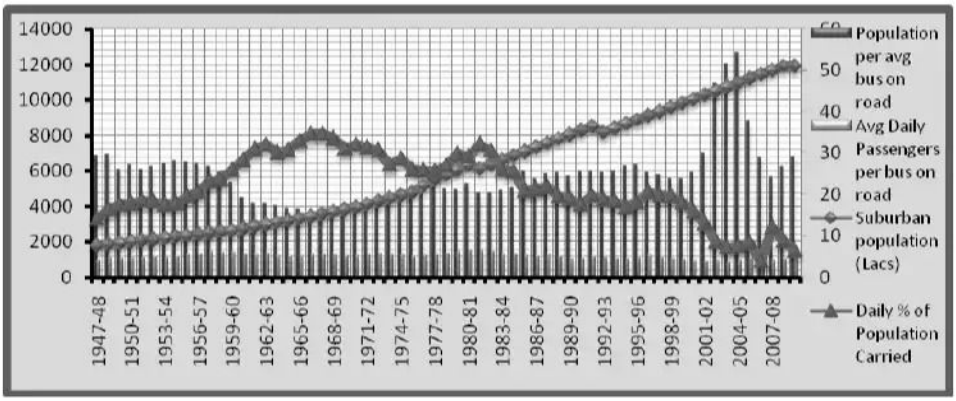

FIGURE 2: CITY POPULATION AND BUS DENSITY

AMTS was launched as a fair-priced alternative to the private options in 1947. As the service evolved, the fares were strictly controlled in spite of rising cost, and concessions were extended to these categories of commuters. Additionally, AMTS had no capital of its own but received from the transport fund created by the municipal corporation. Over the years the losses mounted and the AMTS regularly struggled for funds through loans. These were difficult years as the basic service it offered rendered little revenue, and on the other hand it was routinely required to replace buses in the fleet and maintain them. Figure 3 provides a comparison between the daily traffic revenue and daily passengers on an average at AMTS.

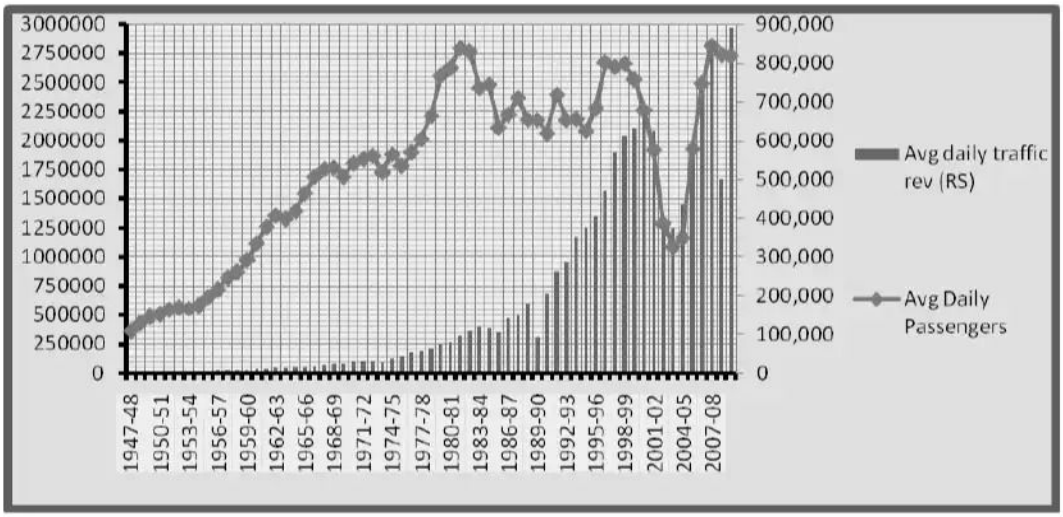

FIGURE 3: AVERAGE DAILY PASSENGERS AND TRAFFIC REVENUE AT AMTS

The pressure on the fleet was palpable, and the people had reasons for looking for alternatives to AMTS service – as shown in Figure 4 that compares daily passengers and passengers per bus (Figure 4).

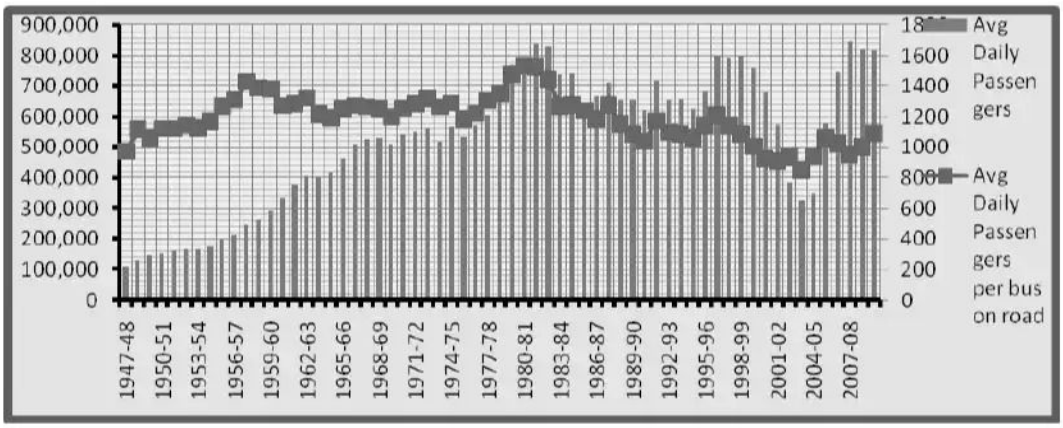

FIGURE 4: PASSENGERS CARRIED EACH DAY BY AMTS

The breakdowns, for example – general indicator of the health of a fleet, fell in the growth stage after the first phase of launch indented with numerous problems and the organization

on its learning curve. The number of breakdowns is affected directly by the efficiency with which inspection, routine maintenance and preventive maintenance is applied to the fleet of buses. In a cash-strapped and resource-short organization, efficient repair and maintenance depend upon the skilled supervision and involvement of the executives in charge, too (Figure 5).

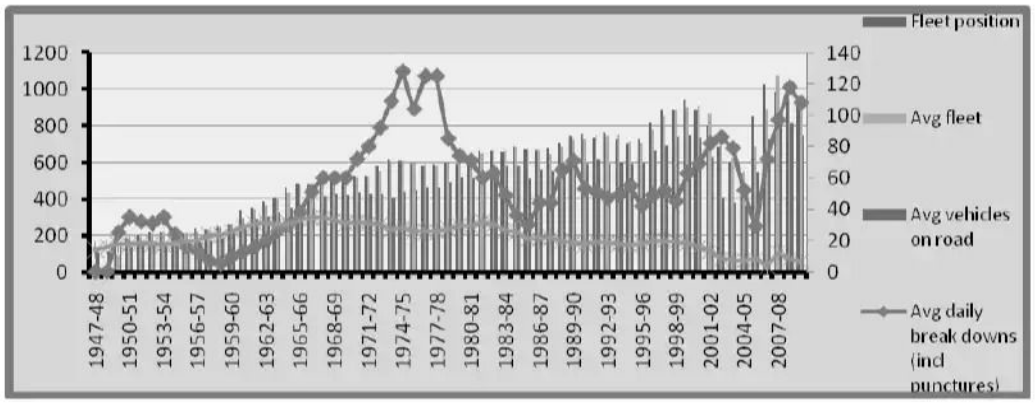

FIGURE 5: BREAKDOWNS, FLEET AND TENURE OF TRANSPORT MANAGERS AT AMTS

With the breakdowns increasing, the fleet on road also shrank, widening the ratio of fleet size and vehicles on road. That was the indicator of worsening utilization of fleet, and with the population evergrowing; the service began to fall short of the need for mobility. This phenomenon must have been marked by tremendous stress at the organization level, and it began to decline as indicated by the number of accidents and breakdowns reported daily (Figure 6).

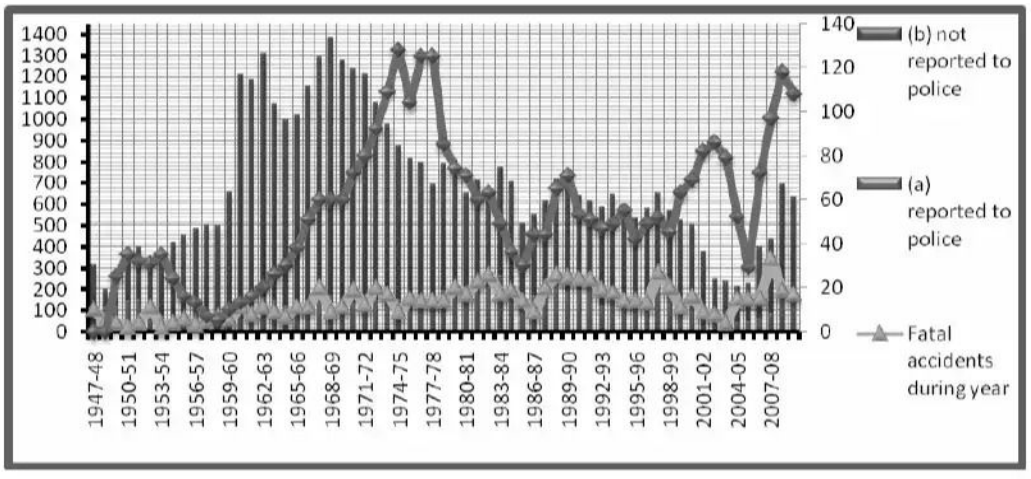

FIGURE 6: ACCIDENTS, FATAL ACCIDENTS AND DAILY BREAKDOWNS AT AMTS

The accidents and fatalities increased. The income levels remained low while expenses mounted. Several executives at AMTS pointed that since making profit was not a motive, the object of management was to minimize losses. The extent to which they could realize that goal is evident from Figure 7.

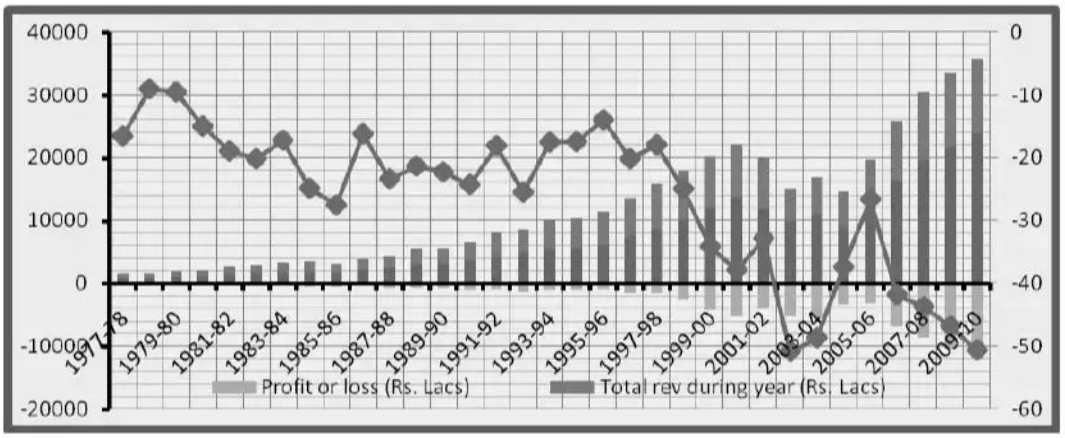

FIGURE 7: TOTAL REVENUE, TOTAL EXPENDITURE, ANNUAL LOSS AND LOSS AS A PERCENT–AGE OF EXPENDITURE AT AMTS

Much of this began to change in 2005 with introduction of new buses, private contractors and so on. Whether the changes make AMTS more viable and sustainable depends on analysing whether the intended improvement is actually happening. A closer look on the years after 2005 can help compare. Vehicle Utilization has improved after a sharp rise in 1995 and after the entry of private operators in 2005-06, again the daily passengers have increased to match the previous high of eight lakh per day (Figure 8).

AMTS since 2005: Entry of the Private Operators

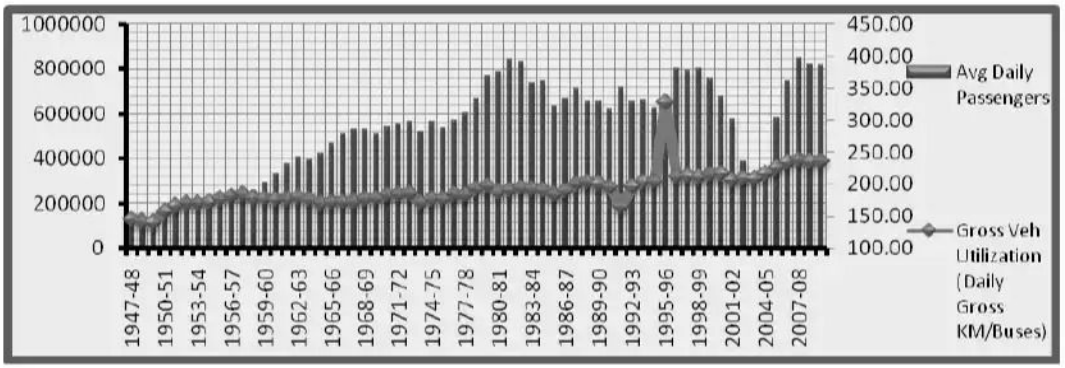

FIGURE 8: DAILY PASSENGERS AND GROSS VEHICLE UTILIZATION AT AMTS

The entry of private operators appears to also have eased the pressure on the sole major workshop and the four other maintenance facilities of AMTS. Since 2005-06, the shortfall in buses because they were in the workshop, fell sharply (Figure 9).

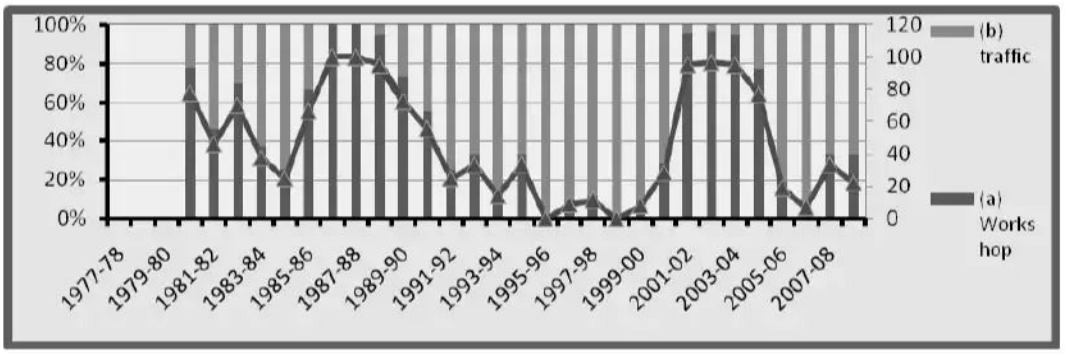

FIGURE 9: LESSER BUSES ON ROAD DUE TO WORKSHOP AND TRAFFIC RELATED REASONS

Similarly, the late turning out of buses on account of workshop, also fell sharply (Figure 10):

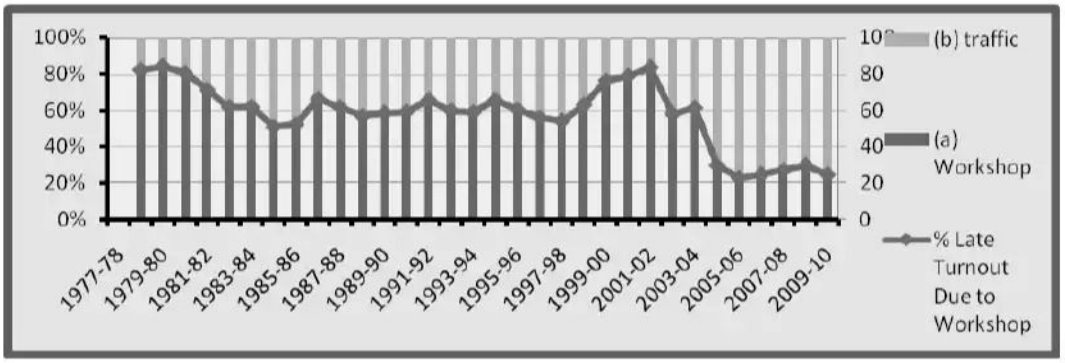

FIGURE 10: RATE OF BUSES TURNING OUT LATE DUE TO TRAFFIC AND ON ACCOUNT OF WORKSHOP

The average daily kilometres also improved (Figure 11):

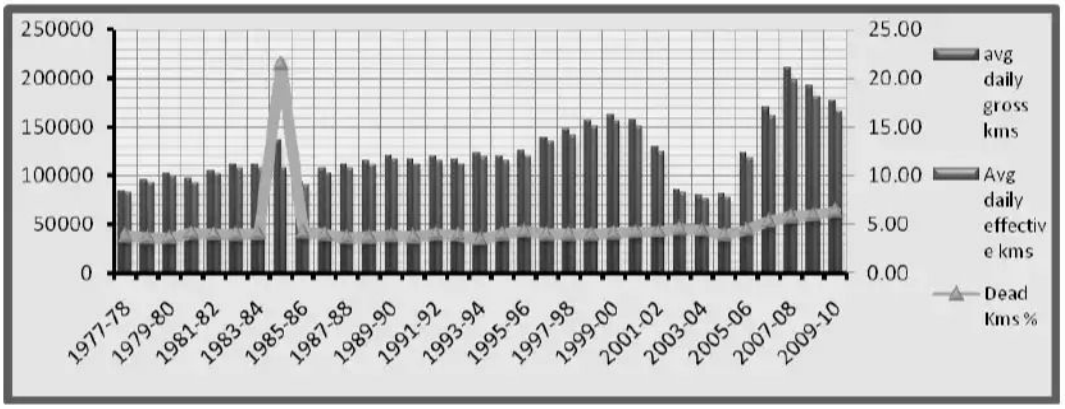

FIGURE 11: AVERAGE DAILY GROSS, EFFECTIVE AND DEAD KILOMETRES

The fleet position, buses scheduled and buses on road improved (Figure 12):

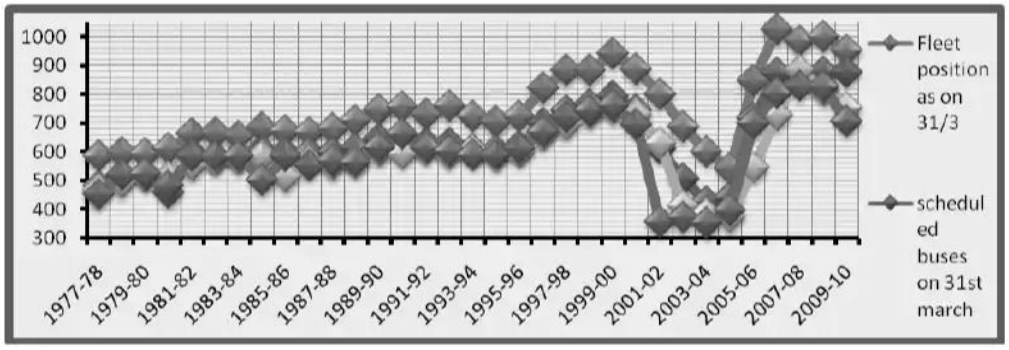

FIGURE 12: FLEET POSITION COMPARED WITH SCHEDULED, ON ROAD AND DAILY AVAILABLE BUSES AT AMTS

However, private contractors do not automatically improve PUT. In spite of a sharp increase in the fleet size, the gap between the scheduled buses and buses on road has persisted and even worsened. That means that the management of fleet, scheduling the vehicles taking into account the checking and maintenance could be a problem (Figure 13).

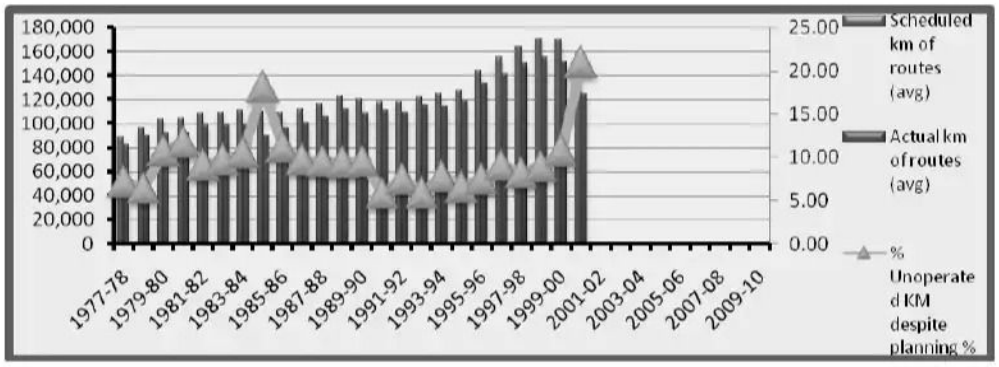

FIGURE 13: SCHEDULED AS AGAINST ACTUAL KILOMETRES OF ROUTES AT AMTS

Also, the gap between scheduled routes and actual kilometres of routes had shot up in 2000-01, but it was no longer monitored. Likewise the cancelled trips as against the planned ones also show a gap (Figure 14).

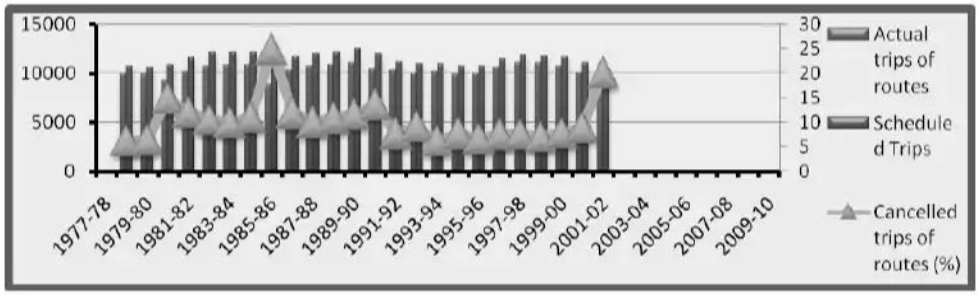

FIGURE 14: ACTUAL, SCHEDULED AND CANCELLED TRIPS SINCE THE ENTRY OF CONTRACT OPERATORS

Entry of private contractors did not improve the bus utilization in terms of fuel efficiency. The Average Daily Kilometres per Litre of fuel has seen a steady decline since 1995 (Figure 15).

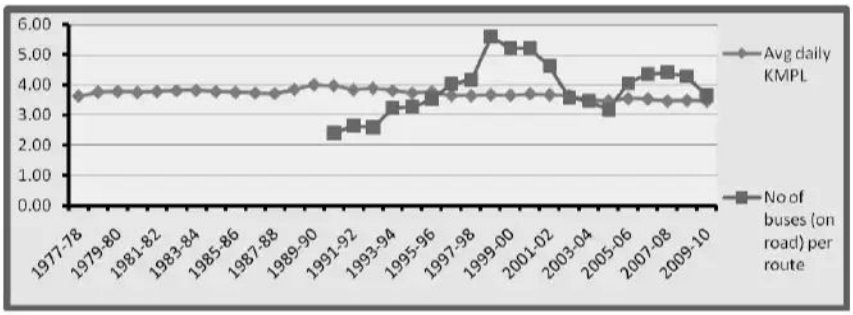

FIGURE 15: FUEL EFFICIENCY AND BUSES PER ROUTE

The fleet that AMTS has suggest aging, too, as shown in Figure 16:

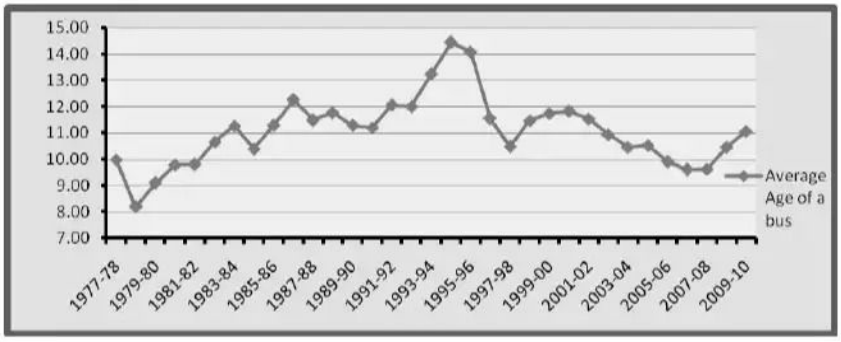

FIGURE 16: AVERAGE AGE OF A BUS AT AMTS

AMTS can benefit immensely from the contribution of private participants' investment and maintenance of buses, but what seems to be happening is that the operators do not have buses to spare for preventive maintenance. Additionally, their drivers also might not be highly skilled, causing greater wear and tear to the bus as well as raising accidents (Figure 17).

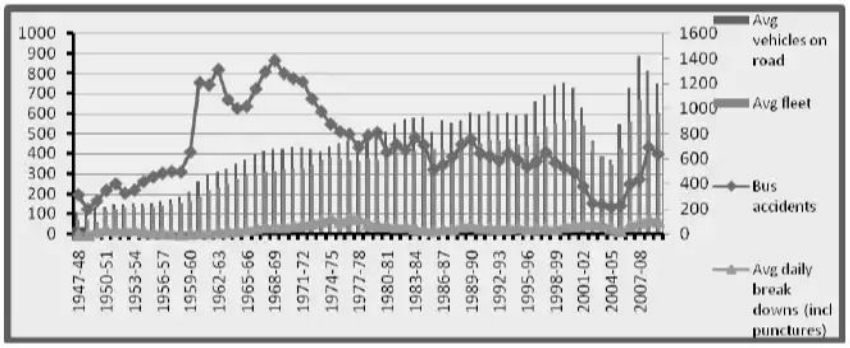

FIGURE 17: ACCIDENTS AND BREAKDOWN AS AGAINST THE FLEET AVAILABLE AND DEPLOYED

One needs to also consider the capacity of the operators in terms of buses they operate (Table 1):

TABLE 1: PRIVATE OPERATORS (IDENTITY MASKED) AND THEIR FLEET SIZE FOR EACH TYPE OF BUSES

Operator	Fleet Size	Operator	Fleet Size	Operator	Fleet Size
A*	Regular: 70 Low Floor: 5	B	Regular: 30	I	Regular: 20 Low Floor: 5
K	Regular: 70 Low Floor: 5 Mini: 3	C	Regular: 30 Low Floor: 5	E	Regular: 10
D	Regular: 50 Low Floor: 25	L	Regular: 30 Low Floor: 5	G	Regular: 10
F	Regular: 40	H	Regular: 20		

* Names masked

Hence, as the thumb rule goes, 20% of fleet is reserved for repair, maintenance and general checking at AMTS. However, how many buses are reserved similarly by the operators is a question, and in the long run it might impair the quality of service offered (Figure 18).

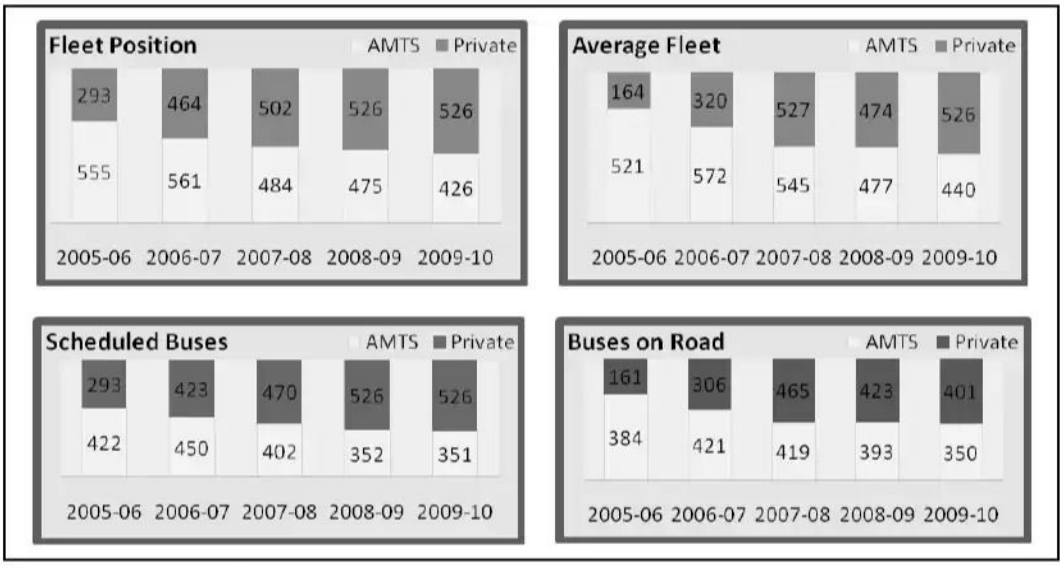

FIGURE 18: CHANGING SHARE OF AMTS BUSES IN THE FLEET

As greater percentage of operating fleet is contributed by the private operators, the share of AMTS in traffic revenue is declining. For example, the latest split of conductor revenue between the two operators looks like (Figure 19):

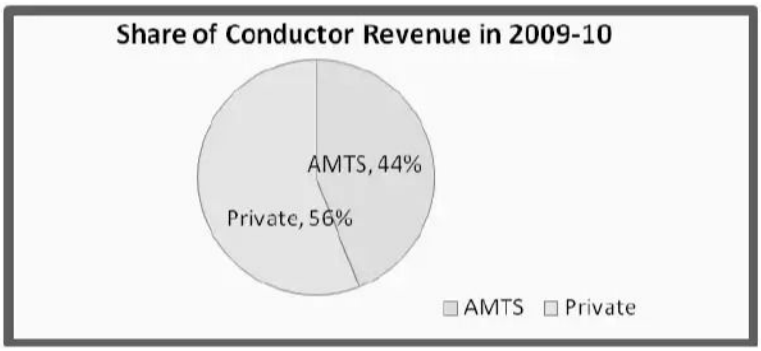

FIGURE 19: THE LATEST SHARE OF AMTS IN CONDUCTOR REVENUE

Regulation of Private Operators for Leveraging the Benefit they Bring

Thus, it seems that funds for investing in new buses and technology may be available, private contractors may be available, but PUT requires effective and efficient management to ensure its viability and sustainability. Costs need to be controlled relentlessly, which can come easily through keeping maximum number of buses on road. In absence of rigorous preventive and routine maintenance, this might hurt the efficiency of the operations (Figure 20 and 21):

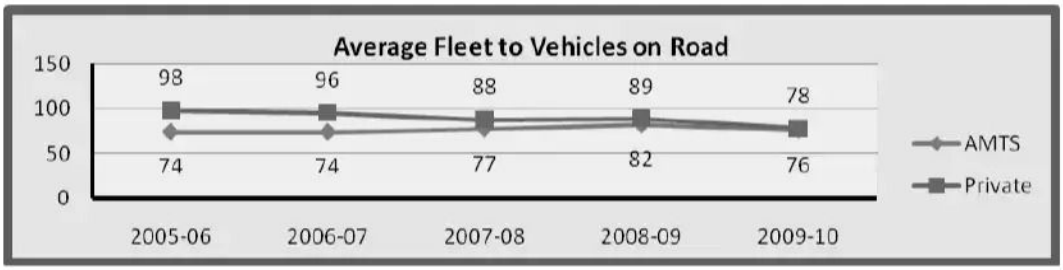

FIGURE 20: FLEET SIZE AND VEHICLES ON ROAD

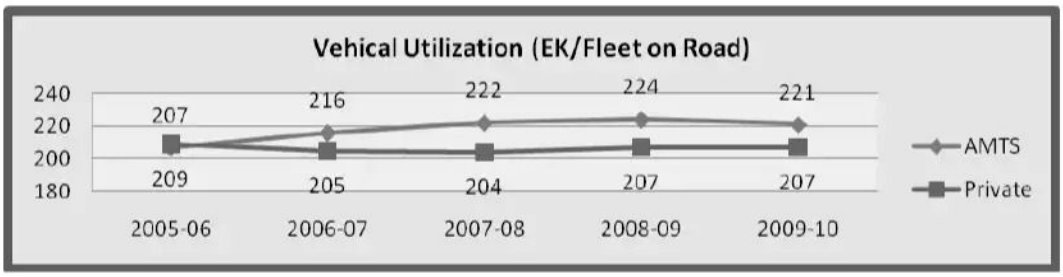

FIGURE 21: VEHICLE UTILIZATION

Or, simply running the bus along the routes for collecting the per-kilometre rent, and not stopping on all the designated stops (Figures 22 and 23):

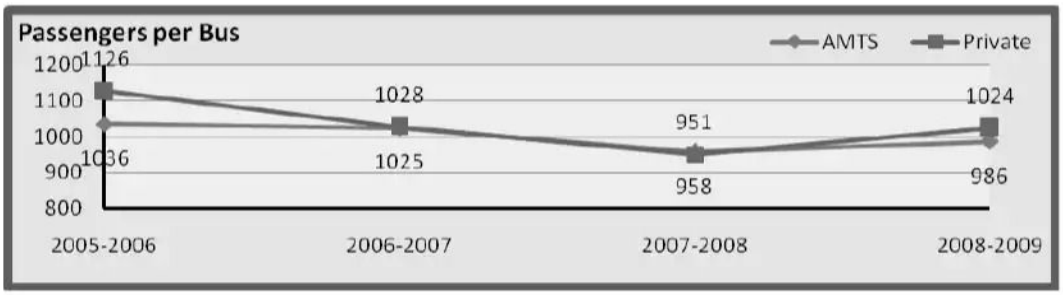

FIGURE 22: PASSENGERS CARRIED PER BUS

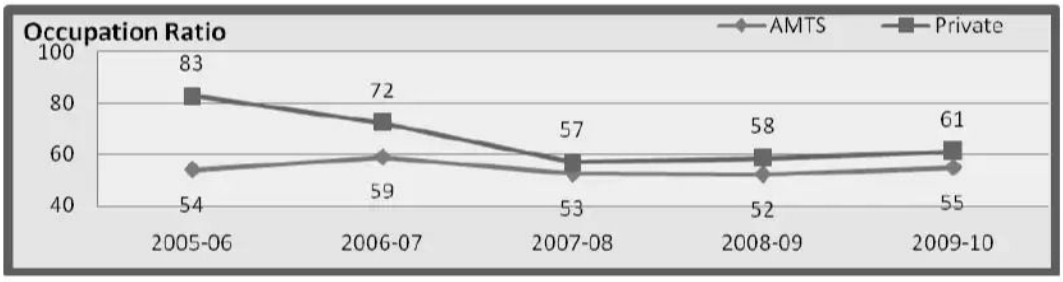

FIGURE 23: AVERAGE OCCUPATION RATIO

It is also possible to imagine that the issues such as driver training fall through the cracks, leading to accidents (Figure 24):

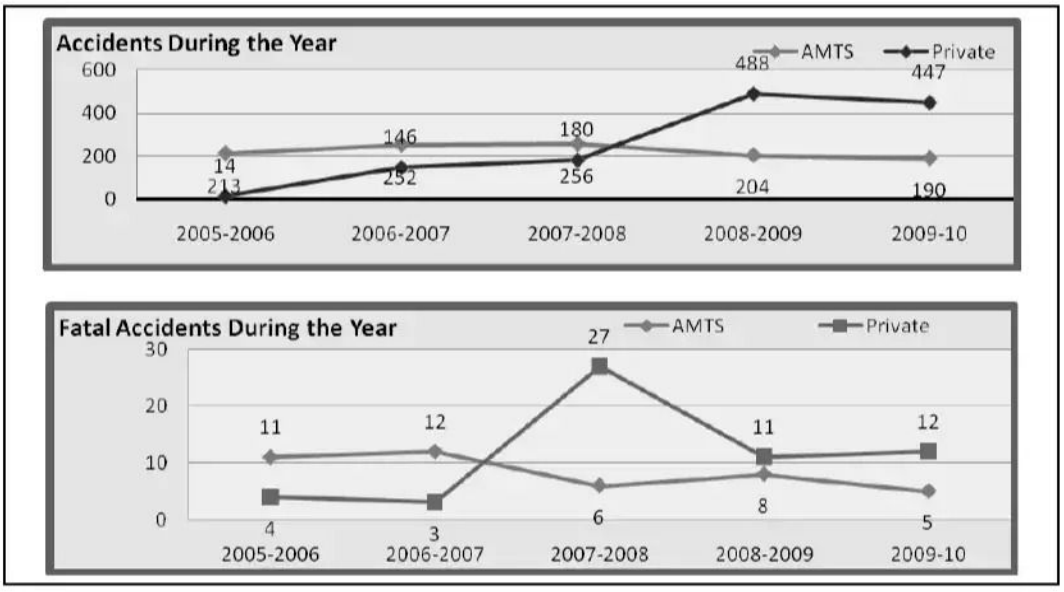

FIGURE 24: ANNUAL ACCIDENTS (ABOVE) AND FATAL ACCIDENTS (BELOW)

Breakdowns during the year also increase (Figure 25):

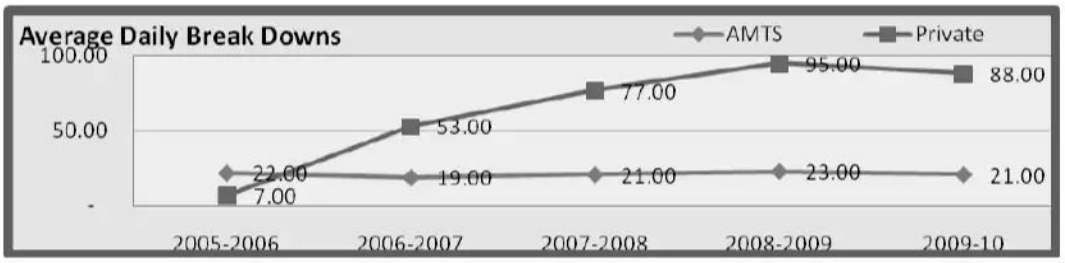

FIGURE 25: AVERAGE DAILY BREAKDOWNS

Breakdowns indicate technical problems, fixing them and preventing them requires skilled and efficient staff as well as supply of spares and replacements. In a heavy wear-and-tear service such as transport, this replenishment needs funds. In the case of AMTS, the source of funds is clearly not the service itself. Only in the recent years does there seem to be a greater correspondence between the daily passengers who use the service and the revenue that AMTS generates from traffic. AMTS has struggled with profitless and incomeless growth and that raises a question that if the ban on fare increase was unshakable, why did anyone not think of looking for other sources of revenue (Figure 26)?

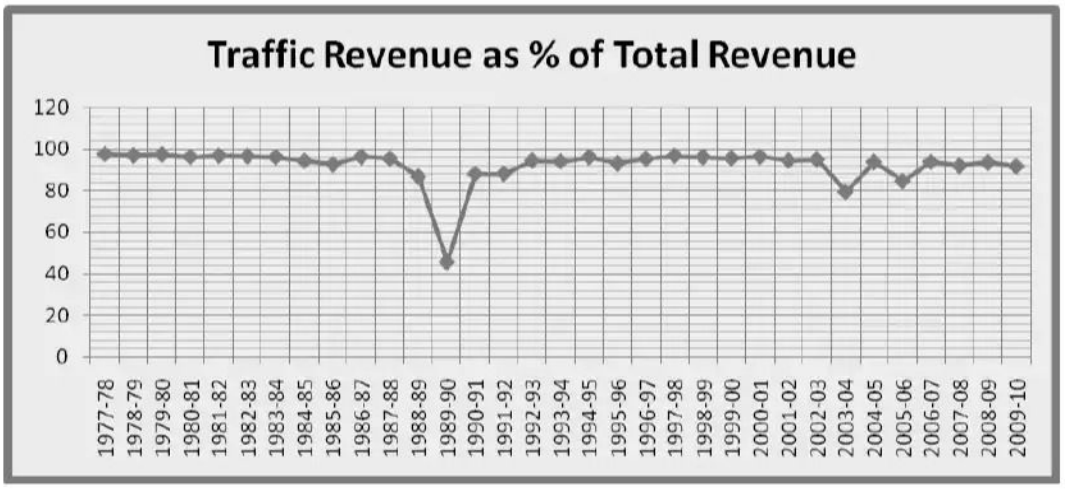

FIGURE 26: TRAFFIC REVENUE AS % OF TOTAL REVENUE

Discussion and Conclusion

This analysis shows AMTS poised at the beginning of new transition. The transition is set off by two major events. One is the launch of BRTS that will generate revenue through the feeder buses operated by AMTS, and the entry of the private operators which will enable AMTS reduce its aged fleet and enabling it to play an important role in the delivery of PUT. In order to remain sustainable, it has to be viable. For viability, the following need to be done:

(a) ***Generating adequate resources, not just aversion for profits and satisfaction with cost-cutting***

AMTS' own experience suggests that getting funds from AMC is difficult, and loans from the state government and other bodies are not only difficult to obtain, but expensive to service. Deficit of funds is one of its most persistent problems. If AMTS cannot raise fares, if funds cannot be infused by the AMC or other agencies without difficulties, what other avenues are open for AMTS for raising resources? This is an issue of exploration for it, which AMTS does not seem to have sufficiently explored earlier. It needs to think creatively and raise new sources of revenue such as advertisements.

(b) ***Managing the relationship with private partners for effective control and development***

Delivering the service jointly with the private partners is a new experience for AMTS. But if not effectively managed, this phase can lead to undesirable outcomes. The way AMTS negotiates its relationship with private partners is of great importance. Mainly two aspects need to be taken care of for sustainable and effective relationships: (i) Fair return for the operator and (ii) vigilant regulation of their operations.

(c) ***Managing its own operations***

Even if profit is not a motive, delivery of transport service is its business and AMTS has scope for improvement. With complexity of the business increasing and the challenge of winning once-lost users, AMTS is going to need to explore ways of accomplishing the same and using its scarce resources efficiently for the purpose. It appears that finding and implementing the ways to enhance efficiency itself is an area to be explored.

Each of the three challenges needs to be effectively managed. This effectiveness would not be achieved by innovation alone or efficiency alone. Both demands must be satisfied at once. AMTS has taken some measures in this direction. Even if it is too soon to conclude one way or the other, this process of change has potential for learning for management scholars.

Formula-based Fare and regular revision: While there are technological measures lined up for better fare collection in future, AMTS introduced a formula that retains a component of subsidy but will revise fares every year on realistic basis. As a result of this step, the gross deficit is dropped from 128% of revenue to 81% of revenue and it is expected that by 2013, the revenue will meet the operating cost.

Increase in buses through JnNURM and contracts with private parties: The establishment cost of the private parties is lower than that at AMTS so it is planning to run more buses on contract. Fitted with the GPS, these buses can be tracked from AMTS control room for route completion and timing. If this information is used for enforcing the contractor compliance, it will result into better servicing of the routes.

Advertisement and Property development: Two heads of income have good potential for exploitation: advertisement and commercial development of property. The revenue from advertisement has increased from ₹ 2,00,00,000 to ₹ 4,00,00,000 between 2005-06 and 2011-12 with fluctuation in between. Using shrewd business acumen, AMTS can leverage the location advantage of the bus stops, shelters and depots, and the reach to million-plus

commuters each day to determine advertising and property rent and invest in business-oriented development. This revenue can then be used to subsidize poor commuters.

Sustainability of AMTS depends on its viability and its viability depends on the effectiveness of its management. The key processes requiring comprehensive changes are decision-making, management training and development, information collection and processing, and control. AMTS does not have to look far for discovering ways of raising funds. Several other organizations have done it in India and elsewhere. More crucial question is of developing leadership talent, management will and capability within AMTS and focusing it towards determining which sources AMTS can develop and exploit, with which partners for what synergy at what terms – be it contracts for operation, advertising or property development that maximize the interest of AMTS.

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7

Entrepreneurship and the Role of Agribusiness in Agricultural Sustainability

Dr Veena Goel*

Words such as entrepreneur and entrepreneurship have acquired special significance in the growth context particularly industry in a rapidly changing socio-economic and cultural environment in the developed as well as developing countries. Entrepreneur and entrepreneurship can be distinguished from each other.

Keywords: *Entrepreneurship, Agribusiness, Sustainability*

INTRODUCTION

In a predominantly agricultural economy like India, agricultural sector occupies a crucial position as it absorbs large chunks of population that derives its livelihood from it. So due to heavy dependence of this sector upon nature, its growth must be sustainable to keep pace with the expanding food and feed requirements of the growing population as well as meet the requirements of future generations. To this end, the entire spectrum of agribusiness activities spanning from farm input supplies to food processing and its distribution to the various market segments also need to grow sustainably. This is required to be in consonance with the taste preferences and purchase capacities of consumers that can mitigate the emerging demand and supply gaps for the various food stuffs in each category i.e., primary, semi processed and processed with. Thus a judicious allocation of the various resources such as manpower, capital as well as natural can lead to its proper utilization. In this context, it becomes essential to examine how entrepreneurship can contribute towards sustainability

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ENTREPRENEUR

Entrepreneur has the capacity and willingness to develop, organize and manage a business venture. He is an innovator and a creator who remains in search of new challenges and responds to these. He might not have resources but will have the ideas that may relate to products, markets or techniques. So he has the ability to convert a threat to an opportunity and acts as a catalyst to bring about this change which is essential for a nation's ability to succeed in a fast-growing competitive global environment. An entrepreneur does not immediately shut-down or shift to another business either when losses incur/or are anticipated rather he analyses the situation. He is viewed by the Economists as a fourth factor of production along with land, labour and capital. Various entrepreneurs might have some common traits but they will have certain unique features. Entrepreneurs can be clubbed into various categories:

1. Business entrepreneurs convert ideas into reality and deal with manufacturing as well as trading.
2. Trading entrepreneurs undertake trading activities and are concerned with marketing at the domestic and international levels.
3. Industrial entrepreneurs undertake primarily manufacturing activities and may deal with new product development, etc.
4. Corporate entrepreneurs possess certain unique organizing and coordinating skills and are interested in the management of an organization.
5. Agricultural entrepreneurs undertake the production and marketing of agricultural inputs and outputs such as dairy, horticulture, forestry, etc.

ENTREPRENEURSHIP

Entrepreneurship can be described as a process of actions that an entrepreneur undertakes to establish his enterprise. These actions comprise numerous activities such as those involved in the conception, creation and running of an enterprise. Entrepreneurship is a philosophy, i.e., the way one thinks and acts. Certain communities and cultures promote entrepreneurship, for example, Gujaratis, Sindhis, etc. It can exist in any situation such as business or government, field of education or science and technology, poverty alleviation, etc. and is equally applicable to a big/small business as well as the economic/non-economic activities. Entrepreneurship is the purposeful and organized search for change which is conducted after a systematic analysis of the opportunities in the environment. It is a dynamic and risky process which is an outcome of complex socio-economic, psychological, technological, legal and other factors. In the entrepreneurial process, initial stage is income generation wherein one tries to generate surplus/profit; second stage is self-employment while the terminal stage is entrepreneurship wherein after setting up a venture one looks for growth and diversification. So it begets and injects entrepreneurship by starting a chain of reactions wherein an entrepreneur continuously tries to improve the quality of existing goods and services and add new. It is the most effective way of abridging the gap between science and market place by creating new enterprises. It is thus concerned with creating

wealth through the production of goods and services whereby real per capita income increases that contributes to economic development. Hence, industrial health of a society depends upon the level of its existence. And a country might remain backward because of the lack of entrepreneurial talents but not of natural resources or dearth of capital.

AGRI-PRENEURSHIP

It is a business in agricultural industry and an agricultural entrepreneur can undertake any activity such as crop raising, marketing of crops, fertilizers and other agricultural inputs; agricultural improvements through mechanization, irrigation and the application of dry land technologies, etc. An agri-entrepreneur faces risk when he makes a choice between two or more alternative situations and evaluates its potential outcomes with limited information. So innovations and entrepreneurial activities can play a key role in promoting rural development wherein rural entrepreneur can exploit the opportunities by establishing linkages between agriculture and allied industries. Government policies aimed at providing incentives to promote the growth of entrepreneurial activities should consider structural differences in the business environments of farm sector. Escalante (2006) study indicated that the initial conditions of firms in the farm group as well as among firms within this group are different. For example, among the agribusiness entrepreneurs compared to non-agribusiness execution and skill deficiencies tend to prevail more so agribusiness entrepreneurs showed the tendencies to adopt less structured specific action plans. And, production, marketing and pricing policies of agribusiness firms had been dictated usually by the size and structure of their market competition. These firms diversified production process, sold products at low-to-moderate prices and showed a tendency to compete with less established market players through acquisition, leasing and subcontracting (Escalante 2006).

Sustainable Agriculture

As agriculture depends upon nature and makes use of scarce resources such as soil and water as well as various operational inputs to nourish and protect crops so limiting the adverse impacts of agricultural activities is essential in preserving land's ability to remain productive and ensure future food demand.

GENESIS OF FOOD MARKETS: FUTURE SCENARIO

According to FAO, food production will have to increase by 70% over the next 40 years to meet the growing demand. Increased demand shall accrue due to population growth, economic prosperity in the emerging economies as well as growing demand for biofuels. World's population is expected to grow by 30% (it will exceed 9 billion by 2050) that will be driven mainly by longer average life expectancies in the expanding emerging markets particularly Asia. Rising incomes shall contribute to changes in the dietary patterns favouring high value products such as meat, fish, dairy products and processed foods that shall increase the demand for animal feed. Increase in the demand for biofuels (expected to triple) that are produced from several crops (also the important sources of food and feed) shall intensify competition for land. In addition, consumers want food not only at reasonable prices but also fresh, clean and healthy which is produced sustainably and ethically. This implies that

the food is produced by preserving the environment, treating farmers fairly and paying heed to animal welfare. Consumers are often willing to pay a premium price for such a food.

On the supply side, opportunities for the expansion of agricultural land are limited. Productivity gains are also declining because several developed regions in North America and Europe are already operating at high productivity levels. Even though vast expanses of land in the Black Sea Region, Latin America and Africa still have the potential to increase production through acreage expansion or adoption of modern farming techniques but in many of these regions land is often located either in remote areas or that lack a favourable institutional environment. A large portion of food produced for human consumption is also wasted along the supply chain from farm to fork. So, coupled with improved logistics such as transport and storage trade, shall constitute a crucial link to abridge the gap between local demand and available supply.

Global food markets that had been characterized earlier by plenty have come to confront scarcity and volatility at present. Hence, the occasional food shortages that were met in the past through strong supply responses have come to face constraints due to declining global productivity gains and lesser scope for expansion in farmland. So the emerging gap between a growing food demand and supply will have to be mitigated in future primarily through sustainable increases in productivity and improved efficiencies, along the entire value chain. It will require large scale innovations and investments in new technologies from farm inputs and improved agronomic practices to logistics such as transportation, storage, packaging and processing. And, this is becoming of an increasing concern for the market agents such as farmers and agribusiness enterprises as well as governments.

MARKET PLAYERS

Farm Sector

Sustainable development of agriculture requires the development of entrepreneurial and organizational competencies among farmers. The need for an entrepreneurial culture in the agricultural sector has been recognized in recent decades (Bergevoet et al., 2005; McElwee and Bosworth, 2010). This is because farmers operate in a highly complex and multi-facet environment which is tightly constrained and regulated that acts as a barrier to an entrepreneurial activity (Carter, 2003; McElwee, 2008). Researchers in several European countries have investigated the factors and educational processes that contribute to the development of entrepreneurial capabilities among farmers for promoting growth of the agribusiness (Pyysiäinen, et al., 2006), increasing productivity as well as improvement in ztheir environment (Marsden and Smith, 2005). Lack of organizational competency among farmers prevents them to safeguard their business interests such as dealing with intermediaries or using more efficient production models (Cortés, 1993). So, collective entrepreneurship (wherein each member undertakes risk) can play an important role in market development as well as economic development policies (Cook and Plunkett, 2006). And, the agricultural sector shall have to facilitate the development of entrepreneurial and organizational capacities

as well as attitude formation of the farmers. To do so, farmers can either diversify their economic activities or integrated vertically with the value chains (Carter, 2003; Haugen and Vik, 2008; McElwee, 2006; McElwee and Bosworth, 2010). Agribusiness enterprises can herein play a crucial role by building up integrated supply chains through backward and foreword linkages. These enterprises can provide them with requisite inputs and technical support as well as assured markets for the disposal of their produce thereby enthuse farmers to raise particular crops to enhance their incomes.

Agribusinesses

Various agribusinesses comprise four clusters of companies:

- Those engaged in the production of agricultural inputs such as seeds, fertilizers, insecticides/pesticides for crop protection and agricultural machinery.
- Those engaged in the production of agricultural commodities, livestock, fish, and timber.
- Those engaged in the purchase/sale and shipment of agricultural raw materials.
- Manufacturers, distributors and retailers of food and beverage products.

Agribusinesses compared to other industries often face more challenges to deal with risky business situations. Such situations arise due to weather and pest infestations as well as fluctuations in resource and commodity prices. Hence lenders (being cognizant of the risky nature of farm operations) are more cautious for lending to farmers. Agribusinesses offer fundamentals that enable investors to combine long-term lucrative returns with investments to secure a stable food supply in future. However, these enterprises have to be sustainable, i.e., commercial as well as society's interests should coincide to operate and establish global brands such as Unilever's 'Magnum ice cream', Nestlé's 'KitKat', etc. Companies that operate sustainably tend to have more reliable supply chains. So these are better prepared to maintain social licenses to operate, experience less volatility in profits/losses and better positioned to deliver greater value to its shareholders.

Higher long-term food prices provide an incentive to the agribusiness enterprises for funding innovations, improvements in technology and investments in infrastructure. This is because the companies that address inefficiencies along the value chain with innovations can experience growth stemming from an increase in real demand for its products and services. And, it is one of the primary responsibilities of the agribusiness sector to ensure the quality and safety standards as supply chains from farm to fork lengthen. This has created a new wave of actions for the agri food sector to meet the growing challenges. Some multinationals have taken this responsibility seriously and have embraced new business models with positive consequences, for example, Unilever and Nestlé. These companies have focused upon the concept of "creating a shared value" (CSV) for themselves and the key stakeholders particularly farmers. So these companies have shifted to the premise that "what's good for the society and its consumers in the long term is also good for a big business".

Cocoa's Experience

Cocoa is a key raw material for chocolate and more than 90% of the world's cocoa is grown mainly in West Africa. Its production is becoming unprofitable for about 5.5 million smallholder farmers who are looking for more attractive crops. Their children want to shift in search of better employment opportunities to the cities. However, this is in the commercial interests of confectionery companies to help farmers in improving its productivity and quality by using lesser quantity of fertilizers, herbicides, water and other inputs. So these companies have started working more closely with the input suppliers for their mutual benefits as well as build up strong brands images for establishing long-term trusts with consumers.

CONCLUSION

Several instances of entrepreneurship, particularly in some of the leading agribusiness enterprises at the processing level, have indicated that these through its backward supply chain linkages succeeded in integrating even with the small- and marginal-sized farmers. It may be inferred that this has occurred primarily due to vast resources bases, superior manpower skills, wider networks spread over upper/upper middle market segments in various countries, etc. of such enterprise. Besides this, an urge to project strong brand images in the mindsets of cautious consumers and theirs' growing concerns for human and environmental safety in its target market segments have facilitated this phenomenon for the selective crops. However, in the developing countries such as India, food habits of the consumers' remain traditional, supply chains for majority of the foods are fragmented, majority of the farmers have miniscule holding sizes. So it becomes imperative to inculcate entrepreneurial skills at the grass roots, i.e. farm level also through concerted policy initiatives. This may require institutional changes such as encouragement for the formation of NGOs, corporative societies, etc.

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8

Sustainable Human Development in India
Challenges and Policy Measures

Dr M M Goel*

To understand, analyse and interpret the challenges for sustainable human development in India and suggest long-term preventive and promotive policy measures is the objective of this paper.

To uphold development dimensions in all aspects of sustainability, we need commitment of all stakeholders including politicians, policy makers, bureaucratic innovators, academics of today and tomorrow.

Keywords: *Sustainable Development, Human Development, Srimad Bhagwad Geeta*

INTRODUCTION

The Brundtland Report (1987) defines sustainable development as "a form of development which satisfies the needs of the present generation without compromising the ability of future generations to meet their own needs." Even though this was not necessarily the intent of the Brundtland Commission, sustainable development has been narrowly associated with economic development pursuant to meet the material needs of people. In his seminal work, Development as Freedom (1999), Amartya Sen put this misconception to rest by showing that the top priority is to enable people to develop their capabilities to the maximum possible extent. Sen perceives freedom (both physical and psychological) as fundamental for individual and social development.

SUSTAINABLE HUMAN DEVELOPMENT

In a presentation about the 2011 Human Development Report(HDR), Eva Jespersen has proposed the following definition of sustainable human development: "The preservation –

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and whenever possible expansion – of the substantive freedoms and capabilities of people today while undertaking reasonable efforts to avoid risks that would seriously compromise the capability of future generations to have similar – or greater – freedoms." This is a further elaboration of Sen's definition to stress distributive justice, the need to ensure – as much as possible – the freedoms required for further development of human capabilities, and the need for careful analysis of the risks and uncertainties associated with technological development and plans for required substitution of resources. It is a good step forward, both conceptually and analytically. However, it is possible to go even further.

The term 'sustainable human development' is defined here as *development that promotes the integral human development of each and every human person today without compromising the integral human development of people tomorrow*. This definition is patterned after the Brundtland Report (1987) and Amartya Sen (1999) definitions, albeit with additional of emphasis on the integration of the physical, psychological, and spiritual needs of people. People need bread, but they need more than bread. People need respect and esteem, but they still need more. People need freedom to develop their talents and capabilities, but they also need to use freedom and capabilities responsibly. People need to grow in solidarity with others, for it is only in self-giving to others that humans become fully human. This fundamental insight, which is shared by all ethical and religious traditions, must be kept in mind at all times; for sustainability without solidarity is a social impossibility.

Abraham Maslow (USA, 1908-1970) created the "hierarchy of human needs" in the 1940s. Maslow's model explicitly takes into account the physiological, safety, emotional, love/belonging, esteem/self-esteem, and self-actualization stages of integral human development. The hierarchy of human needs is usually represented as a pyramid, with the most basic needs at the bottom and the socialization needs at the top. There are many variations of the pyramid: one is shown to the right and others can be easily found. Going upward, the progression for each human being is to satisfy (1) the basic physical and physiological needs, (2) the need for safety and security, (3) the need psychological well-being, (4) the need for self-actualization (self-esteem, social responsibility), and (5) the need for self-giving to others which, if lived to a heroic degree, leads to people like Francis of Assisi and Teresa of Calcutta. For further discussion of Maslow's "levels of human development" – and other models of human development – the reader is referred to the May 2010 issue of *Mother Pelican*. It is suggested that embracing the ethics of solidarity is practically impossible under level 3, and generally requires level 4. What about sustainability?

An ethics of solidarity is also needed in the relationship between humanity and the human habitat. Human solidarity is meaningless if it excludes taking good care of the very natural resources that are indispensable for human survival. A human being is capable to live life in a sustainable manner. We must adapt to the ethics of sustainability, and our institutions must adapt to the same ethics. Else, the vicious cycle of extravagant consumerism and resource exploitation will lead to an increasingly unsustainable outlook for human civilization.

DIMENSIONS OF SUSTAINABLE HUMAN DEVELOPMENT

Two dimensions of sustainable human development are crucial to go forward: gender equality and clean energy. Gender equality is crucial because it is the most universal form of human

solidarity. As long as cross-gender solidarity is lacking, how can we expect any other form of solidarity to be sustainable? Clean energy is critical because the environmental predicament confronting humanity is fuelled by the burning of fossil fuels. As long as we keep abusing the planet, how can we expect any level of human development to be sustainable? Human Development is not free.

Freedom is required for human development, but human development is not free. Experience confirms that human capabilities tend to decrease in dictatorial states. But even under total freedom, human development takes human effort and integral human development even more so. The era of "externalities" ("free" natural resources) is rapidly coming to an end, and so is the era of extravagant energy consumption at a low cost. It will not be simply a matter of working longer hours and postponing retirement until age 75, although some such adjustments may become necessary. What is bound to increase is the investment in mental and emotional effort, because people will need to adapt their ways of thinking and behaving to changing conditions. In making decisions they may be compelled to think about the common good and act accordingly. The consequent inner conflicts may in turn induce many to undertake the inner journey earlier in life. This is more difficult than simply running around in pursuit of material gratifications, for it requires overcoming fear: "It takes more courage to dig deep into the dark corners of one's own soul than it does for a soldier to fight on the battlefield." (William Butler Yates, Ireland, 1865-1939).

SUSTAINABLE DEVELOPMENT IN INDIA

We are awakened in India to move fast towards development by creating huge infrastructure, rainbow revolution in agriculture, conducive industrial and export climate created by the Government of India in recent times. We believe in spirituality – the science of soul flowing from our great epic 'Bhagavad Gita' which is ism neutral, religion free treatise on management and welfare economics most relevant to cope up any crisis and its challenges.

We possess the potential to function still better by keeping a vigilant eye on the emerging challenges in recent times and concrete plan of action with political will, determination, shared(vision, mission, goal, objective, targets and sacrifice).

India is second in the size of its population next to China. In Malthusian sense, the overpopulation is a kind of situation that exists in India because its population is increasing more rapidly than its supply of food. The rate of growth of population is greater than the rate of growth of food production. The associated problems of overpopulation are: (1) Food problem (2) Malnutrition (3) Famines (4) Diseases (5) Pestilence (6) Fall in per capita income (7) Inadequate agricultural production (8) Poor standard of living, and (9) Unemployment.

According to Census 2011 Indian population is 1210.19 million (17.31 percent of the world's population) including 623.7 million (51.54%) male and 586.46 million (48.46%) female. India is the second most populated country after China with over 1,350,044,605 (1.35 billion) people. India is all set to take the numero uno position by 2030. With the population growth rate at 1.58%, India is predicted to have more than 1.53 billion people by the end of 2030. What about the demographic dividend being claimed by the census

data consisted of 58.2 percent people in the age group (15-60) – the productive age group for work and is likely to increase in 2026 as 68.4 percent? The actual realization of the demographic dividend cannot be thought of without concrete plan of action.

The measures in National Population Policy (NPP) 2000 for controlling population are necessary but not sufficient. Over emphasis for female participation and soft on male is not in good taste. To make it sufficient, there is an urgent need of sex education among all with Rhythmic Method of population control which is the duty of the parents to tell their children for all times to come. It possesses the potential to do wonders. There is a strong case for making bearing and rearing child costly. We need to adopt suitable pricing policy for birth, death, marriage and pregnancy registration which can act as source of financing FWP in a big way. FWP deserve to be given the status of basic infrastructural activity in India for making it human resource development activity in the strict sense.

To reduce unemployment problem (disguised, underemployment, and educated unemployment) in India, we have taken measures which constitute employment policy. The unemployment problem exists in rural and urban areas for which Government has taken measures separately for them and falls in the domain of employment policy.

National Sample Survey Organization (NSSO) has been collecting data on 3 types of unemployment.

- ***The Usual Status Unemployment:*** The number of persons who remain unemployed for a major part of the year also called open unemployment.
- ***Weekly Status Unemployment:*** It means number of persons who did not find even an hour of work during the survey week by NSSO.
- ***The Daily Status Unemployment:*** The number of persons who did not find work on a day or some days during the week of survey by NSSO.

The report of 64th round (2007-08) of NSSO released recently reveals that the total employment (ussual status) created between 2005-2008 was only 2.4 million which is 0.8 million per year merely a small fraction of the 12 million jobs created per year during 1999-2000 to 2004-05.

The total number of workers increased from 457.9 million in 2004-05 to 460.2 million in 2007-08 with a growth rate of 0.17 percent per year- the lowest rate of employment generation during the last three decades even lower than the jobless growth during 1993-2000 when employment increased by less than one percent per year.

A close perusal of the trends reveals that employment generation increased by on2ly 4.4 million during 2005-2008 in urban areas where as actually declined by two million in rural areas. It is sad and shocking to note that the decline in female work force in both rural and urban area. The male employment has increased by 5.2 million per year but female employment has declined by 4.4 million per year- a complete lip service of the women empowerment programmes with hollow claims. It cannot be thought of without creating job opportunities for women- the fair segment of the society which is otherwise powerful than man in many respects including pressure cooker environment they work in. The

bearing and rearing child is a unique gift of god with women which makes her stronger than man.

The daily status measure of employment by NSSO reflects day to day employment and unemployment scenario reveals that employment in rural areas have declined from 93.8 billion person days in 2004-05 to 92.9 billion person days in 2007-08 in spite of the fact that employment by public works including flagship programme known as Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) has increased from 221 million persons day in 2004-05 to 939 million person days in 2007-08.

The hollow claims of the employment generation by the "Mid Term Appraisal of the 11th Five Year Plan" by the Planning Commission (the second cabinet of the Government of India) have been belied by the data of 64th round of the NSSO survey.

It has been sadly observed that increasing inequalities in opportunities for employment and income.

The widening wage gap between the unskilled and skilled labour force at a faster rate than before has been noted by the report of 64th round which is considered most reliable source of data for employment and unemployment in India. To reduce unemployment, the Government of India (GOI) has been pursuing employment policy since 1951(first five year plan). As unemployment problem is multidimensional, GOI followed multi-faceted policy which means many sided approach. It constitutes many sub policies to tackle various forms of unemployment including disguised unemployment, underemployment, and educational unemployment. In our opinion, unemployment is a scale 0 to 100. The zero productivity of a person is called disguised unemployed. Less then 100 percent productivity is called underemployed.

We have emphasized self employment through training of skills, supply of inputs, marketing of products, micro financing in formal and informal sectors. We have stressed an asset creation for productive employment.

We had Jawahar Rozgar Yojana (JRY) for rural areas and Nehru Rozgar Yojana (NRY) for urban areas. Now (SJGSY) and SJSRY–umbrella schemes for all the ongoing programmes in it earlier.

To face the challenges of unemployment, we need to create a conducive environment for private sector to be boosted for employment opportunities with grassroot changes in our policies. Above all good governance is the need of the day

To provide ROTI (Bread) and livelihood to the unemployed, we need to increase ROTI–Returns on Training Investment.

To utilize the human capital of India in urban areas in an effective manner calls for manpower planning for matching demand and supply of skilled personnel, training of manpower for reducing mismatch between the abilities and the jobs on offer and above all mechanism by pairing people with jobs through information network (WWW).

To research the ways and means of solving unemployment problem, there is an intellectual debt on the economists and policy makers of India. We need to seriously think of

unemployment insurance as being told by 2010 Noble laureate Professor Peter Diamond of MIT Boston who's "Diamond Coconut Model" of 1982 is required to be studied.

To hire the unemployed in the unorganized sector particularly the poor women who can work as domestic help, we need to allow income tax exemption to the tune of the wage paid to them by those who do so of course with prior information and details.

By believing in the phrase, 'Jai Jawan Jai Kisan', we need to face the challenges caused by internal threats and terrorism of various kinds including unemployment, under employment and suicides by farmers. One practical solution of these problems is to make military services compulsory (as in South Korea) for the youth with status of HRD activity which will bring discipline to Indian economy in one sense or the other. We need to bring more land under cultivation for which we may think of nationalization of agriculture by acquiring land as advocated by Dr B.R. Ambedkar. We can hand over such land to army to develop military farms which possess the potential to do wonders in terms of bringing discipline on the one hand and more barren land under cultivation.

There is a case for rural industrialization for reducing under employment and disguised unemployment in India. It means not village industries but industries having backward and forward linkages with agriculture.

To achieve the objective of self employment by inter alia organizing the youth into Self Help Groups (SHG) through a process of social mobilization, their training and capacity building and provision of income generating assets through a mix of bank credit and government subsidy. This approach of credit is known as Micro finance for self employment. Credit is one of the most crucial inputs in the process of development for creating employment opportunities. Micro finance is expected to play a significant role in giving natural death to the twin sister problems of poverty and unemployment. In the recent past it has become one of the most promising ways to use scarce development funds to achieve the objective of poverty alleviation and self employment. Micro finance is a term for the practice of providing financial services such as micro credit, micro savings and micro insurance to the poor and unemployed youth. There are several microfinance implementing organizations in India which provide small loans to rural people. Some of them have successfully extended their services to thousands of borrowers. For many, it is difficult to have an access to financial services through the formal sector because of the cumbersome procedure.

The process of Micro finance starts with the formation of the Self help group (SHG) which is a group of youth who have volunteered themselves into a group of about 10-20 people from a homogeneous class for addressing their common financial problems. The individual approach to micro finance self-employment activities could not yield the expected results due to the relatively high transactional costs and procedural delays involved in it. However, it was observed from experiences that delivery of micro-credit is more effective and less costly in the organized form of self help groups. This approach can help the rural unemployed youth.

We need to create the equality of opportunity coming from education, skills and jobs for men and women who needs to modify their mental makeup in present era of competition both healthy as well as unhealthy at all levels.

The current human development tide which endorses public for social development is the fruit of Ambedkar's endeavour. The Human Development Index (HDI) developed by UNDP since 1990 is an outstanding innovation for measuring the level of human development. It takes into account three basic elements of human well-being; longevity, knowledge and the access of resources required for living measured by life expectancy, adult literacy and mean years of schooling as well as real GDP per capita in purchasing power parity.

The HDI Ranking of India is 134 out of 187 countries in the Human Development Report of 2011. Although Ambedkar's prime concern was the uplift of the depressed classes, he anticipated the imperative of human development on a wider plane long ago.

Just throwing funds and schemes in the name of inclusive growth in 12th Five Year Plan are not sufficient without controlling Corruption, Population and Inflation (CPI). We need financial inclusion as one of the oils in the economic engine of inclusive growth in real sectors of the economy with reliability, accountability, transparency and efficiency (RATE). We need political willpower with concrete plan of action in place of lip service for the weaker sections of the society. Inclusive growth has no meaning without inflation targeting, manpower planning and good governance.

National Development Council (NDC) on December 27, 2012 approved the strategy to achieve average growth rate of 8 percent during the 12th Five Year Plan (2012-17) with total plan allocation of Rs 3568626 crore which is an increase of 124.53 percent over the eleventh plan realization of Rs 1589342 crore.

CONCLUSION

Human Happiness Index (HHI) with simple mathematics 1+1=1 meaning thereby one human being as soul plus one GOD makes it equal to one (spiritual development) can implement inclusive growth strategy in more effective manner than by any material means full of discrimination, deprivation and discontent (3Ds). Let 12th plan generate socio-economic wisdom in all the stakeholders to implement the programmes therein with sense of commitment and honesty of purpose. Let there be no wastage of crucial and precious resources by any of the 28 States and 07 Union Territories in our beloved INDIA with attributes of independence, non-violence, democracy with integrity and amity.

To develop essentials for manpower in good governance including politicians and bureaucrats with input from Ambedkar, it would be relevant to adopt the canons of public expenditure advocated by him in terms of the faithfulness to the intentions of the will of the people, wisdom as provided by the professionals in the field, coupled with well-considered and honest judgment, and economy in execution. The allocation of public expenditure among competing demands and the manner of utilization fall within the domain of Ambedkar's canons, which can be seen as a touch-stone to see whether a particular items of public spending is necessary or not.

Let wisdom prevail for good governance as SMART administration with simple, moral, action oriented, responsive and transparent system. The monitoring and evaluation at all levels in the economy is the need of the hour.

Let Ambedkar be known to the world as father of HRD in India for changing the mindset of our people for achieving sustainable human development.

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9

Recycling of Textiles Waste
A Sustainable Approach

Prof. Alka Goel*
Rachna Sharma**

Recycling of textile waste provides a new life to a product in a life cycle and thus increases the total value of the material. Most of the recycled textiles end up in low-value products. The development of new, higher value products from recycled textiles will encourage utilization of the waste and contribute to the future sustainability of the textiles industry. Textile waste can be classified as either pre-consumer or post-consumer waste. Pre-consumer textile waste consists of by-product materials from the textiles and clothing industries where as any type of garments or household article, made of some manufactured textiles that owner no longer needs and decides to discard is considered as post consumer waste. These articles are discarded either because they are worn out, damaged, outgrown or have gone out of fashion. They are sometimes given to charities but more typically are disposed of into the trash and end up in municipal landfills.

Keywords: *Recycling, Textile Waste, Pre Consumer, Post Consumer, Land Fill*

INTRODUCTION

Today, clothing not only responds to practical needs, but also has become a form of self-expression. Sheer volume and variety of textile products available in the market have reached to unprecedented levels. According to the Bureau of International Recycling (2013) the textile industry is a $1 trillion worldwide business. Textiles are not used just for clothes – they are also in our homes, hospitals, workplaces and vehicles, in the form of cleaning materials, leisure equipment and so on it has wide applications.

The sector of technical textiles is one such area which has the capacity to foster creativity in the conception, use and the end of life of the products/materials and provides immense opportunity for experimenting with different types of materials for making products which

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may not be aesthetically appealing but certainly have some functional properties which may be useful and stand for a long time. Technical textile, registered positive economic and employment trends is an example of "traditional sectors" able to "reinvent itself" on new business model fully suited to the needs of the new industrial revolution (more smart, more inclusive and more sustainable). Textile Materials and Technologies are key innovations that could respond to a huge variety of societal challenges. Technical textiles are enablers in other industries by proposing and offering alternative materials (light-weight, flexible, soft, multi-functional, durable), new technologies (flexible, continuous, versatile) and functional components (reliable, multi-functional, cost-effective, user-friendly) parts of larger technology systems and solutions.

As much as the demand of textiles increases, the production of waste will take place proportionally. With the rise in the living standards, the demand for textiles and clothing is expected to grow[1]. An increasing amount of waste is generated each year from textiles and their production.

Textile recycling is the method of reusing or reprocessing of used clothing, fibrous material and clothing scraps from the manufacturing process. Textiles in municipal solid waste are mainly found as discarded clothing, although other sources include furniture, carpets, tires, footwear and non-durable goods such as sheets and towels. Recycling and reuse of textile wastes has assumed importance in the recent past in our country[1]. Waste recycling is of utmost importance as far as economic and environmental reasons are concerned rather than disposing the waste in landfill sites[2].

RECYCLED CONTENT: DEFINITION BY FTC (FEDERAL TRADE COMMISSION)

A recycled content claim may be made only for materials that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer). Any express or implied claim about the specific pre-consumer or post-consumer content of a product or package must be substantiated[3].

Products that are partially made of recycled material, the percentage of recycled content in such products must be stated clearly to avoid consumer deception about the amount of recycled content in the finished product[4].

Recycling is a process to change materials (waste) into new products to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, reduce energy

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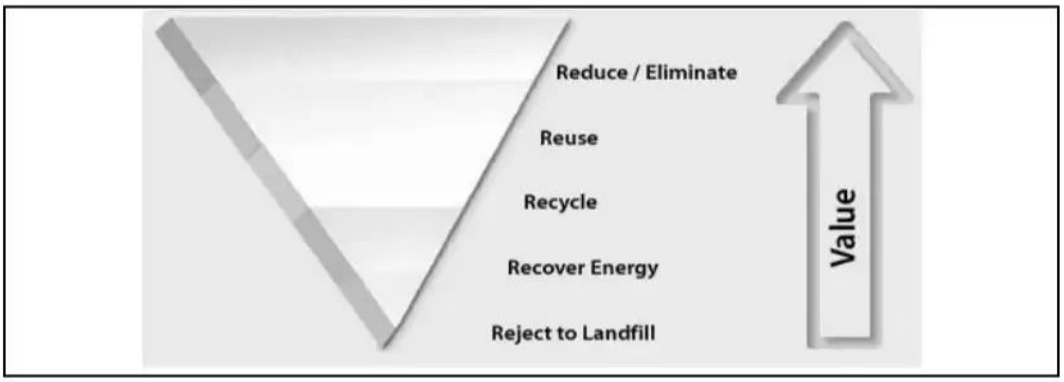
usage, reduce air pollution (from incineration) and water pollution (from land filling). Currently, under waste reduction technique recycling has occupied third place under reduce, reuse and recycle waste hierarchy.



Source: Directive 2008

FIGURE 1: WASTE HIERARCHY

In reality the rate of textile recycling is still relatively low. Like any other industry, textiles industry also generates following categories of industrial wastes namely liquids, solids and gaseous waste .Various useful materials can be recovered from these wastes by adapting new processes. The wastage of raw materials can be reduced by improving manufacturing process at each stage. During the process certain kind of wastes such as solid wastes can be recovered by adopting new technologies, whereby these wastes can be converted into useful materials for other applications.

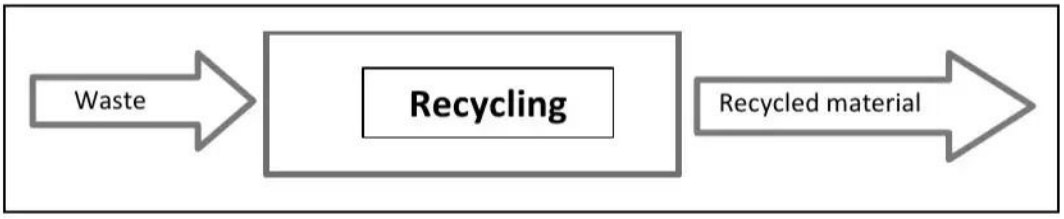


FIGURE 2: WASTE IN PROCESS

TYPES OF TEXTILE WASTE

Major types of textiles waste are:

1. Pre-consumer waste
2. Post-consumer waste

On the basis of waste there are generally two types of recycling:

- ***Pre-consumer recycling:*** In this form, the manufactured material does not reach to a consumer and is recycled. Pre-consumer recycled materials can be broken down and remade into similar or different materials, or can be sold "as it is" to third party buyers

who then use those materials for consumer products. One of the largest contributing industries to pre-consumer recycling is the textile industry which recycles fibres, fabrics, trims and unsold "new" garments to the third party buyers.

- ***Post-consumer recycling:*** It is the form of recycling where the materials being recycled have already passed through the consumer market and are recycled or re-constituted into a product for the consumer market once again.

SOURCES OF TEXTILE WASTE

A major part of textile waste comes from household sources. Average lifetime of any clothing is deemed to be for about three years, after which, they are thrown away as old clothes. Sometimes even 'not so worn garments' are also discarded as they become unfashionable, or undesirable. These are post-consumer waste that goes to jumble sales and charitable organizations. Most recovered household textiles coming to these organizations are old or donated. Remaining textiles waste goes to either a textile recovery facility or to the landfill. Textile waste is also generated during yarns and fabric manufacturing, apparel-making processes and from the retail industry. They are the post-industrial waste. Apart from these textile wastes other wastes such as PET (Polyethylene terephthalate) bottles are also used for recycling of polyester fibres[5].

FIGURE 3: CLOTHING CLIPS

5. Anonymous, 2008/98/EC on waste (Waste Framework Directive) <http://www.teonline.com/knowledge- centre/textile-recycling.html> retrieved on 16 February 2013

FIGURE 4: SORTING OF TEXTILE WASTE

FIGURE 5: RECYCLED FIBRES

FIGURE 6: FABRIC RECYCLING ON HANDLOOM

Categories of textile waste may be

1. 100% cotton yarn waste
2. Comber noil
3. Cotton linter
4. Cotton waste for mushroom
5. Cotton shoddy
6. Poly chip waste
7. Sliver
8. Roving
9. Cotton card fly
10. Cotton willow fly
11. Carding waste
12. Super carding waste
13. Cotton Gin waste
14. Cotton dropping
15. Willow dropping
16. Yarn waste
17. 100% polyester yarn waste
18. Hosiery cutting clips

TEXTILE WASTE RECYCLING

Why to recycle? Wastes utilization in the textile industries is gaining vital importance. The Indian textile industry is focusing on waste utilization as the international legislations come into force in our country. The textile and apparel recycling efforts are concerned with recycling, recycle-ability, and source reduction of both pre-consumer and post-consumer waste. Decomposition of clothing releases methane, a harmful greenhouse gas and a significant contributor to global warming. There are dyes and chemicals in fabrics and also other components of clothing which play a significant role in causing environmental pollution.[6]

Textile Recycling Industry

As far as post-industrial waste is concerned, all collected textiles are sorted and graded by highly skilled and experienced workers. These workers are able to recognize the different variety of fibres as synthetic fibre and natural fibres from the blended fabrics. Once sorted

6. Anonymous, (2012), Waste Materials from Textile Industry Textiles Waste <http://www.triplepundit.com/2012/01/textile-waste-be-banned-landfills/> retrieved on 18 March 2013

the items are sent to various destinations. Initially the textile material (pre consumer and post consumer waste) is cleaned then clipped and shredded into 'shoddy' (fibres). Depending on the end-uses of the fibre or yarn other fibres are chosen to be blended with the shoddy. The blended mixture is carded, and spun into yarn ready for weaving or knitting.

The recycling processes are usually as follows:

- ***Sorting:*** collected textiles are manually sorted and graded according to their condition and the types of fibres used.
    - ❖ *Wearable textiles:* Shoes and clothes are resold either in the same country of origin or abroad.
    - ❖ *Non wearable textiles:* These are sold to the 'flocking' industry for shredding and re-spinning.
- **Re-sorting:** Mills-grade incoming material according to their type and colour. The colour sorting means no re-dying is needed, saving energy and avoiding pollutants.
- ***Shredding and pulling:*** Textile materials are shredded or pulled into fibres. Depending on the end use of the yarn, other fibres may be incorporated.
- ***Carding:*** The blended mixture is carded to clean and mix the fibres.
- ***Spinning:*** The yarn is re-spun ready for later weaving or knitting.

Clippings from apparel manufacturing industries are also used by textile recycling units to make into other useful recycled products as blankets, carpets, etc. Some recovered items are even reused by fashion designers for making garments and bags. However, this process is carried out at small scale level.

According to the **EPA** (Environmental Protection Agency 2013)[7] an estimated 13.1 million tons of textiles were generated in 2011 i.e. 5.2 percent of total municipal solid waste (MSW) generation. An estimated 13.9 percent of textiles in clothing and footwear and 17.6 percent of items such as sheets and pillowcases were recovered for export for reprocessing in 2011. The recovery rate for all textiles was 15.3 percent in 2011, i.e. 2.0 million tons. Based on a data from the Council for Textile Recycling (2013), it was estimated that 1.3 million tons of textiles in clothing were recovered for recycling in 2009. Some recovered textiles become wiping and polishing cloths. Cotton can be made into rags or form a component for new high-quality paper. Knitted or woven woollens and similar materials are "pulled" into a fibrous state for reuse by the textile industry in low-grade applications, such as car insulation or seat stuffing. Other types of fabric can be reprocessed into fibres for upholstery, insulation, and even building materials. Buttons and zippers are stripped off for reuse. Very little is left over at the end of the recycling process. The remaining natural materials, such as various grades of cotton, can be composted. Although, this amount accounts for 75% of textile waste in the United States, there is very few researches on textile excess produced in countries such as China, Vietnam, Thailand, India and Bangladesh that play a larger role in the textile production of all over the world[7].

7. Environmental protection agency, (2013), Wastes - Resource Conservation - Common Wastes & Materials <http://www.epa.gov/osw/conserve/materials/textiles.htm> retrieved on 30 July 2013

The goals of the Council for Textile Recycling are to increase the amount of textile waste that can be recovered and at the same time develop new uses, products and markets for products derived from pre-consumer and post-consumer textile waste.[7]

Aims of council for textile recycling are Identical with EPA's overriding goals to encourage the trends toward[7] -

(1) The increased utilization of recycled materials in products

(2) The increased recovery of material for recycling.

Benefits of Textile Recycling[8]

- By recycling requirement of landfill space is reduced. Most of the Synthetic fibres cannot be decomposed. So recycling is the best option for such fibres.
- Woollen garments are degradable but produce methane, which contributes to global warming, so instead of degradation may be reused and recycled.
- Recycling of old textiles reduce the pressure on fresh resources.
- Through textile waste recycling, fibres get available locally, which reduces the need of importing those type of fibre from abroad.
- Recycled material is already processed so require lesser energy for further processing, as items don't need to be re-dyed or scoured.
- Waste water reduces as it does not need to be thoroughly washed with large volumes of water as it is already done before. For example- processing of raw wool.
- Textile waste which is already dyed reduces the demand for textile chemicals like dyes and fixing agents.

Since textiles are made from biodegradable and/ or non-biodegradable materials so the kind of recycling method to be used, should be selected carefully, i.e. environment-friendly or method with lowest stress on environment.

Recycled textiles can be used in**:**

Recycled materials can be turned into a wide range of products for apparel, accessories and footwear, for example:

- Recycled textiles can be used in knits, woven, tapes, labels, cords, laces ,sewing threads
- Recycling of waste water from textile production can be used for waste water treatments.
- Moulded/Injected items: zippers, buttons, pullers, stoppers can be used further.
- Use of recycled material in technical textiles field like – agrotech, geotech, mobiltech, etc.
- Handloom carpets can be formed through old fabric or cloth cuttings.

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8. Saravanan, K., (2011) Indian Textile Journal August <http://www.indiantextilejournal.com/articles/FAdetails.asp?id=3941> retrieved on 11 April 2013

- Blanket and bed sheet can be made from recycled yarn.
- Recycled carpet waste fibres for reinforcement of concrete and soil can be used.

Today, recovering textile waste is a multi-billion dollar global industry that performs a vital social and environmental function and provides employment for millions of people all around the world[2].

Textile recycling also results in better economics since it provides job opportunities for people. More people get into curtain, rags, blankets, accessory making and some other items like belts, ribbons, laces, etc. This also creates job for people to make socks, handbags, shoes, gloves, hats and other products that could be created with these recycled textiles.

Textile recycling also teaches everyone to reuse, reduce and recycle these products instead of throwing them away. Since most of these are non-biodegradable, they clog out drainage and waterways. If thrown into incinerators, they cause pollution and more damage to the air around us. So, it is the time to think and make up our mind to use recycled products to reduce the environmental pollution. Environmental issues are playing an increasingly important role in the textile industry, both from the point of view of government regulation and consumer expectations.[9]

Latest Advancements[1] in Textile Industry Waste

The following technologies have been recommended for the recovery of specific wastes in the textiles industry.

Area	Technology	Waste Recovery
Dyes and Chemicals	Ultra-filtration technology Ex-colour technology (Advanced oxidation technology) EVAC-Vacuum technology Physicochemical technology (Zero discharge) by TDS control	PVA (polyvinyl alcohol) in sizing cotton fibres Colour Chemicals Recovery of chemical from effluents
Soil Wastes	Developed by M/s Laroche-Invotex, France	Cotton wastes Hard wastes Old rags
Polyester Wastes	Siko-Plast Maschinen fabrick, Germany	Polyester fibres, lumps
Waste Heat Recovery	Platular waste heat recovery ETSU technology Technologies available in India	Waste heat recovery from gases Recovery of waste heat from effluents containing soil wastes. Waste heat recovery from different processes in a dying house.
Willow Wastes	BTRA-CTRL technologies	Biogas generation from willow wastes.

9. Blackburn, R. S., (2009), "Sustainable Textiles: Life Cycle and Environmental Impact," Woodhead Publishing Series in Textiles no 98 ISBN 1 84569 453 8 ISBN-13: 978 1 84569 453 1

Obstacles to Recovering Textile Waste (Based on a Research in Tirupur [10])

There are numerous political, economic, social, technological, environmental, legal and institutional barriers for the improvement of resource recovery in India. The following are some evident barriers.

Knowledge

In order to manage an environmental issue, it must first be measured and quantified. The limited and inadequate data available in India regarding the amounts and types of textile waste is an impediment to intelligent and effective recovery and or regeneration of textile waste.

Financial

The recycling industry's contribution to protecting the environment would not be possible without its significant expenditure on often highly sophisticated plant, machinery and equipment. Indeed, it has been calculated that the industry – which comprises a large proportion of privately-owned enterprises -invests a large amount each year on new equipment and research & development. Government policies are needed for the investment to develop modern infrastructure facilities so that textile recycling may be encouraged and enhanced.

Research and Development

Lack of research and development activity is the main reason of less recycling and recovery of waste. Technologies that have been specifically developed to solve textile regeneration issues are required.

Community Awareness

Recovery of post-consumer textile waste is dependent on donations from the public. People attitudes toward waste issues are complex and constitute a barrier to improved resource recovery. The increased use of recycled materials in products and the increased recovery of material for recycling can be achieved with an educated public. The quality of recycled products must be very good. So that demand may be increased.

CONCLUSION

Most of the textile materials are completely reusable or recyclable, but only if they are proactively collected. There is a substantial demand for second-hand clothing in developing countries. Textiles materials can be recycled into furniture padding, insulation, wiping rags and recycled fabrics. So there is a great need of motivating people for recycling. Considering the diversity of fibrous waste and structures, numerous technologies should work in concert in an integrated industry, in order to increase the rate of recycling.

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10. Sakthivel S., et al., (2012), "Source & Effective Utilisation of Textile Waste in Tirupur," The Indian Textile Journal <http://www.indiantextilejournal.com/articles/FAdetails.asp?id=4236> retrieved on 19 June 2013

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10

Sustainability Reporting Challenges and Practices of Power Sector Firms

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Sustainability is a major concern of the energy sector firms epecially the power sector firms in India and sustainability reporting involves reporting on the economic, environmental and social impact of the organization performance. A sustainability report is a high level strategic document that addresses the issues, challenges and opportunities sustainable development brings to the core business and its industry sector. Sustainability reporting involves using a concept called "Triple Bottom Line" reporting. The article discusses the following Sustainability Reporting Frameworks

- *The SIGMA Project - Sustainability: Integrated Guidelines for management*
- *The Global Reporting Initiative*
- *The ISO 14031 environment performance evaluation standard*

Keywords: *Sustainability Reporting, Power Sector, Triple Bottom Line*

INTRODUCTION

Sustainability is a major concern of the energy sector firms and sustainability reporting involves reporting on the economic, environmental and social impact of the organization performance. Sustainability reporting involves a concept called "Triple Bottom Line" reporting. It covers People, Planet and Profitability. There are different frameworks available to communicate the organizations holistic values. All this and more vital concerns in the energy sector are discussed in this paper.

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REFORMS AND POLICIES IN ENERGY SECTOR

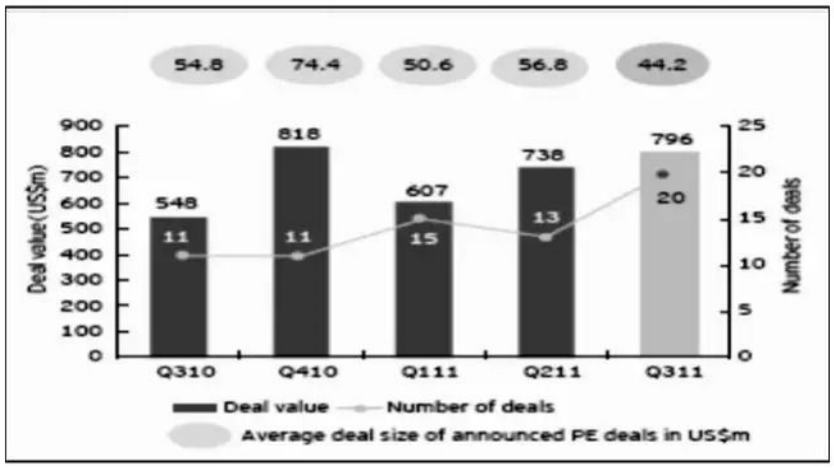
There is a large demand supply gap in the power sector of India. The average All India energy shortfall is around 9% and the peak demand shortfall is about 14%.

The following reforms will help boost the growth in the segment. These reforms include open access to transmission and distribution networks, select distribution networks to be franchised or privatized, tariff reforms by regulatory authorities. There are also many opportunities in the power generation. There are 9 Ultra Mega Power plants of 4000 MW each. Government of India has assessed that the generation opportunities for at least 150000 MW has not been tapped. In addition to this, there are a lot of opportunities in the renovation, modernization and life extension of old thermal and hydel power plants.

There are many parts in India which are not catered to by power of any sort. This gives rise to opportunities in transmission network for 60000 km by 2012. The private sector participation in these projects is possible only through joint venture and 100% equity mode.

Overall it can be summarized that there is an investment opportunity of about USD 150 billion over a 5 year horizon.

In the year 2011, there were 20 PE deals in the infrastructure industry totalling 796 million US Dollars. The largest among them was the investment of 204 million US Dollars in ReNew Wind power, a renewable energy independent power producer by Goldman Sachs. The company will use this amount to meet its generation capacity targets.



Note: Deal value considers deals where values have been disclosed, while the deal volumes consider all the deals announced in respective quarters.

Source: VCCEdge; AVCJ; Dow Jones Factiva; ISI Emerging Markets; Ernst & Young research.

FIGURE 1: PE INVESTMENT TRENDS IN INFRASTRUCTURE IN Q-O-Q BASIS IN THE LAST YEAR

The following are the policies presently in the power sector.

- 100% FDI is permitted in Generation, Transmission and distribution. This shows that the government is keen to bring private players into the industry.

- The policy framework is the Electricity Act 2003 and the National Electricity Policy 2005.
- ***Incentives:*** Income tax holiday for a block of 10 years in the first 15 years of operation and waiver of capital goods import duties on mega power projects of above 1000 MW generation capacity.
- ***Independent regulators:*** Central electricity regulation commission for central PSUs and inter-state issues. Each state has its own electricity regulation commission.

Sustainability is a major concern of the energy sector firms and sustainability reporting involves reporting on the economic, environmental and social impact of the organization performance. A sustainability report is a high-level strategic document that addresses the issues, challenges and opportunities sustainable development brings to the core business and its industry sector.

Sustainability reporting is the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organisational performance towards the goal of sustainable development.

– *GRI Sustainability Reporting Guidelines*

Corporate Sustainability is a business approach that creates long term shareholder value by embracing opportunities and managing risks deriving from economic, environmental and social developments. Corporate sustainability leaders achieve long term shareholder value by gearing their strategies and management to harness the market's potential for sustainability products and services while at the same time successfully reducing and avoiding sustainability costs and risks.

– Dow Jones Sustainability Index

Sustainability reporting involves a concept called *"Triple Bottom line"* reporting.

THE TRIPLE BOTTOM LINE

The three bottom lines in a typical sustainable report include: "People, planet and profit" succinctly describes the triple bottom lines and the goal of sustainability.

A principle difference between a single (economic) bottom line focus and a triple bottom line focus is that instead of simply viewing social and environmental issues as expenditures to be subtracted from revenue, they are viewed as opportunities for the better. With a strategic and integrated approach, efforts and expenditures on social and environmental issues may (and do for some firms) lead to increased profit through cost avoidance, as well as product, service, and productivity improvements.

"People" (human capital) pertains to fair and beneficial business practices toward labour and the community and region in which a corporation conducts its business. A TBL company conceives a reciprocal social structure in which the well-being of corporate, labour and other stakeholder interests is interdependent.

The Global Reporting Initiative (GRI) has developed guidelines to enable corporations and NGOs alike to comparably report on the social impact of a business.

"Planet" (natural capital) refers to sustainable environmental practices. A TBL company endeavours to benefit the natural order as much as possible or at least do no harm and curtail environmental impact. A TBL endeavour reduces its ecological footprint by, among other things, carefully managing its consumption of energy and non-renewable and reducing manufacturing waste as well as rendering waste less toxic before disposing of it in a safe and legal manner."

"Profit" is the economic value created by the organisation after deducting the cost of all inputs, including the cost of the capital tied up. It therefore differs from traditional accounting definitions of profit.

In the original concept, within a sustainability framework, the "profit" aspect needs to be seen as the real economic benefit enjoyed by the host society. It is the real economic impact the organization has on its economic environment. This is often confused to be limited to the internal profit made by a company or organization (which nevertheless remains an essential starting point for the computation). Therefore, an original TBL approach cannot be interpreted as simply traditional corporate accounting profit plus social and environmental impacts unless the "profits" of other entities are included as a social benefits.

The potential internal and external benefits associated with sustainability reporting are as follows.

- Demonstrating transparency
- Creating financial value
- Enhancing reputation
- Achieving continuous improvement
- Improving regulatory compliance
- Strengthening risk awareness and management
- Encouraging innovation
- Enhancing management systems and decision making
- Raising awareness, motivating and aligning staff, and attracting talent
- Attracting long term capital and favourable financing conditions
- Maintaining licence to operate
- Establishing competitive positioning and market differentiation

THE POWER SECTOR AND SUSTAINABILITY REPORTING

One of the key inputs to sustain Indian Growth story is a supply of abundant and clean energy. Electricity is more than energy. It is a vital component of infrastructure and an essential part of modern day life. It plays a critical role in the economies of most countries. Electric power has become a prime mover for productivity, wages and jobs throughout the world; and the lifeblood of what is now being referred to as the new global economy.

Largely as a result of electrification, energy intensity (energy consumed per unit of economic value) has been declining steadily on a global scale at about 1% per year over the last century. Carbon intensity (carbon per unit of energy) has been declining at a rate of about 0.3% per year over the same period. While some two billion people around the world still do not have access to electricity, electricity progressively increased its share of energy consumption during the 20th century to nearly 40% in the Organization for Economic Cooperation and Development (OECD) nations.

There are a number of supply-side options for generating electricity. The principal generating technologies include fossil fuels, hydroelectric power, and nuclear.

Electric generation utilities take in a number of natural resources as input and release a number of components into the natural environment.

The amount of water usage is often of great concern for electricity generating systems as populations increase and droughts become a concern.

Many of the power plants, especially in the developing world use fossil fuels as the primary fuel source. There are concerns about the emissions that result from fossil fuel burning. Depending on the particular fossil fuel and the method of burning, other emissions may be produced as well. Ozone, sulphur dioxide, NO_2 and other gases are often released, as well as particulate matter. Sulphur and nitrogen oxides contribute to smog and acid rain.

Some of the relationships between electric utilities and the three fundamental dimensions of sustainable development are summarized below:

SUSTAINABILITY REPORTING FRAMEWORKS

The major sustainability frameworks available for reporting the triple bottom line of a company

- The SIGMA Project - Sustainability: Integrated Guidelines for management
- The Global Reporting Initiative
- The ISO 14031 environment performance evaluation standard

The SIGMA Project

The SIGMA Project – Sustainability – Integrated Guidelines for Management – was launched in 1999 with the support of the UK Department of Trade and Industry. It is a partnership between the British Standards Institution (the leading standards organisation), Forum for the Future (a leading sustainability charity and think-tank), and Accountability (the international professional body for accountability).

The Guidelines consist of:

- A set of Guiding Principles that help organisations to understand sustainability and their contribution to it.The holistic management of five different capitals reflects an organizations overall impact and wealth.

The five capitals are as follows:

- ❖ Natural Capital
- ❖ Social Capital – includes networks, communication channels, families, schools
- ❖ Human Capital – incorporates the elements needed for human beings to engage in productive work and creation of wealth
- ❖ Manufactured Capital
- ❖ Financial Capital

- The SIGMA guidelines help improve organizational performance. This is done by a blend of social reporting, sustainability planning, and the engagement of all the stakeholders and a complete integration of the organizational activities with the objectives. The paradigm is very simple. It allows the organization complete freedom to choose its principles which are in tandem with its vision. These principles are the key to sustainability evaluation and reporting. Also this builds accountability for the achievement of the desired performance. The SIGMA guidelines also answer the applied solutions to tackle the challenges. This is possible through the Benchmark Questionnaire, Sustainability Scorecard, Environment accounting, etc.However these guidelines have time and cost implications, especially for the smaller organizations. The guidelines may be fully or partially used the most commonly used being the SIGMA management framework. Generally the implementation of these guidelines is through a dedicated team.With SIGMA the firm endeavours to achieve a capacity for continuance in the future. This requires committed leadership which is at the heart of SIGMA. The SIGMA guidelines focus on making a specific organizations agenda for its management practices. Finally the focus is on continuous improvement throughout the business.

The Global Reporting Initiative (GRI) Framework

The Global Reporting Initiative (GRI) is a network-based organization. They are actively promoted by GRI itself and the United Nations Environment used sustainability reporting framework and is committed to its continuous improvement.

This framework sets out the principles and indicators that organizations can use to measure and report their economic, environmental, and social performance. The cornerstone of the framework is the Sustainability Reporting Guidelines. J. Emil Morhardt, Sarah Baird and Kelly Freeman evaluated the extent to which Sustainability reports which were declared met the requirements to of two important guidelines in 2000: The GRI 2000 and the ISO14031.

It was observed that environmental reports of 40 of the world's largest companies achieved fewer than 20% of the total possible points in the GRI 2000 scoring system. There was a tremendous gap between what large companies thought was appropriate to report and what was hoped for by the Global Reporting Initiative. Bernow et al. (1991) found that adding emissions costs to the normal costs of operating different types of power plants

resulted in reduction of emissions of SO_2, NOx, PM and CO_2 by 67%, 26%, 65% and 19%, respectively. Therefore, it may be possible to argue that the incorporation of externality or cost of emissions in planning the choice of resources mixes may contribute to reduce emission of pollutants.

The reporting framework is relevant as it results in measuring and improving performance on certain key areas. This has an element of risk management embedded in it. There is also a marked improvement in transparency and accountability as the markets can compare between the stated objectives and the action actually taken on critical issues such as human rights, labour, pollution, etc. These guidelines are an amalgam of what the collective wisdom of experts from diverse domains opined such as Accountants, Academics, Investors, Labour, etc. This ensures that the multiple needs of all the stakeholders are considered.

Now the third generation of the guidelines are applicable which are an improved and more comprehensive version of the guidelines as they are applicable to small companies, NGOs, etc. The GRI is annually developed by constant feedback from the stakeholders. The GRI is updating on the following:

- Community indicators
- Human rights indicators
- Content and Materiality

Thus this latest GRI guideline comes out with a disclosure framework which the organizations can follow voluntarily and incrementally.

ISO 14031: Environment Performance Evaluation

The paradigm of environment performance evaluation entails the process of ascertaining, analysing and reporting the firm's actual environmental performance vis-a-vis the set targets by its own management. In this process the firm learns to explore the areas for efficient useof energy and optimal resource utilization. It earns a reputation as a responsible corporate citizen in the process.

The ISO 14031 is an international standard which captures the process of evaluating environmental performance. It is being used by the whole gamut of organizations. Some firms have systems in place for environment management but some firms don't have this system. This standard gives utility to both. The challenge is as to how does a firm select the right indicators for environmental evaluation? This requires an ability to comprehend internal and exogenous variables. A basic requirement is of quality data which is comprehensive and complete.

The firms also benefit by benchmarking their performances in the criteria with the best industry practices. For example, a firm might consider rain water harvesting, water audit or undertaking awareness programs to improve its present status and scores.

Also the firms' benefits by focussing their attention on the activities and products which have the largest potential for cost saving. This is as relevant to an individual department as

it is to the whole organization. For this the existing data is analysed and worked upon. The performance is eventually rated.

When this exercise is done repeatedly, it leads to identification of trends in the organizations environmental performance regarding energy efficiency, cost reduction, compliances, etc.

CONCLUSION

Sustainability adds value to a company in several ways. A sustainability report communicates this value to its stake holders and imparts a sense of liability to the company.

Sustainability is reported in the form of a "Triple Bottom Line" which covers People, Planet and Profitability. There are different frameworks available to communicate the organizations holistic values.

The Electric Utility sector operates interfaces directly with many of the holistic components: Planet and People. The sustainability aspects and the challenges and trends in this sector are discussed. The elements to be taken into consideration for sustainability in this sector are considered.

The reporting framework specific to this sector is detailed in the form of the GRI – Energy Utility framework. Also, the aspect of how cost accounting of environmental impact in the electric rates impacts consumption, prices and pollution is appreciated.

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11

Demographic, Health and Literacy Levels of Jatapu Tribe in Andhra Pradesh

A Study of Seethammapeta Mandal in Srikakulam District of Andhra Pradesh

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Most of the Scheduled Tribes (STs) live in interior areas and far away from the civilized society. Agriculture is the main occupation of tribes. The isolated location of the tribes from the mainstream of life is hindering their all activities. Due to illiteracy among tribes, the money lenders and small traders exploit them. In our study 75 percent of the households are in the age group of 25 to 55 and 70 percent of the family members are within the working range of 15 to 55. Households living in villages in plain areas are responding to medical care, immunization and family planning programmes. The sex wise literacy levels of the family members show that the adult female literacy rates are very low when compared to adult male. It is a positive sign that the children literacy rates are recorded as a very high. This positive change of the children is attributed to the efforts made by the ITDA for establishment of Ashram Schools in the interior tribal areas.

Keywords: *Tribes, Demographic, Health and Literacy Levels*

INTRODUCTION

The tribes generally have a group of families living together and these groups have pre-historic economy, with several rituals and customs. Certain tribal languages have no script except speech. They live in interior forest areas far away from the civilized world. They have slash burn cultivation and hunting of the wild animals as the way of life. They have a common religion and common customs, and they live as a community. In general, tribes are of peculiar type of people living all over the world. Agriculture is the prime and predominant occupation of tribes and the culture of the tribal communities is reflected in

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their agricultural practices. The agro-climatic conditions and the resource potentialities differ from one tribal area to another. This is due to the nature of soil, fertility, availability of water, etc. Due to prevalence of unemployment and underemployment, agriculture alone cannot sustain them throughout the year. So, the tribes must rely on labour works and the forest produce which occupies and play an important role in their daily life. Hence the tribal economy may rightly be called as agro forest based economy. The isolated location of the tribes from the main-stream of life is hindering their economic activities. The illiteracy among the tribes and the rich forest produce tempted the money lenders and small traders to exploit the tribes. India ranks the second in having the tribal concentration in the world next only to Africa. India holds unique position in the concentration of tribal communities. There are about 532 scheduled tribes in India. They speak about 100 languages and 255 subsidiary languages.

The growth rates of scheduled tribe population in Andhra Pradesh are 5.47, 2.24, 6.50, 2.79 and 3.01 for the years 1951, 1961, 1971, 1981, 1991 and 2001 respectively. Except 1961 and 1991, the decadal growth rate of tribal population is more than the growth rate of general population. From 1951 to 2001 the tribal population has increased by five times but for the general population it is only 1.5 times.

The tribal villages are inhabited by different variety of tribes. The important tribes are Gonds, Andhs, Thothis, and Kolanes in Adilabad district, Koya, Konda Reddies, Naikpads in Khammam, Warangal and Godavari districts, Bagatha, Valmiki, Kondhs and Jatapus in the districts of north coastal Andhra Pradesh and Chenchus in the pockets of Mahaboob Nagar, Kurnool and Prakasam Districts. The social structure of the various tribal groups resemble with each other tribal groups. It is due to their similar clan organizations. The social practices, customs, beliefs and code of conduct are very nearer to each other tribal groups. Almost all the tribal groups in Andhra Pradesh eat cooked food. Some tribes in higher community status generally do not accept cooked food from other tribal communities who have lower than their status. The tribal economy is with very poor economic conditions and almost intertwined with the social phenomena.

RESEARCH METHODOLOGY

The primary data comprise collecting information during the months of June and July of 2010 from the selected sample tribal households in the tribal areas the multistage stratified random sampling method is used for the study. There are four stages in which sampling process is carried out. The first stage is selection of district, the second stage consists of selection of mandal, the third stage consists of selection of villages and the forth stage is of selection of households. Out of the nine districts of Andhra Pradesh which have concentration of tribal population, only Srikakulam District is selected.

The second stage of sample consists of selection of mandal. The selected Seethampeta is only the tribal concentrated mandal out of 37 mandals of Srikakulam district. Out of 37, 19 mandals have tribal population in Srikakulam district, with a total of 11, 9304 tribal population. Seethampeta alone is having 40, 189 tribal population (33.69 percent of total tribal population of the district).

The third stage of sample consists of selection of villages. The Seethampeta mandal consist of 113 revenue villages and five uninhabited villages formed by 24 panchayats and 290 hamlets. To examine the socio-economic conditions of prominent tribes in Srikakulam District, i.e. Jatapu, the specific tribe population concentration is considered in the selection of villages. Specific tribe population with 80 percent and less than 90 percent in the respective panchayats are considered as criteria for selection. After identification of specific tribe concentration in the panchayats, the Jatapu concentrated 10 villages are selected. To examine the differences in the living patterns of Jatapu tribe households in Plain and Interior villages, among the 10 selected villages, purposively 5 villages, viz. Panukuvalasa, Manapuram, Pedduru, Pedarama and Valegaadda on roadside plain villages of the Seethammapeta mandal are selected. Similarly the remaining 5 villages, viz. Jayapuram, Kusumuru, Talada, Tadipai and Pedapolla are selected from the interior parts of the Seethammapeta Mandal.

In the final stage from Jatapu concentrated villages a number of 20 households are selected from each selected village and as a whole from the selected 10 villages a total of 200 Jatapu tribe households are selected.

This paper deals with the demographic, health and literacy levels of Jatapu Tribes in Seethammapeta Mandal of Srikakulam District of Andhra Pradesh.

DEMOGRAPHIC AND LIVING CONDITIONS OF SELECTED JATAPU HOUSEHOLDS

In this section an attempt is made to conduct an in-depth study to analyse the demographic conditions of the selected tribal households. The age composition of the family members helps to assess the available workforce in the family and its impact on production of the household. The field data shows that nearly 75 percent of the total sample households are in the age group of 25 to 55 years. Majority of the heads of households (50%) are in the age group of 35 to 55 years. In this regard significant differences are not found across villages. Village wise distribution of the heads of the household in age groups is presented in Table 1.

TABLE 1: AGE COMPOSITION OF HEAD OF THE HOUSEHOLDS

S. No.	Village	Age Composition					
		Below 25	25-35	35-45	45-55	Above 55	Total
1	Selected villages in plain areas	13	25	28	23	11	100
2	Selected villages in interior areas	17	27	27	22	7	100
3	Total selected village	30 (15.0)	52 (26.0)	55 (27.50)	45 (22.50)	18 (9.0)	200 (100.00)

The age composition of the family members is presented in the following Table 2. It can be seen that, the total number of family members of 200 selected households recorded as 833. Out of the total family members 58.46 percent of the family members of the households

are below the age group of 35 years. The classification also shows that more proportion of the family members of the selected households are in the age group of 25-35 years. On the total we can say that 62.90 percent of heads of the households are in the effective age-group 25-55. The average household family size is estimated at 4.16. The family size is relatively low in the case of the households living in the plain areas when compared to the households living in the interior areas. Totally among the family members of households, children constitute 13.20 percent and old ages are 5.41 percent.

TABLE 2: AGE COMPOSITION OF THE TOTAL FAMILY MEMBERS

S. No	Village	Age Composition							
		0-15	15-25	25-35	35-45	45-55	Above 55	Total	Family Size
1	Selected villages in plain areas	53	71	110	99	49	13	397	3.97
2	Selected villages in interior areas	57	83	113	98	55	30	436	4.36
3	Total selected village	110 (13.20)	154 (18.49)	223 (26.77)	197 (23.65)	104 (12.48)	43 (5.41)	833 (100.00)	4.16

Note: The figures presented in the parenthesis are percentages to total.

The information relating to sex wise distribution of family members is having relevance. The sex-wise distribution of family members is presented in Table 3. From the table it can be noticed that, among the total family members (833) women (55.58%) are recorded more than men (44.42%). Among the family members of the selected households above the age group of 14 years are classified as adults. The workmen between age group of 25 to 45 are treated as effective workforce. It can be observed from the table, in all the selected tribes proportion of male adults is lower (31.21%) when compared to female adults (39.13%). Out of the total family members, children constitute 29.66 percent.

TABLE 3: DISTRIBUTION OF FAMILY MEMBERS BY SEX

S. No.	Village	Male			Female			Grand Total
		Adult	Children	Total	Adult	Children	Total	
1	Selected villages in plain areas	117	57	174	155	68	223	397
2	Selected villages in interior areas	143	53	196	171	69	240	436
3	Total selected village	260 (31.21)	110 (13.21)	370 (44.42)	326 (39.13)	137 (16.45)	463 (55.58)	833 (100.00)

Note: The figures presented in the parenthesis are percentages to total.

Along with sex ratio, the size of the family will also influence the productivity of family. Table 4 presents the village wise distribution of the households by family size. It can be

noted from the Table that 23.0 percent of the families have less than 5 members. 58.50 families are having less than 7 family members and 18.50 percent families recorded with more than 7 numbers of family members.

TABLE 4: SIZE OF THE FAMILY

S. No.	Villages	Family Size				Adoption of Family Planning by Households
		< 5	0-7	7+	Total	
1	Selected villages in plain areas	29	52	19	100	48
2	Selected villages in interior areas	17	59	24	100	39
3	Total selected village	46 (23.00)	111 (58.50)	43 (18.50)	200 (100.00)	87

Note: The figures presented in the parenthesis are percentages to total.

Health Conditions

The health practices of the selected households both in the interior villages and roadside plain villages are presented in Table 5. The collected information relating to adoption of family planning by heads of households show that family planning has not become more popular among the households living in the interior remote villages. It is noticed that almost all the households living in the interior villages use some or other kind of native medicines, which are derived from herbs to control the size of their families. However, there is a good response in the households living in the plain villages regarding family planning. Midwives and health workers posted in the villages were trained to propagate the family planning programmes in the villages of interior tribal areas, where the households are not showing interest in the family planning.

The data indicates that though 64.50 percent of the family members are aware of family planning but 43.5 percent adopted it. Nearly 70 percent of the households living in interior villages are still using a native medicine as a preventive alternative. The adoption is very limited among the households of interior villages. However, more than 40 percent of the households living in plain villages responded positively to the family planning programmes. The survey conducted about the existing health facilities in the tribal area indicate that the governmental and non-governmental agencies have been trying to intensify health facilities in the tribal areas during last few decades. In spite of the facilities, the native doctor and medicine are still playing an important role in the health care of tribal people. However, 30 percent of the households in plain villages reported that they are taking medical care from government PHCs and at their village health camps. The number of children vaccinated is found high in plain villages rather than in the households living in interior villages.

TABLE 5: ADOPTION OF FAMILY PLANNING PRACTICES

S. No.	Village	Awareness & responded	Not responded	Total	Adopting
1	Selected villages in plain areas	71	29	100	48
2	Selected villages in interior areas	49	51	100	39
3	Total selected village	120 (64.50)	80 (35.50)	200 (100.00)	87

Note: The figures presented in the parenthesis are percentages to total.

Literacy Levels

Since their inception, the Integrated Tribal Development Agencies (ITDAs) have been putting tremendous effort in the provision and spread of both formal and non-formal education among tribal people. The enormous expenditure on education in the tribal areas expected to have positive impact on the literacy rates of the tribal people. The tribal literacy is very low in Andhra Pradesh. The village wise distributions of head of the households' literacy level are presented in Table 6. From the table it is revealed that only 23.00 percent households are completed primary education and 9.50 percent completed secondary education and 66.00 percent are illiterates.

TABLE 6: LITERACY LEVELS OF HEAD OF THE HOUSEHOLDS

S. No.	Village	Literacy level				
		Primary	Secondary	Higher	Illiterates	Total
1	Selected villages in plain areas	29	11	3	57	100
2	Selected villages in interior areas	17	8	0	75	100
3	Total selected village	46 (23.00)	19 (9.50)	3 (1.50)	132 (66.00)	200 (100.00)

Note: The figures presented in the parenthesis are percentages to total.

The details relating to the literacy levels of all the family members of the households are collected and they are presented in the Table 7. From the table it can be observed that out of total family members of the households only 32.88 percent are literates. The adult literacy rates are very low and it is 38.85 percent in case of male and only 8.96 percent in case of women. However, the children literacy rates are very encouraging in the study area. Out of the total male children 79.08 percent are literates; it is very interesting to note that in the total female children 55 percent are literates. The children literacy rate is recorded as 65.89 percent. The difference between the adult female literacy and female children literacy levels indicate the changing position in the tribal areas. The literacy level of the family members of the households living in the interior villages is relatively recorded low when compared to their counterparts who are living in the roadside villages.

TABLE 7: LITERACY LEVELS OF THE FAMILY MEMBERS

S. No.	Village	Male Literates			Female Literates			Grand Total
		Adult	Children	Total	Adult	Children	Total	
1	Selected villages in plain areas	70	26	96	35	22	57	153
2	Selected villages in interior areas	54	25	79	24	21	45	124
3	Total selected village	124 (44.76)	51 (18.41)	175 (63.17)	59 (21.30)	43 (15.53)	102 (36.83)	277 (100.00)

Note: The figures presented in the parenthesis are percentages to total.

Generally in the tribal villages, the number of dropout children is expected to be more. Hence, an attempt is made to study the pattern of dropouts and the relating data are presented in Table 8. It can be noticed from the above table that among school drop-out children the proportion of female children (62.50%) is more than that of male children (37.50%). Most of the children are dropouts at the primary education level. The number of dropout children is more in the interior villages rather than in villages in plain areas. The overall picture regarding literacy levels of the households and their family members indicate that the literacy rate is very high among the households and family members who are living in the plain villages. At the same time the level of education is comparatively low among the households and the family members who are living in the interior villages.

TABLE 8: DISTRIBUTION OF SCHOOL DROPOUTS OF CHILDREN BY SEX

S. No.	Village	School drop-outs of children						Grand Total
		Male			Female			
		Primary	Upper Primary	Total	Primary	Upper Primary	Total	
1	Selected villages in plain areas	10	6	16	21	8	29	45
2	Selected villages in interior areas	13	7	20	25	6	31	51
3	Total selected village	23 (23.96)	13 (13.54)	36 (37.50)	46 (47.92)	14 (14.58)	60 (62.50)	96 (100)

Note: The figures presented in the parenthesis are percentages to total.

CONCLUSION

In the selected villages, there are variations in literacy levels, health and demographic characteristics of the tribal households. These variations explain the variations in the levels of living and well being of the tribal households in the selected villages.

The selected Jatapu tribe in Seethammapeta mandal responded favourably towards the exogenous change agents. The degree of response towards these change agents is found higher in the case of Jatapu tribe households who are residing in the villages in the road side plain areas which are having very close access to Seethammapeta. The modern forces and change agents actively influenced the tribes in plain areas particularly in the road side plain villages the households responded to the imitative effect of these forces of change is felt through their changing food habits, type of family life style, material culture, social relations, political organization and rituals.

On the front of demographic and economic analysis of the selected tribal households the findings relating to composition of the selected households shows that, nearly 75 percent of the households are in the age groups of 25 to 55. The analysis pertaining to age composition of the family members of the selected households indicate that around 70 percent of the family members are within the working range of 15 to 55. Children are at the extent of 25 percent and old ages constitute only around 5 percent of the total family members. The sex-wise distribution of total family members of the selected households reveals that the number of total female is relatively higher than total male. Similarly the adult female are higher in proportion than men and children constitute early 35 percent of total family members. The household average family size is 4.68 and the family size is relatively higher among the households living in the villages in the interior areas. The households with more than 7 members are 20 percent in total households and they are more among the households living in the villages in the interior areas.

Regarding health and family planning the households adopting family planning is relatively low among the households living in the villages in the interior areas. Among the total households, though 60 percent are having awareness about family planning only 36 percent are adopted family planning. Tribal households living in the interior villages are not exposed to medical care facilities provided by PHCs, they are still relying upon native doctors and native medicines. However, households living in villages in plain areas are responding to medical care, immunization and family planning programmes.

So far as the literacy levels are concerned, the literacy levels of heads of households are very low and 35 percent of the total family members are literates. The sex wise literacy level of the family members show that the adult female literacy rates are very low when compared to adult male. Important positive indication is that the children literacy rates are recorded as a very high. It is very high in case of male children and relatively low in case of female children. This positive change on the front of children education is attributed to the efforts made by governmental agencies like ITDA for a widespread establishment of Ashram Schools in the interior tribal areas. However, the literacy levels are relatively very low among the households who are residing in the remote villages, particularly female children literacy is relatively low among these households of interior villages. Also the number of school dropouts is relatively higher among the households of interior villages. This indicates that households in the villages in plain areas have realized the importance of education for the better future of their children and there is a change in the perception of these households in interior villages about education of their children. The dropouts rates are recorded very high in the case of female children than male children among the households living in the interior villages.

The above analysis ultimately reveals that in literacy levels, health and demographic characteristics of the tribal households are different across the selected villages. The households in plain villages are able to move fast towards modernization process when compared to households living in the interior villages'. As a whole, the analysis pertaining to the conditions of the selected households shows the process of transformation which is taking place in the living patterns of the selected households living in the villages in plain areas. The degree of responsiveness to modernity is still relatively low among the selected households living in the villages located in the interior areas of the Seethammapeta mandal of the Srikakulam district of Andhra Pradesh.

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12

Greenhouses Breathe New Life into Sustainable Vegetable Production

Dr Minal*

Agriculture is the backbone of India's economic activity, and our experience during the last 50 years has demonstrated a strong correlation between agricultural growth and economic prosperity. The present agricultural scenario is a mix of outstanding achievements and missed opportunities. If India has to emerge as an economic power in the world, our agricultural productivity should equal those countries, which are currently rated as economic power of the world. We need a new and effective technology, which can improve continuously the productivity, profitability and sustainability of our major farming systems. One such technology is the green house technology. Although it is centuries old, it is new to India. Greenhouses afford the opportunity to experiment with unusual or hard to grow plants, garden during the winter, and perfect propagation and seeding techniques – all in a controlled, up-close and personal environment. Greenhouses are a fair-sized garden investment and take up a fair amount of space. Certainly, one can build his own to save money if he has the tools and the skills. Greenhouse manufacturers are aware of both the money and space concerns of their customers, and have put out a wide variety of really nice styles, from wood-framed to English Garden designs to cool-looking futuristic designs. Good choices for those without much room can be found in styles that adjoin the house, basically leaving the landscape in the yard unscathed. Whatever be the situation, there is a greenhouse available that will likely suit a person's economic or any other related needs.

Keywords: *Greenhouse, History, Technology, Uses, Advantages, Classification*

INTRODUCTION

Agriculture is the backbone of India's economic activity and our experience during the last 50 years has demonstrated the strong correlation between agricultural growth and economic prosperity. The present agricultural scenario is a mix of outstanding achievements and missed opportunities. If India has to emerge as an economic power in the world, our agricultural productivity should equal those countries, which are currently rated as economic

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power of the world. We need a new and effective technology which can improve continuously the productivity, profitability, sustainability of our major farming systems. One such technology is the green house technology. Although it is centuries old, it is new to India.

MEANING OF GREENHOUSE

A greenhouse (also called a glasshouse) is a building in which plants are grown. A miniature greenhouse is known as a cold frame. Greenhouses can be divided into glass greenhouses and plastic greenhouses. Plastics mostly used are PE film and multiwall sheet in PC or PMMA. Commercial glass greenhouses are often high-tech production facilities for vegetables or flowers. The glass greenhouses are filled with equipments such as screening installations, heating, cooling, lighting, and may be automatically controlled by a computer.

These structures range in size from small sheds to very large buildings. A greenhouse is a structure with different types of covering materials such as a glass or plastic roof and frequently glass or plastic walls; it heats up because incoming visible solar radiation (for which the glass is transparent) from the sun is absorbed by plants, soil, and other things inside the building. Air warmed by the heat from hot interior surfaces is retained in the building by the roof and wall. In addition, the warmed structures and plants inside the greenhouse re-radiate some of their thermal energy in the infrared spectrum, to which glass is partly opaque, so some of this energy is also trapped inside the glasshouse. However, this latter process is a minor player compared with the former (convective) process. Thus, the primary heating mechanism of a greenhouse is convection. This can be demonstrated by opening a small window near the roof of a greenhouse: the temperature drops considerably. This principle is the basis of the autovent automatic cooling system. Thus, the glass used for a greenhouse works as a barrier to air flow, and its effect is to trap energy within the greenhouse. The air that is warmed near the ground is prevented from rising indefinitely and flowing away. Although heat loss occurs due to thermal conduction through the glass and other building materials, net energy increases (and therefore temperature) inside the greenhouse.

HISTORY OF GREENHOUSES

Since Roman times, the idea of growing plants in environmentally-controlled areas has existed. Tiberius, the Roman emperor, ate a cucumber-like vegetable daily. The Roman gardeners used artificial methods (similar to the greenhouse system) of growing to have it available for his table every day of the year. Cucumbers were planted in wheeled carts, which were put in the sun daily, and then taken inside to keep them warm at night. The cucumbers were stored under frames or in cucumber houses glazed with either oiled cloth known as *specularia* or with sheets of selenite (a.k.a. *lapis specularis*), according to the description by Pliny the Elder.

The first few modern greenhouses were built in Italy in the 13th century to house the exotic plants that explorers brought back from the tropics. They were originally called *giardini botanici* (botanical gardens). The concept of greenhouses soon spread to the Netherlands and then England along with the plants. Some of these early attempts required enormous amount of work – to close up at night or to winterize. There were serious problems

with providing adequate and balanced heat in these early greenhouses. Today, the Netherlands has many of the largest greenhouses in the world, some of them so vast that they are able to produce millions of vegetables every year.

Charles Lucien Bonaparte, the French botanist, is often credited with building the first practical modern greenhouse in Leiden, Holland to grow medicinal tropical plants. Originally only on the estates of the rich, the growth of the science of botany caused greenhouses to spread to the universities. The French called their first greenhouses *orangeries*, since they were used to protect orange trees from freezing. As pineapples became popular, *pineries* or pineapple pits were built. Experimentation with the design of greenhouses continued during the 17th century in Europe, as technology produced better glass and construction techniques improved. The greenhouse at the Palace of Versailles was an example of the size and elaborateness; it was more than 500 feet (150 m) long, 42 feet (13 m) wide, and 45 feet (14 m) high. In the 19th century, the largest greenhouses were built. The conservatory at Kew Gardens in England is a prime example of the Victorian greenhouse. Greenhouses were intended for both horticultural and non-horticultural exhibition, and included London's Crystal Palace, the New York Crystal Palace and Munich's Glaspalast. Joseph Paxton, who had experimented with glass and iron in the creation of large greenhouses as the head gardener at Chatsworth, in Derbyshire, working for the Duke of Devonshire, designed and built the first London's Crystal Palace. A major architectural achievement in monumental greenhouse building was the Royal Greenhouses of Laeken (1874–1895) for King Leopold II of Belgium. In Japan, the first greenhouse was built in 1880 by Samuel Cocking, a British merchant who exported herbs. In the 20th century, the geodesic dome was added to the many types of greenhouses. A notable example is the Eden Project in Cornwall.

In the 1960s when wider sheets of polyethylene film became widely available, the greenhouse structures were adapted. Several companies and growers made Hoop houses. Constructed of aluminium extrusions, special galvanized steel tubing, or even just lengths of steel or PVC water pipe, construction costs were greatly reduced. This meant many more greenhouses on smaller farms and garden centres. Polyethylene film durability increased greatly when more effective inhibitors were developed and added in the 1970s. These UV inhibitors extended the usable life of the film from one or two years up to 3 and eventually 4 or more years. Gutter-connected greenhouses became more prevalent in the 1980s and 1990s. These greenhouses have two or more bays connected by a common wall or row of support posts. Heating inputs were reduced as the ratio of floor area to roof area was increased substantially. Gutter-connected greenhouses are now commonly used both in production and in situations where plants are grown and sold to the public, as well. Gutter-connected greenhouses are commonly covered with a double layer of polyethylene film with air blown between to provide increased heating efficiencies or structured polycarbonate materials.

GREENHOUSE TECHNOLOGY

Growing plants is both an art and a science. About 95% of plants, either food crops or cash crops are grown in open field. Since time immemorial, man has learnt how to grow plants under natural environmental conditions. In some of the temperate regions where the climatic conditions are extremely adverse and no crops can be grown, man has developed methods

of growing some high value crop continuously by providing protection from the excessive cold, which is called as Greenhouse Technology. So, Greenhouse Technology is the technique of providing favourable environment condition to the plants. It is rather used to protect the plants from the adverse climatic conditions such as wind, cold, precipitation, excessive radiation, extreme temperature, insects and diseases. It is also of vital importance to create an ideal micro climate around the plants. This is possible by erecting a greenhouse/glass house, where the environmental conditions are so modified that one can grow any plant in any place at any time by providing suitable environmental conditions with minimum labour. Greenhouses are framed or inflated structures covered with transparent or translucent material large enough to grow crops under partially or fully controlled environmental conditions to get optimum growth and productivity.

GREENHOUSE VENTILATION

Ventilation is one of the most important components in a successful greenhouse. If there is no proper ventilation, greenhouses and their plants become prone to myriad problems.

Ventilation serves four major purposes within the greenhouse:

- Regulating the temperature
- Ensuring plenty of fresh air to photosynthesise
- Preventing pest infestations
- Encouraging important pollination within the greenhouse

In gr2eenhouses, recirculation fans can be used in parallel or series ventilation.

SITING

Siting a greenhouse is a huge consideration. In the Northern Hemisphere, the side with the largest surface area should face south. The rule is reversed in the Southern Hemisphere. The greenhouse should get as much unobstructed light as possible. Considerations are given to deciduous trees which will lose their leaves and permit light penetration and also coniferous trees which will generally always block light. The greenhouse site must also be levelled.

USES OF GREENHOUSES

Greenhouses protect crops from too much heat or cold and help to keep out pests. Light and temperature control allows greenhouses to turn inarable land into arable land, thereby improving food production in marginal environments.

Because greenhouses allow certain crops to be grown throughout the year, greenhouses are increasingly important in the food supply of high latitude countries. One of the largest greenhouse complexes in the world is in Almeria, Spain, where greenhouses cover almost 50,000 acres (200 km^2). It is sometimes called the sea of plastics.

Greenhouses are often used for growing flowers, vegetables, fruits and tobacco plants. Bumblebees are the pollinators of choice for most greenhouse pollination, although other

types of bees have been used, as well as artificial pollination. Hydroponics can be used in greenhouses, as well, to make the most use of the interior space.

Besides tobacco, many vegetables and flowers are grown in greenhouses in late winter and early spring, and then transplanted outside as the weather warms. Started plants are usually available for gardeners in farmers' markets at transplanting time. Special greenhouse varieties of certain crops, such as tomatoes, are generally used for commercial production.

The closed environment of a greenhouse has its own unique requirements, compared with outdoor production. Pests and diseases, and extremes of heat and humidity, have to be controlled, and irrigation is necessary to provide water. Significant inputs of heat and light may be required, particularly with winter production of warm-weather vegetables.

ADVANTAGES OF GREENHOUSES

Some of the advantages of greenhouses are:

- The yield may be 10–12 times higher than that of outdoor cultivation depending upon the type of greenhouse, type of crop and environmental control facilities
- Reliability of crop increases
- Ideally suited for vegetables and flower crops.
- Year round production of floricultural crops.
- Off-season production of vegetable and fruit crops. Disease-free and genetically superior transplants can be produced continuously.
- Efficient utilisation of chemicals, pesticides to control pest and diseases.
- Water requirement of crops is very limited and easy to control
- Maintenance of stock plants, cultivating grafted plantlets and micro propagated plantlets.
- Hardening of tissue-cultured plants.
- Production of quality produce free of blemishes
- Most useful in monitoring and controlling the instability of various ecological systems
- Modern techniques such as Hydroponics (Soil less culture), Aeroponics and Nutrient film techniques are possible only under greenhouse cultivation

GREENHOUSES – WORLD SCENARIO

In the world, there are more than 50 countries where cultivation of crops is undertaken on a commercial scale under cover. United States of America has a total area of about 4000 ha under greenhouses mostly used for floriculture with a turnover of more than 2.8 billion US $ per annum and the area under greenhouses is expected to go up considerably if the cost of transportation of vegetables from neighbouring countries continues to rise.

The area under greenhouses in Spain has been estimated to be around 25,000 ha and Italy 18,500 ha used mostly for growing vegetable crops like watermelon, capsicum, strawberries, beans, cucumbers and tomatoes. In Spain, simple tunnel-type greenhouses are generally used without any elaborate environmental control equipments mostly using UV stabilised polyethylene film as cladding material.

In Canada, the greenhouse industry caters both to the flower and off-season vegetable markets. The main vegetable crops grown in Canadian greenhouses are tomato, cucumbers and capsicum. Hydroponically grown greenhouse vegetables in Canada find greater preference with the consumers and could be priced as much as twice the regular greenhouse produce.

The Netherlands is the traditional exporter of greenhouse grown flowers and vegetables all over the world. With about 89,600 ha under cover, the Dutch greenhouse industry is probably the most advanced in the world. Dutch greenhouse industry however relies heavily on glass-framed greenhouses, in order to cope up with very cloudy conditions prevalent all the year round. A very strong research and development component has kept the Dutch industry in the forefront.

The development of greenhouses in the Gulf countries is primarily due to the extremity in the prevailing climatic conditions. Israel is the largest exporter of cut flowers and has a wide range of crops under greenhouses (15,000 ha) and Turkey has an area of 10,000 ha under cover for cultivation of cut flowers and vegetables. In Saudi Arabia, cucumbers and tomatoes are the most important crops contributing more than 94% of the total production. The most common cooling method employed in these areas is evaporative cooling.

Egypt has about 1000 ha greenhouses consisting mainly of plastic covered tunnel-type structures. Arrangements for natural ventilation are made for regulation of temperature and humidity conditions. The main crops grown in these greenhouses are tomatoes, cucumbers, peppers, melons and nursery plant material.

Asia, China and Japan are the largest users of greenhouses. The development of greenhouse technology in China has been faster than in any other country in the world. With a modest beginning in late seventies, the area under greenhouses in China has increased to 48,000 ha in recent years. Out of this 11,000 ha is under fruits like grapes, cherry, Japanese persimon, fig, loquot, lemon and mango. The majority of greenhouses use local materials for the frame and flexible plastic films for glazing. Most of the greenhouses in China are reported to be unheated and use straw mats to improve the heat retention characteristics.

Japan has more than 40,000 ha under greenhouse cultivation of which nearly 7500 ha is devoted to only fruit orchards. Greenhouses in Japan are used to grow wide range of vegetables and flowers with a considerable share of vegetable demand being met from greenhouse production. Even a country like South Korea has more than 21,000 ha under greenhouses for production of flowers and fruits. Thus, greenhouses permit crop production in areas where winters are severe and extremely cold as in Canada and USSR, and also permit production even in areas where summers are extremely intolerable as in Israel, UAE, and Kuwait. Greenhouses in Philippines make it possible to grow crops in spite of excessive rains and also in moderate climates of several other countries. Thus, in essence, greenhouse cultivation is being practiced and possible in all types of climatic conditions.

NETHERLANDS

The Netherlands has some of the largest greenhouses in the world. Such is the scale of food production in the country that in 2000, greenhouses occupied 10,526 hectares, or 0.25% of the total land area of the Netherlands.

Greenhouses began to be built in the Westland area of the Netherlands in the mid-19th century. The addition of sand to bogs and clay soil created fertile soil for agriculture, and around 1850, grapes were grown in the first greenhouses, simple glass constructions with one of the sides consisting of solid wall. By the early 20th century, greenhouses began to be constructed of nothing but glass, and they began to be heated. This also allowed for the production of fruits and vegetables that did not ordinarily grow in the area. Today, the Westland and the area around Aalsmeer have the highest concentration of greenhouse agriculture in the world. The Westland produces mostly vegetables besides plants and flowers; Aalsmeer is noted mainly for the production of flowers and potted plants. Since the 20th century, the area around Venlo and parts of Drenthe has also become important regions for greenhouse agriculture.

Since 2000, technical innovations include the 'closed greenhouse', a completely closed system allowing the grower complete control over the growing process while using less energy. Floating greenhouses are used in watery areas of the country.

The Netherlands has around 9,000 greenhouse enterprises that operate over 10,000 hectares of greenhouses and employ some 1,50,000 workers, efficiently producing • 4.5 billion worth of vegetables, fruits, plants and flowers, 80% of which is exported.

STATUS OF GREENHOUSES IN INDIA

While greenhouses have existed for more than one and a half centuries in various parts of the world, in India, the use of greenhouse technology started only during 1980's and it was mainly used for research activities. This may be because our emphasis so far had been on achieving self-sufficiency in food grain production. However, in recent years in view of the globalisation of international market and tremendous boost and fillip that is being given for export of agricultural produce, there has been a spurt in the demand for greenhouse technology. The National Committee on the use of Plastics in Agriculture (NCPA-1982) has recommended location-specific trials of greenhouse technology for adoption in various regions of the country.

Greenhouses are being built in the Ladakh region for extending the growing season of vegetables from 3 to 8 months. In the North-East, greenhouses are being constructed essentially as rain shelters to permit off-season vegetable production. In the Northern plains, seedlings of vegetables and flowers are being raised in the greenhouses either for capturing the early markets or to improve the quality of the seedlings. Propagation of difficult-to-root tree species has also been found to be very encouraging. Several commercial floriculture ventures are coming up in states of Maharashtra, Tamil Nadu and Karnataka to meet the demands of both domestic and export markets.

The commercial utilisation of greenhouses started from 1988 onwards and now with the introduction of Government's liberalisation policies and developmental initiatives, several corporate houses have entered to set up 100% export-oriented units. In just four years, since implementation of the new policies in 1991, 103 projects with foreign investment of more than ₹ 80 crore have been approved to be set up in the country at an estimated cost of more than ₹ 1000 crore around Pune, Bangalore, Hyderabad and Delhi. Thus, the area under climatically controlled greenhouses pertaining to these projects is estimated to be around 300 ha. Many of these greenhouses have already commenced exports and have received very encouraging results in terms of acceptance of the quality in major markets abroad and the price obtained.

CLASSIFICATION OF GREENHOUSES

Greenhouse structures of various types are used for crop production. Although there are advantages in each type for a particular application, in general there is no single type greenhouse, which can be considered as the best. Different types of greenhouses are designed to meet specific needs. The different types of greenhouses, based on shape, utility, material and construction, are briefly given below:

1. ***Greenhouse Type Based on Shape:*** For the purpose of classification, the uniqueness of cross-section of the greenhouses can be considered as a factor. The commonly followed types of greenhouses based on shape are:
   (i) Lean to type greenhouse
   (ii) Even span type greenhouse
   (iii) Uneven span type greenhouse
   (iv) Ridge and furrow type
   (v) Saw tooth type
   (vi) Quonset greenhouse
   (vii) Interlocking ridges and furrow type Quonset greenhouse
   (viii) Ground to ground greenhouse
2. ***Greenhouse Type Based on Utility:*** Classification can be made depending on the functions or utilities. Of the different utilities, artificial cooling and heating are more expensive and elaborate. Hence, based on this, they are classified into two types.
   (i) Greenhouses for active heating
   (ii) Greenhouses for active cooling
3. ***Greenhouse Type Based on Construction*:** The type of construction predominantly is influenced by structural material though the covering material also influences the type. Higher the span, stronger should be the material and more structural members are used to make sturdy tissues. For smaller spans, simple designs like hoops can be followed. So based on construction, greenhouses can be classified as:

(i) Wooden-framed structure

(ii) Pipe-framed structure

(iii) Truss-framed structure

4. ***Greenhouse Type Based on Covering Material:*** Covering materials are the important components of the greenhouse structure. They have direct influence on greenhouse effect, inside the structure and they alter the air temperature inside. The types of frames and method of fixing also varies with covering material. Hence, based on the type of covering material, they may be classified as:

   (i) Glass glazing.

   (ii) Fiber glass Reinforced Plastic (FRP) glazing

      a. Plain sheet

      b. Corrugated sheet

   (iii) Plastic film

      a. UV stabilised LDPE film

      b. Silpaulin type sheet

      c. Net house

5. ***Greenhouse Type Based on Cost of Construction Involved*** (which includes various factors mentioned above)

   (i) High-cost Green House

   (ii) Medium-cost Green House

   (iii) Low-cost Green House

The local weather conditions and the individual's necessity play a major role in the selection of the model.

CONCLUSION

Greenhouses afford the opportunity to experiment with unusual or hard to grow plants, garden during the winter, and perfect propagation and seeding techniques – all in a controlled, up-close and personal environment. Greenhouses are a fair-sized garden investment and take up a fair amount of space. Certainly, one can build his own to save money if he has the tools and skills. Greenhouse manufacturers are aware of both the money and the space concerns of their customers, and have put out a wide variety of really nice styles, from wood-framed to English Garden designs to cool looking futuristic designs. Good choices for those without much room can be found in styles that adjoin the house, basically leaving the landscape in the yard unscathed. So basically, whatever be the situation, there is a greenhouse available that will likely suit a person's economic or any other related needs.

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13

A Conceptual Orientation of Government Schemes for Sustainable Development of Textile Handloom Industries

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The handloom sector plays a significant and important role in the country's economy. It provides employment to a vast segment of craft persons in rural and semi-urban areas. Handloom industry generates substantial foreign exchange for the country, while preserving its cultural heritage. The government is also very encouraging in this area and is protecting the small-scale industries by specifying certain products only reserved for them to produce. The government of India has been following a policy of promoting and encouraging the handloom sector through a number of policies and programmes. However, the handloom sector being highly decentralised and dispersed suffers from cost disadvantages, technological obsolescence and marketing handicaps in comparison to power loom and mill sectors. This might be due to the fact that most of the weavers, traders engaged in this trade are unaware about various government schemes and its effectiveness. Dissemination of the information on these aspects to the handloom weavers, textile artisans and traders engaged in handloom weaving and related activities is very essential. Therefore, in the present paper, effort has been made to include the gist of some important government schemes, which are being implemented for growth and development of handloom in the country. The information given in the present paper related to various governmental schemes, if utilised properly by the textile traders can facilitate the upliftment of their textile trade.

Keywords: *Handloom, Government Schemes, Handloom Mark, Power Loom*

INTRODUCTION

The handloom, one of the ancient textile enterprises in India, has brought great changes in the Indian industrial and economic revolution. Within the textile industry, the handloom

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sector is one of the largest employers in India, providing employment to about 6.5 million people (second only to agriculture) as per the joint census of handlooms and power looms 1995–1996 (Anonymous[1], 2010). Handloom textiles constitute a timeless facet of the rich cultural heritage of India. The production of handloom fabrics is estimated to be approximately 6947 million sq. metres during 2007–08 and the contribution of handloom to the total cloth/textile production, comprising Handloom, Mill and Power Loom sectors during the year 2007–08 is estimated to be about 16%. It is expected that with increasing population and prosperity, the domestic and international market size will expand and per capita consumption will increase. Most of the schematic interventions of the Government of India in the ninth and tenth plan period have been through the state agencies and cooperatives in the handloom sector relating to input supplies, production, marketing, etc. This has helped the sector in development of new/diversified products for domestic and foreign markets. However, in the face of growing competitiveness in the textile industry both in the national and international markets and the free trade opportunities emerging in the post MFA environment, a growing need has been felt for adopting a focused yet flexible and holistic approach in the sector to facilitate handloom weavers to meet the challenges of a globalised environment. To uplift the handloom industry, Government has introduced many schemes, some of the important handloom schemes are enumerated below.

1. ***Development Scheme:***
   - (i) Integrated handlooms development scheme
   - (ii) Diversified handloom development scheme
2. ***Welfare Scheme:***
   - (i) Health Insurance Scheme (HIS) – A component of handloom weavers' comprehensive welfare scheme
   - (ii) Handloom Weavers Comprehensive Welfare Scheme .
3. ***Marketing Schemes:***
   - (i) Marketing and export promotion scheme
   - (ii) Scheme for Reimbursement of One Time Rebate @ 10% given on Sale of Handloom Products by the Handloom Agencies during 2006–07, 2007–08 and 2008–09
4. ***Other Handloom Schemes:***
   - (i) Handloom mark scheme
   - (ii) Technology upgradation fund scheme
   - (iii) National Awards Scheme for Handicrafts Artisans and Handloom Weavers

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1. Anonymous, (2010), Handloom Industry and Government Schemes Retrieved March 12, 2010 from <http://www.fibre2fashion.com/industry-article/16/1549/handloom-industry-and-government-schemes1.asp>

DEVELOPMENT SCHEME

Integrated Handlooms Development Scheme (IHDS) – A Centrally Sponsored Scheme (Anonymous[2], 2010)

The Integrated Handlooms Development Scheme (IHDS) is an attempt to facilitate the sustainable development of handloom weavers located in and outside identified handloom clusters into a cohesive, self-managing and competitive socio-economic unit. Integrated Handlooms Development Scheme (IHDS) to be implemented during the XI Plan has been formulated as a Centrally Sponsored Scheme by merging the essential components, with or without modifications, of the four schemes, i.e. Deen Dayal Hathkargha Protsahan Yojana (DDHPY), Integrated Handloom Training Project (IHTP), Integrated Handloom Cluster Development Scheme (IHCDS) and work shed-cum-Housing Scheme, implemented during the 10th Plan.

Objectives of the Scheme

The main objectives of this scheme are:

1. To focus on formation of handloom weavers' groups as a visible production group in selected handloom clusters
2. To assist the handloom Weavers Groups for becoming self-sustainable
3. An inclusive approach to cover weavers both within and outside the Co-operative fold
4. To upgrade the skills of handloom weavers/workers to produce diversified products with improved quality to meet the market requirements
5. To provide suitable workplace to weavers to enable them to produce quality products with improved productivity
6. Market orientation by associating entrepreneurs, designers and professionals for marketing, designing and managing the production
7. To facilitate process of credit from financial institutions/banks
8. Holistic and flexible interventions to provide need-based inputs specific to each Cluster/ group

Diversified Handloom Development Scheme (Anonymous[3], 2010)

Handloom weaving constitutes one of the richest and most vibrant aspects of the Indian cultural heritage. The artistry and intricacy achieved in the handloom fabrics is also unique. The essential requirements for realising the potential to generate additional employment and economic benefits from this sector are constant improvement in the skill of the handloom

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2. Anonymous, (2010), Integrated Handlooms Development Scheme.
3. Anonymous,(2010),Diversified Handloom Development Scheme: Andhra Pradesh Retrieved April 14, 2010 from <http://handlooms.nic.in/hl_dhds.pdf (417 kb)>

weavers and dyers, ensuring availability of technically trained manpower, upgradation of the machinery and equipments and manufacturing processes, development in designs and quality of products in consonance with the market demands.

Objectives of the Scheme

The Diversified Handloom Development Scheme provides for technological upgradation through a variety of programmes, which cover skill upgradation of weavers, development of design and product development to meet the market demand and improve the productivity and earnings of the handloom weavers. The main objectives of this scheme are:

1. To strengthen the activities of Weavers' Service Centres (WSCs) in design development and technology and its dissemination to weavers through exhibitions and seminars
2. To improve the infrastructure of Indian Institute of Handloom Technology (IIHTs) to enable them to enhance standards of performance with modern facilities, equipment and use of upgraded technology
3. To set up new WSCs and IIHTs to meet the technically trained manpower requirements of the handloom industry and thereby generate avenues for employment in the sector
4. To meet the training requirements of personnel of WSCs and IIHTs and to acquaint them with the fast changing technology, techniques of production, market trend analysis, design development with use of CAD system, etc.
5. To run the activities of National Centre for Textile Design for promoting the traditional and contemporary designs to enable the textile industry, particularly the handloom sector, to be responsive to the rapidly changing market demand.
6. To conduct third Handloom Census in order to update data base of the sector in an accurate manner and to facilitate formulation of more useful and effective schemes for the benefit of handloom weavers.
7. In order to ensure direct transfer of various benefits to the handloom weavers, a drive for identification, registration and certification of the weavers and master weavers need to be undertaken. The Identity cards would be issued to the handloom weavers which will ensure that only genuine weavers get the benefits of the various handloom related schemes.

Components of the Scheme

The scheme consists of the following components:

1. Strengthening of Weavers' Service Centres/Indian Institutes of Handloom Technology
2. National Centre for Textile Design (NCTD)
3. Research & Development (R&D)
4. J&K Wool Project
5. Weavers' Service Centre (J&K)

6. Setting up of new IIHTs in Central Sector
7. Third Handloom Census and Issue of Identity Cards to Handloom Weavers

WELFARE SCHEME

Handloom Weavers Comprehensive Welfare Scheme (Anonymous[4], ss2010)

Handlooms Weavers Comprehensive Welfare Scheme of Government of India consists of two components, namely Health Insurance Scheme (HIS) and Mahatma Gandhi Bunkar Bima Yojana (MGBBY). The Government of India had introduced the Health Insurance Scheme for Handloom Weavers in 2005–06 which was implemented through with ICICI Lombard General Insurance Company Ltd. This scheme was subject to implementation in the revised form in 2007–08 and 2008–09. The Government of India had introduced the 'Bunkar Bima Yojana' in December, 2003, which was a combination of Janshree Bima Yojana and Add-on Group Insurance Scheme being implemented in collaboration with the Life Insurance Corporation of India. Since 2005–06, this scheme was revised and has been implemented with the title 'Mahatma Gandhi Bunkar Yojana'.

Health Insurance Scheme (HIS) – A Component of Handlooms Weavers' Comprehensive Welfare Scheme (Anonymous[5]. 2010)

The Government of India commenced implementing a Health Package Scheme since the year 1992–93 as a welfare measure for the benefit of handloom weavers. The Government of India had introduced the Health Insurance Scheme for Handloom Weavers in 2005–06 which was implemented through ICICI Lombard General Insurance Company Ltd. This scheme will be implemented in the revised form in 2007–08 and 2008–09.The objective and other salient features of the Health Insurance Scheme are given below.

Objective of the Scheme

The Health Insurance Scheme aims at financially enabling the weaver community to access the best of healthcare facilities in the country. The scheme is to cover not only the weaver but his wife and two children, to cover all pre-existing diseases as well as new diseases and keeping substantial provision for OPD. The ancillary Handlooms workers like those engaged in warping, winding, dyeing, printing, finishing, sizing, Jhala making, Jacquard cutting, etc. are also eligible to be covered.

Implementing Agencies

The scheme will be implemented by the O/o DCHL through ICICI Lombard General Insurance Company Ltd. The State Director of Handlooms/Director of Industries/in-charge

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4. Anonymous,(2010), Handloom Weaver's Comprehensive Welfare Scheme. Retrieved April 24, 2010 from <http://www.imsme.org/uploads/mediatypes/documents/handloom_weavers_comprehensive_welfare>
5. Anonymous, (2010), Guidelines for Implementation of "Health Insurance Scheme (His)" – A Component of Handlooms Weavers' Comprehensive Welfare Scheme. Retrieved February 13, 2010, from <http://handlooms.nic.in/hl_sch_hwcws.pdf>

of Handlooms will be responsible for ensuring efficient implementation of the scheme in their respective States.

Mahatma Gandhi Bunkar Bima Yojana/MGBBY (Anonymous[5] 2010)

The Government of India had introduced the 'Bunkar Bima Yojana' in December, 2003, which was a combination of Janshree Bima Yojana and Add-on Group Insurance Scheme being implemented in collaboration with the Life Insurance Corporation of India. Since 2005-06, this scheme was revised and has been implemented with the title 'Mahatma Gandhi Bunkar Yojana'. During the XI Plan, the Mahatma Gandhi Bunkar Bima Yojana will be implemented with enhanced benefits. The Scheme will cover 66,66,665 weavers during the period 2007–08 to 2011–12 including maximum renewal cases each year.

Objective of the Scheme

The basic objective of the 'Mahatama Gandhi Bunkar Bima Yojana' is to provide enhanced insurance cover to the handloom weavers in the case of natural as well as accidental death and in cases of total or partial disability.

Benefits of the Scheme

1. In the event of death of the member, Sum Assured of ₹ 50, 000 will be paid to the nominee
2. In the event of death by accident or Partial/Total Permanent Disability due to accident, the following benefit shall be payable:

(in ₹)

(i)	On death due to accident	80,000
(ii)	Permanent total disability due to accident.	50,000
(iii)	Loss of 2 eyes or 2 limbs OR one eye and one limb in an accident.	50,000
(iv)	Loss of one eye or one limb in an accident.	25,000

MARKETING SCHEMES

Marketing and Export Promotion Scheme for the 11th Five Year Plan (2007–08 to 2011–12)

Merchandising and marketing have been recognised as being central to the growth and development of the handloom sector in India. Domestic marketing is important for providing linkage between the producer and the consumer. In this regard, the office of the development commissioner for handlooms had been implementing a scheme in the 10th Five Year Plan period, namely, marketing promotion programme. Marketing promotion programme included components for organisation of exhibitions, fairs and crafts meals, setting up of marketing complexes and urban hats, publicity and awareness and brand development to promote the marketing of handlooms in the country and to improve the levels of awareness amongst handloom weavers and the general public in the interest of overall development of

the handloom sector. Given the current importance of brand building as a necessary ingredient of any long-term strategy for augmentation of sales in domestic and international markets, the scheme also aimed at brand promotion of Indian handlooms through Handloom Mark.

With a view to develop and promote the marketing channels in domestic as well as export markets and bring about linkages between the two in a holistic and integrated manner, it was decided to amalgamate the Marketing Promotion Programme and Handloom Export Scheme of the 10th Plan with some modifications and addition of new components in the 11th Plan under the banner 'Marketing & Export Promotion Scheme'. Marketing & Export Promotion Scheme in the 11th Plan has been introduced as a Centrally Sponsored Plan Scheme with the following two components:

1. Marketing Promotion.
2. Handloom Export Promotion.

Objectives of Marketing Promotion

The objectives of marketing promotion are:

1. To assist in the sale of handloom products by organising exhibitions at National, Regional, State and District Level;
2. To provide facilities to the consumer to purchase genuine handloom products from different parts of the country under one umbrella
3. To serve as a window for promoting awareness among consumers about the latest designs and varieties of fabrics produced in the handloom sector
4. To provide marketing infrastructural support to Handloom Agencies in major cities and towns with a view to creating permanent outlets to make available quality handloom products to the consumers at one place
5. To provide group merchandising under one roof by making available handloom products of different States at one place with a view to enhancing marketing of handlooms
6. To encourage innovation in designs and techniques and preserve and promote traditional skills and designs among handloom weavers
7. To assist in creation of marketing infrastructure for the use of handloom weavers and agencies
8. To foster awareness of brand identity and promote the development of a brand of handlooms of Pan National importance and for the International Market
9. To promote awareness of technological developments and advances among weavers for improving quality and productivity of handloom sector (**Anonymous[6]. 2010**).

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6. Anonymous, (2010), Marketing & Export Promotion Scheme for the 11th Five Year Plan.2010. (2007-08 to 2011-12). Retrieved May 23, 2010, from <http://india.gov.in/govt/viewscheme.php?schemeid=1899>

Scheme for Reimbursement of One Time Rebate @ 10% Given on Sale of Handloom Products by the Handloom Agencies During 2006–07, 2007–08 and 2008–09 (Anonymous[7], 2010)

Marketing has always been a problem with the handloom organisations/societies/weavers. Accordingly, in order to augment marketing of handloom products particularly in the wake of stiff competition with textile products of power loom and mill sectors, the Government of India had approved the introduction of the 10% Rebate Scheme on 15th January, 2004 with a budget provision of ₹100 crore. The implementation of this scheme helped the handloom sector to market handloom products worth ₹957 crore and reduce their inventories/ accumulated stocks. This Scheme was discontinued after 31.3.2005. Subsequent to the discontinuation of the rebate scheme, many of the state governments and handloom organisations had been emphasising the need for re-introduction of the Scheme. The withdrawal of CENVAT Scheme and negligible marketing support available under the Marketing Incentive component of the DDHPY further necessitated the reintroduction of the Rebate Scheme. A proposal was accordingly taken up with the Ministry of Finance and the Cabinet Committee on Economic Affairs for reintroduction of the Scheme. The Cabinet Committee on Economic Affairs, in its meeting held on 10.08.2006, has approved the reintroduction of the scheme for a period of three years, i.e. 2006–07 to 2008–09. The scheme will be 100% funded by the central government with a total budgetary provision of ₹100 crore.

Objective of the Scheme

The main objective of the scheme is to provide marketing support to the National-level handloom organisations/agencies like: (i) National Handloom Development Corporation (NHDC), (ii) All India Handloom Fabrics Marketing Cooperative Society (AIHFMCS), (iii) Handicrafts and Handlooms Export Corporation (HHEC), along with State-level organisations like: (i) State Handloom Corporations/State Apex Cooperative Societies/ Handloom Federations/Regional Handloom organisations and (ii) Primary Handloom Weavers Cooperative Societies, etc. by way of reimbursement of 10% rebate on sale of handloom cloth generated by them through their emporia and other sales outlets and/or by organising/participating in special fairs, exhibitions, participating in National/Special Handloom Expos, District-level events, etc. This would supplement their ongoing marketing efforts thereby creating scope for keeping the production cycle alive and sustain thereby the existing employment of handloom weavers.

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7. Anonymous9, (2010), Scheme for Reimbursement of One Time Rebate @ 10% Given on Sale of Handloom Products by the Handloom Agencies during 2006-07, 2007-08 and 2008-09. Retrieved January 24, 2010 from <http://handlooms.ni c.in/hl_sch_rebate.pdf>

OTHER HANDLOOM SCHEMES

Handloom Mark Scheme (Anonymous[8], 2010)

The Office of the Development Commissioner for Handlooms, Government of India has been implementing a number of developmental schemes and programmes to protect the interest and welfare of the weavers. It is proposed to introduce the 'Handloom Mark' which will provide a collective identity to the handloom products and can be used not only for popularising the hand woven products but can also serve as a guarantee for the buyer that the product being purchased is genuinely hand woven. Besides, this would provide a distinctive name in identifying the product or the manufacturer. The Handloom Mark would therefore be a hallmark of powerful creative work that defines the product with clarity, distinguishing it from competition and connecting it with customers.

The creation of handloom mark was entrusted to the National Institute of Design, Ahmedabad. The form of the logo has been derived from the interlocking of the warp and the weft. These threads stand for the collaborative institutes giving their inputs and the weavers giving their skills. The interaction between them is leading to a close network. The warp and weft have been moulded to form a three dimensional cube. The mark is in two forms. One for Domestic use – the word 'Handloom' is written beneath the logo. The other for International marketing same logo with the word 'Hand woven in India' written beneath it (figure 1).

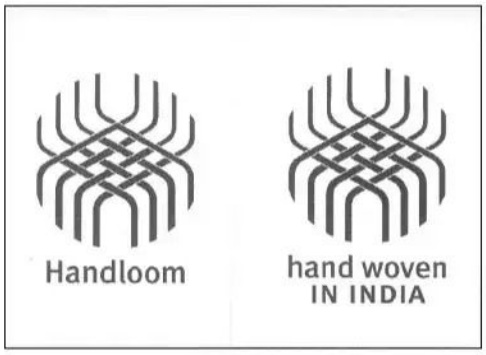

FIGURE 1: HANDLOOM MARK

Description of Handloom Mark

- Handloom Mark is registered for Certification Trade Mark under the Trade Marks Act, 1999 as well as for Copyright under the Copyright Act, 1957.
- Each label is coded on its backside for easy identification/classification. For example, DF followed by coded number for fabric for domestic sale, DM followed by coded number for made-ups and garments for domestic sale: EF followed by coded number

8. Anonymous, (2010), Handloom Mark Scheme. Retrieved March 24, 2010 from <http://www.handloommark.gov.in/about-scheme/hlm-scheme.pdf>

for fabric for export and EM followed by coded number for made-ups and garments for export (figure 2).

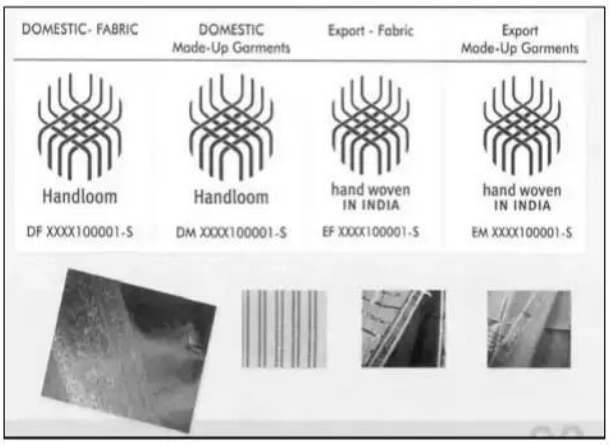

FIGURE 2

Method of Fixing Labels

- One label will be affixed on each made-up item and each garment produced from hand woven fabric. The user can have the option of either affixing the label by tag gun or stitching.
- In case of hand woven fabric, one label will be affixed on the inner end of the fabric fold (*Than*).
- When the fabric is sold in retail to the consumer, the retailer will fix a label on the cut piece of the fabric.

Scope of the Scheme

- The scheme covers all handloom fabrics and products made thereof.
- The Handloom Mark scheme will be operational throughout the country. Individual weavers, apex and primary handloom weavers' co-operative societies, master weavers, handloom development corporations, retailers, and exporters are entitled to participate in the scheme and avail benefits thereof.

Objectives of the Scheme

- Promote handloom products in Domestic as well as International Market.
- Provide assurance to the consumers about the genuineness of the product origin.
- Improve international marketing linkages to the handloom weavers.
- Strengthen supply chain for Handloom products

- Improve price realisation of the Handloom products in Domestic as well as International Market
- Improve the earnings of the handloom weaver community
- Facilitate uninterrupted workflow throughout the year to the handloom weavers.
- Develop database on the handloom supplies and weavers that will help in supporting the weavers through the existing schemes being implemented by the Govt. of India and framing of the future plans.

Technology Up-Gradation Fund Scheme for Handloom Sector (Anonymous[9], 2010)

The Handloom Sector occupies an eminent place in preserving the country's heritage and culture and plays a vital role in the economy of the country. This Sector is one of the largest employers in the country, estimated to be the second only after agriculture, with about 65 lakh people directly or in-directly employed as weavers and allied workers. The Handloom Sector, being highly decentralised and dispersed suffers from cost disadvantages, technological obsolescence and marketing handicaps in comparison to power loom and Mill Sectors.

The Govt. of India, Ministry of Textiles, Office of the Development Commissioner for Handlooms has been supporting the Handloom Sector through State Governments by implementing various programmes relating to input supplies, production, marketing, etc. This has helped the sector in development of new/diversified products for domestic and foreign markets. However, there is need to upgrade the technology in the areas of pre-loom, weaving, post-loom, etc. with a focus on the overall improvement in the productivity and quality of the products for niche market.

Objectives of the Scheme

The objective of the scheme are:

- To encourage the beneficiaries to set up all the facilities at one place, which would ease inter-linking of all the production activities.
- To establish a production base with up-graded technology in pre-loom/on-loom/post-loom/quality control, etc. as the case may be, under one roof, thus, strengthening the capacity to undertake bulk production for domestic and export markets, with improved productivity and quality.
- To reduce production cycle time, thus ensuring delivery of goods in time;
- To achieve product and quality standards and ensure price and quality competitiveness in the domestic and export market.

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9. Anonymous, (2010), Technology Up-Gradation Fund Scheme Handloom Sector. Retrieved April 14, 2010 <http://handlooms.nic.in/tufs.pdf>

Benefits Available under the TUF Scheme for Handloom Sector

1. 5% interest reimbursement of the normal interest charged by the lending agency on Rupee Term Loan (RTL)
2. 25% capital subsidy.

National Awards Scheme for Handicrafts Artisans and Handloom Weavers

Background and Objective

The National Awards for craftsmen was introduced during the year 1965 and later the same was extended to weavers also. National Awards are being conferred to the craftspersons and weavers in recognition of their outstanding contribution, craftsmanship and development of craft. There shall be a maximum of 40 national awards and 40 national merit certificates in a year. This recognition will encourage them to continue with the craft in a more enthusiastic and productive manner and will ultimately encourage others to emulate them.

Eligibility

All craftsmen and weavers residing in India are eligible to compete for the National Award.

The Award Contents

Each award shall consist of a cash prize of ₹ 1,00,000, a copper plaque and an Angavastram. Each National Merit Certificate shall consist of, besides a Certificate, a Cash prize of ₹ 50,000.

Selection Procedure

The selection procedure for selecting the items for National Award will be through a 3–tier procedure. The first stage selection would be at the State-Level in case of Handicrafts artisans and at Zonal Level in case of handloom weavers. In the second stage of the selection process, the handicraft entries recommended by various State-Level Selection Committees would be next screened by the Headquarter-Level Selection Committee. Similarly, there would be a separate Headquarter-Level Committee for Handloom items which will scrutinize the entries short-listed by various Zonal Committees. There will be a Common Central Selection Committee for final selection of the items for National Awards from amongst the items recommended by the Headquarter level Committees of both handlooms and handicrafts.

Procedure for Submission of Entries

The craftsperson's and weavers may submit their entries in their respective State in the office of the DIC/Directorate of Industries/ concerned Regional Offices/ HM&SECs of Office of the Development Commissioner (Handicrafts) and Weavers Service centres of the Office of DC (HL) as the case may be for consideration by the State Level Committee/ Zonal Level Committee (HL). The transportation charges for carrying the entries from the above field offices up to the venue of the State Level Selection Committee/Zonal Committee

would be borne by the Office of the Development Commissioner (Handicrafts) in case of Handicrafts items & Office of the Development Commissioner (Handlooms) in case of Handloom items.

CONCLUSION

Sustainable poverty elimination will be achieved only if external support recognises the socio-economic, cultural and ethnic diversity of communities focuses on what matters to people and works with them in a way that fits in with their current livelihood strategies, social environment and ability to adapt. Poor people must be closely involved in identifying and addressing the involvement of government and non-government agencies. Handloom have great potential, as they hold the key for sustaining not only the existing set of millions of artisans spread over length and breadth of the country, but also for the increasingly large number of new entrants in the crafts activity. The government is also very encouraging in this area and is protecting the small-scale industries by specifying certain products only reserved for them to produce. The decentralised handloom weavers are totally dependent on handloom agencies and private traders for marketing of their products. The Government interventions in the form of support schemes have helped the handloom organisations to market the products of handloom weavers and, thereby, sustenance of their employment.

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14

Current Scenario of the Indian Power Sector

Gurjinder Singh*

Indian economy has been growing at a rate of 6-8 % annually during the last eight years, which requires growth of basic infrastructural facilities at a still higher rate. Power sector being a major component of infrastructure development requires a growth rate of 9-10% during the next decade. This requires huge amount of investments and restructuring of power sector for which Government cannot fund the entire amount independently. Hence, private participation is necessary either as an independent venture or through Public-Private Partnership (PPP). This paper attempts to review the Indian power sector with respect to generation, transmission and distribution of electricity and identify and highlight the key initiatives and reforms undertaken for private participation in the electricity sector and some issues that are being grappled with in the effort to make the sector efficient and attractive for investments.

Keywords: *Indian Power Sector, Power Transmission, Electricity distribution, Public-Private Partnership (PPP)*

INTRODUCTION

Electric Power Sector is a vital aspect of the national economy. India's Gross Domestic Product (GDP) is growing by about 6 to 8% from the previous eight years. Due to liberalisation and globalisation in Indian economy, day-to-day life of the common man relies upon technology and I.T. Thus, demand for power has continuously increased. Therefore, development of the Power Sector shall be proportionate with the overall economic growth of the nation.

Power, being in the Concurrent Subject list under the Indian Constitution, is the joint responsibility of the State and Central Governments. Despite liberalisation and economic reforms of 1991, the power sector in the country is still dominated by the public sector in generation, transmission and distribution segments. Almost 80 percent of electricity is

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generated by the public sector with the State and Union Governments generating about 49.9% and 31.9% of total installed capacity, respectively. The share of private sector in generation is increasing from almost negligible to almost 18 percent as of 20–11-12. The bulk of the transmission and distribution functions are with State utilities, however, the government is encouraging private sector participation in the transmission and distribution segment.

The electricity generation has been growing at a growth rate of almost 8 percent since the last 40 years making India the third largest producer of electricity in Asia. The installed generation capacity has increased manifold from a trivial 1,362 MW in 1947 to 2, 05, 340 MW as on June 2012. While this is an impressive growth viewed over a long-term perspective, the demand continues to outstrip electricity supply. Per capita consumption of electricity, reported at 818.9 killowatt hour (kWH) according to Central Electricity Authority, is way behind the levels corresponding to high economic growth regions. To meet the increasing demand for electricity, the government has adopted a blend of thermal, hydro, renewable and nuclear forms of energy. However, share of thermal and in some regions hydro-power dominate the generation of electricity. The total power generated – thermal, hydro and nuclear and sector-wise is exhibited in the table 1.1 below:

TABLE 1: STATUS OF POWER GENERATION (AS ON 30.06.12) (MW)

Sector	Thermal	Hydro	Nuclear	Renewable	Total
Central	47,977.23	9,316.00	4,780.00	0.00	62,073.63
State	55,370.93	27,380.00	0.00	3,524.27	86,275.40
Private	33,088.02	2,595.00	0.00	21,308.21	56,991.23
All India	1,36,436.18	39,291.40	4,780.00	24,832.68	2,05,340.26

Source: Monthly Report of Power Sector, June 2012, Central Electricity Authority

Despite this, the sector continues to face enormous challenges particularly in terms of shortage of peak power, an adverse hydro-thermal mix, unstable grids, frequency excursions, skewed tariff, poor and substandard distribution networks, high aggregate technical and commercial losses among others.

The total capacity addition in the three Plans put together (Eighth, Ninth, and Tenth Five Year Plans) was 56,518 MW, of which 44 percent was from the central sector, 40 percent from the state sector, and only 16 percent from the private sector. The private sector could contribute only 8.71 percent of the actual capacity addition in the Eighth Plan, 26.6 percent in Ninth Plan, and 12.67 percent in the Tenth Plan. The main impediments for the low performance of the private sector has been the chronic financial weakness of the SEBs; unviable tariffs to IPPs due to factors such as high cost of liquid fuels, risk factors involved and slow growth in demand for future power below the expected levels; and the lack of recognition of the fact that the distribution segment would need to be made efficient and bankable before private investment and competition emerges in generation. However,

in the 11th Five Year Plan, a capacity addition of about 52,000 MW[1] is expected, which is over 250% of the achievement during 10th Plan and highest ever since independence. The achievement of the 11th Plan could be attributed to various initiatives of the Government like the New Hydro Policy, setting up of Ultra Mega Power Projects, enhancing the partnership of private sector in manufacture of power equipments and bulk ordering of 11 units of 660 MW each with supercritical technology with mandatory phased indigenous manufacturing programme to promote indigenous manufacturing capability. Private sector performance is likely to be much better in the Eleventh Plan and is likely to contribute more than 30 percent of the expected capacity addition. Table 1.2 shows the share of the central, state, and private sectors in the previous three plans and in the current plan.

TABLE 2: PLAN-WISE SECTORAL SHARE OF CAPACITY ADDITION

	Eighth Plan	Ninth Plan	Tenth Plan	Eleventh Plan
Central	8, 157	4,504	12,165	21,222
State	6,835	9,450	6,244	21,355
Private	1,430	5,061	12, 671	19,797
Total	**16,422**	**19,015**	**21,080**	**62,374**

Source: Mid-term Appraisal of the Eleventh Five Year Plan, 2010

POLICY INITIATIVES

The role and the participation of private industry in the Indian power sector has been limited and confined to specific areas of small jurisdiction and consumer base. About 88% of the generating capacity and all of the transmission are in the public sector while distribution is controlled by state-owned monopolies except in Orissa, Delhi, Mumbai, Ahmedabad, and Surat where these have been replaced by private monopolies. As a part of the efforts for market orientation, the government has focused the policy stance to encourage a greater private sector role. Private sector has been permitted to set up coal, gas or liquid-based thermal projects, hydel projects and wind or solar projects of any size, foreign equity participation up to 100% in the power sector under the automatic route for all category power plants. Apart from generation capacity, there is a steady progress towards having a synchronised grid network throughout the country to facilitate efficient power transfers. Building upon the facility of open access and segmented inter-regional transfers, power trading has now emerged as a key route for short-term transactions. Power distribution, so far labelled as the weakest link of the power sector, is also showing improvements in terms of fresh investments for loss reduction as well as adoption of new models of private participation. To minimise the role of the Central Government, the State Government and State Electricity Boards (SEBs) are empowered to negotiate directly with developers, facilitating speedy clearances for the investor. The key enabling features of the policy framework since 2000 are given in Table 3

[1] Working Group of the Twelfth Five Year Plan 2012-17, Planning Commission, pp.7

TABLE 3: ENABLING FEATURES OF THE POLICY FRAMEWORK

S. No.	Policy	Objectives
1.	**Electricity Act, 2003**	1. Safeguard the interest of the consumers by the independent regulatory commissions 2. Promote competition 3. Rationalisation of electricity tariff 4. Ensure transparent policies regarding subsidies, promotion of efficient and environmentally benign policies 5. Eliminate entry barriers in the entire chain of the electricity supply business 6. Facilitate establishments of central and state regulatory commissions and appellate tribunal
2.	**National Electricity Policy, 2006**	1. Accelerated development of the power sector 2. Provide supply of electricity to all areas 3. Protect interests of consumers and other stakeholders 4. Ensure availability of energy resources 5. Ensure technology availability to exploit these resources 6. Ensure economics of generation using different resources 7. Energy security issues
3.	**Tariff Policy, 2006**	1. Ensure availability of electricity to consumers at reasonable and competitive rates 2. Ensure financial viability of the sector and attract investments 3. Promote transparency, consistency and predictability in regulatory approaches across jurisdictions 4. Minimise perceptions of regulatory risks 5. Promote competition, efficiency in operations and improvement in quality of supply
4.	**New Hydro Policy, 2008**	1. Inducing private investment in the hydro power development 2. Harnessing the balance hydro-electric potential 3. Improving resettlement and rehabilitation 4. Facilitating financial viability
5.	**Mega Power Projects, 2008**	1. Grant of mega power projects 2. Fiscal concessions and benefits available 3. Price preference to domestic PSU bidders

Contd...

6.	**National Load Dispatch Centre Rules, 2004**	Constitution and functions of the national load dispatch centre
7.	**Rural Electrification Policy, 2006**	1. Providing access to electricity to all households by year 2009 2. Quality and reliable power supply at reasonable rates 3. Minimum lifeline consumption of 1 unit per household per day as a merit good by year 2012
8.	**Regulations on Tariffs, 2004**	CERC has notified the regulations on terms and conditions of tariffs in 2004
9.	**Open Access in Transmission, 2004**	CERC has made the regulations on Open Access in inter-state Transmission in 2004 to enable operationalisation of open access in the States
10.	**Transmission Licensing, 2009**	Grant of trading licence and other related matters
11.	**Indian Electricity Grid Code, 2006**	Rules, guidelines and standards to be followed by the various agencies and participants in the system to plan, develop, maintain and operate the power system, in the most efficient, reliable, economic and secure manner, while facilitating healthy competition in the generation and supply of electricity
12.	**Appellate Tribunal for Electricity, 2004**	Hear appeals against the orders of the adjudicating officer or the Appropriate Commission under the provision of Electricity Act, 2003
13.	**R-APDRP, 2008**	Accelerated Power Development & Reform Programme (APDRP) was launched in 2001, for strengthening of Sub-Transmission and Distribution network and reduction in AT&C losses and the programme has been extended as Restructured-APDRP in the Eleventh Plan and Twelfth Plan.
14.	**Standard Biding Documents, 2009**	To encourage and establish power projects through the Public–Private Partnership (PPP) mode, a precise policy and regulatory framework has been laid down in the form standard model documents. The Standard Request for Proposal (RFP) and Request for Qualification (RFQ) and Transmission Service Agreement in the power sector has been finalised in the year 2008.

REVIEW OF PROGRESS

The cumulative investment in power sector has increased over the years from ₹ 47,612 crore in the year 2002–03 to an estimated level of ₹ 1,44,974 crore in the year 2010–11. Out of the total investment of ₹ 1,44,974 crore, private sector contribution is estimated to the extent of ₹ 60,760 crore, i.e. 41 percent. According to the mid-term

appraisal of the Planning Commission, the investment in the power sector is estimated to have more than doubled over the last ten years from ₹ 12,926 crore in 2002-03 to ₹ 1,59,471 crore in 2011-12. The revised projected investment in electricity during the Eleventh Plan period is ₹ 6,58,630 crore out of which 43 percent i.e. ₹ 2,87,546 crore is expected to come from the private sector. The contribution of the private sector is likely to increase by 50 percent in the Twelfth Five Year Plan.

Generation

The installed capacity (excluding captive plants) as on 30 June, 2012 was 2,05,340 MW. Out of total installed capacity, the private sector has contributed a share of 27.7 percent, followed by the Central share of 30.2% and a maximum of 42% share of State sector. The thermal plant load factor of private power plants has increased from 74.7 percent in the year 2001-02 to a level of 91% in 2008-09 as compared to plant load factor of 84.3 and 71.2% of Central and States power plants showing the efficiency improvements in the private electricity generation. Out of the total capacity addition target of 17,601 MW in the current financial year (2011-12), a capacity addition of 20,501.70 MW is expected to be achieved and the private sector is expected to contribute to the extent of 11970 MW (58 percent).

The private sector contribution is hovering around 21%, dominated, mostly by domestic players. Since 2003, 30 private power projects totalling 22,038 MW have achieved financial closure. Through the Inter-institutional Group of the Ministry of Power, 16 private power projects having a total capacity of about 7320 MW achieved financial closure and another 12 projects with a total capacity of 12647 MW are being monitored for facilitating early financial closure. While the availability of plants and equipment is going up with expansion by BHEL from a level of 10,000 MW per annum (December 2007), to around 20,000 MW per annum by the end of 2012, private players like L&T and Mitsubishi JV, Toshiba and JSW JV, and ALSTOM and Bharat Forge are also going to set up new capacities, which will help the Twelfth Plan projects.[2]

- ***Hydro Power***: The pace of hydropower development has been slow. As against the target of 15,627 MW for the Eleventh Plan, only 8,237 MW (53 percent) is expected to materialise during the Plan. As per the mid-term appraisal of the Eleventh Five Year Plan, Hydro power plants are facing hurdles in terms of environment and forest clearances; lack of infrastructure (roads and highways); Land acquisition; rehabilitation and resettlement issues; security clearance; availability of hydrological data to private developers; power evacuation; storage project versus Run-of-River (RoR) projects and long-term financing.
- ***Nuclear Power***: The total installed capacity was 4,780 Mw as on 30 June, 2012, which means a contribution of 2.74% in the total installed capacity. With the signing of the Civilian Nuclear Deal in 2008 and the removal of the restrictions of NSG, the Department of Atomic Energy (DAE) envisages adding 5,900 MW in the Twelfth Plan based on domestic manufacturing capability and an additional 10,000 MW

[2] Mid-term Appraisal of the Eleventh Five Year Plan, 2007 –12, pp. 316

with the support of international players. Companies like Reliance have announced their interest in setting up nuclear power plants.

- ***Ultra Mega Power Plants (UMPPs):*** The initiative of developing Ultra Mega Power Projects (UMPPs), which was launched by the Ministry of Power in 2005 to accelerate the pace of capacity addition and to rekindle private sector interest has been proved to be successful. Each UMPP has been envisaged with capacity of 3500 MW or more and would require a capital cost of ₹ 20,000 crore. A total of 16 (sixteen) UMPPs have so far been identified and out of those, 4 (four) of these have already been transferred to the successful bidders. Projects are awarded on the basis of competitive bidding with the biding based on the first year of quoted tariff. From the initial four, the number of planned UMPPs has increased to nine.

  Out of total identified, four UMPPs have been awarded; first to Tata Power Company in December 2006 at Mundra district in Gujarat. Similarly, the Sasan UMPP was awarded to Reliance Power Limited (RPL) in August 2007 and two units are expected to be commissioned by April 2012. Krishnapatnam UMPP was also awarded to RPL in Nov. 2007. It has received coastal clearance and is scheduled to be commissioned between September 2013 and October 2015. These projects are mainly based on imported coal.

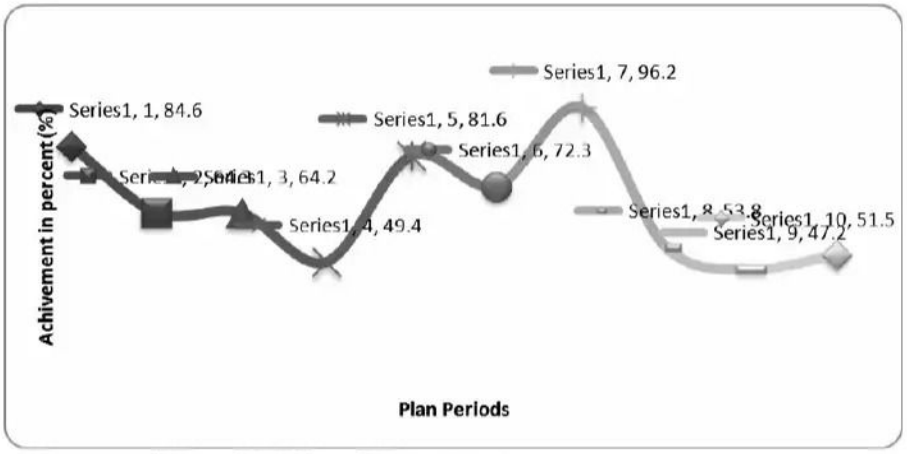
- ***Captive and Merchant Power Plants:*** There has been a dramatic increase in the number of captive plants. The installed capacity of captive generation of 1 MW or more has grown to 31,000 MW by the end of 2010–11 i.e. 25% of the total installed capacity. The reason for this spurt is the steep growth in industrial production coupled with rising shortages in many states. Mostly industries like iron & steel, aluminium, cement, sugar, fertilizers, paper and chemicals, wherein the cost of electricity can be anywhere between eight to twelve percent of the total cost of production, have their own captive plants. The captive generators are also being encouraged to supply their surplus power to the grid. A capacity addition of around 12,000 MW is likely during 11th Plan. A capacity addition of approximately 13,000 MW is likely during Twelfth Plan (2012-17).

Challenges

Despite a manifold increase in the installed generation capacity, the country has failed to meet power sector targets by a significant margin. Figure 1 indicates the slippages in terms of percentage and it can be seen that the achievement in generating capacity has fallen short of the targets in the entire planning process of 60 years except during the Seventh Five Year Plan when the achievement has been noted at 97 percent.

The sector faces a host of factors for the slippages ranging from shortage of fuel or fuel availability (especially thermal projects), shortage of equipment to the delay in financial closure, land acquisition problems, environmental clearances, financial risk, manpower shortages and inadequate preparedness of projects. Including this, the Hydro projects also faced issues like rehabilitation and resettlement, security clearances, financing, availability of hydrological data and power evacuation. Although measures have been defined by the

policymakers and stakeholders in a sense of complacency that the issues will indeed be resolved and India will plug the supply deficit of power to resolve the same but the outcome yielded is not satisfactory and the country still is short of power at a rate of 10.3 percent in the peak times and energy deficit still hovers around 7.5 percent.



Source: Annual Report of the Ministry of Power, 2010–11.

FIGURE 1: ACHIEVEMENTS IN CAPACITY ADDITION TARGETS

The following table gives the power supply position in the last 10 years and the shortfalls thereon:

TABLE 4: POWER SUPPLY POSITION

Period	Peak Demand (MW)	Peak Met (MW)	Peak deficit/ surplus (%)	Energy Demand (MW)	Energy Availability (MW)	Energy deficit/ surplus (%)
9th Plan End	78,441	69,189	11.8	5,22,537	4,83,350	7.5
2002-03	81,492	71,547	12.2	5,45,983	4,97,890	8.8
2003-04	84,574	75,066	11.2	5,59,264	5,19,398	7.1
2004-05	87,906	77,652	11.7	5,91,373	5,48,115	7.3
2005-06	93,255	81,792	12.3	6,31,757	5,78,819	8.4
2006-07	1,00,715	86,818	13.8	6,90,587	6,24,495	9.6
2007-08	1,08,866	90,793	16.6	7,39,345	6,66,007	9.9
2008-09	1,09,809	96,785	11.9	7,77,039	7,46,644	11.1
2009-10	1,19,166	1,04,009	12.7	8,30,594	5,82,225	10.1
April-Dec.2010	1,19,437	1,07,286	10.2	6,38,181	65,529	8.8

Source: Annual Reports, Ministry of Power

An ambitious target of 78,700 MW was set up for the Eleventh Five Year Plan. However, in the light of the slippages in first three years, the Mid-term Appraisal of the Eleventh Five Year Plan has scaled down the target to 62,374 MW, which involves a significant improvement in the pace of capacity addition in the remaining two years of the Eleventh Plan. However, according to the Working Group Report of the Twelfth Plan, a capacity addition of 52,000 MW is expected to be achieved in the Eleventh Plan. The key obstacle to power generation in the present times is the fuel supply including drop in domestic gas production from Reliance industries D-6 block, imported LNG which is three times as costly as local supply and state monopoly Coal India, which is unable to meet the production targets as environment ministry is not allowing it to uproot trees to extract coal and also under 'No-Go' policy, restrictions have been imposed on mining of coal. Further, the imported coal-fed plants and projects won under competitive bidding cannot pass through fuel hikes in tariffs and are losing heavily. Therefore, the capacity addition targets are showing slippages.

Transmission

The guidelines for private sector participation in transmission sector were issued by the government in January 2000. These guidelines envisaged two distinct routes for private sector participation in transmission: Joint Venture (JV) route, wherein the CTU/STU shall own at least 26% equity and the balance shall be contributed by the JV partner; and Independent Private Transmission Company (IPTC) route, where 100% equity shall be owned by the private entity and shall facilitate private investor including investors coming through FDI to invest 100% by themselves. The standalone private investment in the power transmission has been difficult to achieve due to a combination of payment security issues and pre-commissioning risks, and forest and environment clearances. However, only examples of private participation in transmission are the joint venture – Tala Transmission System was established by the PowerGrid and Tata Power for implementation of major transmission lines of 1200 KM costing about ₹ 1,100 crore. It was commissioned in 2006-07 and is the first such Transmission System in Haryana on PPP basis. The Transmission System for evacuation of power from 2×660 MW Thermal Power Project and 1424 MW Adani Power at Mohindergarh through Public Private Partnership has been developed. The project has already been awarded to M/s Kalpataru Power Ltd. through competitive bidding.

NATIONAL GRID

Recognising the need for development of National Grid, thrust was given to enhancement of the interregional capacity in a phased manner. The total Inter-regional transmission capacity by the end of 10th Plan was 14,050 MW, which is now planned to grow to about 25,650 MW by 11th Plan end through creation of "Transmission Super Highways". PowerGrid is working towards achieving this target of creation of the National Grid along with other private players. The Central Transmission Utility, Power Grid Corporation of India Limited (PGCIL) has planned to invest ₹ 55,000 crore on transmission infrastructure to expand the existing transmission network and grid strengthening. Efforts to strengthen

the grid like closely integrated transmission planning, additional interconnections among various generating projects and more inter-regional transmission links and contingency arrangements are under implementation.

Challenges

In comparison to the world average of 50 to 60 %, transmission lines in India are loaded up to 90% of the capacity. To achieve the Government of India target of 'Power For All By 2012', it is envisaged that our installed generation capacity should be increased at least to 2, 00,000 MW by 2012 from the present level of 1,14,000 MW. Huge investments are required to expand inter-regional grid capacity.

Distribution

The distribution segment is facing impediments in terms of operational efficiency as well as financial performance. The slow pace of investment generation in the distribution infrastructure can be attributed to the severe cash flow problem associated with the under-recovery of costs and poor collection efficiency. The distribution utilities have poor operational efficiency, which further aggravates the situation imposing a heavy burden on the economic resources of the respective state governments. On an average, the country loses about 26.15% of electricity in terms of Aggregate Technical and Commercial losses in the year 2010–11 as compared to a level of 32.54% in the year 2002–03. The total losses incurred by the distribution companies, taken together were estimated at about ₹ 40,000 crore in 2009–10 as compared to ₹ 24,063 crore during 2001–02. These are likely to rise to even higher levels because of the increasing share of short-term purchase of power at high prices According to the Thirteenth Finance Commission Report, the losses of the distribution companies are expected to increase to ₹ 1,16,000 crore in 2014–15. The rate of return of the distribution utilities has deteriorated from a level of 32.8% in 2001–02 to 14.3% in the 2008–09.

- ***R-APDRP*** With the objectives to reduce the AT&C losses, unsustainable commercial losses of State Utilities and improvement in the quality and reliability of supply of power, R-APDRP was launched. Till 31 December 2009, a sum of ₹ 1,094 crore was released under this scheme, out of which ₹ 1,068.57 crore is the loan to PFC to disburse to utilities and ₹ 25 crore is a grant to PFC as rolling advance against fee to the nodal agency. PFC in turn has released ₹ 692 crore to various states.
- ***Open Access:*** Competition in the distribution segment of electricity, which was envisaged in the Electricity Act, 2003 which allows more than one licensee in the same area of the supply has not been introduced. As a part of the reform process, the CERC issued Inter-State Open Access Regulations which became effective from 1 April, 2008. Two inter-ministerial Task Forces have been set up under the chairmanship of Shri B. K. Chaturvedi, Member (Power), Planning Commission, to examine the current status and make recommendations on measures for operationalisation of the provisions of the Electricity Act, 2003 in respect of open access which submitted its reports. But not a single case of open access has been registered till date.

- ***Distribution Franchisees:*** To bring reform in the distribution segment, the government introduced Franchisee model in the distribution circle for private participation in the area. The key role of private franchisees includes reducing losses, improving billing and collection, and upgrading and strengthening distribution systems. Some of the State Governments like Maharashtra, Uttar Pradesh, Uttarakhand and West Bengal had taken the initiative to introduce an input-based franchisee for distribution in selected towns. Further, a Task Force has been set up under Member (BKC), Planning Commission in November, 2010 for private participation in the distribution of electricity, which is expected to work out the different forms of bringing in private investment in the distribution segment including Public–Private Partnership (PPP) model, Franchisee Model or any other form.

POWER TRADING

Short-term trading is an essential tool for the optimisation of resources and plays an important role in deficit scenario for harnessing additional/captive sources of generation for meeting the peak demand. Trading of electricity in India has picked up considerably after the advent of Electricity Act, 2003, which recognises trading as a distinct licensed activity. Two Power exchanges, namely, India Energy Exchange and Power Exchange of India Limited (PXIL) are existing in the country. There are 43 trading licences at present. Of the total electricity procured in India in 2011-12, the short-term power market comprised 11 percent. The balance 89 percent of generation was procured mainly by distribution companies through long-term contracts and short-term intra-state transactions. In volume terms, the size of the short-term market in India was about 94.51 billion kWh (units) in the year 2011-12.

Challenges

Due to inadequate investments over the years for system improvement works, which has resulted in unplanned extensions of the distribution lines, overloading of the system elements like transformers and conductors, and lack of adequate reactive power support, the technical losses in the system are exceptionally high. Further, the commercial losses are mainly due to low metering efficiency, theft and pilferages. The commercial losses of the State Electricity Boards are expected to increase to ₹ 60,000 crore in 2010–11. Power in the country is being traded at a high cost of ₹ 4–6 per unit – implies retail tariff of ₹ 6–9 per unit, which is the highest tariff among the developed countries in the world. Discoms bought 9,453 crore units of electricity for ₹ 39,425 crore in 2011–12. Despite mandatory provision of open access in distribution as per Electricity Act, 2003, not a single case of open access has been registered in the country even after 8 years. Urban Distribution Franchise Model being adopted by few states is essentially a sub-contract for discharging the O&M obligations of the Discom. But the Model is inconsistent with section 12 of the Electricity Act, 2003. Franchisee is not regulated by the SERC even though it is distributing electricity; implying regulatory, investment, supply, competition and sustainability gaps. Distribution segment is becoming unsustainable and the Electricity Act is not being implemented in letter and spirit.

OTHER INITIATIVES

Some of the other initiatives of the government include the following:

- ***RGGVY, 2005:*** Continuation of 'Rajiv Gandhi Grameen Vidyutikaran Yojana'. Scheme of Rural Electricity Infrastructure and Rural Household Electrification", has been sanctioned in the XI-Plan for attaining the goal of providing access to electricity to all households. The total numbers of villages electrified till July, 2011 is 5,39,127, which implies that 90.8 % village electrification has been achieved.
- ***Rural Electrification Policy, 2006:*** The central government has notified rural electrification policy in the year 2006 with the objective of providing quality and reliable power supply at reasonable rates, minimum lifeline consumption of 1 unit per household per day as a merit good by year 2012. A total of 83.25 lakh (21 percent) households have also been provided connections out of which 72.69 lakh (31 percent) BPL households have been provided free connections. This has resulted in 4.16 crore rural people with access to electricity.
- ***Investment Opportunities:*** There are several opportunities for private sector investment in the generation, transmission and distribution sector. The Government has announced an ambitious plan to add around 80,000 MW of capacity addition in the Twelfth Plan. It is proposed to add this capacity through Central Power Utilities, State Power Utilities and private investors. Total fund requirement for development of transmission system is estimated to be of the order of ₹ 1,80,000 crore out of which ₹ 25,000 crore is expected to be from the private sector. Encouraged by the success of privatisation of power distribution in Delhi, the state governments of Andhra Pradesh and Karnataka have started drawing up a road map for privatisation of power distribution in their respective states.

CONCLUSION

The government has recognised the importance of changing the policies and creating an environment conducive to sustainable private sector involvement in the power sector. However, the gap between demand and supply in the Power Sector is still huge. Many of the 'B' and 'C' category towns have daily power cuts of 5–6 hours even in the non-peak months. The small and medium industries have to rely on their own generators to continue production but that comes at higher recurring costs and more capital investments. Thus, products of many of these industries become uncompetitive as compared to cheaper imports from other countries. There is a need to involve private sector more intensively in Power Sector to bridge the gap between demand and supply.

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15

Sustainable Development

The Imperative Need for Organisational and Global Survival

Dr Vijay Chopra*

Reckless development driven by a strong urge to outcompete other enterprises and countries is leading to the rapid depletion of precious natural resources, global warming causing natural calamities, and disastrous environmental pollution. This has made Sustainable development an imperative need not only for the well-being but also the survival of mankind. This paper covers all the major aspects of this critical global issue including the Concept, the prevailing grave scenario, the major Culprits, Global response, the Hurdles and the Remedies.

Keywords: *Reckless Development, Rapid and Alarming Damage to Precious Natural Resources and Environment, Sustainable Development for Organizational and Global Survival, The Principle of Environmental Sustainability.*

INTRODUCTION

The ever increasing competitive struggle of enterprises to make profits and grow faster than the competitors has disturbed the balance of the environment to the point where we are dangerously close to losing the essential environmental life-support systems. Sustainable development has, therefore, been accepted as essential for organizational and global survival. It needs to be a core value in the strategic vision of enterprises for long-term survival.

THE CONCEPT

A generally accepted definition of sustainability is that 'people must ensure the development needs of the present without compromising the ability of future generations to meet their needs'.

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A basic component of the traditional belief system of the enterprises is that in competitive markets, the only choice is to grow or die. This competitive struggle to accumulate profits and grow has disturbed the balance of the environment to the point where we are dangerously close to losing the essential environmental life-support systems.

Sustainability is now accepted as essential for organisational and global survival. It, therefore, needs to be a core value to support a strategic vision of enterprises for long–term survival by integrating their need to earn profit with their responsibility to protect the environment.

THE PREVAILING GRAVE SCENARIO

Ignoring of the essential sustainability aspect of development has led to the following dangerous consequences, which need urgent attention and remedial steps to ensure not only the well-being but also the survival of mankind.

- Rapid depletion of precious natural resources.
- Global warming causing drastic natural calamities such as unprecedented floods even in desert areas, droughts and climate changes across the world.
- Disastrous environmental pollution.

The gravity of this scenario provoked the greatest living Scientist Stephen Hawking to put an open question on the internet, 'In a world which is in chaos politically, socially and environmentally, how can the mankind be sustained for the next 100 years?'

DISASTROUS CONSEQUENCES OF ENVIRONMENTAL POLLUTION

Let us take the example of China – the world's second largest economy, Chinese model of breakneck growth, driven by their strong desire to become the next Superpower of the world, has led to the following calamitous consequences for China:

- Recurring heavy smog in major cities of China including Beijing.
- Increase in lung cancer cases by 60% in the last 10 years without increase in the numbers of smokers.
- 99% of China's 560 million urban population breathes air deemed unsafe by European standards as per a World Bank study.
- Reckless industrialisation and dumping of chemical waste is causing poisoning of soil and crops.
- Increasing air and water pollution are leading to soaring healthcare cost due to pollution-related diseases.

This example of China is applicable to other fast growing economies of the world like India to varying degrees.

MAJOR CULPRITS

- Driven by a powerful urge to outcompete and dominate the rivals in a fiercely competitive world, large corporate and Governments are resorting to reckless growth which is not sustainable and is highly damaging for the mankind in the long-term.
- In fact, the giant corporates across the world with their immense financial power influence the Governments to frame policies which suit their rapid and unfair growth objectives.
- Some intensive global studies have shown that it is the giant corporates with their tremendous financial clout, who are really ruling the world to serve their own selfish and myopic interests, and that is extremely harmful for the common human beings everywhere.

GLOBAL RESPONSE

This grave situation has created global concern at the highest levels. Global initiatives have been taken to grapple with this situation.

THE HURDLES

- Earnest efforts to implement the desired steps are missing.
- Giant Corporates are influencing the Governments and even bribing some scientists to play down or dispute the environmental damage being caused by them.
- Economics Nobel Laureate Joseph E Stiglitz said in the recent World Economic Forum (WEF) in Davos that the grave damages to mankind arise from the fact that we are living in a leaderless world without any Global Leaders who have a global perspective. The world has moved from being dominated by 2 Superpowers to becoming leaderless and multipolar. We talk of G-7, G-8, G-20, which hides the fact that the more apt description is G-0.

THE REMEDY

Healthy Societies follow the Principle of Environmental Sustainability, which requires that their economies must satisfy the following three conditions:

- Rates of use of renewable resources should not exceed the rates at which the ecosystem is able to regenerate them.
- Rates of consumption of non-renewable resources should not exceed the rates at which renewable substitutes are developed and put into use.
- Rates of pollution emission into the environment should not exceed the rates of the ecosystem's assimilative capacity.

The International Community must develop and adopt strategies and practices which satisfy these conditions. Besides that what is needed even more importantly is truly great global leaders who have global perspective and concerns and not bound by only their regional interests which lead to the conflict of different regional interests. To achieve the imperative need of sustainable development, mankind does not merely need "Neeti" (Strategy) but, more importantly, "Niyat" (Intention).

CONCLUSION

The International Community must develop and adopt strategies and practices which ensure Sustainable development. Besides that, what is needed even more importantly is truly great global leaders with global perspective and concerns, and "Niyat" (Intention) not merely "Neeti" (Strategy) to achieve and maintain sustainable development.

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16

Sustainability
The Changing Face of CSR

Satish Chander Jain*

Economic growth, social development and environment protection are the three pillars of sustainable development. According to Dr A P J Abdul Kalam, 'Sustainable development refers to a mode of human development in which resource use aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for generations to come.' The future is expected to see the sustainability initiatives and core strategic initiatives closely intertwining. The Green Company (Greenco) rating initiative of the Confederation of Indian Industry (CII) got rolling in early March, 2012. Greenco rates the environmental performance of a company.

Keywords: *Triple Bottom Line, Philanthropy, Sustainable Development, ASSOCHAM, Confederation of Indian Industry, Greenco Rating*

INTRODUCTION

Hardly a day goes by without some mention in the media of CSR and its growing significance on the good business practices. CSR, as it is commonly known, is becoming increasingly important to us all, both as individuals and in our professional lives. CSR is changing its face due to sustainability challenges.

'CSR is becoming a bigger agenda,' says Mr Anil K. Gupta, an INSEAD professor of strategy. At the basic level, 'CSR 1.0' companies simply leverage their financial capital by charitable contributions. At the next level, i.e. 'CSR 2.0' companies leverage their human capital and encourage employees to take off to work in the community. At 'CSR 3.0' level, CSR really becomes meaningful in which companies reflect on their organisational capital, core competencies and their whole value chain and analyse how those can be leveraged. At that point, CSR is not a peripheral thing. It is the whole value chain being directed and

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channelled towards CSR and companies embrace it and integrate social values and sustainable practices. For all its benefits, however, both tangible and intangible, CSR efforts come at a cost, particularly to shareholders and analysts seeking short-term returns. 'We believe that doing well by doing good is a business model that allows us to grow our business sustainably and profitably.' CEO of Unilever Mr Manwani says, "At the end of the day, you have got to ask yourself, what are the drivers of value in an organisation? Ultimately value has to be sustainable. It has to be long term." 'We believe that the best value comes out of giving our customers what they are looking for and catering to the communities in which we live.' *(From INSEAD Knowledge – The New York Times News Service)*

Economic growth, social development and environment protection are the three pillars of sustainable development. Sustainability has different meaning for different contexts. For example, while developed countries are grappling with lifestyle sustainability, the developing countries are tackling issues of livelihood sustainability. Sustainable Development or Sustainability for Corporate is about conducting business in a way that benefits all stakeholders, such as employees, customers, business partners, communities and shareholders. According to Mr A W Savitz and Mr K Weber,[1] authors of "The Triple Bottom Line", sustainability for corporates is not about philanthropy, nor it is about ethics, it is about finding the sweet spots where the long-term interest of shareholders and society overlap, e.g. reducing energy and water consumption in production process by the corporate help reduction in cost of production, increase in profit for shareholders and availability of more water and energy to the society. Not so long ago, the job of most companies was relatively simple: provide safe goods and services to the consumers, provide reasonable return to the shareholders and comply with legal obligations. However, this is no longer the case now.

Business and environment have never seen eye to eye, though the latter has always borne the brunt of the former's impact. It has been evident for some time that the current production and consumption pattern across the world are no longer sustainable. This consumption and production pattern is based on an underlying assumption of unlimited resources. It is evident that we are consuming resources beyond the earth's regenerating capacity. It is like living off one's capital with imminent bankruptcy, except that in this case ecological bankruptcy threatens planetary survival itself. India is particularly vulnerable because of its inability to stabilise its population and to adopt sustainable development strategies. A recent World Wildlife Fund study[2] shows that India is already using 50 percent more ecological resources each year than can be replenished by nature. Ecological deficit is not only an Indian phenomenon; the entire planet is ecologically challenged. India is more vulnerable because the margin of survival of its people is dangerously thin.

SUSTAINABLE DEVELOPMENT

The term 'sustainable' means something that lasts long while 'development' implies a change that is considered desirable in a society leading to improvement in the conditions of

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life. According to Dr A P J Abdul Kalam[3] 'Sustainable development refers to a mode of human development in which resource use aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for generations to come.' Conservation of environment and building social infrastructure is imperative for sustainable development and to ensure prosperity reaches bottom of the pyramid and touches life of all citizens, said former President of India, Dr A P J Abdul Kalam at ASSOCHAM, CSR Excellent Award 2012-13 held in New Delhi. The term 'Triple Bottom Line' has its origin in the concept of sustainable development. John Elkington is one of the early champions of sustainability and the creator of the term 'triple bottom line' measuring a corporation's financial, social and environmental performance. In 1987, the World Commission on Environment and Development (WCED) published a report titled 'Our Common Future'. The document came to be known as Brundtland Report after the commission's chairperson Grow Harlem Brundtland, the then Prime Minister of Norway. The document developed the guiding principles for Sustainable Development.

Thus, sustainable development may be defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. Sustainability makes a business sense. It makes new markets. It builds trust among the communities, it helps in employee retention. For a global company, access to financial capital overseas is linked to sustainability. Acquiring companies abroad is easier if the company is perceived as sustainable.

According to Brundtland Report, the critical global environment problems are the results of non-sustainable patterns of consumption. The report suggested a strategy that would combine development and environment described by the now commonly used term 'Sustainable development'.

On the basis of UN General Assembly debate on the Brundtland Report the UN Conference on Environment and Development[4] was organised followed by International Agreement like the Montreal and Kyoto Protocol, Agenda 21, etc.

International concern about sustainable development concerning environment and social issues recognises that 'development is not just about bigger profits and higher standards of living for a minority. It should be about making life better for everyone and this should not involve destroying or restlessly using up our natural resources, nor should it involve polluting the environment'.[5]

The Clean Development Mechanism (CDM) is perhaps the most exciting feature of Kyoto Protocol. CDM mechanism allows Annex 1 countries – (Industrialised Countries) to meet their emission reduction targets by paying for greenhouse gas emission reduction in Non- Annex 1 (developing countries). The purpose of the clean development mechanism is

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to assist developing countries in achieving sustainable development and to assist developed countries in achieving compliance with their quantified emission reduction commitment. The developed countries, instead of reducing emission of their own companies, can 'buy' emission reduction in non-Annex 1 countries.

In India, clearance for sustainability is granted by National CDM Authority (NCDMA) under the Union Ministry of Environment and Forests. The Sustainable Development Criteria prescribed by the Indian NCDMA are as follows:

- Social well-being
- Economic well-being
- Environmental well-being
- Technological well-being

The transaction for sale and purchase takes place in the form of Certified Emission Reductions (CERs) through the CDM Registry Administrator.

According to Ms Seema Arora, "Sustainability is a difficult subject, beyond just CSR. It is about integrating it into the business model itself. Social, economic, ethical and environmental concerns are vital to it." CII-ITC - CESD is working with the Ministry of Environment and Forests to develop public procurement norms to boost sustainability initiatives. She says, "Soon it will no longer be lowest bid that will decide which product the Government will procure. Factors such as water and energy-efficient manufacturing processes and the product's end-of-life use will play a role. They are a little inspirational so that they push industry to invest in cleaner technology."

THE CHANGING FACE OF CSR

Sustainability has moved from being a Regulatory Issue to a Management Issue, to a Business Issue and to a Core Strategy Issue now. Integrating business strategy with sustainability initiative, successful companies allocate resources to ensure well-being of stakeholders, which also enables the company to acquire a differentiator vis-a-vis its competitors, thereby making the business sustainable. Linking sustainability to business strategy can also improve access to supply chains.

EXAMPLES OF SUSTAINABILITY INITIATIVES

Given the global shortage of pulpwood for paper board production, ITC and Ballarpur Industries are helping small farmers with degraded land pockets by providing to them saplings, financial and technical support and assured buy back of timber. This ensures sustainable raw material supply for the company and also improves farmers' livelihood. Such initiatives go well beyond monetary financial donations, and more importantly are sustainable. Hindustan Unilever invests in research and is working with nutrition and health specialists for its ready-to-eat food business and is striving to reduce the salt contents to the recommended dietary levels, cut Trans-fat from vegetable oil, reduce sugar in its

ready to drink teas, and drastically cut calories in children's ice cream. In its personal care business, it is moving towards 'dry shampoo', which refreshes hair between washes, reducing hot water consumption. Vaseline packaging too has been re-engineered to cut plastic use for well-being of environment and customers. Social Initiatives can also help enhance ethical values in society and at the same time offer a distinctive edge to companies. Socially responsible initiatives have potential to improve employability in the society and at the same time provide companies access to skilled labour, a key driver of profitability across many sectors. For example, Maruti has recently adopted forty Industrial Training Institutes, which not only enhances skill levels of youth, but also guarantees supply of skilled personnel to the company, Tata Steel, L&T, Microsoft, etc. are also investing in skill trainings for youth for the same reason.

Thus, competitiveness and profitability will be dependent on integrating sustainability into the operational framework, rather than leaving it out as administrative or corporate communication function. The future is expected to see the sustainability initiatives and core strategic initiatives closely intertwining. Companies too have stated realising the need to focus on social and environmental aspects, which are important for their sustainability.

Investors are also realising that chronic or multiple problems with a company's conduct on environmental, social and governance (ESG) issues may be indicative of broader management problems, impacting the financial performance of the company. Therefore, companies are increasingly viewing ESG-related issues as business risk, as opposed to mere corporate social responsibility issue.

Further, companies are also realising that incorporating ESG issues into company's corporate policies is not enough, as the public demands transparency and accountability. Therefore, credible reporting about the company's conduct on these issues is as important as financial reporting. The need for such non-financial reporting is also spurred by peer pressure, growing activism of institutional investors and due to regulatory provisions. Recently, SEBI has made it mandatory for top 100 listed companies to submit business responsibility reports, as a part of their annual reports. A number of Indian companies have begun to publish non-financial reports covering their conduct and ESG issues but information presented in them varies widely because non-financial reporting is still evolving.

Non-financial reporting may help a company to evolve a strategy for mitigating risk and tap new market opportunities and enhance external relationship and credibility. However, with the passage of time and awareness, sustainability reporting is bound to become more sophisticated to capture the changing face of CSR.

The Global Compact was first proposed by United Nations Secretary – General Kofi Annan in 1999 and formally organised the next year in July 2000. Companies from around the world may participate by supporting and acting on the Compact's ten principles in the four areas of human rights, labour, environment and anti-corruption. The objective is to achieve sustainable growth for society by having companies that endorse and support the Global Compact voluntarily and behave as good citizens.

TEN PRINCIPLES OF THE UNITED NATIONS GLOBAL COMPACT

Human Rights

- ***Principle 1:*** Business should support and respect the protection of internationally proclaimed human rights
- ***Principle 2:*** Business should make sure that they are not complicit in human rights abuses

Labour Standards

- ***Principle 3:*** Business should uphold the freedom of association and the effective recognition of the right to collective bargaining
- ***Principle 4:*** Business should uphold the eliminate all forms of forced and compulsory labour
- ***Principle 5:*** Business should uphold the effective abolition of child labour
- ***Principle 6:*** Business should uphold the elimination of discrimination in respect of employment and occupation

Environment

- ***Principal 7:*** Business should support a precautionary approach to environmental challenges
- ***Principal 8:*** Business should undertake initiatives to promote greater environmental responsibility
- ***Principle 9:*** Business should encourage the development and diffusion of environmentally friendly technologies

Anti-Corruption

- ***Principle 10:*** Business should work against all forms of corruption, including extortion and bribery.

ABCDE OF SOCIAL RESPONSIBILITY

Madan Sabnavis, Chief Economist, Care Rating has suggested the acronym ABCDE to bring participative, sustainable development with tangible benefits and better service delivery for the poor through CSR:

- ***A – Adopt:*** A geography which really means that it should target a fixed area and work towards developing this area. Having scattered programme seldom works.
- ***B – Building Structure:*** The funds deployed should be used for building structures that entails creating social requirements for the adopted geography so that the community is aware of what the company is doing. Building schools, health centre,

community halls, setting up of bank branches are some of the examples of physical and financial infrastructure that has to be created.

- ***C – Creating Competencies:*** The focus should be on creating competencies. Government programmes normally are constrained by funds and have bizarre situations where schools exit but have no teachers or blackboards or chairs or toilets. It is better to have a smaller set up where education is of national level so that the children actually grow to compete well in future.

  The present education system is biased where education in an Indian language automatically puts the student at a permanent disadvantage. As a result large young population of the country does not have the necessary skill sets to enter the corporate world. This needs to be corrected.

- ***D – Distribute the Gains:*** Distribute the gains of profits in the form of tangible benefits such as subsidised health facilities, education, basic infrastructure, etc.

- ***E – Engage Local Community:*** Engage the local community in one's own work. Here the idea is that the community is trained and developed in their own activity that works well in terms of providing employment, imparting skills and earning trust.

There is a need to the bridge trust between the rural folks and corporate India to ensure smooth operations. A small step through allocating 2% share of the profit can go a long way in assuaging the poor and involving them in participative development.

GREENCO RATING INITIATIVE OF CII

The Green Company (Greenco) rating initiative of the Confederation of Indian Industry (CII) got rolling in early March, 2012. Greenco rates the environmental performance of a company. Greenco rating will come only if the company can show results across the following nine parameters:

1. Energy saving
2. Water conservation
3. Use of renewable energy
4. Mitigation of greenhouse gas (GHG) emission
5. Conservation and recycling of materials
6. Waste management
7. Establishment of a green supply chain
8. Product stewardship
9. Life cycle assessment

The five-level ratings – Certified, Bronze, Silver, Gold and Platinum are valid for three years, after which the company could request for a fresh audit. It could request for a fresh rating even earlier, if it believes that environmental performance has improved. The Greenco

rating by the Indian industry is in line with the Rio-Plus 20 Global Environment Conference. Three of the nine parameters – energy efficiency, renewable energy and mitigating GHG emissions relate directly to goal of reducing India's carbon footprint and the rest contribute indirectly.

However, it is not the promise of public good alone that will motivate the industry for conservation of resources. In the medium- to long-term, reduced resources use will reduce costs and increase profits for companies. Reduced cost of water and energy conservation, recycling of material, use of renewable energy and recycling can have an immediate impact on reduction of costs and improvement in profits. Developing a green supply chain will make sure that the ancillary products used in a company's production process are themselves green. With Greenco auditors looking at this aspect, they will make sure that the company is not moving the more polluting operations to smaller units.

Product improvement will make the producing company responsible for the product during its entire lifecycle, which, in turn will encourage them to innovate, design and develop products that are less polluting during its life. When all these parameters are considered, and a company gets a Greenco rating, then the improved marketing edge can be felt.

The industry will have to encourage companies to get their operations rated. CII would also need to continue to maintain the standard of assessment so that the credibility of Greenco rating grows in India and abroad. Though this is a small beginning, but if the momentum is built, then within a short period of time, it could add to a greener footprint for the industry.

CONCLUSION

Sustainability is not the promise of public good alone that will motivate the industry for conservation of resources. In the medium-to-long -term, reduced resources use will reduce costs and increase profits for companies. Reduced cost of water and energy conservation, recycling of material, use of renewable energy and recycling can have an immediate impact on reduction of costs and improvement in profits.

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17

Whistleblowing

An Important Tool to Prevent Corporate Frauds and Establish a Relationship between Corporate Governance and Whistleblowing

Shikha Sachdeva*

'Whistleblowing', the word speaks for itself. To blow the whistle; but what causes the whistle to blow is a matter of concern. Whistleblowing is generally accepted as to bring to limelight any kind of immoral, illegal or illegitimate activity going on or which had taken place in the past in an organisation. The next cause of concern is who will blow the whistle and why would he do so because blowing the whistle or bringing to light the wrongdoing comes with a package of many repercussions which the whistleblower has to face. The repercussions can be really fatal as can be concluded from the cases, which have taken place in our country.

This paper seeks to the following aspects of whistleblowing: firstly, what causes an employee to blow the whistle; secondly, the types of whistle-blowers who generally emerge in various corporate frauds; thirdly, the retaliation the whistle-blowers face; fourthly, the need of a concrete law for the protection of whistle-blowers in India and the current legislation if any and lastly, how whistleblowing can be an important tool of corporate governance.

Keywords: *Whistleblowing, Corporate Governance, Clause 49*

INTRODUCTION

Whistleblowing has become a debatable and burning issue in today's world. With number of corporate frauds, scams and scandals coming into light every now and then, whistleblower's law has become a compulsory and inevitable part of a country's constitution. Especially a country like India is in dire need of such a law or an act which would protect the interest of whistleblowers if they stand against malign or any wrongful deed. Till now neither there is

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any strong law for the whistleblowers' nor any mandatory provision in the company's act for their protection besides the fact that whistleblowers play the most significant part in prevention or detection of corporate frauds. Another matter of concern is that should the provision for the protection of whistleblowers be made a part of clause 49 of company's act? Will this create any difference in the corporate governance? Corporate governance means the code of conduct which the company has to follow in order to direct and control the company in a better manner, whistleblowing if becomes a part of clause 49, will this help a company to built a better repute for itself and its employees can feel more secure. This paper provides for all the discussions being done on the significance of whistleblowers' and the existence of a law for the protection of the same. Also it figures out a relationship between corporate governance and whistleblowing in a descriptive manner.

WHAT MAKES AN EMPLOYEE BLOW THE WHISTLE AND THE DILEMMA HE FACES OF WHETHER TO BLOW THE WHISTLE OR NOT TO BLOW THE WHISTLE?

When an employee observes wrongdoing in the organisation he works in, the very first thought which strikes his mind is to report it to authorities so as to protect the interests of the people who could get affected by such an act. But the very next moment, he gets into a dilemma of what will be the adverse effects of such whistleblowing on him and his career. He gets into a dilemma of whether to blow the whistle and inform about the wrongdoing to his superior or just stay quiet and protect him from being affected by the wrongdoing. This dilemma is very common and also justified in a country like ours, where we have hundreds of examples of negative retaliation towards the whistleblowers, the recent being the case of IAS Durga Shakti Nagpal, who was suspended from work because she brought into limelight the sand mafia of UP and the one milestone example being of Satyendra Dubey, an engineer working with NHAI, who was killed because of bringing to light the corrupt activities in NHAI. So, these kinds of dilemmas come with a justification of fear of losing job, reputation, place in the peer group and even threat to life.

But there are a lot of many motivational factors, which encourage an employee to blow the whistle like being an honest and loyal employee of the organisation, his long-term association with the organisation (tenure), his want of creating good reputation amongst top officials and promotion in job.

Overall, it can be concluded by saying that the existence of such a confusion of whether to blow the whistle or not calls for a dire need of a concrete law on protection of whistleblowers in our country, which would not prevent the potential whistleblowers from taking any step.

CHANNELS OF WHISTLEBLOWING

Channels of whistleblowing basically mean the 'path to report the wrongful act', we generally have two kinds of channels of whistleblowing. One being the very own part of the organisation being the 'internal channel' of whistleblowing, in which the employee reports the

wrongdoing to his immediate superior and a hierarchy is followed for reporting or he can also use the complaint box and hotlines, which are put up in the organisation for the employees if they want to follow anonymity in their complaint. The internal channel of whistleblowing, the action taken against the wrongdoer remains inside the four walls of the organisation, keeping intact the reputation and public image of the organisation.

The second type of channel of whistleblowing is the external channel, in which the employee instead of reporting the wrongdoing to the insiders directly follows the route of media or police officials. The choice of the channel totally depends upon the kind of working environment, the kind of superiors or the authorities he is working under. If the environment and the management of the organisation are supportive and sensitive towards such matters, then the employee is likely to follow internal channel of whistleblowing otherwise his preference would be the external channel of whistleblowing.

REPERCUSSIONS THE WHISTLEBLOWERS FACE

The term 'Repercussion' means the after effects which a whistleblower faces after bringing into light the wrongdoing. It does not necessarily depend upon the channel of reporting a whistleblower follows, but to a large extent depends on it. If an employee follows internal whistleblowing, the positive impact could be reward, award, promotion, image-building, good reputation, etc. On the other hand, there could be negative impact also such as lack of trust by fellow colleagues and peer group and even getting fired from the job if the superiors are also involved in the wrongdoing.

Similarly, external channels of whistleblowing also have its positives and negatives. The positive effects being awarded and rewarded by the regulatory bodies. But the negative repercussions could be more fatal like loss or suspension from job, loss of life, (taking examples from our country, Satyendra Dubey, S Manjunath, RTI activists, etc.

So, the potential whistleblowers must be careful not only while blowing the whistle but also to whom the whistle should be blown.

TYPES OF WHISTLEBLOWERS

Whistleblowers can be categorised on the following basis, according to the path the whistleblowers follow, internal and external whistleblowers as discussed above. But the other kinds also include dutiful whistleblowers (role play whistleblowers). They are the ones who have the task of finding out the wrongful activities in the organisation. They intentionally look for the frauds and bring them to light. For example, auditors; it is the responsibility of the auditors to blow the whistle in case of any accounting fraud. It is an obligation for the auditors to do so, that is why the name is given as dutiful whistleblowers.

NEED FOR A CONCRETE LAW IN INDIA

The large and numerous corporate frauds that emerged in the last three decades provoked the legislative response in many countries in order to prevent and uncover frauds. This law was the whistleblower law, i.e. the law which was mainly formed to protect the whistleblowers

from the aggressive retaliation they had to face for bringing the wrongdoing to light. In order to make whistle blowing more meaningful and worthy, the existence of such laws has become a mandate in the current scenario. The law that a government enacts to protect such persons, who help expose corruption is called a whistleblower protection law.

In the wake of corporate frauds like Enron, Worldcom, etc. whistleblower laws have been adopted by many countries like United States, United Kingdom, Australia, etc.

The Government of India has been considering adopting a whistleblower protection law for several years. In 2003, the Law Commission of India recommended the adoption of the Public Interest Disclosure (Protection of Informers) Act, 2002. In August 2010, the Public Interest Disclosure and Protection of Persons Making the Disclosures Bill, 2010 was introduced into the Parliament of India, Lok Sabha. It was approved by the cabinet in 2011, but the bill was stalled in Rajya Sabha on 29th March, 2012.

THE WHISTLE BLOWERS PROTECTION BILL, 2011(PROPOSED)

The Bill commonly known as the Whistleblower's Bill establishes a mechanism to register complaints on any allegations of corruption or wilful misuse of power against a public servant. The Bill also provides safeguards against victimisation of the person who makes the complaint.

Highlights of the Bill

- The Bill seeks to protect whistleblowers, i.e. persons making a public interest disclosure related to an act of corruption, misuse of power or criminal offence by a public servant.
- Any public servant or any other person including a non-governmental organisation may make such a disclosure to the Central or State Vigilance Commission.
- Every complaint has to include the identity of the complainant.
- The Vigilance Commission shall not disclose the identity of the complainant except to the head of the department if he deems it necessary. The Bill penalises any person, who has disclosed the identity of the complainant.
- The Bill prescribes penalties for knowingly making false complaints.

CENTRAL VIGILANCE COMMISSION (CVC)

In order to fight against corruption, Central Vigilance Commission has taken an initiative in setting up blow your whistle technology. It is dealing with all matters of corruption in the Central Government. Blow your whistle is a transparent anti-corruption initiative of the Central Vigilance Commission (CVC), India's apex vigilance institution dealing with all matters of corruption in the Central Government.

As on today, India does not have any concrete law to protect the whistleblowers from negative retaliation, because of which either the whistleblowers that raise their voice against the wrong are getting killed or the potential whistleblowers do not gather the courage to raise their voice.

RELATIONSHIP BETWEEN WHISTLEBLOWING AND CORPORATE GOVERNANCE

Corporate governance is the acceptance of the inalienable rights of shareholders as the true owners of the corporation and of the role of the management is perceived as that of trustees on behalf of the shareholders. It encompasses commitment to values, ethical business conduct and strikes a fine distinction between personal and corporate funds in the management of a company (Preamble, Narayana Murthy Report of the SEBI Committee on Corporate Governance, 2003).

It defines the parameters of accountability, scrutinises the reports and disclosures with the objective of fulfilling the purpose of the corporate's existence in this era of globalisation with the aim directed towards the welfare of shareholders (Chandratre K R, Role of Board of Directors in emerging dimensions of Corporate Governance and impending changes in Company Law, The Chartered Secretary, The Institute of Chartered Secretary of India, New Delhi, May 97, p.505).

Hence, corporate governance goes beyond the letter of law enlisted in the Statutes and tries to further the interests of the shareholders and the general public in an ethical and transparent manner in order to make the organisation a responsible corporate citizen (Atul Mehrotara, Corporate Governance, SEBI and Corporate Laws, The Corporate Laws Weekly, Vol. 90, Part 4, March 16th 2009, p. 157).

The whistle blower policy is the extension of company's code of conduct which is applicable to all the employees of the organisation in order to regulate and build a strong culture of corporate governance in the corporate scenario. Through this policy, company gives its employees, directors, vendors and all other stakeholders a proper mechanism to disclose any unethical conduct and take appropriate actions for the same.

Whistle blowing is relevant and plays a critical role in corporate governance. Invariably, the first to realise or to suspect the malpractice are the employees, or the non-executive directors. If there needs to be an effective regulatory framework, be it self-regulatory or mandatory, consideration must be given to those who are prepared to blow the whistle as they have the most to lose.

Unless culture, practice and the law indicate that it is safe and acceptable for individuals to raise a genuine concern about corruption or illegality, persons, especially employees, will assume that they risk victimisation, losing their job or damaging their career. Persons should not just be told to blow the whistle by the authorities but should be reassured that if they choose to do so, they are free to blow safely and lawfully whenever and wherever there is violation of the rules.

Employees, for example, should feel free to raise their concerns with directors, audit committee, regulators or law enforcement agencies. Non-executive directors should also feel free to challenge the executive directors and not be too concerned about 'rocking the boat'.

It is important to note, however, that internal whistle blowing is more ideal, as alleged malpractice will not become public knowledge and therefore may not involve unwarranted public debate.

Embracing the corporate governance ideology involves empowering the individuals to get involved when rules are being violated. Regulators, therefore, must erect the necessary safeguards in the event of reprisals.

In the U.K. for example, the Public Interest Disclosure Act, 1998 is designed to protect workers from detrimental treatment or victimisation from their employer if, in the public interest, they 'blow the whistle' on wrongdoing.

The U.S. corporate governance law, Sarbanes-Oxley Act, 2002, has made it a criminal offence, punishable by a fine and/or up to ten years in prison, to take any action harmful to a person, who provides truthful information about a federal offence to a law enforcement officer.

There should be a moral and legal obligation to protect those who have made responsible disclosures to the appropriate authorities. This obligation will encourage companies to foster a culture, which is open to hear and address the individual's concerns about practices that contravene the law.

In India, the listed companies are governed by Clause 49 of the Listing agreement, where whistle blowers policy is non-mandatory in nature. It reads that listed companies may establish a mechanism to enable disclosure of unethical behaviour, actual or suspected fraud or violation of company's code of conduct or ethics policy. RBI now has a whistle blower policy to strengthen financial stability and enhance public confidence in financial sector. The Limited Liability Partnership Act, 2008 has also incorporated provisions to protect the interests of whistleblowers (Section 31, Limited Liability Act, 2009) and ensure that they are not subjected to harassment, termination of employment or any such treat, to enhance transparency and promote an anti-corruption tendency within the company. The Narayana Murthy Report also suggested the incorporation of whistle blowers policy within the companies to enable the employees to approach the audit committee when they observe unethical or improper practice and also protect them from unfair termination and other prejudicial practices.

CONCLUSION

Throughout this paper an attempt has been made to provide strong arguments in favour of the relevance of whistleblower's protection law in India and also how it is an important part of corporate governance. However, proper evidence on the basis of research cannot be developed, but suggestions herein are consistent with what has been done to date.

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Analysis and Implications of Rural e-Governance in India

Yogendra Pal Bharadwaj*

Good Governance is not a finished product. It is like a dream flower. Governance refers to the interaction between government and other factors of the social sphere and the process of decision-making in a complex world. There are so many instruments like RTI and e-Governance (Rural and Urban), which have been a powerful charter to address and ensure transparency in the decision-making process.

Rural development implies both the economic development of the people and greater social transformation using electronic governance (e-Governance). There is no doubt that e-Governance has increased transparency and efficiency. Services are being delivered very efficiently through Information Technology to far away and distinct places, which is proving to be a tool of social and economic change in lives of rural people. The information architecture of the administrative and political set up plays a crucial role in making governance answerable and responsive to the people. The prime goal is that rural e-Governance projects serve as a means to attain good-governance for enhancing sustained rural development.

While information dissemination at a wider scale remains important, the models which are implemented in many parts of the country seek to answer this issue. All these models or projects have tried to leverage the advantages of ICT to channelise information of critical importance to the targeted audience to engender change. Hence, the need for periodical rethinking on and even remodelling of the concept and institutions of governance. In this field, this search for good governance on rural development has to be a continuing exercise. I present its many facets. But it would be worthwhile to reiterate that governance is not only the concern of the government. A constant and critical dialogue between the government and society is essential to refine and effectively put to practice the principles of rural e-Governance on good governance in India.

Keywords: *e-Governance, Technological Features, Models of Rural e-Governance, Bottom-up Approach*

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RURAL DEVELOPMENT AND GOVERNANCE

The journey of the concept of Good Governance in modern times has gone through many phases. In the pre-independence period, Gandhiji's vision of good governance essentially meant democratic decentralisation, which entailed power to the Gram Panchayat and people at the lowest level of political hierarchy. By the early 1990s, however, the idea of good governance had turned into a metaphor of donor-conditionality for the debt-ridden countries. It was often blamed for social unrest and political upheaval in many parts of the world. But freed from the element of coercion and external force, the concept retained a certain attraction spurring a number of policy initiatives based on the demand for participatory development, transparency in decision-making and empowerment of people to decide and shape their destiny.

In the rural context, development involves use of physical, financial and human resources for economic growth and social development of the rural economies (Burkey, 1993). The term 'rural development' also represents improvement in quality of life of rural people in villages. As per Chambers (1983) 'Rural Development is a strategy to enable a specific group of people, poor rural women and men, to gain for themselves and their children more of what they want and need.' Singh (1999) defines Rural Development as 'A process leading to sustainable improvement in the quality of life of rural people, especially the poor'. The fact of the matter is that three quarters of the world's poor, about 900 million people are in rural areas, and the Millennium poverty target set by Millenium Development Goals (MDG), cannot be met unless the world addresses rural poverty. 'Sustainable Rural Development can make a powerful contribution to four critical goals of: poverty reduction, wider shared growth, household, national, and global food security and sustainable natural resource management' (World Bank, 1997).

The process of development in a country is to be aided by its governance. The goal of governance 'should be to develop capacities that are needed to realise development that gives priority to the poor, and creates needed opportunities for employment and other livelihoods' (The World Bank, 1992; UNDP, 1994). Increased number of poor, hungry or marginalised people in a country represents decrease in its quality of governance. To promote development, various studies have proposed governance in the contextual realities of each country, including veritable participation of citizens in the governmental decision-making process (Grindle, 2004; Evans and David, 2006).

INTRODUCTION TO e-GOVERNANCE

In the year 2005, UNDP defined, "e-Governance is the use of information and communication technologies with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective." India is a nation of villages. The rural mass in the nation comprises the core of Indian society and also represents the real India. According to the Census Data 2011, there are 638,387 villages in India that represent more than 72 percent of the total population. In a participatory democratic society, ICT can be used for good governance, enhance democratisation and citizen empowerment. The digital

governance creates better connections between citizens and government and encourages their participation in governance. The process gives chance to open up the avenues for direct participation of women in government policy-making process. It is very significant in rural areas where people are deprived of getting benefit of the different integrated programmes.

DEFINITION OF e-GOVERNANCE

World Bank, 2001 – e-Governance is the government-owned or operated systems of information and communication technologies that transform relations with citizens, the private sector and/ or other government agencies so as to promote citizens' empowerment, improve service delivery, strengthen accountability, increase transparency or improve government efficiency.

e-GOVERNANCE FOR RURAL DEVELOPMENT

Rural e-Governance can provide timely information to the citizens and have the potential to spawn innovative means of wealth generation in rural context (Singh, 2004, Malhotra et al., 2006). ICT can improve living standards in remote and rural areas by providing important commercial, social and educational benefits (Share, 1993; Madden et al., 1997). Electronic service centres have a pivotal role to play, especially in reaching out to the marginalised sections living in remote areas (Singh, 2000). A study by Wilson (2000) concludes that in a developing economy like India, ICT has development applications in education, governance, environmental monitoring, health, human rights promotion, economic growth and other areas. An earlier research confirms that transaction costs have substantially reduced by adopting automated supply chain management models for selling agriculture produce (Annamalai and Rao, 2003). Other studies show that e-Government projects are successful in rural India as it acts as an intermediary between government and recipients, while pursuing commercially sustainable objectives (see for instance, Kaushik and Singh, 2004).

However, given the high incidence of poverty in rural India, e-Governance implementation to cover 135 million rural poor is an increasingly complex process. Jhunjhunwala, et al. (2006) states that success stories of e-Governance in rural India are isolated cases, and says that 'sum total of the Indian experience in terms of two important parameters *viz.* villages connected and lives transformed are yet too minimal'. Although there are more than fifty grassroots' projects currently using modern ICT for development in India, Keniston (2002) despairingly notes that since no systematic study or evaluation has been conducted on ICT-based projects so 'opportunities to learn the diverse creative Indian experience so far remain almost entirely wasted'.

e-GOVERNANCE AND GOOD GOVERNANCE

Richard Heeks (2001) studied the effect of new information and communication technologies and how it can make a significant contribution to the achievement of good governance goals.

The paper outlines the three main contributions of e-Governance: improving government processes (e-administration); connecting citizens (e-citizens and e-services); and building external interactions (e-society). Case studies are used to show that e-Governance is a current, not just future, reality for developing countries. However, most e-Governance initiatives fail. Countries therefore face two challenges. First, the strategic challenge of e-readiness: preparing six identified pre-conditions for e-Governance, i.e. Data Systems Infrastructure, Legal Infrastructure, Institutional Infrastructure, Human Infrastructure, Technological Infrastructure and Leadership and Strategic Thinking. Second, the tactical challenge of closing design–reality gaps: adopting best practice in e-Governance projects in order to avoid failure and to achieve success.

APPLICATIONS OF e-GOVERNANCE FOR INCLUSIVE DEVELOPMENT

Figure 1 shows how a transition is feasible from 'Open doors to open hearts', with the application of ICT.

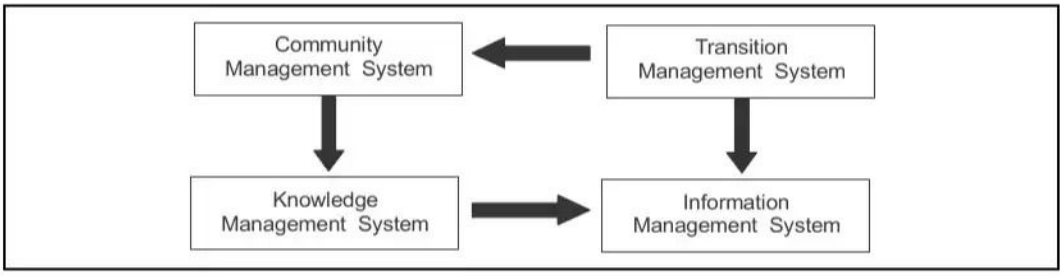

FIGURE 1: E-GOVERNANCE COMMUNITY MANAGEMENT SYSTEM

The application of e-Governance can create an open door administration and transparent government. To describe the designing message for rural development through e-Governance, it is considered that it should have citizen-centric services and be dependable. In this system, the selection of appropriate (dependable, maintainable and cost-effective) technologies for rural connectivity and information processing solutions should focus on the betterment of society. However, we should keep in mind that the inequity of economic condition of rural masses should not create any hindrance to access their required information, which is considered one of the basic constraints in any participatory development.

RURAL e-GOVERNMENT INITIATIVES

Following are some of the important rural e-Government initiatives:

- ***Computerised Rural Information System Project (CRISP):*** It is aimed at facilitating the District Rural Development Agency (DRDA) in the monitoring of exercise of poverty alleviation programmes through Computer-based Information System. Till date, four versions of CRISP application software packages have been developed. Rural Soft 2000 allows online monitoring agencies at Centre and State and enables a common man to access information using a browser-based interface provided by the software.

- ***National e-Government Action Plan (2003):*** National e-Government Action Plan suggested a list of core policies: (1) Overall vision, mission strategy approach; (2) e-Governance technology architecture, framework and guidelines; (3) Human Resource Strategy; (4) Policy for front-end facilitation counters, kiosks, integrated service centres and (5) Policy on back-end department automation.
- ***State Wide Network Area Project (SWAN):*** This project aims at providing high speed, high connectivity network connecting offices at block level for faster access to Government services.

RURAL E-GOVERNMENT PROJECTS

Important Rural e-Government Projects include the following:

- ***e-Choupal:*** Agriculture is the backbone of India. Indian farmers have to depend on many agents, right from the process of procuring raw materials to selling their produce. Each agent will add his/her profit margin, thereby increasing the cost of product. Some agents even try to block the market information. To protect farmers from such practices, the International Business Division of Indian Tobacco Company (ITC-IBD) came out with an e-Government initiative called e-choupal (which means a village meeting place).
- ***Drishtee:*** Drishtee is a rural model of distribution and promotional network for consumer goods and basic services. Information is provided to the users in the form of services via internet. Drishtee made a presence in Dhar, Seoni and Shahdol districts in Madhya Pradesh, Sirsa district in Haryana and Jalandhar district in Punjab. A village entrepreneur is trained to handle the software that works on MS SQL Server at the back-end and runs on ASP, Java script, VB Script at the front-end.
- ***Akashganga:*** Akashganga uses ICT to facilitate rural milk producers by integrating all the operations of rural co-operative society right from milk procurement to accounting. First pilot model of Dairy Information System Kiosk (DISK) is currently under implementation at Uttarsanda Dairy Cooperative Society in Gujarat. Each farmer is given a plastic identification card. When farmers arrive at the Raw Milk Receiving Dock (RMRD) counter, his/her identification is updated in the PC.
- ***Gyandoot:*** Gyandoot has been established as community-owned, technologically innovative and sustainable information kiosks in a poverty-stricken, tribal-dominated rural area of the state of Madhya Pradesh. The server system runs on Windows NT with Internet Information Services (IIS) server; client PCs run Windows 98. Information kiosks have deal-up connectivity. The server hub is housed in the computer room in the district Panchayat.
- ***Jagriti E-Sewa:*** The emphasis of Jagriti is deployment of appropriate, affordable, scalable and sustainable technologies available in the developing countries. The system works on LINUX, which is a 'License-Free' operating system. Old computers (e.g. Pentium I) are used in some places. The project uses dial-up telephone lines. The whole system can be adapted to any language in the least time.

- ***Rural Access to Services through Internet (RASI):*** Sustainable Access in Rural India (SARI), now renamed as RASI, provides internet and voice connectivity to the villages of Madurai district in Tamil Nadu. The project has 100 internet kiosks in more than 100 villages. Current network technology is based on the CorDECT that was jointly developed by the TeNet group at IIT Madras, Analog Devices Inc. and Midas at Chennai.
- ***Tata Kisan Kendra (TKK):*** Tata Chemicals Ltd. came out with TKK to help farmers in states of Uttar Pradesh, Haryana and Punjab. The TKK tracks key parameters relevant to farmers, such as soil, ground water and weather on a real-time basis with the help of Geographic Information System (GIS). The GIS software provides spatial information regarding roads, rivers or buildings. It works by imposing layers of data in digitized maps with information about administrative, socio-economic and physical set-up.
- ***LokMitra:*** LokMitra project was developed by the National Informatics Centre (NIC) in Himachal Pradesh, in order to provide easy access at remote areas and to redress complaints. The LokMitra Intranet in Hamirpur district consists of two Pentium III-based client systems. The servers and clients are connected on a LAN. The hub is placed in the Deputy Commissioner's office. The client systems are used by the officials from concerned departments for answering the complaints and queries received and for updating with information.
- ***N-Logue:*** N-Logue Communications Pvt. Ltd. provides telecom and internet services in small towns and rural areas of India. For operational purposes N-Logue divides the country into service areas corresponding approximately to a taluka (Tehsil). 85 percent of taluka headquarters in India have optical fibre today, which acts as the backbone for telecom and internet connectivity.
- ***Bellandur Project:*** Bellandur Project is a gram panchayat e-Government solution. Working closely with the panchayat members and villages residents, the software was designed to suit the needs of panchayat administration. Bellandur Rational Unified Process (RUP), a set of software engineering tools enables a phased and interactive approach to e-Government.
- ***Kisan Call Centres:*** Mainly to respond to the issues raised by farmers instantly in the local language on a continuous basis. The Department of Agriculture and Cooperation, Ministry of Agriculture launched this scheme during April 2002 with a view to leverage the extensive telecom infrastructure in the country to deliver the extensive services to the farming community.

FEATURES OF TECHNOLOGICAL ADVANCES

Technological advances have opened up new possibilities and raised expectation that governments should serve communities. These factors include the following:

- Cloud computing as a viable ICT provisioning model and a way to reduce costs and deliver new services.

- Social media to enhance and improve levels of participation and citizen satisfaction.
- Unique identity technologies enable greater degrees of inter-agency collaboration and information sharing.
- Open data and government data stores to allow much wider access to publishing and distributing public information.

BOTTOM-UP APPROACH

The importance of adopting a bottom-up approach cannot be emphasised enough. Reaching the last mile is an issue across all development programmes whether it is financial inclusion, delivery of health services or e-Governance. In this context, one needs to speed up the e-District project, for instance. Envisaged as Mission Mode Project under the National e-Governance Plan, it is proceeding at a slow pace, in different directions and hardly qualifies for a national endeavour. Districts are the de facto front-end of government-to-consumer or G2C interaction.

Achieving success in e-Governance in rural areas requires active partnerships between government, citizens and the private sector. The e-Governance process needs continuous input and feedback from the customers, citizens, residents, businesses and officials, who use electronic public services. Their voices and ideas from the grassroots are essential to making e-Governance. There has to be a shared vision with all the stakeholders – government and non-government participating in defining this vision.

SUGGESTIONS AND CONCLUSIVE REMARKS

Good rural e-Governance is essential in establishing an attractive investment climate characterised by competitive and efficient society. Ethics, transparency and the competition for reputation, which are the cornerstone of good rural e-Governance, would invariably be the distinguishing features of development that emerge ahead in an increasingly competitive market. To make this vision of rural e-Governance more effective and precise in nature, we need to implement the following factors:

- ***Cost Reduction and Efficiency:*** The appropriate application of ICT may possibly reduce the number of processes by allowing file and data sharing across government departments, thereby contributing to the elimination of mistakes from manual procedures and reducing the required time for transactions. Efficiency is also attained by streamlining internal processes, enabling faster and more informed decision making, and speeding up transactions processing.
- ***Quality of Service delivery to Businesses and Customers:*** In the traditional model of public service delivery, the procedures are long, time-consuming and lack transparency. A business that wishes to obtain a license or a permit has to fill out a number of application forms, visit a number of different offices and spend a considerable amount of time. If a citizen wishes to obtain a certificate or any other official document, he or she will have to travel to the central government office, go to different offices and

spend a lot of time for a simple service. The consequences are high costs and citizen and business dissatisfaction.

- ***Transparency, Anticorruption and Accountability:*** e-Government helps to increase the transparency of decision-making processes. In many cases, e-Governance offers opportunities for citizens to directly participate in decision-making, by allowing them to provide their own ideas and suggestions in forums and on-line communities. If websites are designed carefully and openly, they can be valuable resources for transparency as citizens, businesses and other stakeholders should be able to see political and governmental information, rules and policies.
- ***Network and Community Creation:*** ICT creates both pressures and opportunities for network creation and community building. As argued before, an e-Government initiative requires a complex web of interrelationships among government, customers, businesses, employees and other governmental agencies. Moreover, the very nature and function of e-Government require a network approach to put together skills, technologies, information and knowledge that span the boundaries of different governmental agencies. It is generally impossible to find all of them in one single governmental agency.
- ***Improve the Quality of Decision Making:*** Community creation forums, continuous interaction and communication between government and its citizens contribute further to the decision-making process. By means of active participation in political and government discussions, citizens can contribute their own ideas, and share their knowledge and information. This will in turn lead to building trust in government and improving the relationships between the government and the governed.

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Financial Efficiency of SIDBI in Improving MSME for Sustainable Development

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Micro, Small and Medium Enterprises (MSMEs) play a major role in generating employment and contributing to regional economic growth. In India, one of the main bodies helping in supporting the development and financing of the MSME sector is the Small Industries Development Bank of India (SIDBI). SIDBI calls for the financing of regional development initiatives and providing assistance to the so-called 'backward' areas in efforts to correct existing regional economic imbalances and promote more equitable levels of development on an intra-national basis. SIDBI is the principal financial institution for the promotion, financing and development of industry in the small scale sector. SIDBI has been implementing various measures/activities to ensure that the Indian MSME sector becomes globally competitive.

This paper deals with the study of financing provided by the SIDBI to MSMEs (Micro, Small and Medium Enterprises) including an evaluation of the bank's responsiveness to MSMEs in regional areas and also how SIDBI is helping Micro, Small and Medium enterprises for growth, sustainability and development.

Keywords: SIDBI, MSMEs, Growth, Sustainability, Development

INTRODUCTION

Small scale industries are the backbone of a developing economy. The development of small scale industries creates vast employment opportunities, decentralisation of industries and re-distribution of economic power of income. This ultimately results in raising the standard of living of people and contribution to the national wealth. The financial year 2010–11 has been a significant year for the small scale industries sector that witnessed growth acceleration, enactment of Micro, Small and Medium Enterprises Development (MSMED) Act,

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a favourable policy package for promotion of micro and small enterprises and preparation of blue print of micro, small and medium enterprises sector by Planning Commission to take the sector to a higher growth level during Eleventh Plan. The accelerated growth reflects the growing importance of the sector to the overall economic performance of the country. They are the seed-bed for large industry. They have made a notable contribution in expanding employment opportunities, adoption of modern technology, mobilising local resources and skills, and dispersal of industries in small towns and rural areas. Not only this, the small scale industries have also contributed to the foreign exchange of the country through export. All along, it has shown the growing sprit of entrepreneurship. All this could be made possible as a result of the successful implementation of the programme for assistance of small scale industries in different requirements.

The small scale industries in the country have a long standing demand that there should be an apex bank to meet the requirements of the industries in the small-scale sector as they were facing a lot of inconvenience for financing and development of their industries. The Small Industries Development Bank of India is one of the lending institutions in this respect.

This paper reports on an investigation concerning regional development and the macroeconomic financing function of the SIDBI, examining how well the SIDBI fulfilled its role with respect to fostering the start-up and growth of MSMEs in less-developed regions of India.

VISION: SIDBI

"To emerge as a single window for meeting the financial and developmental needs of the Micro, Small and Medium Enterprises (MSME) sector to make it strong, vibrant and globally competitive and customer-friendly institution and for enhancement of share-holder wealth and highest corporate values through modern technology platform".

MISSION: SIDBI

'To empower the MSME sector with a view to contributing to the process of economic growth, employment generation and balanced regional development'.

In order to meet the longstanding demand from entrepreneurs, small industry associations and related stakeholders for a single comprehensive legislation, a new act in the name of Micro, Small and Medium Enterprises Development (MSMED) Act, 2006 came into existence. It is the first Act for micro, small and medium enterprises. The Act provides for establishment of a Statutory National Board for Micro, Small and Medium enterprises, filling of memoranda, measures for promotion, development and enhancement of competitiveness of micro, small and medium enterprises, credit facilities, procurement preference and provisions related to delayed payments to micro and small enterprises. The medium sector and micro enterprises have been defined for the first time in this Act. Under the MSMED Act 2006, the enterprises have been classified broadly into two categories, namely enterprises engaged in the manufacture/production of goods pertaining to any industry; and enterprises engaged in providing/rendering of services. Enterprises

have been defined in terms of investment in plants and machinery/equipment (excluding land and building).

The following table gives the meaning of micro, small and medium enterprises in terms of investment made in these enterprises in Micro, Small and Medium plants machinery/ equipments excluding investment in land and building:

TABLE 1: INVESTMENT CHARACTERISTICS OF MICRO, SMALL AND MEDIUM ENTERPRISES

Type of Enterprise	Investment in Plant and Machinery/Equipment (excluding Land and Building)	
	Manufacturing Enterprises	Service Enterprises
Micro	Up to ₹ 25 lakh	Up to ₹ 10 lakh
Small	More than ₹ 25 lakh and up to ₹ 5 crore	More than ₹ 10 lakh and up to ₹ 2 crore
Medium	More than ₹ 5 crore and up to ₹ 10 crore	More than ₹ 2 crore and up to ₹ 5 crore

Source: Annual Report, Ministry of Small Scale Industries, Government of India, 2010-11, pp. 3 and 9.

The development of small scale sector has been constantly the priority of the government. The government has made regular efforts for the growth of this sector by assisting in many ways to bring it on the map of the economy. Undoubtedly, these efforts resulted in the growth in the number of SSI units thereby contributing growth in production, employment and exports. The following table shows the growth of small scale sector:

TABLE 2: GROWTH OF SMALL SCALE SECTOR

Year	No. of units (Lakh)			Production (₹ in Crore)		Employment (₹ in Lakh)	Exports (₹ in crore)
	Registered	Unregistered	Total	Current Price	Constant Price		
2003-04	12.32	84.83	97.15	234255	170708	229.10	54200
2004-05	13.10	88.00	101.10	261289	195613	239.09	69797
2005-06	13.75	91.46	105.21	283270	195613	249.09	71244
2006-07	15.91	85.42	110.10	311993	210636	261.38	86013
2007-08	16.97	96.68	113.95	357733	228730	271.38	97644
2008-09	17.53	101.06	118.53	418263	245747	282.57	124417
2009-10	19.30	104.71	123.42	418884	277668	299.85	150242
2010-11	20.32	108.12	128.44	471663	N.A.	312.52	N.A.
Total	**129.2**	**760.28**	**897.4**	**2757350**	**1524715**	**2144.98**	**653557**

Source: Banking Finance, Apr. 2011, vol. XXII, p.12

Worldwide, the Micro Small and Medium Enterprises (MSMEs) have been accepted as the engine of economic growth and for promoting equitable development. The major advantage of the sector is its employment potential at low capital cost. The labour intensity of the MSME sector is much higher than that of the large enterprises. The MSMEs constitute

over 90% of total enterprises in most of the economies and are credited with generating the highest rates of employment growth and account for a major share of industrial production and exports. In India too, the MSMEs play a pivotal role in the overall industrial economy of the country. In recent years, the MSME sector has consistently registered higher growth rate compared to the overall industrial sector. With its agility and dynamism, the sector has shown admirable innovativeness and adaptability to survive the recent economic downturn and recession.

As per available statistics (4th Census of MSME Sector), this sector employs an estimated 59.7 million persons spread over 26.1 million enterprises. It is estimated that in terms of value, MSME sector accounts for about 45% of the manufacturing output and around 40% of the total export of the country.

Availability of bank credit without the hassles of collaterals/third party guarantees would be a major source of support to the first generation entrepreneurs to realise their dream of setting up a unit of their own Micro and Small Enterprise (MSE). Keeping this objective in view, Ministry of Micro, Small and Medium Enterprises (MSMEs), Government of India launched Credit Guarantee Scheme (CGS) so as to strengthen credit delivery system and facilitate flow of credit to the MSE sector. To operationalise the scheme, Government of India and SIDBI set up the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE).

The main objective is that the lender should give importance to project viability and secure the credit facility purely on the primary security of the assets financed. The other objective is that the lender availing guarantee facility should endeavour to give composite credit to the borrowers so that the borrowers obtain both term loan and working capital facilities from a single agency. The Credit Guarantee Scheme (CGS) seeks to reassure the lender that, in the event of a MSE unit, which availed collateral free credit facilities, fails to discharge its liabilities to the lender, the Guarantee Trust would make good the loss incurred by the lender up to 75/80/85 percent of the credit facility.

MSME FINANCE GAP AND THE INDIAN ECONOMY

Development banks exist to supplement existing sources of finance, fund bankable economic development projects, and promote and finance enterprises and industry (Diamond, 1957, p.45; Boskey, 1959, p. IX; Gupta, 1969; Kane, 1975, pp.14-15; Singh, 1985). Financial institutions and government-sponsored funding bodies of a developmental nature and that target MSMEs have operated in many developed nations, such as the United Kingdom, United States, Canada, Japan and Germany (see OECD, 2004), as well as in developing nations (for example, the Asian Development Bank and the SME Development Bank of Thailand). While conventional banks mobilise savings through financial intermediaries and channel these savings into profitable investment outlets, where there are deficiencies in the availability of finance to industry through such channels, development banks are generally created to fill some of the gap.

In terms of the MSME sector, this financing shortfall is labelled the finance gap. The MSME finance gap has been the subject of a body of research in developed countries over

a considerable period of time (see Ray & Hutchinson, 1983; Berry et al., 2004; Garcia-Teruel & Martinez-Solano, 2007). Aspiring entrepreneurs, as well as owners of existing MSMEs, may face difficulties in obtaining loan finance from commercial banking organisations due to interest rate charges, lack of collateral or security for loans, and risk factors; components of a 'supply gap'. There is also a 'knowledge gap' on the part of MSME owners concerning their awareness of sources and availability of funding (for a review see, Holmes et al., 2003). Development banks act to address both of these aspects of the finance gap.

In developing nations the contribution of MSMEs, particularly those which shape and diversify the industrial structure, is critical to national and regional economic development, however, in such countries and particularly in India and for Indian MSME start-ups, the extent of the finance gap is often quite profound (see Dossani & Desai, 2006; OECD, 2006). The pool of savings available for lending in developing nations is more limited and, in the context of funding MSMEs, the transaction costs associated with micro financing can present barriers for both lenders and borrowers. Lenders profit little from small loans, and both venture risk and the likelihood of loan default can be high. Borrowers have few if any financial resources of their own to commit to a business venture and lack collateral to secure financing. Collectively, these factors produce information asymmetries; moral hazard issues, high switching costs, and a range of other problems, which are more pronounced in the MSME financing context (see Srinivas, 2005). There is also evidence from a range of nations that MSMEs in 'peripheral', rural or remote locations face relative disadvantages in accessing and securing finance, as well as difficulties arising from the remoteness of markets and various labour force supply and skills restrictions (see Felsenstein & Fleischer, 2002; Smallbone et al., 2002). In India, "a vibrant and developed micro-finance sector would impact economic development across the country and help in the distribution of wealth among the populous for ultimately narrowing down the gap between the haves and have-nots" (Raghavan, 2006, p.1144; see also Dutta, 2007).

Often the investments of conventional banks are in the form of shareholdings in corporations, with relatively limited amounts invested in existing or new MSMEs and small-scale industries. Conversely, in the guise of finance gap-filler, development banks are generally charged with funding new and emerging industries and businesses, particularly those in less developed areas or regions – reflecting their overt developmental nature. While the profitability of investments is crucial in the financing decisions of conventional banks, government policy generally circumscribes that development banks recognise broader economic and social imperatives in making funding choices. Development banks must also manage problems and obstacles to growth and development in the communities and nations that they serve. In comparison to the developed world, capital shortages are more acute in developing nations and there is often a range of resourcing constraints, as well as socio-economic tensions and exigencies in developing nations that may hinder development and growth.

In such developing nations, the government plays a lead role in advancing industrialisation and commercialisation in order to move the economy forward, since the private sector is largely unable to do so due to resource scarcity. To foster growth in countries such as India, development banks such as the SIDBI are tasked with working to correct deficiencies in the

capital market by investing in viable new and emergent businesses and industries. Development banks also work to improve the prospects of individuals, businesses and industries in less developed regions of a nation as a means for improving regional economic parity. In India, development banks established and sponsored by government are charged with providing a financing function as one means for government to implement and support its industrialisation and development strategies.

GOVERNMENT POLICY IN INDIA AND THE SIDBI

When India achieved independence from British rule in 1947, the nation was significantly underdeveloped, there was intense personal and resource poverty, and the Indian economy lacked financial institutions and functional capital markets. In 1948, the government established the Industrial Finance Corporation of India (IFCI), the nation's first development bank, in an effort to incite economic growth. The development of industry has remained a national priority based on the notion that industrialisation is necessary for the growth of other sectors of the economy (Tiwary & Singh, 1990). In 1951, the nation's first 'five-year' plan was promulgated, aimed at enhancing the financial and socio-economic structure. Embodied within the objectives of the first and consecutive five-year plans were targeted strategies to develop particular sectors and 'backward regions', reduce imbalances in regional economic growth, and redistribute income and assets in favour of the less socio-economically advantaged (Goela & Bisman, 2007). The tenth plan (2001) was especially targeted at correcting imbalances in regional development, including disparities in employment levels.

In addition to five-year plans, the Indian government's Industrial Policy, including Industrial Policy Resolutions and Industrial Policy Statements, was directed at fostering a planned economy aimed at providing equitable distribution of wealth and income. The Government of India (2003, p. 9) continued to affirm that:

Despite government policies and strategies for economic intervention, disparities in regional development in India have been both significant and increasing. The difference between the highest and lowest state-wise per capita incomes in the nation, for the states of Goa and Bihar, respectively, was 560% in the 1996-1997 financial years, rising to a differential of 783% by 2000-2001 (see Chandigarh Administration, 2003).

Meeting the Indian government's economic and social objectives is directly linked to the provision of finance, and thus to the establishment and operation of development banks. Included in the mission statements of these banks were requirements to invest in organisations and activities to promote industrial growth in relatively more underdeveloped regions as one means for reducing income disparities and alleviating regional unemployment problems. The main emphasis of the financing decisions made by development banks should "thus be on providing funds for development purposes, particularly in those areas most requiring development and which have less access to other forms of finance" (Goela & Bisman, 2007, pp. 907-912).

In the developing world, MSMEs make large contributions to national employment and output. However, the MSME sector often lags behind that of developed nations in terms of contributions to gross domestic product and in relation to other economic indicators.

In India, the economy is dualistic, characterised by 'a few massive private sector conglomerates ... and various nationalised firms ... while there is an enormous mass of small shopkeepers and local industrial firms' (Dossani & Kenney, 2002, p.233). In March 2001, an estimated 3.37 million 'units' (individual SMEs) were operating in the small scale industries sector in India (SIDBI, 2001) and more recent metrics show that Indian SMEs employ in excess of 30 million people and account for more than 35% of the nation's exports and nearly 6% of gross domestic product (Parashar & Venkataramanaiah, 2008).

The SIDBI operates as the apex institution for financing, refinancing and promotion of this small-scale industries sector (SIDBI, 2001), including financing and coordination of state-level institutions, directly funding SMEs, and specifically fostering 'employment generation and economic development of the rural poor through promotion of microenterprises' (IDBI, 2001, p. 41). The bank's mission statement asserts that the SIDBI operates 'to empower the Micro, Small and Medium Enterprises (MSMEs) sector with a view to contributing to the process of economic growth, employment generation and balanced regional development' (SIDBI, 2009). The SIBDI funded a large number of microfinance and primary lending institutions intended "for on-lending to poor groups and individuals with an emphasis on women taking up micro-industrial activities" (Meyer, 2002, p.354; see also Chopra, 2004; Planning Commission, 2007). Four years after its founding, the SIDBI began a micro-credit lending scheme, which became the Foundation for Micro Credit in 1999 (SFMC, 2009), and developed a wholly-owned venture capital company, which was incorporated in 1999 (SIDBI Venture, 2009). Assistance provided by the SIDBI has generally been granted for funding new projects, expansion or diversification, technological and other modernisation, environmental and quality management, marketing, and rehabilitation of 'sick' SMEs (SIDBI, 2002; Ministry of Finance, 2005). The bank has also provided a range of schemes for SME promotion and entrepreneurship development, and a Rural Industries Programme.

FINDINGS AND CONCLUSION

A range of government and institutional interventions and subventions has failed in correcting regional economic imbalances in India (Goela & Bisman, 2007). Consistent with this observation, the current study provides convincing evidence of statistically significant variation in the mean finance sanctioned by the SIDBI to less developed and more developed states. These differences provide support for concluding that there has been a substantial degree of regional bias in the historical financing decisions of the SIDBI, functioning to favour MSMEs in the more developed states. This finding suggests that the SIDBI has not been the panacea for small businesses and small industries in particular regional areas, and nor was the apparent misdirection of funding in accord with the Indian government's policy agenda for the redistribution of resources to achieve regional parity in relation to wealth and income. This lack of achievement of objectives is particularly troubling as the disjunction between less developed and more developed states in India continue to widen.

Even when operated at local levels, rural poverty programmes in India have been mis-targeted and the non-poor have represented the majority of participants in such programmes (Gaiha et al., 2001). The same has been said of the SIDBI – that it does not

suitably target small rural enterprises and excludes the poorest from its micro-credit financing program (see Fisher et al., 1997, Gaiha, 2002). An officially sanctioned review of the SIDBI's operations produced the conclusion that of the Micro Finance Institutions (MFIs) funded by the SIDBI "the North and East of the country, where poverty is most concentrated, are underserved" and "the poorest are not being significantly covered" (EDA Rural Systems, 2003).

However, several factors served to exculpate the SIDBI from fulfilling its role of providing finance to MSMEs in line with national objectives to eradicate regional imbalances. One such factor was the modern era of liberalisation of the banking sector in India, which heralded changes in the manner in which development banks could operate and thereby their success (or failure) in promoting balanced regional development (see Ninan, 1996; Goela & Bisman, 2007), and which has had particular impact on the MSME sector (see Subrahmanya, 2005). In the past, the operations of the SIDBI and other Indian development banks were not governed by market considerations. However, the deregulation and removal of certain constraints on the banking system in the 1990s, as well as increasing competition from private sector financial institutions and resource restrictions on the ability of government to continue to buttress development banks, have made risk and return factors of increasing importance in the financing decision-making processes of development banks such as the SIDBI. With conspicuous change to the banking sector, such as the listing of India's ICICI national development bank on the New York Stock Exchange in 1999 (see Dasgupta, 2000), Indian public sector banks "have become more conscious of the need for greater profitability and efficiency" (Dash & Singh, 2004, p. 5). Such an emphasis on profitability necessarily affected the investments the SIDBI and other Indian development banks chose to undertake. Thus, there are two means for assessing the performance of development banks – one being the financial function that measures profitability, and the other being the development function focusing on economic development (Jain, 1989). Liberalisation of the banking sector may well have increased the intensity of effort directed to achieving the former, perhaps at the expense of the latter.

There is, however, a range of further or alternative explanations for the concentrated pattern of SIDBI assistance in relatively more developed regions. Once such explanation is that the more developed states were in superior positions to support new or emerging MSMEs because of existing industrial infrastructure and facilities, and access to raw materials, skilled labour and entrepreneurial talent (see Goela & Bisman, 2007). Thus, SIDBI development bank finance has been directed to MSMEs in those regions which were more viable. Relatively more developed states were also likely to have greater visibility because of the concentration of power, vested interests and lobbying activity which could be brought to bear. Limited industrial infrastructure and capacity in less developed states increased risks and endangered returns on investments made by the SIDBI in such regions. When coupled with political instability and unrest at the time in a number of these less developed states, such as territorial disputes in the Jammu and Kashmir region and separatist movements in Assam and Nagaland, incentives for the SIDBI to make investments in MSMEs in these areas declined.

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Selected Readings on

Sustainable DEVELOPMENT

Sustainability is not an overnight job or a defined quantitative objective. Rather, it is an ongoing process and every actor of the environment has to assume responsibility to change and even more, become responsive to change.

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