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CSR: What it Matters, Means & Where it is going

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India's Emergence as a Global Hub

N.A. Viswanathan

Goldman Sachs predicted that in less than 40 years, the BRIC economies (Brazil, Russia, India and China) could together be larger than the G-6 in US dollar terms. In this paper, an effort is made to analyse the relative performance of the BRIC countries over the past four years, with a focus on India. India's competitive advantages and disadvantages are identified, and the role of the National Productivity Council (NPC) in making India a global productivity hub, is highlighted.

N.A. Viswanathan, IAS, is Director General, National Productivity Council, New Delhi.

As we move into the first decade of the Twenty First Century, the civilizations of the world are increasingly feeling the effect of rapid globalization of world economies. Capital, technology, knowledge and to a lesser extent, people, are crossing national boundaries at enormous speed in pursuit of wealth and competitiveness and high quality of living standards. As we progress along this path of unification of the global economy, the traditional patterns of classification of the nations according to their wealth, income, defence and technological capabilities etc may become less relevant and new paradigms may emerge.

In 2003, Goldman Sachs in their Economic paper, "Dreaming With BRICs: The Path to 2050" predicted that in less than 40 years, the BRICs (Brazil, Russia, India and China) economies together, could be larger than the G-6 (US, Japan, UK, Germany, France and Italy) in US dollar terms. They predicted that the largest economies in the world (by GDP) may no longer be the richest (by income per capita) and as a result, the list of the world's ten largest economies may look quite different in 2050.

India was the richest nation of the world in terms of both the GDP share as well as per capita income, 300 years ago. It lost its pre-eminent position, due to the plundering of its resources by invaders and colonisation. The post-independence priorities of the reconstruction of its basic survival structure through a controlled economic regime, though the need of the time, could not improve its competitiveness amongst other nations. However, the liberalisation efforts since the 1990s have provided enormous leverage to the entrepreneurial talent of the country. It has been predicted that India has the potential to show the fastest growth over the next 30 to 50 years. Growth could be higher than 5% over the next 30 years and close to 5% as late as 2050, if development progresses successfully. Further, India's economy could be greater than all but the US and China in 30 years, and India's GDP may outstrip that of Japan by 2032, if the pace of growth is maintained. Out of the BRIC nations,

being the only country with a population that continues to grow throughout the next 50 years, India has the potential to raise its income per capita in 2050 to 35 times the current levels.

Comparative Competitiveness

In this paper, an effort is made to analyse the relative performance of the BRIC countries in the past four years towards their development process. For this, information from the "World Competitiveness Yearbook" (WCY) published by International Institute for Management Development (IMD), Lausanne, Switzerland and the National Productivity Council, India has been used.

The definition of competitiveness given by the WCY (2006) is:

"Competitiveness of Nations is a field of Economic theory, which analyses the facts and policies that shape the ability of a nation to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people".

A comparison of BRIC countries vis-a-vis USA has been made based on rankings of different competitiveness criteria. It can be seen that for the last six years (2000 to 2006) USA topped the list of countries considered by the IMD for WCY. An analysis of the World Competitiveness Yearbook 2006, reveals that the overall competitiveness performance of Brazil and Russia has deteriorated considerably from the ranking of 38 to 52 and from 47 to 54 respectively between 2000 and 2006. However, the performance of India and China has improved significantly during this period. India's economic performance has improved significantly. As a result, its rank in economic performance has improved from 24 in 2000 to 7 in 2006. Similarly, business efficiency has increased and is reflected by improvement in ranks from 40 in 2000 to 19 in 2006. Though the level of Government efficiency during this period has fluctuated a bit, yet India has shown an improvement from 39th rank in 2005 to 35th rank in 2006. However, infrastructure continues to remain a bottleneck for India's development. The fall in India's rank in infrastructure from 47 in 2000 to 57 in 2004 has only slightly improved to the 54th position in 2005 and 2006.

Comparatively, China's overall performance improved from 24 in 2000 to 19 in 2006. Though China's economic performance is more or less stable and its governance efficiency is better than India, its business efficiency came down to 50 in 2005 from 35 in 2004. However, it managed to improve this in 2006. Like India, lack of infrastructure

is a hurdle for China's development. China's rank in infrastructure has improved in 2006 as compared to 2005, but it is still lower than that in 2000.

India and China, though improving on these factors relative to their past situation, still have a long way to go to catch up with the USA and to realise the predictions of the Goldman Sachs referred to earlier.

It is clear from these observations that the USA is much ahead of the BRIC countries in the overall competitiveness in 2006. China is better than USA in only a few factors like international trade, employment, prices, public finance, fiscal policy and labour market. India is ahead of USA in only fiscal policy and labour market.

Table 1: The Competitiveness Scorecard of BRIC countries vis-a-vis USA

	2000	2004	2005	2006
USA				
Overall Performance	1	1	1	1
Economic Performance (77 Criteria)	1	1	1	1
Government Efficiency (72 Criteria)	9	10	16	14
Business Efficiency (68 Criteria)	1	1	3	4
Infrastructure (95 Criteria)	1	1	1	1
Brazil				
Overall Performance	38	53	51	52
Economic Performance (77 Criteria)	38	53	33	43
Government Efficiency (72 Criteria)	46	57	57	59
Business Efficiency (68 Criteria)	24	33	31	42
Infrastructure (95 Criteria)	38	54	52	53
Russia				
Overall Performance	47	50	54	54
Economic Performance (77 Criteria)	47	54	57	59
Government Efficiency (72 Criteria)	47	40	46	44
Business Efficiency (68 Criteria)	46	52	55	53
Infrastructure (95 Criteria)	39	43	46	51
India				
Overall Performance	41	34	39	29
Economic Performance (77 Criteria)	24	12	12	7
Government Efficiency (72 Criteria)	33	33	39	35
Business Efficiency (68 Criteria)	40	22	23	19
Infrastructure (95 Criteria)	47	57	54	54
China Mainland				
Overall Performance	24	24	31	19
Economic Performance (77 Criteria)	4	2	3	3
Government Efficiency (72 Criteria)	21	21	21	17
Business Efficiency (68 Criteria)	27	35	50	30
Infrastructure (95 Criteria)	35	41	42	37

Source: World Competitiveness Yearbook (2006), IMD

Table 2 brings out the strengths and weaknesses and the relative positions of the factors that determine the economic performance, governmental efficiency, business efficiency and infrastructure of the BRIC countries

Table 2: Factor rankings of BRIC countries vis-a-vis USA for 2006

	USA	Brazil	Russia	India	China Mainland
Overall Performance	1	52	54	29	19
Economic Performance	1	43	59	7	3
Domestic Economy	1	60	23	10	2
International Trade	11	43	17	22	6
International Investment	1	29	33	18	27
Employment	7	36	39	10	1
Prices	19	21	61	3	12
Government Efficiency	14	59	44	35	17
Public Finance	41	43	2	42	1
Fiscal Policy	19	39	23	12	10
Institutional Framework	11	61	50	36	24
Business Legislation	12	47	57	41	43
Societal Framework	14	52	51	45	30
Business Efficiency	4	42	53	19	30
Productivity & Efficiency	5	53	51	38	29
Labour Market	21	35	42	1	5
Finance	1	52	56	26	51
Management Practices	15	34	54	23	37
Attitudes and Values	16	33	49	11	24
Infrastructure	1	53	51	54	37
Basic Infrastructure	2	44	58	33	20
Technological Infrastructure	1	55	57	43	33
Scientific Infrastructure	1	50	24	26	17
Health and Environment	22	44	59	57	51
Education	11	52	37	59	51

Source: World Competitiveness Yearbook (2006), IMD

Table 3: Labour Productivity in India Vs China

	Country	1990	1995	2000	2003	CAGR (%)
Labour Productivity(GDP per person employed (1990 US\$))	China Mainland	3744	5136	6800	8380	6.94
	India	3484	4232	5046	5781	4.31
In Manufacturing (GDP per person employed (1997US\$))	Taiwan, China	20850	32960	57971	72861	10.99
	India*	2567	3387	4437	5200	6.06
In Agriculture, forestry and Fishing (GDP per person employed (1997 US\$))	China Mainland	542	692	802	797	3.27
	India	513	536	573	607	1.41

Note: * 2002 data is taken for 2003, CAGR indicates cumulative average growth rate

Source: KILM 4th edition, 2006

with that of the USA. It can be seen that India and China, though improving on these factors relative, still have a long way to go to catch up with the USA and meet the predictions of Goldman Sachs.

Importance of Being a Global Hub

India has an ambitious plan to hike its growth rate to the level of about 9% during its Eleventh Five Year Plan. It plans to achieve this ambitious growth through the augmentation of individual growth in agriculture, industry and services by consistent levels of 4%, 12% and 10% respectively, throughout the Plan period. If these high growth levels are to be achieved and sustained, it would be possible only by focusing on its strengths leading to its competitiveness amongst the global nations. India should be a global competitor in those factors so that the gains of such a position can be advantageously converted into higher standards of living for its population. In this era of globalisation, economies of scale and scope can be achieved only through operations on a Global Hub basis.

We would discuss the factors which are in favour of India operating as a global hub to create wealth.

Leveraging Labour Productivity

The two Asian economies, India and China, have been registering continuous improvement in labour productivity. The highest labour productivity growth has been recorded from China mainland at 6.94 per cent per annum during 1990-2003, whereas in India, labour productivity has grown at the rate 4.31% per cent per annum for the same period (Table 3).

Manufacturing Labour Productivity of India has been found growing at the rate of 6.06 per cent per annum during 1990-2003.

Table 4: Sectoral real growth rates in India's GDP at factor cost

Item	Percentage change over the previous year						
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06 (Q)	2006-07 (A)
I. Agriculture & Allied	-0.2	6.3	-7.2	10.0	0.0	6.0	2.7
II. Industry	6.4	2.7	7.1	7.4	9.8	9.6	10.0
Manufacturing	7.7	2.5	6.8	6.6	8.7	9.1	11.3
III. Services	5.7	7.2	7.4	8.5	9.6	9.8	11.2
Total GDP at factor cost	4.4	5.8	3.8	8.5	7.5	9.0	9.2

Source: Economic Survey, 2006-07

The large size of the labour population and the advantage of its demography in terms of a profile of continuously growing young workforce create a natural advantage for India to be a Global Hub for manufacturing and industry-oriented services. This trend is becoming already evident by the fact that all major automobile manufacturers of the world, namely, Ford, General Motors, Toyota, Honda etc have manufacturing bases in India and the production operations of these plants and their suppliers in India are not only catering to the domestic market but are also increasingly contributing to the global export markets.

Global Agriculture Production Hub

The improvements in agricultural productivity in India, have, on average, been less than the growth in overall productivity during the 1990s and early 2000s, although agriculture is the main provider of jobs. India, one of the best performers in the 1980s in terms of increase in agricultural productivity, has shown an increase of only 1.41 per cent per annum during 1990-2003.

India's farming system is traditionally geared for subsistence and not tailored to compete in the international trading of agricultural products. The landholding pattern in the country with each farmer holding not more than an average acre of land creates hurdles for large-scale mechanization and contract farming. This practice has provided vast advantages to trading nations like USA who export large quantities of agricultural products. Even those nations with very high agricultural productivity levels, provide substantial subsidies to their farmers to make them competitive in the global markets.

India has certain natural advantages for its farming sector as well like the availability of a large percentage of fertile land and suitable climate for multiple crop farming. It has the highest cattle population in the world and also produces the largest quantum of milk and vegetables in the world. The productivity levels, however, need to be

improved vastly through infrastructure augmentation like provision of cold storages and efficient food processing practices, to improve the value addition to these agricultural products.

India also has high potential for organic farming products which fetch a premium in the global markets. The traditional farming practices with the usage of natural manures, organic and bio-pesticides, small-scale local irrigation systems and food preservation methodologies, if properly utilized by scientific management techniques, can make global hub services in organic farming products from India a reality.

Global Services Hub

The economic survey of India (2006-07) estimates the growth of GDP at factor cost at 1999-2000 prices for the year 2006-07, at 9.2 per cent. In the last five years (2002-03 to 2006-07) the service sector has contributed the highest 68.5 per cent to the overall average growth in GDP. The share of industry and services improved to 26.4 per cent and 55.1 per cent respectively, while that of agriculture declined to 18.5 per cent in 2006-07. Among the sub-sectors of services, "Trade, Hotels, Transport and Communication services" have continued to boost the economy.

The success of India's service sectors in the Information Technology Services and Information Technology Enabled Services has been a well documented story. The advantage of a large proportion of scientists and engineers being produced by the Indian educational institutes and their proficiency in the English language makes India a natural choice for the global organizations to outsource their IT services to us. India has global leadership position in banking and financial services software exports. The other fields that are emerging as interesting markets for the Indian IT sectors are animation, games, telecommunications and manufacturing automation.

Health services are another sector where India can function as a global hub. India produces a large number of medical and para-medical professionals who have an international reputation for their quality of services. This, combined with the low cost of hospital services in India, has been attracting a large number of international patients to choose India as a destination to get treatment. Added to this, India has a vast potential of talent in the traditional medicines of Ayurveda, Yoga etc and can become a global hub for the provision of integrated and holistic health.

Considering the intellectual capabilities of Indian scientists and engineers, all global giants in IT, communications, pharmaceuticals etc. have set up their Research and Development bases in India. Intel, General Electric,

IBM, Microsoft, Glaxo are some names that have already established large R&D laboratories in India which cater to their global operations. India also has a large matrix of scientific research institutions in the public sector and combined with its vast university and educational base, can provide global hub services for R&D and its commercialization.

Financial and tourism services are also growing in India to reach global competitive levels in the coming decade.

Factors that need attention in the path towards Global Hub

Table 5 gives a list of India's competitive advantages

Table 5: India's Competitive Advantages and Disadvantages

	Advantages	Disadvantages
Economic Performance	Relocation of R&D facilities is not a threat to the future of your economy (survey)	GDP (PPP) per capita Estimates : US\$ per capita at purchasing power parity
	Relocation of services is not a threat to the future of your economy (survey)	GDP per capita US\$ per capita
	Relocation of production is not a threat to the future of your economy (survey)	Portfolio investment assets US\$ billions
	Cost of living index (Index of basket of goods & services in major cities; excluding housing (New York = 100)	Export of goods (% of GDP)
	Resilience of the economy to the economy cycle is strong (survey)	Trade to GDP Ratio (Export + Imports) / (2*GDP)
Govt. Efficiency	Effective personal income tax rate (% of an income equal to GDP per capita)	Bribing and corruption do not exist in your economy (survey)
	Employees social security contribution rate compulsory contribution as a % of an income equal to GDP per capita	Corporate tax rate on profit Maximum tax rate, calculated on profit before tax
	Employer's social security contribution rate compulsory contribution as a % of an income equal to GDP per capita	Government budget surplus/deficit % of GDP
	Management of public finances over the next two years is likely to improve (survey)	Country Credit rating on a scale of 0-100 assessed by the Institutional Investor Magazine ranking
	Total reserves including gold and official reserves (gold = SDR 35 per ounce)	Start-up days: Number of days to start a business
Business Efficiency	Remuneration in services professions (Gross annual income including supplements such as bonuses in US\$)	Overall Productivity Estimates: GDP (PPP) per person employed US\$
	Working hours (Average number of working hours per year)	Female labour force (% of total labour force)
	Compensation levels (Estimates: Total hourly compensation for manufacturing workers (wages + supplementary benefits) US\$)	Value traded on stock markets US\$ per capita
	Skilled labour is readily available	Unit labour costs in the manufacturing sector % change
	Remuneration of management Total base salary plus bonuses and long term incentives, US\$	Labour force (% of population)
Infrastructure	Mobile telephone costs Prepaid cellular tariffs-US\$ per 1 minute (local)	Pupil-teacher ratio (primary education) Ratio of students to teaching staff
	Qualified engineers are available in your labour market (survey)	Medical assistance (no. of inhabitants per physician and per nurse)
	Science in schools is sufficiently emphasized (survey)	Mobile telephone subscribers (No. of subscribers per 1000 inhabitants)
	Youth interest in science is strong (survey)	Internet users (no. of internet users per 1000 people)
	Internet costs cost for 20 hours dial up per month, US\$	Computer per capita (No. of computers per 1000 people)

Source: IMD 2006

and disadvantages, as identified in the Competitiveness Report. India's competitive advantage lies in the availability of skilled manpower in terms of absolute numbers. This is mainly because of India's huge population, even though labour force as a percentage to total population is not encouraging. Though the service sector in India accounts for 54.1 per cent of the GDP in 2005-06, India's share in world commercial services was only 1.9 per cent. The growth in the Indian service sector is attributed to its competitive advantage in working hours, compensation levels i.e., the remuneration of service professionals as well as management. However, the factors contributing to the competitiveness of the Government efficiency, business efficiency and infrastructure need to be looked into for their constant upgradation.

Role of the National Productivity Council

To achieve all the above competencies and become a globally important player, productivity efforts need to be augmented and further maintained at continuously sustainable levels. Productivity should not only be reflected in the physical factors of measurement of the performance of enterprises but also must be reflected in the positive attitude towards continuous improvement.

For the last five decades the National Productivity Council (NPC) has been actively engaged in the promotion of productivity in India both at macro as well as micro levels through its consultancy and training services. NPC teams up with the enterprises with a view to evolve implementable programmes for accelerating productivity, increase profitability, foster rapid growth, diversify markets, enhance safety and reliability, ensure better quality, provide reliable database for decision making, improve work culture, redesign systems and procedures, impart training and other related measures.

NPC offers total solutions, and also specific services, depending upon the complexity of the situation through multidisciplinary and participative problem solving approaches. NPC also associates closely with the customers in monitoring, reviewing and implementing the identified strategies including the techno-economic evaluation of existing systems and procedures.

India's growth is closely dependent on the growth of its economic enterprises for both national and international competitiveness. NPC's services towards improving competitiveness of the enterprises covers a wide gamut of management and technological services like Total Quality Management (TQM), Six Sigma, Kaizen, 5 S, Cleaner Production, Total Productivity Maintenance, Energy Audit, Benchmarking, Supply Chain Management, ISO 9000, ISO 14000, HACCP etc.

In India, the National Productivity Council has been the first to pioneer many of these techniques by providing Indian executives with the relevant expertise through its international contacts like Asian Productivity Organisation (APO), ILO, UNDP etc. NPC plans to continuously upgrade its services and bring in the latest state of the art productivity techniques to contribute to making India a Global Productivity Hub and reach its vision to be on top of the world.

The mission of the productivity movement is to promote consciousness and disseminate knowledge and experience in productivity towards higher economic performance and improved standards of living. Such ambitious requirements can be achieved only through a holistic networking of institutions from different sectors as well the Government.

□

Knowledge management is not a tool to make money, but a way of life, because it shares individual visions, dreams, and what we believe for the future.

– Ikujiro Nonaka

Corporate Social Responsibility: Current Context and Future Directions

Iwao Taka

At the outset it is important to relate corporate social responsibility (CSR) to the sustainable development of societies. This is best approached from five distinct areas: 1. The kind of issues the concept of CSR covers; 2. Why CSR is required, especially in relation to business organizations; 3. Major challenges at the global level, such as the United Nations (UN) Global Compact and also the International Organization for Standardization (ISO) initiative; 4. Institutional changes involving CSR underway in Japan; and 5. ECS2000, an evolving Japanese ethical/legal compliance management system standard.

Iwao Taka, Reitaku University.

Scope of CSR

What issues does CSR cover? There are three groups of issues: legal compliance, ethical practices, and social contributions. Legal compliance means corporate acts that comply with the letter of laws and regulations, including those that are related to human rights, environment, labour, or consumer protection. Ethical practices denote corporate acts that comply with not only the letter but also the spirit of laws and regulations. Social contributions are how companies act to help others and bring about positive impacts and influences in the community, environment, and for future generations. Recently, the concept of social contribution is likely to be understood in a much broader sense, going beyond a purely monetary donation to include action to overcome ethical dilemmas that a business organization might face.

Table 1 explains how those three groups of issues are related. It shows two dimensions. Justice means that CSR covers issues of justice, right or wrong, and fair or unfair. Humanity means issues of good/bad for others, and helpful/harmful for others. Basic means an organization's basic commitment to CSR.

Using these two axes, there are four boxes:

- Phase 1, Legal Compliance: The compliance section or the ethics office is mainly concerned with establishing the legal way to avoid the application of laws. The objective is to find the loophole that makes it possible to avoid the reach of the law. If international agreements are ratified and codified into domestic laws, companies at this level will try to comply with international agreements; but other than that, companies will not comply with such agreements willingly.
- Phase 2a, Ethical Practices: Companies try to

avoid any action resulting in a negative impact on others and any action that might cause harm or damage to others.

- Phase 2b, Ethical Practices: Companies comply with not only the letter but also the spirit of the law. Even if international agreements are not ratified or codified into domestic laws, companies at this level will try to understand and put those spirits into practice.
- Phase 4, Social Contributions: Companies exert positive influences and impacts to help others or, for example, develop environmentally friendly technologies.

Table 1: Three phases in CSR

Basic	Phase 1. Legal compliance Do no wrong Do not be deceptive Do not steal Letter of the law	Phase 2a. Ethical practices Do not harm others Do not harm community Respect human rights Be considerate
Full	Phase 2b. Ethical practices Do right Be honest Be fair Spirit of the law	Phase 3. Social contribution Help others Improve community Promote human dignity Be courageous
	Justice	Humanity

Source: Adapted and developed from Lynn Sharp Paine, *Value Shift: Why Companies Must Merge Social and Financial Imperatives to Achieve Superior Performance*, McGraw-Hill Education, 2003.

Moving beyond this framework, an actual business case relating to anti-corruption shows how these issues are related when the company aims to avoid unfair benefits to foreign officials. With regard to legal compliance, in Japan, there is a law that bans corporations from providing unfair benefits to foreign officials or politicians with the intent to receive unfair favours from them in return. Until 2004, this law was enforced only if elements of the offence occurred within Japan. Therefore, a dishonest company could avoid application of this law merely by issuing a simple instruction to employees that when they are out of Japan, if they are asked some favour by foreign officials, they should not ask Japanese headquarters but decide which course of action to take by themselves.

In practical terms, this means that receiving an e-mail or a fax would show that elements of the offence occurred in Japan. At this level, the company is adhering to legal compliance. If it progresses to the second phase of ethical practices, it takes into account why those laws were created and tries to avoid providing unfair benefits to foreign officials. If the company behaves according to 'Ethi-

cal Practices' (Table 1), it is likely to think that an act of bribery is the kind of action that can cause harm to the country in which it is operating. Because, for example, if the company provides unfair benefits to foreign officials in order to make a successful bid for a national infrastructure project, then those foreign officials or persons with privilege would become richer than in the case when the company did not provide such unfair benefits. In addition, the cost of the project would probably be significantly greater than in the case when the company did not provide a bribe to foreign officials. The higher cost of that project would probably be covered by taxpayers and, therefore, an act of bribery will harm society. Providing bribes might distort fair income distribution, thereby destroying the justice and the welfare of the country. This would provide the rationale for companies at this level to refrain from providing unfair benefits to foreign officials.

As previously mentioned, social contribution is not just providing monetary donations but includes practical or creative action making it possible to overcome ethical dilemmas. Here is a real example. One American multinational wanted to do business in a developing country. It submitted materials for approval, but a couple of weeks before signing a contract, a representative of that company was asked to provide a favour to a high-ranking official of that country. The representative faced an ethical dilemma. He knew only too well that this kind of action is clearly against American law (i.e., the Foreign Corrupt Practices Act,) but at the same time the company was eager to do business there. After an intensive series of discussions among senior management, the company decided to provide money to the foreign official but in a creative manner. They provided the money transparently; in a way that everybody knew the money transaction through the foreign official was for a national environmental protection project. In this case, the company benefits because it can do business in a country. The second party, the foreign official, even if he did not receive any money, still benefited because the people in the country thought that project was promoted thanks to the official's efforts.

Therefore, the second party also benefited from this decision. The third party—society and the future generations—also benefited from the project, and thus it created win-win situation.

Why CSR Is Necessary

Why is CSR required? There are two levels of reasons. The first relates to globalization itself. In a sense, globalization is the creation of a new business era when a business corporation can enjoy an enormous amount of freedom. There is no single government or single law

enforcement body to apply the same laws and regulations to all players. International agreements exist but can easily be ignored in a number of countries.

In addition, most developing countries have very comprehensive laws and regulations but lack effective infrastructure to enforce them. Some developing countries might deregulate their standards or regulations in the fields of environment and labour because they want to attract more foreign capital. Thus business corporations that are operating worldwide enjoy an enormous amount of freedom today. However, freedom should be followed by responsibility. In the absence of responsibility, globalization itself might come to a dead end. This is one reason why business corporations are now trying to develop CSR policies and also trying to establish internal systems that make it possible to reduce negative impacts and increase the positive influences over external stakeholders.

The second driver of CSR varies from country to country and region to region. Each society has different issues to be solved with the help of a business corporation. People in the USA suggest that American corporations have been externalizing costs in order to report ever-increasing quarterly earnings, with costs passed on to everybody except for shareholders, such as consumers, workers, or the environment and community. In order to rectify such an excessively shareholder-centered management style in the USA, CSR is emphasized.

In Japan too, excessive CEO-centered management styles have also been criticized. Shareholders' meetings do not work properly and boards of directors are not functioning as the Japanese commercial law expected. Even labour unions do not play their own role properly. The problem was that CEOs had excessive power and could decide whatever they wanted. Until the early 1990s, this characteristic of Japanese management worked to the benefit of Japanese corporations because, with a long-term perspective, top managers could decide whatever they wanted very quickly. However, after the mid-1990s and especially after the long-lasting recession, this trait began to work to the detriment of Japanese corporations and society. In order to protect their own personal position, some top managers in companies began to be involved in unethical or illegal activity. As a consequence, in Japan, society expects business corporations to be much more ethical and more accountable than ever. The issue now is how to establish integrity in business corporations.

Drivers and Changes at the Global Level

CSR is reflected in major global challenges. One of

most well-known is the UN Global Compact. This was started in response to a keynote address made by UN Secretary General Kofi Anan at the World Economic Forum in Davos in 1999. In his address, Anan asked world business leaders to make more efforts to solve world issues in the fields of labour, environment, and human rights. The UN then set up the Global Compact Initiative and asked a number of business organizations to participate. The Global Compact was drawn from nine principles based upon international agreements, such as the UN Declaration of Human Rights, the International Labour Organisation's core conventions, and the Rio Declaration on Environment and Development. A tenth principle, the UN convention against corruption, was added in 2004. There are now more than 1,500 organizations participating in this initiative.

One of the challenges that the UN Global Compact has is that the participants do not have any specific obligations. Companies simply have to report on their commitment to CSR in their annual report once a year. This is a purely voluntary initiative. People have called for a framework that convinces us how seriously business organizations commit to CSR activities. One of the possible means might be an ISO approach.

In 2002, the Consumer Policy Committee (COPOLCO), one of the major councils of the ISO, recommended at the annual meeting that the ISO should explore the desirability and feasibility of CSR standards. In response, the ISO Council established the Strategic Advisory Group (SAG). This group discussed the desirability/feasibility of an ISO/CSR standard for more than one and a half years and failed to reach a conclusion. Its report highlighted the advantages and disadvantages of creating a new standard.

The opposing group insisted that we do not have a commonly held definition of CSR. How can we create a third-generation standard without having a definition, without a common understanding of elements of CSR? The supporting group insisted that the definition and a common understanding over elements are not so important. In the past, ISO14000 was created when there was the same debate that "we do not have a common definition or understanding of environmental protection". Therefore, it is possible to develop a third-generation standard even if we do not have a commonly held definition of CSR or a common understanding of its elements. The supporting group also insisted that if the ISO does not take the leadership role in developing CSR standards, and there are already more than 11 national CSR standards from both developed and developing countries, there is a risk that one of the existing national standards might become

the de facto international standard. This is not desirable, as all countries and ISO member bodies want to participate in the process of developing a CSR standard.

However, if one of the existing standards were to become the international standard, the rest of the member bodies would eventually be excluded from the development processes.

To avoid this, the ISO should take a leadership role in developing an ISO/CSR standard. In response, the opposing group argued that what is needed in the field of CSR is not the old-type management system standard, like ISO9000 or ISO14000. Those standards were process oriented and required organizations to establish internal processes, conduct education, and promote communication among members. However, even with ISO9000 or ISO14000 certification, organizations only have a certificate attached to the wall of the building entrance. Performance of quality or the performance of environmental protection has not been improved at all. The opposing group, mainly from industry, wanted to avoid the same mistake. If ISO wants to create a new standard, it should be result oriented, not process oriented. Moreover, the 11 CSR national standards already created by national bodies are all process oriented. If the objective is to create an international standard, this will probably not be a result - but a process-oriented standard. Therefore, it is not worth creating a standard.

In any case, after the publication of the report and an international conference, the ISO formally decided the following in June 2004:

1. The ISO should create a guidance document but this should not be used as a third party certification framework.
2. The ISO should facilitate experts from NGOs, consumers, and industries to participate in the standard development processes (this is the key.)
3. The ISO expects the project to be conducted under the leadership of developed and developing countries. This involves "twin leadership" from Brazil and Sweden in developing an SR standard (the ISO called this standard an SR standard because it will be applied not only to business organizations but to all types of organizations.)
4. The ISO expects the SR guidance document to be published in early 2008. Thus we have reached a point where the ISO's decision cannot easily be reversed.

Institutional Changes Involving CSR in Japan and ECS2000

(Japanese ethical/legal compliance management system standard)

Merely proclaiming the importance of CSR is not enough to motivate or encourage business corporations to pursue CSR activities. It is necessary to create new social or legal regulatory environments where business people can really feel that organizational commitment to CSR constitutes an important element in maintaining a competitive edge in the market. This has provided the context for facilitating institutional changes by the private and public sectors in Japan, of which three stand out.

The first institutional change is the creation of an ethical/legal compliance management system known as ECS2000. In 1991, Keidanren, Japan's most influential business roundtable, published its charter of business conduct and asked member corporations to adopt it. In 1996, Keidanren revised that charter to make it easier for member corporations to use it in a daily business context. However, the following year, it came to light that some of the major Keidanren corporations had long been involved in wrongdoing. As a result, Keidanren was criticized by many in Japan and could not take any further action on this model at that time. In the light of this impasse, another business roundtable, Kankeiren with headquarters located in the Kansai area, started its new Business and Society Project. In its report, it concluded that publishing codes of conduct is not enough for business corporations. What is needed are effective internal systems and processes, which make it possible for business organizations to comply with not only the letter but also the spirit of the law and regulations.

In response to that conclusion, I organized my project at Reitaku University called the ECS2000 Initiative. This was created with the help of 22 experts including lawyers, certified public accountants, business practitioners, and business consultants. In 1999, we published the ethical/legal compliance management system standard that showed what corporations have to do to establish effective internal systems. In 2000, after receiving feedback from business practitioners, we revised the ECS2000 and published the Guidance Document, which shows how to apply ECS2000 to a daily business context.

There are now more than 500 Japanese listed corporations using ECS2000 to establish and improve their internal systems.

After the publication of ECS2000, the public sector started similar projects. The Cabinet Office published the Codes of Conduct Guidelines which requires business organizations to develop their own codes of conduct and also establish effective internal systems enabling those codes of conduct to be put into practice. At the same time, the Ministry of Economy, Trade and Industry also published the Internal Control Guidelines as a basis of risk management. Consequently, Japanese corporations are changing very rapidly.

Another institutional change is the legislation of Public Interests Disclosure Act, a whistle-blower protection act. In recent years, Japan has witnessed an increasing number of whistle-blowing cases, which looks set to increase further. While some Japanese criticized whistle-blowing as an act of treachery, whistle-blowing continues to play a very important role in making society fairer and safer. This led to the Public Interests Disclosure Act which used British law as its basis. Its key elements are:

1. When whistle-blowers report wrongdoing, they must do it in the public interest. If this is done for their own personal benefit and the report discloses wrongdoing, the damage caused by the company might not be recovered from.
2. When a whistle-blower discloses wrongdoing, he or she must do it internally. If he or she does not report it internally first and reports it to the mass media or third-party agencies, the damage caused by the company might not be recovered from.
3. If a number of conditions are satisfied, whistle-blowers do not need to report the wrongdoing internally and they can report it externally. The first requirement is if reporters reasonably feel that an act of reporting would cause direct or indirect damage to them, they do not need to report internally and they can report it externally. The second requirement is if reporters reasonably foresee that an act of reporting would cause a distraction of evidence, data, or documents, or the falsification of data, then they do not need to report it internally and they can report it externally. Finally, after having reported the wrongdoing internally, if the reporters do not receive any response from the internal section within a certain period of time, then they can report it externally. As a result of the Public Interests Disclosure Act, an increasing number of Japanese corporations have been establishing effective internal systems and ethics hotlines. In order to protect the privacy and confidentiality of reporters, a number of Japanese corporations

have also been using outside, third-party service providers.

The third institutional change is the rise of the Japanese version of socially responsible investment (SRI). SRI is a new type of investment movement in response to social expectations of investors. Social investors are people who want to improve conditions in society by investing their money in shares, by divesting their money from shares, or by exercising shareholders' rights. For example, in the USA in the early 20th century, Christian groups began to ask financial institutions not to invest their money in so-called sinful industries, such as tobacco companies, alcohol businesses, gambling-related businesses, excessive loan providers, nuclear power plants, and weapon-related businesses. Based upon a religious belief, they therefore made decisions about which industries they should invest in. This movement has expanded to include not only Christian groups but also investment groups who want to change society not only in terms of Christian values, but also in terms of human rights, labour, and environment.

In Japan, it is likely that this type of SRI would not be welcomed by a majority of people. The American type of SRI is basically Christian value oriented, and the method of excluding some businesses from the SRI portfolio is called negative screening. This is not rational as such because it is only based upon religious values. Japanese implicitly think that this might promote social discrimination against specific industries or jobs. In Japan, what kind of products and services companies are providing is secondary. The key point is how sincerely and how faithfully corporations and workers are performing.

Even so, after the mid-1990s, Japanese society as a whole showed a much keener interest in how corporations are ethical and accountable. Moreover, society expects that the ethics of a corporation should be established on unshakable integrity. Taking into account this Japanese cultural trait, and also ever-increasing expectations, led to the RBEC001 project. This is the name of a new type of screening method and framework with focus on the integrity of business organizations. This framework is public, and any rating agency can use it freely. In this way the R-BEC001 framework enables companies' rating agencies to evaluate how seriously top management are committed to CSR and how their ethical/legal compliance internal systems are functioning. Japanese corporations are taking into account evaluation by R-BEC001 and improving their internal systems. In 2004, Daiwa Securities released a new type of SRI fund which is the biggest in Japan, except for the environmental fund, because Daiwa Securities' SRI fund is based on RBEC001.

As a consequence of these institutional changes in Japan, an increasing number of corporations has been promoting a commitment to CSR and especially improving integrity in their accountability. What does ECS2000 require companies to do? First, companies need to create codes of conduct but unfortunately most tend just to imitate or copy other companies. With regard to codes of conduct, the first thing that the corporation has to do is to analyze what kind of risk they have, any infringement of relevant laws and regulations, and any deviancy from social norms or international agreements. The code of conduct may be drafted or revised only after analyzing and understanding the risk.

In this connection, there is an interesting study. After Enron collapsed, its code of conduct was sold by its employees on the Internet auction site "eBay" with a comment saying: "it is brand-new because it has never been read". What I want to say is if companies simply copy each other's codes of conduct, then it is likely that they too will never be read by employees and ethics will never be taken seriously by them.

Subsidiaries are likely to have more risks than the parent company as they might more often be involved in conflicts of interest. Working conditions in subsidiaries might not be as good as those in the parent company. However, if all subsidiaries are using the same brand as the parent company, one single wrongdoing in a subsidiary will affect the entire corporate group, including the parent company. This is a kind of collateral risk that can affect corporate reputation. In industry, most assemblers try to externalize their work to suppliers but if they do so without adequate controls and monitoring mechanisms, then assemblers might increase infringement or deviancy risks because suppliers might use illegal materials, or substandard workforce methods. For example, the final product might be made of hazardous materials or some parts might be made by child or forced labour.

Even if assemblers are not involved in this process directly, once those products are manufactured in such a way, they could be blamed. Supply chains carry risks. When businesses start to use new technologies or start businesses overseas, they can create another set of new risks because a new type of technology can be followed by a new set of standard regulations. If a new business is set up overseas, a new set of laws and regulations may need to be taken into account. Therefore, when businesses innovate and attempt something new, they must analyze and understand newly emerging risks comprehensively.

After creating codes of conduct and also creating

implementation plans, the organization will probably have to establish an ethics office or another section in charge of ethical/legal compliance. Employees will almost intuitively know how seriously top management is committed to CSR by judging how those sections are created and how much authority is given to them. If enough resources, budget, or talent is not assigned to these areas, employees will intuitively know the company's commitment to CSR is just a part of its public persona and is not grounded in what it really believes and values, even if top management uses the right soundbites to the public.

The ethics office or team must provide training to managers and employees. This needs to be based on risk analysis, too. To meet the needs of each section and each job, ethics training should be differentiated and provided to different sections and job functions. For example, retailers have register counters. At the register counter, there is usually a donation box. If every time money in the register machine is short, the manager takes money out of the donation box to make the account "balance," this means that the ethics training programme for those stores needs to address the manager's responsibility and donation box. No matter how comprehensive and sophisticated the ethics training given to managers and employees, there is always the possibility that at some point someone might be involved in unethical activity. It is inevitable. Therefore, the organization must have some mechanism in place to prevent such a development from arising or worsening which can identify facts or symptoms of wrongdoing. This is where there is a role for an ethics helpline or hotline. When employees discover wrongdoing and report it, they should do so under their real names. If they report the wrongdoing anonymously, the company can face real difficulties, because after the first round of investigations based upon the original reporter's report, and if the company cannot find anything wrong, no further investigation can be made. This is not desirable for the reporter and the company itself. As employees may hesitate to report under their real names, there should be reliable internal systems that make it possible for the ethics office personnel to communicate with reporters while safeguarding their privacy and confidentiality.

One possibility is using third-party providers, such as lawyers and independent research companies. In recent years, an increasing number of Japanese independent research companies have started services for ethics hotlines. They do not give any advice to reporters but receive reports from employees of the companies they have contracted with. After receiving the report, they transfer it to the company without revealing e-mail addresses

or the reporters' names. In this way, the privacy and confidentiality of the reporters is protected, with the independent research companies taking the role of mere conduits of the information.

In summary, the basics of business have been radically changing at the same time as the prevalent policies of government. These changes are prompting business organizations to be involved in CSR, whether we wait

and see what will happen next or whether we take a leadership role is in our hands. However, I hope that business leaders and policymakers take collective leadership to contribute to the realization of sustainable development in Asia and across the world.

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Globalization can be made to work, and work in a way that the number of people in poverty is reduced. But it has not been working that way.

– Joseph Stiglitz

Corporate Social Responsibility— Why it Matters, What it Means and Where it is going

Arif Zaman

This paper deals with the meaning, importance and future of Corporate Social Responsibility.

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Tepco, Parmalat and Enron—these names, by the admission of senior executives in all companies, are now synonymous with corporate irresponsibility. Indeed, the issue of trust—in business, governments, media and pressure groups in particular—is perhaps one of the most urgent challenges of our time and one that has no borders. This was highlighted at successive Davos Economic Summits and can also be seen in the broader context of confidence—by customers, employees, shareholders, and also communities—in business policy and its translation into practice. Corporate social responsibility (CSR) and socially responsible investment (SRI) have provided opportunities for companies to align their activities with broader societal expectations. But there is still a view that this is window-dressing and does not go to the heart of the business. CSR refers to business practices characterized by extensive disclosure and transparency, which companies initiate to fulfil ethical responsibilities towards employees, communities, and the environment. The emphasis is on creating not only sustainable shareholder value but also sustainable social value. SRI is an investment approach which, in addition to conventional financial criteria, evaluates and selects companies on the basis of social and ethical criteria such as legal compliance, employment practices, human rights, consumer issues, contribution to community, and environmental issues, while seeking stable returns. However, SRI also includes financing motivated by social justice and community contribution and the exercise of shareholders' rights.

A number of major global trends in CSR and SRI can be identified. There is a growing connection to corporate governance through reporting—for example in the U.K., changes to company law suggest that information about a company's relationships with its employees, as well as its policies and performance on environmental,

The Business in Society



Fig. 1. Stakeholders and society

Source: Diagram by Mallen Baker, use freely.

social, and community issues can be subjected to an informed assessment by investors and others. The G8 Summit in Evian concluded that “sound social frameworks and attention to the long-term impacts, including on the environment, of investment decisions, and business processes are also important for sustainable growth.” There is also increasing development of major global voluntary standards such as ISO and OECD Guidelines for Multi-national Enterprises. Though interest in SRI is increasing, more importantly social issues now increasingly influence mainstream investors such as Nomura, Nikko Salomon Smith Barney or Standard Life Investments.

These developments in CSR and SRI have now reached Japan. Some characteristics of CSR in Japan can be seen in Table 1 which compares categories for SRI in each of the financial centres of the UK, USA, and Japan. While UK and USA approaches emphasize human rights and excluded items, the criteria in Japan specify consumer orientation and disclosure. Most Japanese SRI funds include strong consumer corporate brands such as Sony and Toyota. This—together with a number of high profile scandals—has meant that corporate responsibility in Japan has been strongly associated with relationships with customers, as individuals make judgements about companies in relation to their “experience” as customers but in their “behaviour” as investors.

Table 1: Comparative categories for SRI categories

EIRIS (UK)	KLD (USA)	Asahi Shimbun Foundation (Japan)
1. Corporate ethical guidelines	1. Contributions	1. Consideration towards Employees
2. Customer/supplier Relationship	2. Diversity of Employment	2. Emphasis on families
3. Workplace safety/cleanliness	3. Labor relations	3. Ease of work for women
4. Workers' rights	4. Operations outside the U.S	4. Employment of physically disabled
5. Equal opportunity/diversity in employment	5. Product considerations	5. Globalization of employment
6. Employee compensation	6. Executive compensation	6. Consumer orientation
7. Training and development of employees	7. Excluded items (alcohol, tobacco, gambling, defence, nuclear power)	7. Harmony with community
8. Job creation and society		8. Support for security
9. Community service activities		9. Environmental preservation
10. Supply chain		10. Disclosure
11. Human rights at overseas operations		11. Corporate ethics

CSR is about companies taking into account their

complete impact on society and the environment, not just their impact on the economy.

There are seven reasons why CSR matters:

1. Moral and ethical reasons—to 'do the right thing'
2. Sustainability of the markets companies rely upon for income
3. Brand image/reputation
4. Employee/stakeholder motivation
5. To enable the company to respond proactively to changing stakeholder agendas and be able to cooperate effectively under a range of business conditions
6. To account positively on its performance to stakeholders in a way that will enhance the company's reputation
7. To provide managers with a framework for managing the business in a more holistic manner.

There is currently an almost bewildering array of Institutional CSR initiatives. However, stakeholders such as governments, business and civil society groups have identified a range of significant weaknesses in current approaches to promoting CSR:

- An over-proliferation of CSR initiatives at the international level and lack of clarity about how these initiatives relate to each other;
- An excessive focus on getting businesses to make commitments to CSR and not enough focus on enabling them to implement them;
- An absence of credible monitoring and verification processes;
- A lack of engagement with developing country governments and their sustainable development priorities (e.g., economic development and poverty reduction);
- A failure to bridge the governance gap created by weak public sector governance of the private sector in many developing countries;
- Limited impact on sustainable development goals;
- A lack of government involvement and/or investment in international CSR initiatives, which is contributing significantly to their under-performance.

Despite the volumes of paper and the number of

events, the CSR (and corporate governance debate in Europe and the USA) while contributing to heightened awareness of the issue has significant drawbacks which are seldom acknowledged.

1. *Reputational risks of CSR advocates:* The experience of Shell and Ahold, by their own admission and among others, has underlined the limitations of pursuing CSR in a context in which corporate governance and leadership is weak. It has also fuelled the charges of CSR by some as corporate spin or 'greenwashing,' justifiably or not. At the same time, variable standards and a lack of transparency by a growing number of (western) NGOs which undertake advocacy, consultancy and third-party auditing, all too often in tandem, continues to constrain confidence in the processes involved.

2. *A lack of understanding of how corporate governance links to CSR:* While there is much noise there is still surprisingly little that sets out, in succinct and clear language, how the two are related. There is an imbalance in the CSR debate which fails to distinguish where CSR relates—and does not relate—to corporate governance. In this area recent developments in the UK at the Commonwealth Business Council in particular, and also the OECD are of note as well as policyorientated research at Henley Management College. At the same time, the significance of developments in Asia, especially Japan, which links the two areas is being increasingly recognized.¹ Moreover, in developing countries it is important to highlight not just why but how responsible behaviour and good governance can contribute to a more favourable investment climate.

3. *A lack of understanding of what CSR means—and how it is perceived—in an Asian context:* This has several dimensions. As Canon in Japan recently noted, the Anglo-Saxon debate on corporate responsibility seems to be centered only on their historical and social criteria, which naturally deal with Catholicism, Protestantism and Western European Individualism.² In addition, there is a risk that a strong and sustained focus on China and India does not crowd out visibility for innovative practice—and an appetite to learn—in other markets. Moreover, there is an increased need, post Iraq

1. A. Zaman, *Made in Japan—Converging Trends in Corporate Responsibility and Corporate Governance*, Royal Institute of International Affairs, London, 2003. See: <http://www.riia.org/pdf/research/sdp/MadeInJapan.pdf> (research undertaken at the Royal Institute of International Affairs 2002-03 funded by Henley Management College, Marks & Spencer with travel support from British Airways.)

2. *Sustainability Gearing Up* (report for UN Global Compact Meeting 24/06/04)

and a revived Doha trade development round in July 2004, to address a perception that, in the absence of dialogue, CSR is a simple extension of western standards as a proxy global standard and CSR operating as a non-tariff barrier to trade. This is especially sensitive in Asia with the ending of textile quotas from 2005 which will both accelerate competition among major exporting countries but pose particularly acute challenges for the dozen or so poor economies that depend heavily on clothing and textiles production. As the Department for International Development (DFID, UK) recently noted, inappropriate codes of conduct become a form of protectionism that prevents goods from the South being sold in the North. Exporters in developing countries can find the proliferation of regulations and standards hard to comply with. They often fear that "process standards" on the way products are made (such as the standards on labour, the working environment, or animal welfare) will lock their products out of developing country markets.³ As one UN Security Council member from a developing country asks, 'How can developing countries get those social standards, if they cannot earn enough? If there are no jobs, how can we have good jobs? How can we have good labour standards when there is no labour in the developing countries? There is no investment.'⁴ The language of CSR in the West increasingly needs to address a visible commitment to capacity building in the developing countries to enhance their ability to expand exports and trade as a means of promoting development...[and] poverty alleviation through trade.⁵

4. *A weak understanding of the dynamics of international trade and how diversified exports from developing countries for supply chains of global companies can contribute to SME development and poverty alleviation:* The private sector is the main driving force of industrial development in virtually all countries and—through changing patterns of international production, investment and trade—shapes the economic globalization process. A vibrant private sector building on the combined strength and linkages and relationships between large, medium, small and micro enterprises is an essential prerequisite for triggering economic dynamism, enhancing productivity, transferring and diffusing new industrial technologies, maintaining competitiveness, contributing to entrepreneurship development and ultimately poverty reduction—and reduced social and business risk.

4. Address by Munir Akram, Pakistan Ambassador to the UN and formerly to the WTO, to the SAARC Chamber of Commerce, 29/07/03, Islamabad.

5. Statement by Pakistan's Ambassador to the UN, Munir Akram, on Agenda Item 91(a): International Trade and Development in the Second Committee of the General Assembly (November 03, 2003). See: <http://www.un.int/pakistan/00home090803>

5. *A lack of sectoral specific context:* While the Extractive Industries Transparency Initiative (EITI) in the UK has relevance for a BP it is less clear what this means for an established international listed company in the financial services, media, retail or transport and logistics sectors where the consumer experience is so different. A profusion of questionnaires from a growing number of (western) rating agencies with a 'one size fits all' approach for diverse sectors is resulting in questionnaire fatigue on the part of companies.

6. *A lack of explicit focus on productivity:* Traditionally, the productivity debate has focused on its input-oriented economic and technological aspects. This view is being increasingly challenged and is a priority of the Dutch Presidency of the EU in 2004. The increasing focus on sustainable development, corporate governance, social responsibilities and ethics, and social auditing and standards represents a significant shift in the growth paradigm which acknowledges that social conditions also affect the rates of productivity growth. Productivity is more than working longer hours but also the about climate of trust that exists and the strength of relationships through which companies create value for key stakeholders such as employees, customers and shareholders and, increasingly, demonstrably responsive to society.

In the productivity debate in Europe, there is an excessive focus on the US experience rather the vibrant economies which have seen fast growth in Asia since 1961 when the intergovernmental organization, the Asian Productivity Organization (APO), was established and which are currently among the strongest worldwide (e.g., Japan, Malaysia, Thailand, Vietnam, India and Pakistan).

7. *An insufficient focus on capacity-building, training, and development, especially in developing countries:* A unique gathering of global companies, major investors and international policymakers at the UN in Tokyo in November 2003⁶ agreed that there has been too little focus in CSR and governance in these areas. Management education can play a critical role by building the human capacity and management capability to understand the issues in emerging markets and work towards solutions both for in-country personnel and local people. It is also one way to link to the next generation of leaders and board members. However, events on CSR and corporate governance whether in Europe or Asia where experts parachute in with set piece presentations are no

6. UN report available at <http://www.henleymc.ac.uk/henleyres03.nsf/pages/corr>. Meeting supported by UK Embassy in Japan, UN, Cable & Wireless, Japan Business Council in Europe and Reuters.

substitute for activities which build the confidence and trust as well as develop the capabilities and harness the creativity of those directly involved, especially decision-makers among policy-makers, companies, and investors from developing countries. In this, a trusted regional intergovernmental intermediary such as the APO which now spans a range of 20 Asian countries is key and much-needed.⁷

The issue of training and development on corporate governance and CSR is not limited to Asian countries: UK pension schemes recently acknowledged that only 25% of their trustees took part in formal training programs other than induction training.⁸ However, it is clear that the CSR agenda also has some important strengths, including:

- the high levels of commitment shown by some key leadership companies;
- the capacity for innovation and openness to change shown by a range of international CSR initiatives;
- the openness of leadership companies and CSR initiatives to working in partnership with a wide range of stakeholders, including the UN, governments, other businesses and civil society organizations, including at the local level in developing countries; and
- the growing recognition by leadership companies and organizations of the need for the CSR agenda to address public sector governance issues and to scale up the impact of CSR activities so that they can improve the delivery of sustainable development at a systemic level.

A wide range of CSR initiatives has emerged in recent years and include:

- voluntary codes and standards for corporate behavior;
- voluntary reporting guidelines;
- auditing/verification of reports, production processes, supply chain standards or products;
- policy frameworks, including reporting requirements, tax incentives, and enabling legislation;

- multi-stakeholder partnerships;
- work with supply chains; and
- dissemination of best practice.

Japanese companies are also increasingly conscious of CSR. In 2004, more than 20 of the firms on the *Morningstar* SRI index mentioned it in their reports to shareholders, compared with only three in the previous year. Last June, the ISO decided to standardize the social responsibility of businesses as global citizens. In Japan, the Ministry of Economy, Trade and Industry has been asking companies to cooperate by offering proposals and advice to the ISO. At the same time, Nippon Keidanren and its European counterpart, the Union of Industrial and Employer's Confederations of Europe (UNICE), recently agreed that the voluntary initiatives of companies are more important than setting up an international yardstick for CSR. One positive development is Mitsubishi Corporation's moves in sustainable development reporting and stakeholder engagement.

In Japan, however, the weakest link in CSR and SRI overall remains is its international application. This is reflected in decisions by asset managers to reduce their holdings in particular companies because of a shift to offshore manufacturing locations in more low-cost environments. Why should a company be any less responsible if it is closing down its operations in Malaysia and developing its activities—and employing local people—in Vietnam or India?

In fact, providing local producers with access to international markets is one way of reducing poverty. Support for small-and medium-sized enterprise development can be an important part of the CSR commitment of large companies. And improvements in social and environmental impact can go hand in hand with improvements in quality and management. Supporting enterprise development through long-term trading relationships and community investment is one of the most important ways that internationally listed companies can contribute to the fight against world poverty.

This is very relevant for Japan. Japan does not wholly accept the mainstream thinking of the Western aid community about development. It continues to believe that the East Asian development experience, to which Japan itself has made a significant contribution through aid, trade, and investment, provides a useful model. Japan's aid programme focuses on growth strategies, including industrial promotion and infrastructure development. These are, interestingly, exactly the areas where there appears to be an emerging consensus in approaches by the U.K., the U.S., and Japan.

7. Interestingly the APO organized a conference on social responsibility in Asia, involving six countries, as far back as 1982 which examined the practice of both foreign and local companies.

8. The Myners Principles and Occupational Pension Schemes, Volume 2 of '2. Findings from Quantitative Research,' 2004. See: <http://www.dwp.gov.uk/asd/asd5/summ2003-2004/213summ.pdf>

What is now needed is greater coordination between foreign direct investment (FDI) and development assistance policies and practice. Efforts by governments, NGOs, and donor agencies to build human capital typically lack the input of private sector expertise in countries that need that expertise most. There is an opportunity for large enterprises, impelled by skill shortages or social responsibility goals, to assist local firms and entrepreneurs in upgrading proficiency. There is also a role for partnerships in helping public institutions understand and adapt to the needs of local firms and larger companies. In a number of cases, Japanese corporate activities in poor countries are groundbreaking (such as Toyota's social investment in northern Pakistan.) Japan has made strong commitment to promote development via the UN and also through the Japan Bank for International Cooperation (JBIC) and the Japan International Cooperation Agency (JICA). Top Japanese manufacturing companies have also made FDI in some of the poorest countries in Asia. These commitments generate real potential (and relatively little effort) for SRI in Japan to link better with aid programs to increase capital flows to emerging markets and help build domestic capacity, reduce poverty and mitigate social risk. Indeed, Vietnam is increasingly looking to foreign private sector companies to demonstrate their commitment to reducing poverty.

Commonwealth Business Council Guidelines for Corporate Citizenship

There are many different definitions of "corporate citizenship" and "corporate social responsibility." The Commonwealth Business Council (CBC), established by the Commonwealth Heads of Government in 1997 to involve the private sector in the promotion of trade and investment, uses the term corporate citizenship with a definition developed from the work of the World Business Council on Sustainable Development:

"Corporate citizenship is the commitment of business to contribute to sustainable economic development, working with employees, their families, the local community, and society at large to improve the quality of life of all their stakeholders."

Business in the Commonwealth has become increasingly aware of its role in helping to make globalization work in a way that combines economic advance with social development. Indeed, many Commonwealth companies are leading the way by demonstrating good corporate citizenship in action, "living out" the business

Despite a perception that Western SRI funds support global development, recent evidence suggests that they singularly fail to do so. For Japan, CSR and SRI would have enormous potential if it were to become more closely aligned to mainstream development issues. The reality is that in the short to medium term four countries in Asia will be of increasing importance to Japan for their combination of trade potential, manufacturing costs, and the relative stages they have reached in economic and social development for regional security: China and India, but also Vietnam and Pakistan. These countries are also characterized by real and urgent challenges of social development and so provide an opportunity to rise to the challenge posed at Chatham House in January 2003 by Gordon Brown, the U.K. Minister of Finance, that "we should not judge our results just by the input and the community involvement we seek to have, but by the difference we make to poverty reduction on the ground in the developing world." In other words, CSR needs to be measured by output not by input; not by the broadly defined contributions that companies make, but by the impact they make on reducing social risk and supporting sustainable development.

(This article is taken from: Report of the APO Top Management Forum on Corporate Social Responsibility Published by the Asian Productivity Organization ©APO 2006, ISBN: 92-833-7049-X)

Annex

principles that they have established and articulated in different ways.

The CBC Guidelines for Corporate Citizenship provide guidelines of good corporate citizenship derived from CBC corporate members in Asia and beyond. They are a useful template for an international approach to CSR which has relevance and rigour in an Asian context.

1. Values

The company will be guided by values and work towards reflecting them in its business operations:

- **Core values**—having clear values and a Code of Ethics such as honesty, integrity, fairness, and openness, clearly stated and followed in practice;
- **Transparency**—being actively open in structure, process and disclosure; establishing and maintaining communication with key stakeholders;
- **Tackling corruption**—adopting agreed codes, being persistent in enforcing them internally and in external dealings; and

- **Human rights**—recognizing the implications for the business of a respect for human rights; having a policy and acting on it.

2. Corporate Governance

The company will manage its business with strong and effective corporate governance implemented by the board according to the following principles:

- **Compliance**—ensuring that the corporation complies with all relevant laws, regulations, and corporate commitments;
- **Profitability**—ensuring that the company is profitable and provides a reasonable return on the assets it employs;
- **Leadership**—exercising leadership, enterprise, integrity and judgement in directing the corporation so as to achieve continuing prosperity for the corporation and acting in a manner based on transparency, accountability, and responsibility;
- **Accountability and responsibility**—recognizing and differentiating accountability linkages (to shareholders and statutes) and responsibility linkages (to other stakeholders); and establishing reporting mechanisms to support these linkages;
- **Board qualifications**—ensuring that through a managed and effective process, board appointments are made that provide a mix of directors, each of whom is able to add value;
- **Checks and balances**—ensuring that no one person or block of persons has unfettered power and that there is an appropriate balance of power and authority on the board which is, *inter alia*, usually reflected by separating the roles of chief executive officer and chairman, or by having a balance between executive and non-executive directors;
- **Management**—appointing the chief executive officer and at least participating in the appointment of senior management, ensuring the motivation and protection of intellectual capital intrinsic to the corporation, ensuring that there is adequate training in the corporation for management and employees, and a succession plan for senior management;
- **Strategy**—determining the corporation's purpose, values and strategy, and implementing its values in order to ensure that it survives and

thrives, and ensuring that procedures and practices are in place that protect the corporation's assets and reputation;

- **Monitoring**—monitoring and evaluating the implementation of strategies, policies, management performance criteria, and business plans;
- **Evaluation**—regularly reviewing processes and procedures to ensure the effectiveness of its internal systems of control, so that its decision-making capability and the accuracy of its reporting and financial results are maintained at a high level at all times; regularly assessing its performance and effectiveness as a whole; and that of the individual directors, including the chief executive officer;
- **Risk management**—identifying key business risk areas including technology and performance indicators of the business enterprise and monitoring these factors; and
- **Disclosure**—providing shareholders and markets with necessary and timely information material to the company's performance and risks.

3. Relationships

The company will seek to develop and maintain strong relationships with its stakeholders and communicate effectively with them:

- **Customers**—recognizing the primacy of customers to business success; ensuring that product safety, effectiveness and value are maximized;
- **Shareholders**—recognizing shareholders as the primary stakeholder with a need for a good return on investment and growth in the medium term; understanding particularly the position of those with smaller shareholdings;
- **Employees**—respecting employees; treating them fairly and with cultural sensitivity; enabling them to develop their potential through skill and technology transfer; recognizing employees' contribution to company success; recognizing international agreements on the right to freedom of association and collective bargaining; eliminating all forms of forced labour; and dealing with the problem of child labour;
- **Suppliers**—conducting relationships fairly; disseminating information on corporate citizenship to them; assisting them to achieve continued improvement against agreed codes of practice in

areas such as health and safety, human rights in the workplace; and sharing knowledge, technology and ideas;

- **Local communities**—engaging in dialogue with relevant community representative organizations and seeking to contribute to long-term development;
- **Government**—engaging in open and constructive dialogue to improve the policy and practice environment for business and to assist government to foster corporate citizenship in the business community; and
- **Civil society**—engaging with civil society organizations on a basis of respect, and within a framework in which both sides are committed to be open, transparent, and accountable with respect to their financial and public support base.

4. Impact

The company will assess and seek to minimise any potential adverse impacts on the environment and local communities:

- **Environment**—practicing and encouraging environmental responsibility and minimizing environmental footprint;
- **Consumer awareness and product impact**—raising awareness of consumers regarding contents, safe use, and disposal of products;
- **Building capacity**—working to build capacity in dealings with host, local, and national communities; and
- **Impact on other species**—recognizing and limiting negative impacts on other species.

□

Attempts to censor in public ways almost always raise awareness of an issue, and this provides a great conversational landscape.

– Jeffrey Rutenbeck

Positive Aspects of the CSR Debate in Japan in Comparison with Europe and America

Minoru Inaoka

Asian approaches to corporate social responsibility (CSR) are different from those in the USA and Europe. The debate on CSR in Japan originally started from environmental concerns. At the end of the 1980s, people's awareness of the environment increased. With the Rio Earth Summit in 1992 environmental issues became hotly debated during the 1990s. Towards the latter half of the 1990s, environmental issues and the environmental framework were broadened to include sustainable development and then CSR.

Minoru Inaoka is Managing Director, Managing Executive Officer, Administration Division, Ito-Yokado Co., Ltd.

In the USA and Europe, and also in Japan, the CSR became a hot issue at one point in the summer of 2002. What happened in the summer of 2002 in the USA? From the autumn to the winter of 2001 and towards the spring of 2002, there were major scandals concerning Enron and WorldCom. Arthur Andersen, with a history of more than 90 years in business, suddenly collapsed overnight which was a shocking development in the US capitalism. Enron was supposed to have good corporate governance as well, but in the summer of 2002, the President had to sign the Sarbanes-Oxley Law.

At the same time, in the USA, the very high salaries for CEOs were being criticized by the public. The Nobel Prize Laureate, Professor Joseph Stiglitz of Columbia University, said that "in the depth of the international community, the trust towards the US model was being shattered, and the high salaries for CEOs were seen as stealing from the economy." According to *Forbes* magazine's annual survey of CEO salaries, Richard Ford received 15 billion yen at Lehman Brothers, and Steve Jobs of Apple Computer Company received 10 billion yen worth in remuneration. At Exxon-Mobil and Merrill Lynch, CEOs received about four billion yen worth in only one year. CEOs in Japan receive just 1/100th of this.

What is very interesting about the debate on CSR in the USA is that it is quite different from that in Japan and Europe. For example, in the USA, the keyword on CSR in 2003 was said to be homosexuality. The Federal Supreme Court's decision stating that ban on homosexuality was against the Constitution led to the elimination of discrimination against homosexual workers at the companies. Massachusetts became the first state in the whole of the USA to legally approve homosexual marriages. This issue was hotly debated even during the last Presidential election. The background is the USA's religious value—

Americans are the sons or the descendents of the Pilgrim Fathers and feel that they should strictly abide by the teachings of the Bible. In addition, domestic violence or violence against women have been taken up by companies and one in four women is said to be a victim of domestic violence.

In Europe, there is a strong will to promote CSR through the single European Union. This movement of CSR in Europe dates back to 1989 at the time of the fall of the Berlin Wall. After the Soviet Union collapsed, there were a large number of refugees who fled to various parts of Europe. Civil wars ensued intensively in a number of locations. There is a five-fold gap between wages in Eastern and Western Europe. In 2004, the European Economic Community was enlarged from 15 to 25 members and there was an expansion towards the East. Such economic integration aims to enhance the productivity of the region. However, since they are working under the same economic system there is bound to be massive social friction. Therefore in Europe, we often hear the word "social cohesion," which means uniting people together for the development of their economies. In the European Union, CSR is being used like a banner to integrate Europe. European CSR focuses on legislation and social policies. It does have impact on various legislation as well as social policies.

What has been happening in Japan during the same time? From the autumn of 2001 to the beginning of 2002, several food and car companies experienced corporate scandals. People started to question company attitudes towards customers and the corporate accountability. For the first time in half a century, the Corporate Law was revised. When the Corporate Law was revised, people questioned the relationship between the board members and stakeholders.

There is a demand for better corporate governance. George Hara, the famous venture capitalist in Japan, argues that US capitalism could force the vital companies in society to collapse. He also argues that management people in the USA are just focusing on expanding and increasing their personal profit and not the companies. Once a CEO is appointed, then the past cumulative losses are written off as well as future debts. Naturally share prices then go down. However, this is what CEOs want. If they were to reduce the cost, then profits would increase and then share prices would go up. If they were to exercise the option, they would be able to gain much profit. This is the reality of corporate governance in the USA and the true image of CEOs who are thought to be godly figures.

In Britain and other European countries, corporate

governance is discussed in such a way that it reflects their version of CSR. In Britain, they are also revising their corporate law which is in line with what they call 'enlightened shareholder value.' In other words, you have to have not only a short-term but also a long-term vision. This is what is required of board members and they need to develop a relationship with all the stakeholders incorporating a wider scope of management.

On this point, Norman Boyd, Professor of Minnesota University, has suggested there are three models of capitalism. There is an American type of capitalism which attaches importance to the stockholders, the shareholders, and their profit. It is a short-term profit-oriented capitalism. At the US business schools, they teach as though this is the only effective model. Therefore, CSR focuses only on maximizing profit. This implicitly says that rich people should be engaged in charity activities through philanthropy. In the second model, there is a need to balance the profit of stakeholders as well. CSR strives to reflect this balance of a win-win situation between the company and shareholders. The third model is sustainability which has three aspects—economic and financial success, consideration to the environment, and social responsibility ('the triple bottom line'.) In Europe, sustainability and CSR are considered to be equal. Thus, corporate governance is taken up in the same debate with CSR. ISO is now trying to standardize SR rather than CSR, because social responsibility encompasses more than just corporations.

In Japan, environment reports are being issued by more than 100 companies. However, this environmental report is changing. Our company also has been releasing environmental reports for about 10 years. In 2002, we called it the sustainability report and in 2003, we started to call this CSR report. We are addressing the environment issue and all other relationships with our stakeholders in this report. This kind of thinking is now spreading in Japan. One thing that supports CSR is socially responsible investment (SRI). According to 2003 data, three trillion dollars are being invested in SRI with 2.16 trillion dollar in the USA. Japanese companies cannot just watch on the sidelines what is happening in the USA. In Japan also, there are many SRI funds being used in investments.

Figure 1 looks at the CSR debate in Japan right now where the main focus is compliance. Corporate governance, business ethics and organizational ethics and organizational integrity also being debated. In CSR, the local society, human rights, employment and also providing equal opportunity to participate in the society, and consideration for the environment and all stakeholders

- Compliance
- Corporate governance
- Business ethics
- Organization integrity

- Employment
- Human rights
- Society/region

- Equal opportunity social participation
- Environment
- Consideration for stakeholders

- Improved customer confidence and satisfaction
- Improved stakeholder credibility
- Risk reduction

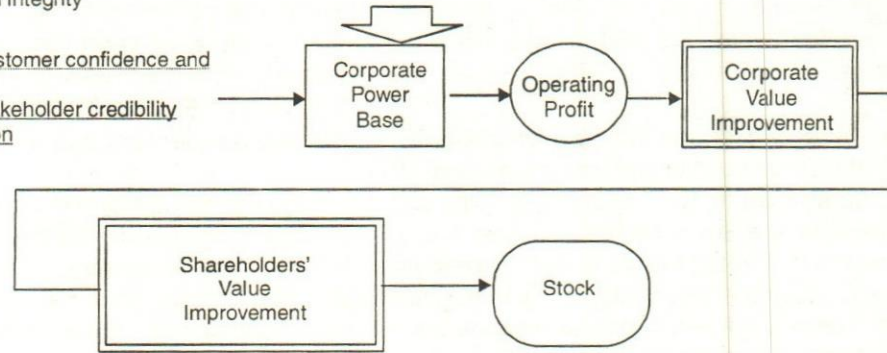


Fig. 1. Spread of CSR debate

are being debated. The debate in Japan is still at an early stage and we do not have a clear cut picture of how the CSR debate will develop in Japan.

At the bottom of Fig. 1, it is clear that if confidence and satisfaction of the customers and stakeholder improved while the risk is reduced, then the power base of the corporation will be strong which would lead to profit. Theoretically and logically, that means there would be an improvement in the corporation value which will then be reflected in share holder value. Logically, stock prices will go up.

Perhaps CSR will be largely related to building up the framework of the Japanese society of the future. Japan has never experienced a civil revolution. It was a change of the system and top down revolution. Today in Japanese society, there is a change in awareness and change in systems in parallel and there is a connection with CSR here.

Fifty years after World War II what was happening in Japan? On the surface Japan appeared to experience a historic economic recovery and rapid economic growth. In thirty or forty years, the landscape of Japan has dramatically changed. Even villages high up in the mountain and urban sceneries have changed. Attitudes towards life and people's lifestyles have also changed. In the half century, we have seen the greatest change ever experienced in Japan. The economic recovery and the economic growth provided, according to Professor Yukio Noguchi of Tokyo University, the seniority system and lifetime employment, and labour unions were established within the company. This was the systematic framework that provided this economic recovery and growth. Professor Noguchi calls this the 1940 system.

What was 1940 like? It was the year when Japan

was bracing itself for the coming Pacific War. It was trying to devote all the resources it had for the coming war and Japan was changing its system to a wartime system. That framework was seniority, lifetime employment, and also labour unions within the company. The psychological or mental framework that supported the economic recovery and growth was the village society and Confucian ethics and values. "Village society" may be difficult to understand and seem to be a very vague concept but it is different from a nomadic society. Villagers grow rice, and when harvest time comes, all of the villagers would help each other to harvest rice.

When you sow seeds, the whole village comes out to help each other. Water used for the rice paddies will be allocated based on discussions of the villagers. They would establish the rules for using the water, and the village leader will be in charge of determining all of these facts. If anybody does something against the village rules, they would be outlawed and they will be sent off from the village. It would not be accepted within the village. However, if you abide by the rules of the village, you would be protected by the village from the time you are born until you die. That is the kind of village society that supported the seniority system after World War II. The company was once like a village. After you leave school and enter a company, the company will protect you until you retire from that company. Unless you break the rules of the company or as long as you do your job you would be protected by the company and you would never lose your job.

Confucian ethics and values are universal in Asia in a sense. Takahiro Hosaka, a philosopher, has said that the Japanese are Confucianists, meaning that Confucianism is the religion of Japan. Professor Makoto Kurozumi of Tokyo University said that Confucianism came to the

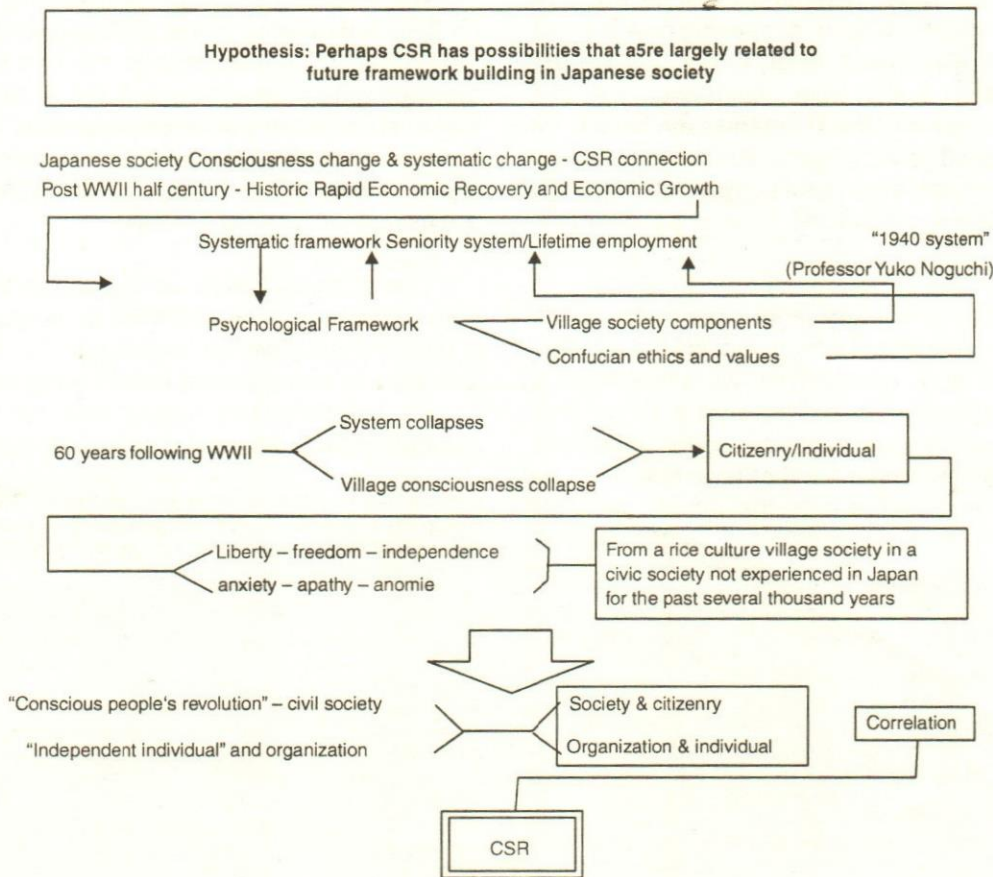


Fig. 2. CSR and the future of Japanese society

surface rather recently in the Tokugawa period from the 17th century to the 18th century under the fourth or fifth Tokugawa shogun. It has a history of about 200 years. In China, it has 1,000 years of history. However, the ethics of Confucianism is reflected very strongly in the behaviour of the Japanese people and that is seen in the seniority system. People of older age and of a higher rank are people you cannot oppose. You cannot deprive that person of his or her work.

Yet after the World War II and 60 years later this systematic framework dramatically collapsed. Interestingly, it is sixty years from the Meiji restoration to the Manchurian Incident, and during this time, Japan entered into the international community and as a result of the Manchurian Incident, there was criticism from overseas. This led to Japan being isolated. Sixty years in modern history might be the life span of a system but what is happening now in Japan could be that we are seeing a collapse of a system and this mentality of a village society collapsing.

Thus on the one hand, the system is collapsing, people's mindset and consciousness is following likewise

very dramatically on the other. There is no company which can assure lifetime employment and they cannot follow the seniority system anymore. For 60 years people have expressed loyalty to the company but young people today cannot embrace the same type of loyalty to the company.

What happens to people who are excluded from the villages? They are no longer villagers but citizens and now for very first time in Japanese history we are starting to see emergence of such citizens. Becoming a citizen, becoming an individual, and living as an individual on the one hand means liberty, freedom, and independence. You do not have to abide by the rules of the company and the government, and you do not have to be concerned about very detail of these rules. You are free and independent so it is really liberating. At the same time you will feel anxiety, apathy or anomie. There is no one there to protect you and you have to protect your own self to live through this very scary society. Thus, people feel anxious and if they fail, they would enter into a state of apathy and could become a social dropout.

Present-day Japan is changing from a rice culture, or village society to a society which Japan has never

experienced in the past. In other words we are now shifting to a civil society. What is happening now is a civil revolution at the awareness level. Every day we are gradually witnessing a shift from village society to civil society where the individual and organization have to be independent. It could be a company, a local government, a national government, a non-profit organization (NPO), or media but these organizations have to become self-sustainable.

As citizens in a society and individuals of an organization, we have to see how to establish a relationship with each other. If in Japan, we were to witness a collapse of the system with civil revolution at the consciousness level, CSR could be said to be the framework for establishing a new system. If that happens, it will be very interesting to observe how the debate on CSR develops.

We need to watch very carefully how the discussion on CSR will develop in the USA as well as Europe. Europe is becoming a block of its own and the USA is also developing its own version of CSR. At ISO they are trying to standardize social responsibility. That being the case, we should not just let the Americans and the Europeans debate on this subject. We, in Asia, should be discussing our version of CSR.

The timing is right for us to discuss and research an Asian version of CSR which will be very beneficial to all of us. From Asia, we can export our own version of CSR and there is real potential here. Taking into account our virtues, traditions and history, Asia can research and communicate to others our version of CSR.

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The man who does not read good books has no advantage over the man who cannot read them.

- Mark Twain

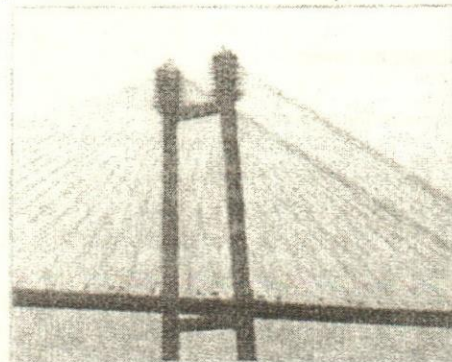
An Overview of CSR and Healthcare: A Case Study of Usha Martin group

Rajesh Sharma, Shivaji Mandal & Amit Ranjan Sinha

Usha Martin, one of the largest wire rope companies in the world, is committed to corporate social responsibility (CSR). Knowing that HIV/AIDs has no cure and usually affects people in the prime of their life when they are the most productive as a worker, the Usha Martin group actively creates awareness and provides healthcare to its workers at its two plants based in Ranchi and Jamshedpur.

Usha Martin, a multi-product and multi-located group, started in 1961 as a wire & wire ropes company in Tatisilwai, Ranchi, has come a long way and today it is one of the largest wire rope companies in the world. It has plants in India, UK, Thailand and Dubai, a speciality steel plant in Jamshedpur and a cable plant in Silvassa. The company's wire rope distribution business spreads across the USA, Scandinavia, South Africa, Singapore, Australia and Scotland. Close to a gross revenue of half a billion dollars, Usha Martin's presence is felt in off-shore and gas related services in Aberdeen, Baku and Norway. With the vision statement, "In our chosen business we shall retain market leadership in India and shall be globally competitive through customer orientation and excellence in quality, innovation and technology," the group is aspiring to become a billion dollar company by 2010.

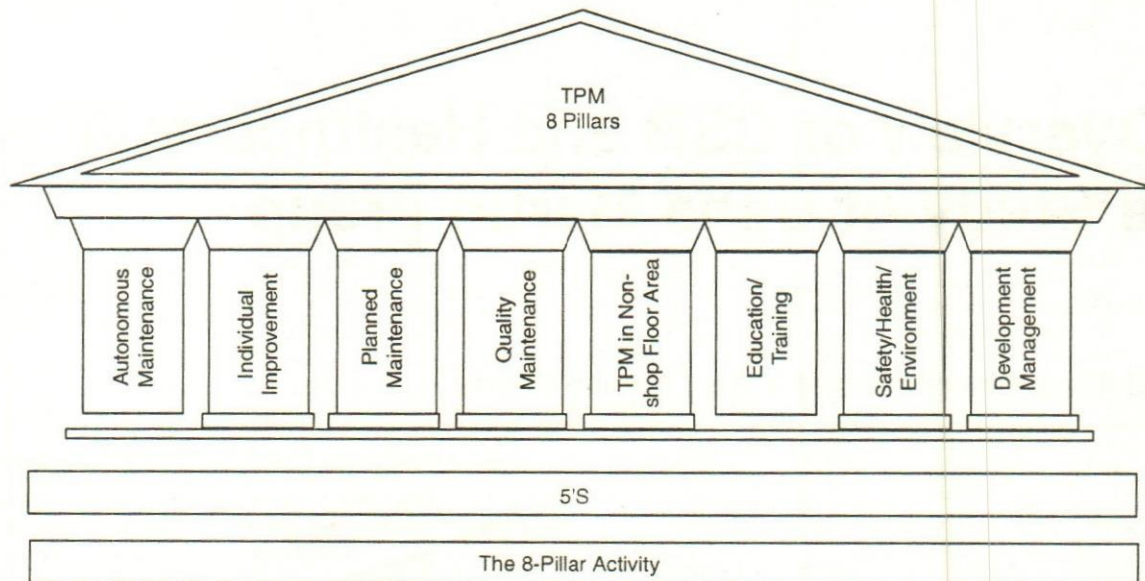
Rajesh Sharma is Asst. Vice President, Operations, Shivaji Mandal is Director Healthcare, KGVK and Amit Ranjan Sinha is Sr. Manager HR, Usha Martin Group.



Second Hoogly Bridge



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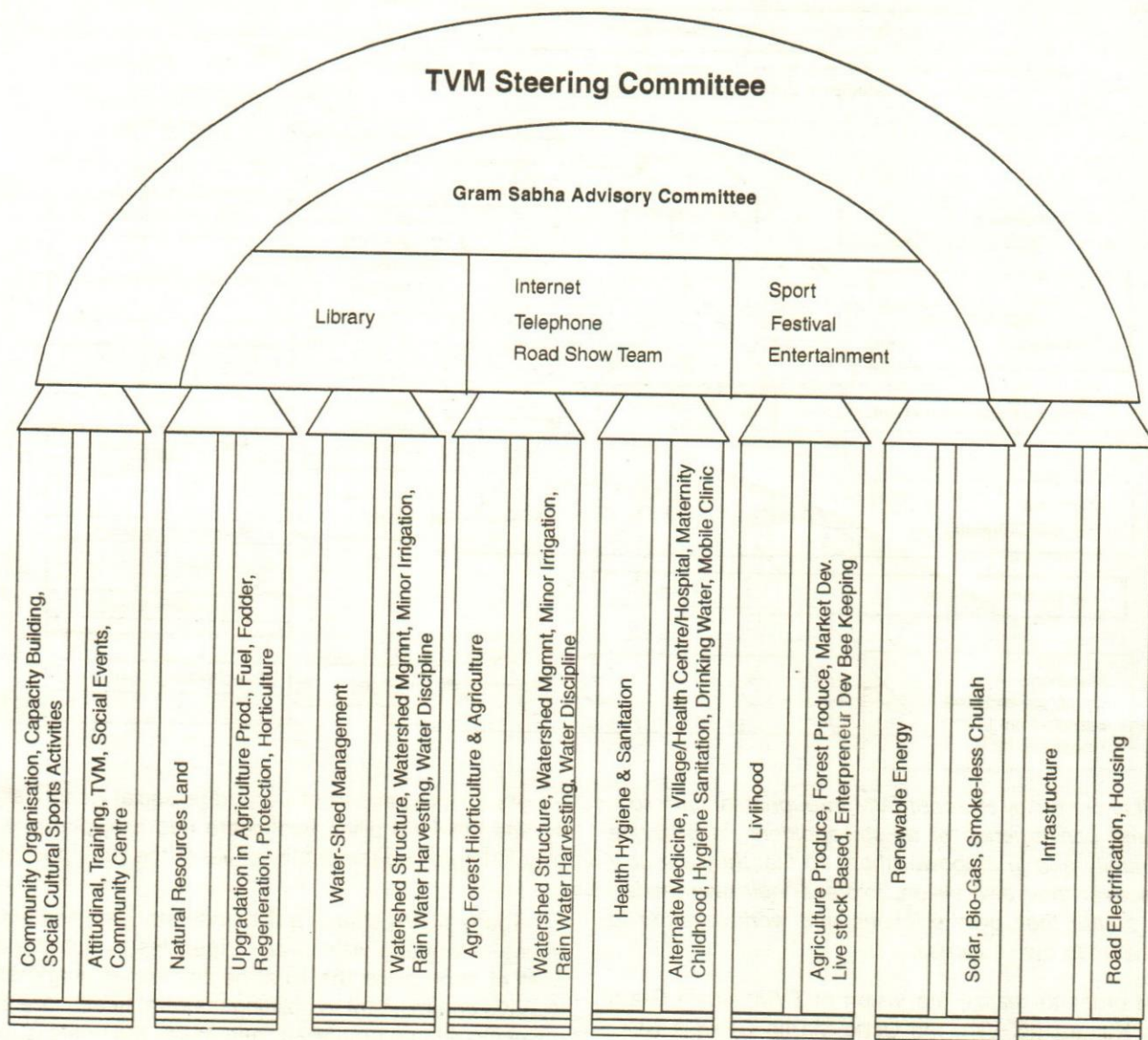


1	Autonomous Maintenance	<ul style="list-style-type: none"> • Maintaining Basic Condition on Shop floor and in Machines • All over participant through TPM circles
2	Individual Improvement	<ul style="list-style-type: none"> • Improvement is everyone's activity
3	Planned Maintenance	<ul style="list-style-type: none"> • Improvement is to eliminate Production losses & reduce cost • Logical analysis 'real cause for real counter measure • Focus on Prevention
4	Quality Maintenance	<ul style="list-style-type: none"> • Improvement in reliability, maintainability and cost • Developing perfect machine for perfect quality • Eliminating in-process defect and customer complaints
5	TPM in non-shop floor Area	<ul style="list-style-type: none"> • Office oriented for excellent support for manufacturing • Improving Office man-hour efficiency
6	Education/training	<ul style="list-style-type: none"> • Skill development for uniformity of work practice on machines • Skill for zero defect, zero breakdowns and zero accident • Multi-skilled employees in all departments
7	Safety/Health/Environment	<ul style="list-style-type: none"> • To achieve zero accident, zero health hazards at works • To maintain zero pollution plant and environment
8	Development Management	<ul style="list-style-type: none"> • Developing machines for high equipment effectiveness • Quick process for developing new products

Usha Martin believes that change is inevitable and it is always for achieving higher goals. It was felt that business excellence could only be achieved through a company-wide transition in existing work methodologies and in the mind-set of the people. By adopting TPM the aim basically was to restructure the corporate culture through improvement of human resources, plant equipment and processes, thereby maximizing productivity and system effectiveness. The change in corporate culture has brought a change in the mindset of the people through motivation, delegation, empowerment and thereby inculcating a sense of ownership.

Over a period of time and in the course of the group's journey towards excellence, TPM (Total Productive Maintenance) has given tremendous results both at Jamshedpur and Ranchi plants. The commitment towards

TPM has culminated in the TPM first phase certification being awarded by JIPM (Japan Institute of Plant Maintenance) to Jamshedpur and Ranchi plants. In these days, technology can be bought at a price anywhere in the world. However, in the prevailing environment of stiff competition on price and quality manufacturing at high level of productivity (P) high quality (Q – Zero defects), low cost (C) of inputs, 100% on-time delivery (D) to customer is more challenging not only to achieve but also to maintain the levels for these parameters. TPM emphasizes the "People Dimension," without whose collaborative working [Safety (S) and Morale (M) of employees], neither building nor maintaining PQCDMSM is possible. TPM is a unique way of building or re-building a manufacturing plant: the performance at each stage of operation can be measured quantitatively using PQCDMSM parameters.

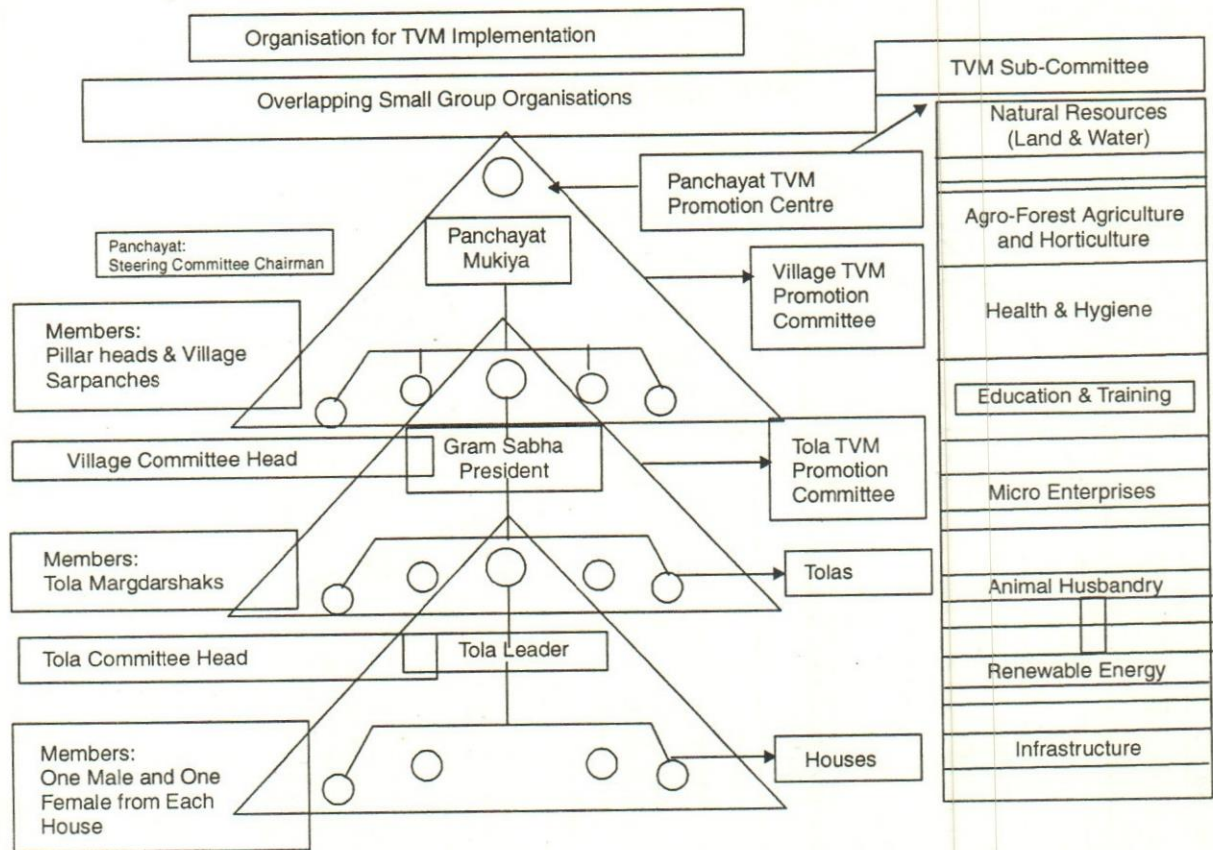


The pillar approach of TPM is comprehensive and total in the way that it encompasses all activities and all employees, from top to bottom in the company, towards improvements.

By conforming to the TPM the whole organization witnessed results in terms of PQCSDM. A change in mindset was brought about in the employees. They were empowered through training and capacity building and their total participation in total productive maintenance was sought. After this the performance of the company started improving.

On the basis of the initial success tasted in TPM within the boundary of the organization, the group's chairman Mr B K Jhawar evolved the concept of Total Village

Management as an integral part of Corporate Social Responsibility to fulfill the Integrated Rural Development. The basic thrust of Mr Jhawar and Mr Brij K Jhawar behind total village management (TVM) was to bring about change in the rural sector. The Government had been pumping in millions of rupees for rural development for almost six decades now and thousands of NGOs were putting in their best for rural development activities, and yet in spite of this, no appreciable change had been achieved in the rural sector. It was felt that a change in the mindset of the villagers was essential, and that they should feel that the village belonged to them and that they could manage its affairs. In line with this is the Usha Martin Group's commitment towards Corporate Social Responsibility. The TVM policy has been formulated as below:



"It is our policy to adopt TVM through total participation and convergence of all stakeholders, to organise community and to empower them so that they are able to discover their own vision, express their own leadership, create their own solutions and work together to achieve their own success."

In order to realize the vision of TVM, Krishi Gram Vikas Kendra (KGVK), the Usha Martin Group's NGO and social arm, is fully committed towards improving life of the rural people. KGVK's Strategy for Integrated Rural Development is to adopt Total Village Management (TVM) through participation and convergence of all stakeholders (public, private, people's partnership-P4) for continuous improvement (Kaizen), to organize the community and to empower them so that they are able to discover their own vision, develop their own leadership, create their own solutions and work together to achieve their own success.

A TVM pillar model has been devised which is shown as below:

It is worthwhile to mention that while formulating the TVM policy and pillar and its implementation the synchronization of expertise, knowledge and experience of TPM has been seriously taken into account.

As an integral part of Corporate Social Responsibility and the TVM pillar, healthcare has a pivotal role to play in improving the quality of life of the rural people.

Today KGVK shares a rich understanding and experience of working with diverse agencies to achieve the best of synergy in the rural healthcare in Jharkhand. KGVK's commitment to uplifting the rural healthcare status of Jharkhand proactively addresses the prime issues – safe motherhood and child health and HIV/AIDS, in two possible spheres of action (urban and rural). The pace to implement AIDS awareness programme at the workplace is day-by-day gaining momentum as it realizes that no business is safe if its workers are on the verge of getting affected/infected by the growing menace of HIV.

The other focus area is safe motherhood and child health in rural Jharkhand. As only 8% population has access to modern healthcare, the infant mortality rate is as high as 70%. 90% deliveries take place at home and only 10% women get the antenatal checkups. Chronic malnutrition, diarrhoea and acute respiratory infection are some of the common life threatening illnesses that children in the age group of 12 to 23 months suffer from.

KGVK proposes to harness the synergies of Public, Private and People's Partnership (P4) – to usher in real changes in the development sector. P4 addressed the need to evolve a new management technique to optimize the strength of the partners for a single cause, namely, health for all.

KGVK healthcare's key focus areas are the following:-

Safe Motherhood and child health

HIV/AIDS awareness

Healthcare services delivery infrastructure

Capacity building in public health

Out of these the first two initiatives are briefly elaborated here.

On safe motherhood and child health

Reduction of low birth weight incidences using life cycle based block level intervention strategy.

Project Objective: To reduce the incidences of low birth weight by improving reproductive and child health status.

The Background: The cases of Low Birth Weight (less than 2.5 kg) in the developing countries are more than 30% of the total live births. In India, low birth weight (LBW) and childhood malnutrition are major public health problems. About one-third of all infants born in India have low birth weight. The prevalence estimates vary from 10% to 56%. Massive resources invested by donors, the Government, and the NGOs to resolve the continuing problem of low birth weight and under nutrition in India have yielded few visible results. Existing body of research and evidence demonstrates clearly that the complex and multifactorial etiology of LBW requires holistic integrated interventions addressing the various dimensions of safe motherhood and neonatal care.

It is generally believed that the solution to LBW lies in the improvement of intrauterine growth. Consequently, majority of the interventions have focused on this aspect in isolation. Evidence shows that LBW is an indication that the infant was malnourished in the womb and/or that the mother was malnourished during her own infancy, childhood, adolescence and pregnancy (Gillespie 1997, *Improving Adolescent and Maternal Nutrition: An overview*). The proportion of babies with low birth weight therefore reflects the condition of women, and particularly their health and nutrition, not only during pregnancy

but also during their childhood and adolescence (Ramaligaswami, Jonsson, Rohde. 1997. *Malnutrition: A South Asian Enigma. In South Asia: A Regional Profile, Regional Office for South Asia (ROSA) (UNICEF, 1997).*

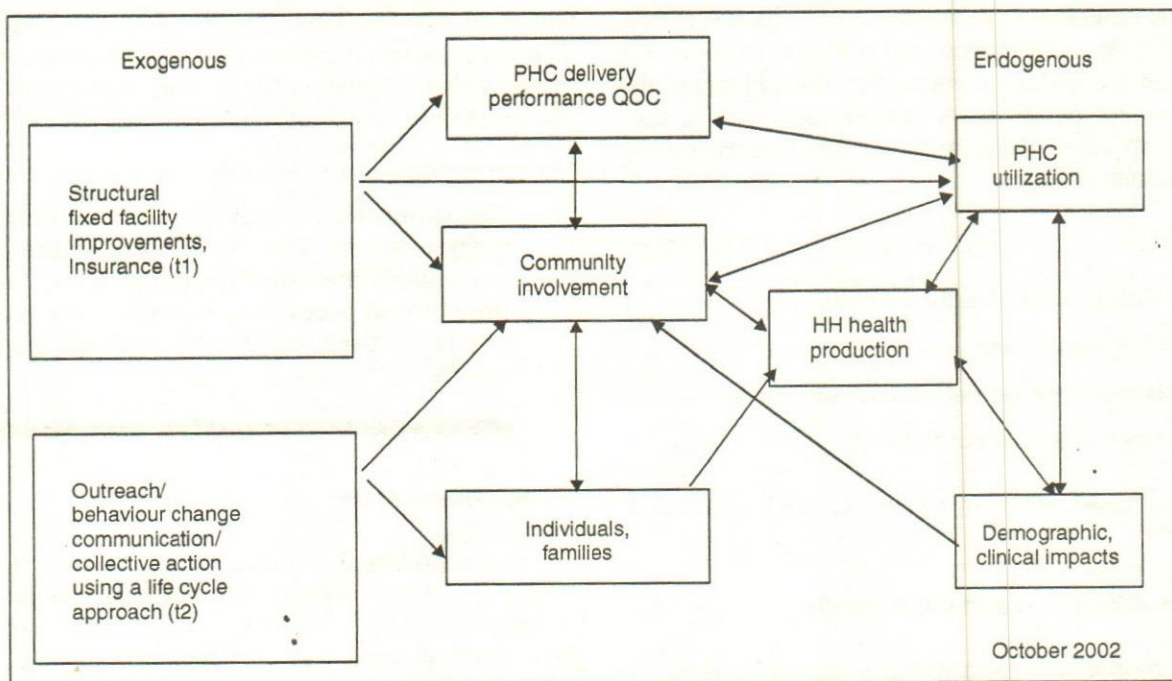
The proportion of babies with low birth weight reflects the condition of women, particularly their health and nutrition, not only during pregnancy but also over the whole of their childhood and adolescence.

In Jharkhand State

In a state like Jharkhand, the poor health indices is reflected in infant mortality rate (IMR) as high as 71 per thousand live births, and the fact that 90% of deliveries take place at home and only 10% of pregnant women receive at least one antenatal checkup. It is not surprising, therefore, to find that a large majority of births in the state are unsafe. Child health indicators further capture condition of chronic under nutrition and poor health care. Less than 10% of children aged between 12-23 months are fully immunized, with around one third receiving no immunization at all. Diarrhoea and acute respiratory infections are common and nearly 80% of children in the state suffer some form of anaemia, of which 56% are moderately to severely anaemic (NFHS-II). There is an intergenerational cycle of low birth weight that is perpetuated through generations and therefore it conclusively follows that interventions have to be targeted at various critical stages to break the vicious cycle that may otherwise perpetuate. The project therefore, aims at reduction of Low Birth Weight incidence through using a multi-pronged strategy that enables the community to keep their health in their own hands.

Project Summary

The project has undertaken to test a block level holistic life cycle based strategy for reduction of low birth weight and childhood malnutrition. The project proposes to demonstrate the efficacy of a life cycle based intervention, covering critical stages of life cycle, viz., pregnancy, 0-2 years of age, and adolescence for LBW reduction and childhood malnutrition. If successful, this will have huge implications for programmatic interventions in the country. To demonstrate its efficacy the project has been conceptualized as an action research with a control area to indicate the direct impact of the interventions



Prepared by Professors of Johns Hopkins University

planned. The operation research project aims to prove the hypothesis that a village level community health worker through collective action superimposed on quality health service delivery compared to only quality health service delivery, makes a better impact on the overall health scenario.

Diarrhoea and acute respiratory infections are common and nearly 80% of children in the State, suffer some form of anaemia, of which 56% are moderately to severely anaemic (NFHS-II).

Innovative Features

The Project is based on 4P formula of Public, Private, and People's Partnership. The project maintains its uniqueness through the following measures:-

- No duplication of health services by the project, but a complementary role to supplement the lacunae of the government health system.
- Building a pool of local human resource and reservoir of authentic information by facilitating training and strengthening capacities of traditional birth attendants and health animators.

- If successfully completed, the country would be provided with a LBW and malnutrition reduction model for an inaccessible tribal area, which can be applied to other similar remote rural populations.
- Introduction of a public health insurance scheme in the project for programme sustainability, which will be the first of its kind in the eastern states.
- Collective action by the community and behaviour change communication.

The programme fits in well into the current state of affairs in Jharkhand. As a new State the government has felt the need to respond to the dire health status and also evolve an approach that is practical in the difficult terrain of the region. The programme acts as the first such initiative and hopes to yield results that may be replicated in other parts of the state and the country.

Project Partners

- ICICI Bank Social Initiatives Group - Strategic Partner cum Funding Agency
- Johns Hopkins University - Operation Research Design
- CINI - Technical Support agency
- KGVK - Implementing agency

Goradih sub-centre, Silli block



(before August 2004)



(after October 2004)

Barwadag sub-centre, Angara block



(before July 2004)



(after September 2004)

- Department of Health & Family Welfare, Government of Jharkhand - Enabler and implementing partner.

As part of improving the Quality of Care in Public Health Service Delivery, the service delivery points have been renovated with active participation of Village Health Committees and contribution of labour on their part.

Methodology: To achieve the goal of making "health-care available to last village, last household and last person" in the state, an approach was adopted that places community participation at the centre of health reforms agenda, in which a Village Health Committee (VHC) and Key Health Worker (KHW) - Sahiyya - are the central agents in the community health programme. Both these act as community based agents working to achieve appropriate health behaviour during the critical stages of the lifespan, i.e. pregnancy, early childhood (0-2 years) and adolescence, through Behaviour Change Communication, nutrition education case management and form-

ing a link between the community and government health care system.

Each Sahiyya will function at the level of a hamlet to which she belongs, to facilitate regular outreach and close interaction between her and the community with which she is well acquainted. The village health committee, which is formed at the level of a cohesive (in terms of topography and dynamics) village, will within the community through these processes be complemented by the presence of a government system that will work in close cooperation with the project to ensure provision of all the mandated healthcare services.

The project aims to test the hypothesis that over a five year period, the proposed community level interventions along with the provision of mandated health service will reduce the incidence of low birth weight, to a greater extent than the impact mandated health service provision and infrastructure would have in isolation. The project seeks to impact not only a reduction of low birth weight incidence, but also impact infants and child mortality rate, reduction in severe malnutrition among the 0-2 age group and reduction in anaemia prevalence among women.

Implementation

The five-year project was initiated in 2003 and is currently in its fourth year. It is being implemented in Angara and Silli blocks of Ranchi district. In actual implementation, the processes were influenced by a multitude of factors evolving in the state scenario. The state recognized the need for reform in the health system and envisaged the project as a pilot to address issues of concern.

To assess the shortfall in service delivery points and to formulate effective plans the state participated in the demarcation exercise. The exercise provided a map of inaccessible areas, which not only served as the criteria for mobile van placement but also provided a plan for prioritizing sub centre renovation and undertaking the same in a phased manner. Further, the Village Health Committees and Sahiyya were adopted as state policy as part of the larger health sector reforms in Jharkhand.



As part of improving the quality of care in Public Health Service Delivery, the service delivery points have been renovated with active participation of VHCs and contribution of labour on their part. These service points



have been equipped with mandated equipment, the logistics have been improved which includes the drug supply and cold chain management, the doctors and auxiliary midwives (ANMs) have started attending the service centres more frequently and the remote areas and inaccessible places are covered with mobile medical vans kitted with medical labs. The service delivery personnel, including local Tribal Birth Attendants (TBAs), Anganwadi Workers, ANM, Community Health Workers (Sahiyyas), have been trained by the project on skill, attitude and knowledge.

Sahiyya, a semi-literate woman, is capacitated through a well designed capacity building programme on pregnancy management, safe motherhood, newborn care, early childhood care, and growth monitoring and behaviour change communication. VHCs are also being

oriented towards RCH issues and to act as a support mechanism for Sahiyya and a catalyst for social change.



Training is being imparted to adolescent boys and girls on reproductive and sexual health issues. Capacity building programmes are being undertaken for Govt. health service providers, like medical officers, auxiliary nurse midwives, lady health visitors and Anganwadi workers.

Prevalence of non-institutional delivery in majority of the cases makes training of Traditional Birth Attendants (TBA) an essential component for safe motherhood and reduction in maternal mortality and morbidity. Disposable Delivery Kits are given to TBA in training programmes to promote safe delivery. Thus the project addresses and ensures the best practices in the project area. To sustain and strengthen VHC and Sahiyya so that the community is able to identify and demand their "Right to health", health service delivery (which is the supply side) becomes critical, especially in areas where services are not available. Services are being offered at the doorstep by reaching out to the remotest pockets through the quality services of the Mobile Medical Van, which is equipped with pathological facilities. Along with provision of health services, sub centres and mobile vans also act as information points to enhance the knowledge base so that the community demands their "Right to Health".

Monitoring

The Project has introduced the following mechanisms to serve as a supportive and monitoring system into the field.

Cohort register is a monitoring cum case management tool being filled by Sahiyyas. This register is seen as a helpful tool since it enables the Sahiyyas to keep a record of the expectant women and also guides them on the various case management aspects (antenatal care and postnatal care) that they can discuss with pregnant women and lactating mothers.

Cluster Meetings have been initiated to introduce aspects of reflexivity within the Sahiyyas and the VHC. The Cluster meetings have been envisaged as events whereby the Sahiyyas and the VHCs in the presence of ANM and AWW can discuss the problems that they are

facing in implementation and can also strategize possible solutions for the same, thereby acting as a platform for convergence within various stakeholders.

Future Plans

The Life Cycle Approach, which is the organizing strategy of the project, targets three critical stages, of which adolescents are an integral part. Currently the project has done interventions with pregnant women and children and sees integration of the adolescent component as an urgent priority that is being undertaken at this stage. Case management started under the project focuses largely on pregnant women and children (0-1). Intervention for the second year of childhood would essentially focus on growth monitoring, for which the Sahiyya is not equipped. This necessitates close linkages with the functioning Anganwadi Centre. The project is now concentrating on establishing this linkage and orienting the Sahiyya towards the same. The project plans to initiate futuristic trainings on health and ICDS entitlement by which all services could be made available to the poorest of the poor with community initiatives. It also envisages strengthening of supply chain of medicine within the government dispensing system as an important future action.

Conclusion

The project learnings and evaluations are helping us to review the interventions undertaken and achievements with regard to the expected results. Documented bottlenecks and success of the project enable us to frame recommended corrective measures. The identification of best practices and successful strategies are now leading to wide-level replication and scaling up. Government of Jharkhand has adopted the plan of mobilizing the Sahiyya and Village Health Committees all across the state today, keeping in light the fact that this project was the first initiative to have germinated the thought and demonstrated the same through successful replication. The journey from practice to policy has had its share of initial hitches, but now that the project has received recognition from the highest level of the state, the challenge ahead is on how it can be replicated across the nation.

Caselet

The Friend in Need

Savita Devi is a Sahiyya (a "friend" or a Key Health Worker) in the dynamic "model" village of Lota, in Silli

block. She enthusiastically talks to her "patient-friends" – expecting or lactating mothers – about the first Monday clinic. The first Monday Clinic, or a clinic open to all expecting or lactating mothers on the first Monday of every month, is run by a PHC doctor, Dr. Shabnam Turkey. Savita Devi not only counsels women to visit this clinic, but also takes them there if they face problems in going on their own. Savita Devi loves the fact that her work is making the lives of all her friends – and their newborns – a lot healthier.

The Issue of HIV/AIDS

"The most serious public health challenge that the country is facing today is of HIV/AIDS that is just a decade old in the country. AIDS is a global problem – sadly, with a strong Indian dimension," Atal Bihari Vajpayee, ex Prime Minister of India.

India is being cited as the country, which along with China, could well become the epicentre of the AIDS epidemic. The epidemic is 18 years old in India, and in this short period, has emerged as the most serious public health problem in the country. According to official statistics, India has an estimated 5.1 million people infected by HIV and the prevalence rate is 0.9%.

The official statistics also indicate that while there are geographically high prevalence areas, HIV is prevalent in almost all parts of the country. In recent years, it has spread from urban to rural areas and from individuals practicing high-risk behavior to the general population.

HIV/AIDS is usually seen as a health issue. However, in reality, it is more of a social issue and if viewed at the macro level, is a very serious developmental issue for the country. There is social stigma attached to AIDS and there is social ostracizing. Myths are still prevalent about how it spreads. Apart from the medical fallouts of the disease, the social rehabilitation issues are greater. So HIV/AIDS is a key development challenge.

Moreover HIV/AIDS is a workplace issue, as out of 50 million HIV/AIDS affected people worldwide, at least 26 million are workers aged 15 to 49 years, in the prime of their working lives. Enterprises and national economies as well as workers and their families feel the effect. HIV/AIDS is a serious workplace issue not only because it affects labour and productivity, but also because the workplace has a vital role to play in the wider struggles to limit the spread and effects of the epidemic.

Situation in Jharkhand

In the state of Jharkhand the reported cases of HIV are low compared to other states. According to Jharkhand State AIDS Control Society (JSACS), altogether 446 HIV positive cases have been reported so far and there are eight cases of reported deaths due to AIDS. But there is still the possibility that this may become a high prevalent state. One of the reasons is that there is large number of Industries particularly in the districts of Ranchi, Jamshedpur, Dhanbad and Bokaro, in which a large number of casual workers work. Apart from that, a large number of truck drivers come to these areas every day. This creates an environment that is favourable for the spread of the deadly disease HIV. JSACS is working in the state to focus its activities on the Targeted Intervention consisting of the commercial sex worker, MSM (gays), intravenous drug users and truckers. Other interventions in the state include blood safety with the hospital and medico, awareness and educative programme with the general population

Usha Martin's response to HIV/AIDS

HIV/AIDS is a workplace issue because it affects workers and enterprises reducing productivity and increasing labour costs. In some countries it has cut the workforce by up to 30%. It should be treated like any other serious illness/condition.

More than sixty per cent of UML's workforce of manual/unskilled labour live without their families. These workers are very prone to sexually transmitted diseases because of low literacy/awareness level and long-term separation from their families. They mostly end up going to Commercial Sex workers (CSWs) as alternative partners for sexual gratification. They are not aware about the importance of protected sex, which prevents various sexually transmitted infections including HIV/AIDS.

As a responsible corporate citizen UML through its social wing, Krishi Gram Vikas Kendra, has included HIV/AIDS in its pillars of interventions, as it believes that a healthy workforce is the biggest asset for a company. In this endeavour "Targeted Intervention in partnership," "National AIDS Control Organization (NACO)," "Jharkhand State AIDS Control Society (JSACS)" since November 2003, were some of the earliest interventions on HIV/AIDS of KGVK. These primarily targetted the core group, consisting of Commercial Sex Workers, intravenous drug users, men having sex with men and the Bridge Population comprising of Truckers and their Helpers.

Along side the project mandate as prescribed by the JSACS, the project intervention has addressed the workers of Usha Martin Limited, through regular workshops with workers, infotainment with the truckers, interpersonal communication and group discussion with the factory workers and ready counselling promoting condom usage for safer sexual behaviour, and treatment through its "Jagriti Clinic". Under targeted intervention the network of CSWs have been formed, which basically deals with legal ethical issues and rehabilitation.

Over a period of time it was felt that the workforce of Usha Martin Limited factory sites, both at Ranchi and Jamshedpur, needed more focused intervention. Therefore with the support of IFC Against AIDS Washington, KGVK is covering 3000 factory workers and 4000 truckers in and around UML factory sites in Ranchi and Jamshedpur. The programme is "Awareness Generation on HIV/AIDS and STI cases among factory worker, medicinal and clinical staff of Usha Martin Limited and the communities and truckers around its factories in Jharkhand".

The purpose of the project is to create awareness and educate the workforce on the issue of HIV/AIDS as, it is a fact that HIV hits hardest the most productive segment of society in the age group 15 to 49 years.

Usha Martin Limited strongly believes that the world of work can play a key role in this effort, as it has been seen that a comprehensive workplace programme is an effective way of generating awareness, bringing behavioural changes and a creating a conducive environment.

Interventions in the UML factory sites:

- Prevention and Control of Sexually Transmitted Infections (STIs) through awareness generation amongst factory workers and their environment.
- Behaviour Change Communication.
- Symptomatic Treatment of Patients with STDs.
- Interventions in the surroundings & Factory Workers, which includes their families, community, truckers and Commercial Sex Workers.
- Awareness & counseling to avoid discrimination against fellow employees affected by HIV/AIDS.

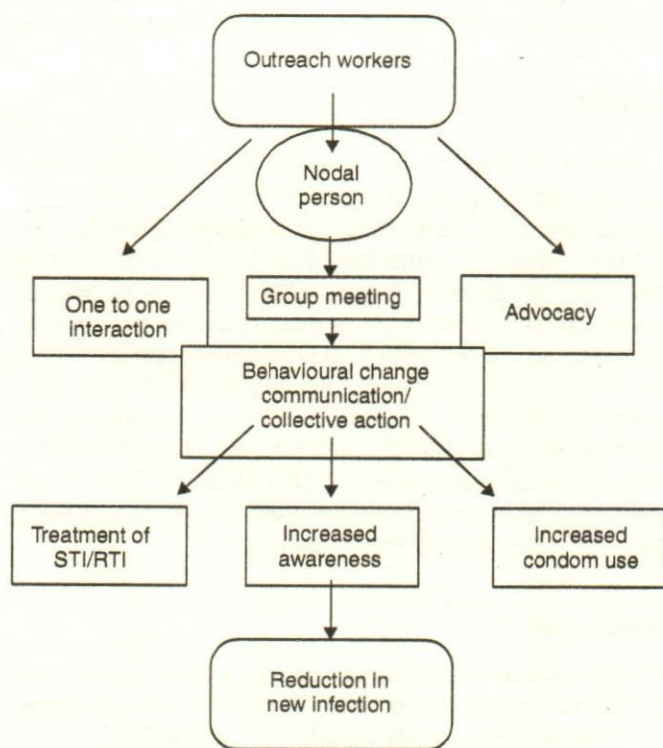
UML's Policy on HIV/AIDS

Usha Martin Limited, to address the pandemic of HIV/AIDS, has a policy in place which it advocates at all lev-

els within its setup and with its stakeholders. The policy focuses on:

- Non-discrimination towards job applicants
- Confidentiality of HIV status of an employee
- Counselling and treatment for STIs through its STD care clinic
- Dissemination of its policy
- All stakeholders provided with care and counselling services through its STD clinic.
- Inclusion of relevant information about HIV/AIDS in all its training modules.

Conceptual Diagram



Strategies Adopted to achieve the Objectives

Behaviour Change Communication Activities

Information, education and communication is a process that informs, motivates and helps people to adopt and maintain healthy practices and life skills. It aims at empowering individuals and enabling them to make correct decisions about safe behaviour practices. IEC also attempts to create an environment which is conducive to and supports access to treatment and services to those workers of UML who are already infected. To sensitize the target population on the issue of HIV/AIDS/STDs, an

interpersonal communication tool was used. Full and relevant information on the issue was given to the group and at the same time their feedback was also recorded. Based on the feedback the IECs are improved from time to time.



Condom Promotion

Condom promotion is the most important aspect of HIV/AIDS intervention. Condoms are procured from the State RCH Office/JSACS and distributed among the Target Population as well as among the general public. To increase the acceptability of condoms, demonstrations are done during IPC, Group Meetings, Advocacy Meetings and Health Camps. Pamphlets showing condoms as a friendly tool to avoid STD/HIV infection and unwanted pregnancies were also distributed so that the people could develop a positive attitude towards condom use.

Enabling Environment

HIV/AIDS is the greatest development challenge that mankind has ever faced, hence there is need for inter-sectoral movement. Therefore the project aims at actively engaging the community in the battle against HIV/AIDS. Attempts are made to enable the population access services and care by creating an enabling environment. In order to involve stakeholders

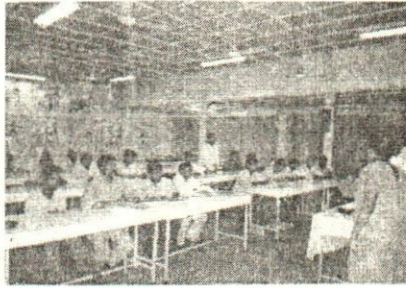


such as transport agents, shopkeepers, police personnel, cinema hall management teams, dhaba owners & workers, advocacy meetings are organized. Altogether 11 such meetings were organized to give orientation to the stakeholders on transmission and prevention of HIV/AIDS/STDs.

Peer Education

HIV/AIDS is a culturally sensitive issue, so influential

people from the factory sites were selected to disseminate the message and to bring about an attitudinal change amongst the workers and truckers. Altogether 30 peer educators were identified and trained for workplace intervention. For the community level work with the high-risk group, a pool of peer educators were trained. From time to time refresher training were conducted for them.



STD Services

STI clinics are established at both the Ranchi and Jamshedpur factory premises. STD patients are more vulnerable to HIV infection, so proper treatment of STIs/RTIs is one of the major objectives. Jagriti Clinic is a STD care centre established by KGVK near by NH 33.



All the interventions undertaken by Usha Martin Limited through its CSR Krishi Gram Vikas Kendra to combat HIV/AIDS, is based on the principle, "Knowledge is the only vaccine against AIDS and tomorrow is too late".

Caselet: Amrita of Ratu Village

Before

One day on her way home from the temple, 20-year-old Amrita was followed and raped by a bunch of local youths. The next morning, when she returned home, her parents turned her away for spending the night out. Helpless and lost, Amrita ran away with her "boyfriend", who then sold her to a brothel for Rs 5000, where eventually she sought refuge in drugs and alcohol.

After some time, Amrita returned to her own village, engaged herself as a commercial sex worker, befriended a man, got married and even bore him a son. But after a year, she divorced him, Amrita, it seemed, had forgotten the meaning of happiness.

After

Last year we met Amrita at the Lalpur Chowk, a TI intervention area. At first, she was indifferent and refused to interact with the project facilitators. But slowly, we started getting through to her, showing her that her high-risk behaviour could lead to venereal diseases with STI symptoms, But although she was motivated for STI treatment, she did not complete the course.

After continued motivation for condom usage and behavioural change, she finally completed the treatment and recovered. And once she had realized the importance of condoms, she even opened a condom outlet in a lodge, supplying these to other CSWs. Today, as a peer educator, Amrita motivates other CSWs to take the pledge of 'no condom, no sex'. And finally, letting go of her past, the future is in the hands of a healthier, happier Amrita.

Caselet

Mr. X, a Truck Driver was suffering from STI. One day he attended one of the group meetings organized by the out reach workers within Usha Martin premises. He got the information regarding STIs and HIV/AIDS. After few days, he came to "Jagriti Clinic" the STD Clinic of KGVK for his treatment. After discussion with the doctor he accepted his high-risk behaviour and expressed that he would like to know about his HIV status. Doctor provided him medicine to cure his STI and referred him to Tertiary Hospital (RIIMS) for HIV test. He got his HIV test done and was found to be HIV negative. Today he is a relieved man and promised that he will always use condom – *Better Safe than Worry!*

Conclusion

- Workplace information education places are essential to combat the spread of epidemic and to foster greater tolerance for people with HIV/AIDS.
- Effective education contributes a lot to the capacity of workers to protect them from HIV infection. It also significantly reduces HIV related stigmatization and minimizes disruption in the workplace and brings about attitudinal and behavioural changes.
- Peer education and community participation is essential for disseminating information about HIV/AIDS prevention.
- Development of an environment of trust is important so that the community, target group and project staff can work together as partners for a common cause.

Jharkhand is a low prevalent but highly vulnerable state, because of high in and out migration, low literacy level and poor health infrastructure. Therefore there is a need to address the issue of HIV/AIDS more aggressively. Although work within the workplace and targeted intervention is on, there is a need to address the general mass. The best strategy would be by harnessing the power of the entertainment media to reach even those in remote villages of Jharkhand.

UML, through its social arm KGVK, in the near future would focus more on developing IECs in the local languages and standardizing the BCC for the media dark areas to promote HIV awareness and a positive attitudinal and behavioural change among the underserved groups. This initiative will increase the outreach of dissemination of standardized information to the poor and marginalized sections of the community.

Our mission is to evolve an integrated process by which people define their own needs, manage their own resources and make their own decisions, ensuring equitable and sustainable development, through convergent efforts of Government, Corporate, NGOs, scientific institutes and beneficiaries... the P4 principle of Public-Private-Partnership.

The journey of Corporate Social Responsibility of the Group is a long one and activities taken under the um-

brella of CSR are only the beginning. The commitment and hard work has started bearing fruit and the TERI award to the Usha Martin Group is a recognition of this effort.



Chairman Mr B K Jhawar receiving the TERI award from President of India Dr Abdul Kalam.

Our mission is to evolve an integrated process by which people define their own needs, manage their own resources and make their own decisions, ensuring equitable and sustainable development, through convergent efforts of Government, Corporate, NGOs, scientific institutes and beneficiaries... the P4 principle of Public-Private-Partnership.

□

The dinosaurs reigned for millions of years. We have only been here for fifty thousand. Pray for grace.

- Ellen Gilchrist

Corporate Environmental Management: Pollution Control in Paper Industry

R. Manikandan, M. Ravichandran & A. Royal Edward Williams

The paper industry is one of the most highly polluting categories. The Central Pollution Control Board, New Delhi, has classified the paper industry in the red category. A case study of the Tamil Nadu Newsprint and Paper Limited (TNPL), located in Karur district of the state, has been taken. The Green Rating Project (GRP) of the CSE has rated TNPL third among the large paper units in India. It was found that the annual pollution control cost commitment was at 1 to 3 per cent of the total cost of the unit. These results show that pollution control costs need not pose a heavy burden on the economy of firms.

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The most pressing environmental problems facing developing countries include water and air pollution and soil degradation. Of these, industrial pollution poses a serious challenge due to its impact on a large number of economic activities. Industrial pollution has been one of the most important factors causing water and air pollution. The disposal of waste waters is of widespread national concern. Industrial activities generate a large number and variety of waste products, which are generally discharged into water streams. The nature of industrial wastes depends upon the industrial processes in which they originate.

The Central Pollution Control Board has declared about 18 categories of industries which are highly polluting. Paper and pulp industry is certainly one of the polluting industries. Paper and pulp industries manufacture newsprints, where the output is essential for economic activities. The pulp and paper industry has historically been considered a major polluter. It consumes vast resources and releases large volumes of wastewater, substantial emissions of gases and generates a huge amount of residual solid waste. Indian pulp and paper mills primarily rely on implementing the pollution control techniques to reduce pollution.

In the globalized world, it is imperative that polluting industries need to go beyond regulatory compliance. Qualifying for ISO 14001, green rating, eco-labeling, and so on became necessary, besides regulations. However, in India it is still difficult to claim cent per cent success with respect to regulatory compliance. In this milieu, an attempt was made to discern the way in which the select paper unit responds to environmental responsibilities.

Material and Method

On a case study basis, this research study was conducted in Tamil Nadu Newsprint and Papers Limited

Table 1: Production in TNPL

Sl. No.	Year	Newsprint (in Mts)	PWP (in Mts)	Total (in Mts)	Sales (Rs. In Lakhs)	Other Income (Rs. In Lakhs)	Total (Rs. In Lakhs)
1	1993-94	33970	60663	94633	20491.25	1062.89	21554.14
2	1994-95	28659	64401	93060	21011.2	1103	22114.2
3	1995-96	19925	81263	101188	29467.97	1095.47	30563.44
4	1996-97	36891	116569	153460	41937.64	1683.92	43621.56
5	1997-98	52410	118208	170618	42101.62	2074.15	44175.77
6	1998-99	64820	111255	176075	45447.3	2197.63	47644.93
7	1999-00	37649	141222	178871	49266.03	1659.1	50925.13
8	2000-01	62140	128966	191106	59638.87	1838.08	61476.95
9	2001-02	33966	150301	184267	57832.12	1677.97	59510.09
10	2002-03	20490	147382	167872	53986.82	1671.45	55658.27
11	2003-04	11581	170634	182215	58359.00	2850.00	61209.00

(TNPL) paper manufactures, Pugalur located in Karur, which was started in 1985. The company has nearly 2000 workers. Data was collected from the production site, raw materials used, products produced, effluent released, number of labourers, level of investment, expenses towards power consumption, chemical used, material consumption, water consumption and expenses made for effluent treatment programme. All the above data were collected from the concerned unit and individual observations from the production site. TNPL is different from the conventional paper industry as the major chunk of the raw material constitutes bagasse.

The Tamil Nadu Newsprint and Papers Limited (TNPL), the selected unit of study, is unique in several respects. Generally, paper and pulp units use eucalyptus trees in large quantum as raw material for the preparation of pulp. While the TNPL uses bagasse, sugarcane is used, as raw material for preparing pulp. Indeed it is recycling of waste, which is central to environmental management. The chief effluents from the paper industry are bagasse extract and dyes in excess. The crucial parameters are pH, COD, BOD, TSS, TDS, and physical observations. These parameters are very important to check the effluents, which are oxidized to reduce to simpler compounds, thereby making it harmless.

The analysis carried out took into account the expenditure incurred towards the operation and maintenance cost and labour wages, etc., spent for the TNPL paper production. Data was also gathered from the production plant and environment section. The collected data was analyzed and screened for its profits and the cost spent for TNPL paper productions for the year.

Analysis and Results

By analyzing the data collected from the paper unit, the results revealed the manner in which environmental responsibilities were being carried out at the factory level. Following is the discussion of the performance of the TNPL unit in regard to production, water used, effluent generation, pollution control technology and the investment made on the same, impact of pollution control on various economic parameters.

Table 1 shows that the production of newsprint and printing and writing paper (PWP) from 1993 to 2004. The production of paper has gradually increased over a period from 1993 to 2003. The TNPL has been supplying newsprint paper to Times of India and the Hindustan Times. The paper manufactured is exported to 20 countries including Australia, Greece, Jordan, UK etc. Income from sales and other activities of the TNPL unit, has increased from Rs.215.54 crores in 1993-94 to Rs.612.09 crores in 2003-04. The reason behind this is due to the upgradation of advanced technology over the period, coupled with the increase in utilization of machine capacity. Not only the production side, even other activities like sales of sludge, sale of power and full utilization of raw materials had improved.

The type of products produced include writing and printing paper, computer printout paper, cream wove and newsprints. The installed capacity of paper machine by TNPL is 212750 tons per annum. The pulping processes are kraft wood, kraft bagasse, and CMP (chemical pulping process) bagasse. The average quantity of water sources showed 21.2 million cubic meters per annum (CSE, 2004).

Manufacture of Paper

Understanding the manufacturing process of paper may be necessary to discern the stages from where effluents get discharged and the treatment methods adopted thereof. Bagasse is a principal raw material used in newsprint manufacturing. It is an agro-residue, and an industrial waste coming out in the processing of sugarcane. Bagasse as a raw material scores more than wood-based fibre as the former consumes less electricity per tonne of pulp, two times lower, than the latter (CSE, 2004).

Bagasse Handling Plant receives bagasse from sugar mills through trucks. The unloaded bagasse is conveyed and screened in clarifiers and depithed to remove pith. The depithed bagasse is stored in yard through self-propelled boom stacker in the form of wet pile. The pith is transferred through conveyors to boilers to be used as fuels. A very clear and uniform bagasse fibre will be available for the subsequent operations.

The pulp mill consists of three streets, namely hardwood pulping, chemical bagasse pulping and mechanical bagasse pulping. The table shows the materials required for making one ton of paper.

(a) Hardwood pulping street is conventional design with digesters of 80 M³ capacity and CEHH bleaching sequence. The installed capacity of the street is 72 tons per day-bleached pulp. The eucalyptus and other tropical hardwood logs are chipped, and the chips are screened stored and fed to the digesters and cooked with white liquor (NaOH + Na₂S) at a pressure of 7.5 Kg/cm² for 2 hours. The cooked pulp is then blown into a blow tank from there it is transferred for washing to three stage counter current called Brown stock washers. The washed pulp is then screened for eliminating any uncooked, long fibre, cleaned for eliminating dirt and impurities and thickened before bleaching. The bleaching sequence consists of conventional chlorination, alkali extractor followed by two stage calcium hypo chlorite (CEHH) bleaching and stored.

(b) Chemical Bagasse Street consists of continuous digesters and three brown stocks washing, screening, cleaning followed by CEHH bleaching.

The washed and pressed raw bagasse having 70% moisture is fed with continuous digesters where it is cooked at vapour phase, using Kraft process under stand are cooking conditions. (Chemicals as Na₂S = 10 – 11% of raw materials, Temperature = 170 C, cooking time = 20 min.). After cooking, pulp is bleached in three stages namely chlorination, extraction and hypochlorite (CHE)

Table 2: Materials used per tone of paper

Sl. No.	Particulars	Quantity
1	Raw materials	7.0 tons of whole major bagasse
2	Sodium hydroxide	35 Kgs
3	Sodium sulphate	40 Kgs
4	Chlorine	50 Kgs
5	Lime	200 Kgs
6	Alum	35 Kgs
7	Resin	15 Kgs
8	Talcum	20 Kgs
9	Tyes	30/40 gms
10	Water	120 M3
11	Steam	8 tons
12	Power	1500 – 2000
13	Coal	2.5 tons

Source: TNPL, Pugalur.

and then stored. The pulp washing is sent to recovery plant to recover spent chemicals to generate steam.

c) Mechanical bagasse pulping line has refines for thermo-mechanical pulping which operates at 1.5 Kg/cm². The washed bagasse is fed to these refines with cooking liquor consisting of caustic and sodium sulphite. The refined pulp is screened and cleaned and there after it is bleached to brightness of 50 – 55%. After reaction time of two hours, the pulp is neutralized with sulphuric acid.

Table 3: Water drawn from Cauvery River

Year	Water drawn from River (KL)	Lagoon out flow (KL)	Usage of Water (KL)
1994-95	18886900	13361820	5625080
1995-96	24642000	17806000	6836000
1996-97	27877000	20420170	7456830
1997-98	26019000	19514250	6504750
1998-99	22225000	18816310	3408690
1999-00	21930000	17786500	4143500
2000-01	20969000	17823650	3145350
2001-02	20540764	17359568	3181196
2002-03	19347843	14412080	4935763
2003-04	18000784	12672240	5328544
2004-05	207484494	14112380	193392114

Source: TNPL, Pugalur.

The refined pulp is then passed on in water suspension to the paper or board machines when the sheet is

formed on continuous running wire, which is then pressed and dried. The Government and the EPA are perfect in the pollution control and safety environment from the industries. If the industries are not properly managing the effluent from the industry then the EPA and Government of Pollution Control Board shall immediately cancel the license and the approval of the industries.

Table 3 highlights the water consumption and release from the year 1994 to 2005. The quantum of water consumed was 5625080 KL during the year 1994-95. During this period, the ETP was installed. In 1995 to 96 the water consumed stood at 6836000 KL then in 1996 to 97 the water consumption rose higher to the previous year the water consumed was 7456830 KL. After 1997 to 2002, the water consumption got reduced greatly due to unavailability of water in the Cauvery River and the recycling of water had been resorted to. The water consumption level during this year was 3408690 KL. However, in the year 2003 the water availability showed higher level in the Cauvery River and the production of paper is also high. So the water intake is also slightly raised when compare to 1997 – 2002. Due to the development of new technology the water which is recycled and fully increased the qualities of the lagoon outflow. Lagoon water is used to the extent of 193392114 KL for agricultural and irrigation purposes by the villages in and around the industry. Nearly 1500 acres of lands got benefited by the lagoon water, which is rich in carbon nitrogen and other salts, that nourish the crop growth and soil fertility. This quality of water is due to the microbial families cyanobacteria, azosbirillum and pseudomonas species. These microbial families fix the carbon, nitrogen and phosphores to the water and soil.

Table 4: Water consumption per ton of paper

Year	Water Consumption per ton of Paper (M ³)
1990-2000	124
2002-2003	105
2003-2004	83

Source: TNPL, Pugalur.

The amount of water consumed in the production site is crucial. In 1990 – 2000, the water consumed to produce one tonne of paper was 124 M³/year. In the next couple of years the water consumed to produce one tonne of paper declined to 105 M³/year. In the year 2003 – 2004 the water consumed for producing one tonne of paper further reduced to 83 M³/year (Table 4). The changes in low volume consumption of water per tonne are achieved due to the adaptation of new technology and recycling of water. The water consumption during

the paper production process has declined over the period from 1990 to 2004. As much as 75 per cent of the water used in the production process is discharged as effluents. Hence, the industry managed the effluent by effluent treatment programme and it is converted to the harmless nutrient rich water distributed to the agricultural and other purpose.

Table 5: Power Consumption of Effluent Water Treatment

Sl. No.	Year	Cons. Qty (Rs. In Lakhs)	Per KWH	Value
1	1996-97	12453	2190	272.78
2	1997-98	10437	2311	241.22
3	1998-99	11796	2282	269.23
4	1999-00	11575	2213	256.12
5	2000-01	12099	2435	294.61
6	2001-02	12528	2111	264.51
7	2002-03	11136	1779	198.08
8	2003-04	11869	1880	223.16
9	2004-05	11549	-	197

Source: TNPL, Pugalur.

The consumption of power during the year from 1996–97 the consumption of electricity registered as 12453/2190 KWH and the amount spent is Rs 272.78 lakhs. The next year 1997–98, 10437 KWH the expenditure spent for electricity is calculated as Rs 241.22 lakhs. In 1998–09, power consumed was 11596 KWH, the expenditure on power was calculated as Rs 269.21 lakhs. In the next year 1999-2000 the power consumption was 11575 KWH, worth Rs 256.12 lakhs. However, after 2002, expenditure on power started to decline owing to power generation through windmill by themselves (Table 5).

Water Pollution and effluent treatment plant in TNPL

The environmental problem central to paper mill is the discharge of wastewater as it sends out as much

Table 6: Characteristics of effluent stream

Sl. No.	Parameter	Unit	High BOD stream	Low BOD stream
1	pH	-	4.5	7
2	BOD	Ppm	4500	300
3	COD	Ppm	7000	1200
4	TSS	Ppm	1900	770
5	TDS	Ppm	2250	1670
6	Colour pt.co.units	Ppm	450	280

Source: TNPL, Pugalur.

Table 7: Cost of Pollution control equipments

Rs. in Lakhs

ETP		Air pollution control							
Actual Cost	Book Value	Actual Cost	Book Value	ESP 1	ESP 2	ESP 3	ESP 4	ESP 5	TOTAL
1592.56	855.04	174.09	42.52	94.54	120.35	82.42	207.78	161.94	2433.68

Sources: TNPL, Pugalur.

water as it consumes. This wastewater is coloured, contains organo-chlorines and can be foul smelling. The challenge, therefore, is to reduce freshwater consumption. The entire waste generated from the mill is segregated and collected into two streams viz., High BOD and low volume stream (flow: 500 m³/hr), and low BOD and high volume stream (flow: 2000 m³/hr). The high BOD stream consisting of wastewater from bagasse storage yards and bagasse preparation plant taken through mechanical bar screen to a bagasse clarifier for settling of suspended solids and then two anaerobic lagoons in series, to reduce BOD levels. The retention time in the anaerobic lagoons is around 10 days. The reduction is around 80 per cent of suspended solids and 90 per cent of BOD load. The overflow from the anaerobic lagoon is taken to primary clarifier 2 with an addition of 1000 ppm of alum for effective of colour removal and suspended particles. The outlet from the primary clarifier No.2 constitutes the stream of treated effluents.

Table 8: Operation and Maintenance Cost

Rs. in Lakhs

Sl. No.	Year	OMC of unit	OMC of PC (air & Water)	Percentage (%)
1	1996-97	23173.72	439.69	1.89
2	1997-98	26179.75	418.81	1.6
3	1998-99	25494.71	623.84	2.45
4	1999-00	26818.97	630.49	2.35
5	2000-01	31946.23	760.93	2.38
6	2001-02	31011.31	704.1	2.27
7	2002-03	28613.84	604.77	2.11
8	2003-04	33548.71	616.93	1.84

Source: TNPL, Pugalur.

Equipment cost of ETP in the year 2001, the actual cost of installment of ETP was Rs 1592.56 lakh, after depreciation (Book Value) cost of equipment was Rs 855.04 lakh for Effluent Treatment Plant. Air pollution control equipment costs were Rs 841.12 lakh. There are five ESP control systems in TNPL; ESP 1 costs of Rs 94.54 lakh, the cost of ESP 2, ESP 3, ESP 4, ESP 5 were Rs 120.35 lakh, Rs 82.42 lakh, Rs 207.78 lakh and Rs 161.94 lakh respectively. The total equipment cost for

both air pollution control effluent treatment was Rs 2433.68 lakh.

The operation and maintenance cost is crucial with respect to the continuance of functioning of the technology under use. Table 8 highlights the status of operational and maintenance cost of the Effluent Treatment Programme (ETP) from 1997 – 2004. In the year 1996 – 97 the cost incurred for operational and maintenance in Effluent Treatment Programme was Rs 439.69 lakh with a percentage of 1.89. During the course of years from 1998–2003, the cost incurred for operational and maintenance in percentage stood at 2.27. But, in the year 2003–2004, where the cost incurred for the operational and maintenance cost in percentage was 1.84. Slight variation in operational and maintenance cost is because of the method of treating the effluents in TNPL. Due to introduction of new technologies, the cost is reduced to a very low amount by biological treatment. In the olden days, the technology was mostly based on the chemical treatment, so that the amount spent on chemical purchased to ETP was very high. The recent trend is to take to biological treatment method. In this method the micro-organism like pseudomonas species and bacterial species are used in ETP. These microorganisms convert the paper waste, bio-chemically the cellulose, into simpler components viz. glucose. This is the process where the effluents get treated. In the year 2003–2004 these type of advanced techniques were implemented to reduce the cost of operational and maintenance. The expenditure on chemical is higher when compared to the cost of microorganisms. However the cost of operational and maintenance in the year 2003–2004 was lower when compared to 1998–2003. The annualized pollution control cost (APCC) for the effluent treatment plant, the cost commitment per annum, is best used in cost analysis. The above table shows the annualized pollution control cost and the management of effluent treatment programme from 1996–2004. The APCC includes operational maintenance cost per annum, depreciation, the proportion of technology used per annum, for both water and air pollution control from the year 1996-97. The cost for treating the water was Rs 439.69 lakh with a depreciation of Rs 26.99 lakh and the rate of interest was calculated as Rs 33.83. In total Rs 544.21 lakh was allocated for ETP out of a total

Table 9: Annualised Pollution Control Cost

(Rs. In Lakhs)

Sl. No.	Year	Annualised Pollution Control Cost (APCC)						Total	Annualised Total Cost (ATC)				APCC as Percentage of ATC
		OMC		Depreciation		Interest			OMC	Depreciation	Interest	Total	
		Water	Air	Water	Air	Water	Air						
1	1996-97	439.69	45	23.22	2.37	30.78	3.15	544.21	23173.72	6452	7061	36686.72	1.48
2	1997-98	418.81	45	22.11	2.37	29.32	3.15	520.76	26179.75	4269	6760	37208.75	1.39
3	1998-99	623.84	45	32.94	2.37	43.67	3.15	750.97	25494.71	4596	6479	36569.71	2.05
4	1999-00	630.49	45	33.29	2.37	44.13	3.15	758.43	26818.97	4732	5050	36600.97	2.07
5	2000-01	760.93	45	40.18	2.37	53.26	3.15	904.89	31946.23	4786	3886	40618.23	2.22
6	2001-02	704.1	45	37.17	2.37	49.29	3.15	841.08	31011.31	5100	3224	39335.31	2.14
7	2002-03	604.77	45	31.93	2.37	42.33	3.15	729.55	28613.84	5198	2864	36675.84	1.99
8	2003-04	616.93	45	32.57	2.37	43.19	3.15	743.21	33548.71	6015	1625	41188.71	1.8

Source: TNPL, Pugalur.

cost of the unit, Rs 36686.72 lakh (table 9). The APCC percentage of annualized total cost was 1.48. This proportion showed a slight reduction for the year 1997-98. For the subsequent years, the proportion raised marginally till 2001-02. Again there was a slight fall during the years 2002-03 and 2003-04. From the foregoing analysis it is evident that the investment on pollution control would not pose a heavy burden on the firm. This empirical result could allay the fear that industrial units can assimilate and internalize the same without much difficulty. Albeit the variation is insignificant, the reasons attributed include fluctuating cost of production and introduction of new technology.

The parameters, which are observed during the process of paper production initially and after the process finally as the effluent from the production plant, are converted into harmless lagoons. The bio-chemical analysis of the effluent are concentrated on pH, colour, TS, TSS,

Table 10: Comparison of Final Treatment of Effluent with TNPCB Norms

Particulars	UOM	From Bagasse Handling & Preparation (mg/L)	From Pulp mill paper machine utilities (mg/L)	TNPCB Norms (ppm)	Final Outlet in TNPL (ppm)
Ph	-	8.6	8.3	7.5	7.6
Colour	PPM	7000	5000	250	241
TS	PPM	5000	3000	250	235
TSS	PPM	3500	700	30	25
COD	PPM	7000	1300	2050	2350
BOD	PPM	3500	350	50	47

Source: TNPL, Pugalur.

COD, and BOD. The above parameters are screened in the inlet and outlet of the effluents produced from the paper industry. The TNPCB (Tamil Nadu Pollution Control Board) fixes the normal exposed values of the above parameters, as tabulated in the table. The first parameter pH showed the percentage of hydrogen present in the effluent. If the pH is greater than eight, then the effluent would destroy the quality of the soil fertility and make the environment polluted. In table 10, the pH of the water in effluent is measured as 8.6 mg/L in bagasse handling outlet and 8.3mg/L in pulp mill and paper machine preparation outlet after the treatment effluents are anaerobically digested and oxidized into the conversion of pH ± 8.3 to 7.6 as per the TNPCB norms the pH is not exceed to 7.5. The colour is one of the important parameters which determined the status of the effluent. It is analyzed as 7000 ppm outlet of bagasse handling and 5000 ppm pulp mill and paper machine preparation outlet. These effluents are treated and the level of ppm is reduced to 241 ppm when compare to the TNPCB norms fixes as 250 ppm. The total solid (TS) is the composition of organic and inorganic substances. These substances showed the values that lowered after the installation of ETP from 5000 mg/l in bagasse handling and 3000 in pulp mill and paper machine preparation outlet are reduced to 235 ppm when compared to TNPCB norms of 250. The treated effluents remain within the permissible level, when compared to the norms fixed by TNPCB. Total suspended solids (TSS) is yet another vital parameter, which defines the amount of suspended particulates in the effluents. The values in bagasse observed as 3500 in bagasse handling outlet and 700 in pulp and paper machine preparation outlet. This above TSS value does not exceed to 30. The TSS is very normal when compared to the norms fixed by TNPCB. COD is known as

chemical oxygen demand the amount of oxygen required to dissolve the pollutant present in the effluents. The demand source as 7000 ppm in bagasse handling and 1300 in pulp and paper machine preparation after ETP, the aerator is the device which produces 5000 litres of oxygen to the effluents to solubalise their effluents to oxidized and converted into harmless manure. For this purpose, in TNPL there are 26 aerators produced sufficient oxygen to dissolve the pollutants present in the effluents. BOD, biological oxygen demand, a measure of the oxygen level required to decompose wastes. The level of BOD observed as 3500 ppm in bagasse and 390 ppm in pulp and paper machine preparation outlet. These values were reduced after ETP into 47 ppm. The TNPCB norms show that the BOD level in treated effluents do not exceed 50 ppm. It refers that the obtained BOD in our effluents is 47 ppm indicates that the TNPL industry is successfully managed the effluents and makes the effluents useful to agricultural and other purposes. Hence, the TNPL keeps the environment safe and clean.

Ambient Air quality and the TNPL

During the production of paper, the particulates which are suspended in the air, makes the air polluted. The sum of the gas pollutants evolved from the boilers includes CO, H₂S, SO₂, NO_x, which would be emitted into air present in TNPL. These pollutants are controlled by 5 ESP and 3 Boiler Chimneys and 2 SRP and 1 Lime Kiln. These devices precipitate SPM (Suspended Particular Matter) and it is neutralized by the ionic electorates and observed by the lime kiln. Hence, the industry is more concerned to control the pollutants and manage the environment safe and clean. The quality of air is checked by TNPCB and it states that inside the industries the SPM is observed as 500 mg/m³ and outside the industry as 200 mg/m³. The SPM are controlled and it is very normal when compared to the level fixed by TNPCB.

Green Rating Project

The foregoing discussion dealt with the cost implications of regulatory compliance in TNPL, the select unit. It must be mentioned that the scope of corporate environmental management is very wide, and that it does not stop with regulation alone. It is something beyond that. The Centre for Science and Environment, (CSE) New Delhi, has come out with an approach called 'Green Rating Project' (GRP). It is defined as "GRP is a civil society initiative to make Indian industry more accountable for the pollution they generate, so that growth does not have to come at a high environmental cost. GRP rates the environmental performance of major companies within an industrial sector and disseminates this in-

formation to the public. On one hand this provides a reputational incentive to 'eco-friendly' companies to maintain and even improve their environment performance. On the other, it pressurizes polluting industries to improve by investing in environmental protection". The CSE has been carrying out this exercise for polluting categories like paper, cement etc. in India.

Incidentally, the TNPL happens to be one the units included for GRP. The CSE rating of TNPL was 57.3 per cent, while the BILT Graphics scored the maximum of 77.3 per cent. The upshot is that the TNPL stood third in the green rating in India (Green Rating Project, CSE, 2004).

Conclusion

TNPL is one of the leading paper manufacturers in the world. It exports the paper to several countries like Australia, UK, and Germany. Having analyzed the data on pollution control cost, it is reckoned that the cost of pollution control is well within the manageable limits of this large unit. This is not an isolated case, where the annual commitment for pollution treatment constitutes between 1 and 3 per cent of the total cost of the entire unit. Most large units showed a similar picture. This establishes a simple fact that pollution control will not force heavy burden on the economy of firms, and that large units can easily internalize the external cost. In addition, when compared to proportion of investment made on media advertisement, the pollution control endeavour is just minimal. Perhaps, small scale units might find it difficult to take to pollution control owing to cost burden but certainly not by the large units.

However the cost analysis does not guarantee that the people who depend on the employment of these industries and those having their houses near the industry are unaffected due to the pollutants. Externality, in terms of damage inflicted on health of human beings by disease like cancer, asthma, lung disorders, were present.

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Nature doesn't work on a rushed schedule. To do good science, you need to do things slowly and rigidly.

– Lu Ke

Factor Substitution and Role of Material Input: Application of Translog Production Function to Petrochemical Industry in India

S.S. Rajan, K.L.N. Reddy & V. Pandit

This paper compares the suitability of Cobb Douglas (CD) and Translog (TL) production functions, for India's petrochemical industry, taking into account the role of material inputs for a 25-year period. Our empirical findings reveal the significance of material input and technical change in the augmented models. Corroborating the importance of technical change, the industry shows inter input substitution possibilities to be very strong, which has important implications for the long-term growth of the industry.

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A large number of econometric studies on different facets of Indian industries have been carried out over the last four decades on the basis of econometrically estimated production function. The main focus in many cases has been the type of production functions that fits the data and related issues of factor productivity and efficiency, while attention has recently turned to newer areas, such as R&D activity, capacity utilization, product pricing, growth and profitability. The earlier issues are not totally resolved. The Cobb Douglas (CD) and the Constant Elasticity of Substitution (CES) have often been used in both theoretical and empirical studies of production relationships. In addition, a few new functional forms that have been investigated are the Variable Elasticity of Substitution (VES) and the Transcendental Logarithmic production function (TL).

Production function estimation has been one the most common areas of econometric analysis in the Indian industry. The CD & TL production function have been employed in the estimation of production relationships in the Indian context. Nevertheless a vital question at this point is about which of these is more appropriate.

The major issues considered in the Indian context have been as follows:

1. Alternative methods of estimations such as OLS, GMM, Instrumental Variables Method, Panel Data Analysis, 2 SLS, SURE etc.
2. Identification of output and input variables, and the appropriate relation between them.
3. Conventional versus augmented production function.
4. Testing of allocative efficiency and technological efficiency.

5. Measurement of technological change.

Using the production function we attempt to evaluate the impact of technical progress in the *Petrochemical Industry*. Regarding intersubstitutability among the various inputs, we also look for the "technological change" induced substitution among the inputs and examine the advantage of such a substitution. The following specific objectives provide the main focus of this exercise.

- Evaluation of the growth of the petrochemical industry.
- Identification of major inputs in quantification of partial and total factor productivity indices and return to scale.
- Comparison of the TL with CD as a preferable model.
- Examination of the substitution possibilities between the factor inputs

The Petrochemical Industry

Petrochemicals are hydrocarbons obtained from crude oil and from natural gas used as feed stock. Cracking (heating to break up larger molecules into smaller ones), of naphtha and natural gas six basic petrochemicals are obtained namely Ethylene, Propylene, Butadiene, Benzene, Xylene, Toluene, which are further broken down to be used as building blocks for all the downstream products namely Acrylonitrile fibre, Ethylene dichloride, Ethylene oxide, High density polyethylene, Low density polyethylene, Poly butadiene rubber, Poly propylene, Polystyrene, Poly vinyl chloride, Styrene butadiene rubber etc. These chemicals are further processed to produce plastics, synthetic detergents, synthetic rubbers, and synthetic fibre which are used in various fields like agriculture, water management, automobiles, electronics, consumer products, transportation, textiles, cosmetics, health and hygiene.

The production of petrochemicals in India began with the setting up of small plants in the late 1950s and early 1960s using non-petroleum feed stocks based on alcohol, calcium carbide and coal based benzene. It was only in 1968 that National Organic Chemicals Ltd (NOCL) in collaboration with Royal Dutch Shell Group commissioned a small integrated petrochemical complex using naphtha based ethylene cracker to manufacture polyvinyl chloride. Presently we have big players like Mangalore Refineries and Petrochemicals Ltd (MRPL), Indian Petrochemical Limited (IPCL), Reliance etc. reporting record performance in production of petrochemicals.

Petrochemicals and their contribution to the economic development of India are indicated by the following broad stylized facts:

- Petrochemicals are cost effective substitutes of natural products like wood, metals and natural fibres, which not only help in conserving our natural resources but also our economic growth.
- In addition to the substitution of natural resource, superior properties of petrochemicals help to develop newer application propelling economic growth and development. Development of newer application creates multiplier effect, which induces economic growth.
- The domestic petrochemical industry has been growing at the rate of 14 per cent to 16 per cent which is more than the overall GDP growth rate and contributes about 13 per cent of the total exports of the country.
- Over the years the capacity addition in petrochemical industry has reduced import dependency and have a exportable surplus in poly ethylene polystyrene fibres and plastics.
- MRPL (Mangalore Refineries and Petrochemicals Ltd), a subsidiary of ONGC, recorded its highest ever turnover of Rs 206.92 billion, up from Rs 126.12 billion during FY (financial year) 2004/05.
- Only in the case of polystyrene the country experience surplus situation in the financial year 2004-05.
- Production of synthetic fibres, polymers elastomers synthetic detergent intermediaries and plastics increased by 4.9 per cent from 7 mt in 2003 -04 to 7.35 mt in 2004-05. Meanwhile the projection of demand for polymers is expected to grow at 10 per cent in this 10th plan period.
- Our exports of polymer have increased to \$1b in 2003 and expected to increase to 4b\$ by 2010.

Therefore, there is ample scope for investment in the industry. Indian petrochemical industry has made a rapid stride in terms of both production and consumption. The impressive growth in the production of petrochemical products has increased the self reliance and is reducing our import dependency gradually in this sector and we are convinced that the industry will play an important role in the Asian region. The present domestic petrochemical industry is on the threshold of the take off stage and hence it calls for proper direction and support

to etch out a prominent place in the international market.

Some of the pioneering studies published since the beginning of the eighties include Brahmanand (1982), Goldar (1986), Ahluwalia (1991), Balakrishnan and Pushpangadan (1994) and Srivastava (1996, 2000). Most of these studies focused on the measurement of productivity and the methodological aspects associated with it. These studies have dealt with the measurement of productivity either at sectoral or industry levels. Some of these studies also attempted to examine the relationship between policy regimes (as these changed over time) and the growth of productivity. Again studies by Goldar (1986), Ahluwalia (1991), have concentrated only on conventional two input production functions. Other studies for example by Goldar (1991, 2004), Bhavani (1991 and 1991A), Little Majumdar and Page (1987), Dembala (2000), have used modified production functions incorporating more factor inputs. Nevertheless none of these studies, except Dembala (2000) have examined the suitability of the alternative production functions. We attempt in our study to provide a comparison of Cobb Douglas (CD), and Translog (TL) production functions, for India's petrochemical industry, taking into account the role of material input. The focus of the study is also on the analysis of the "technological change" induced substitution among the inputs and the advantage of such a substitution.

Model and Methodology

We adopt the following notation in our models

Q = Real value added (Dependent variable)

K = Fixed capital (Capital input)

M = Total inputs (Material & Energy input)

L = Total employees (Labour input)

t = Technological Change (Trend Variable)

Ln = each variable is measured on the logarithmic scale denoted by Ln.

Production function under examination are specified as follows

(a) Cobb Douglas specification: augmented model (CD)

$$\text{Ln}Q = \alpha_0 + \alpha_L \text{Ln}L + \alpha_K \text{Ln}K + \alpha_M \text{Ln}M + e$$

(b) Translog production: augmented model (TL)

$$\begin{aligned} \text{Ln}Q = & \alpha_0 + \alpha_K \text{Ln}K + \alpha_L \text{Ln}L + \alpha_M \text{Ln}M + \frac{1}{2} \beta_{KK} \\ & (\text{Ln}K)^2 + \frac{1}{2} \beta_{LL} (\text{Ln}L)^2 + \frac{1}{2} \beta_{MM} (\text{Ln}M)^2 \\ & + \frac{1}{2} \beta_{MM} (\text{Ln}M)^2 + \gamma_{LK} (\text{Ln}L)(\text{Ln}K) + \gamma_{LM} \\ & (\text{Ln}L)(\text{Ln}M) + \gamma_{KM} (\text{Ln}K)(\text{Ln}M) e \end{aligned}$$

(c) Translog with Technical Change (TLTC):

$$\begin{aligned} \text{Ln}Q = & \alpha_0 + \alpha_K \text{Ln}K + \alpha_L \text{Ln}L + \alpha_M \text{Ln}M + \alpha_t t + \\ & \frac{1}{2} \beta_{KK} (\text{Ln}K)^2 + \frac{1}{2} \beta_{LL} (\text{Ln}L)^2 + \frac{1}{2} \beta_{MM} (\text{Ln}M)^2 \\ & + \frac{1}{2} \beta_{MM} (\text{Ln}M)^2 + \frac{1}{2} \beta_{tt} (t)^2 + \gamma_{LK} (\text{Ln}L)(\text{Ln}K) + \gamma_{LM} \\ & (\text{Ln}L)(\text{Ln}M) + \gamma_{KM} (\text{Ln}K)(\text{Ln}M) + \gamma_{Lt} \\ & (\text{Ln}Lt) + \gamma_{Kt} (\text{Ln}Kt) + \gamma_{Mt} (\text{Ln}Mt) + e \end{aligned}$$

It is well known that compared to Cobb Douglas (CD) and the Constant Elasticity of Substitution (CES), Translog (TL) function is more general in so far as it imposes relatively fewer a priori restrictions on the properties of the underlying production technology. For instance the Translog function does not restrict the value of elasticity of substitution at any point in the input space. Homotheticity, separability and constant returns to scale may be imposed by restricting the parameters then the form reduces to the multiple inputs Cobb Douglas specification as a special case Christensen et al (1971). Thus the Translog production function provides a suitable framework within which a number of hypotheses concerning the structure of production can be tested. Therefore, we use this specification in our empirical investigation.

Under the Classical methods of estimation, we assume that the means and variances of the variables are well-defined constants and independent of time i.e. stationary. However, research over the last two decades has shown that for large number of time series this is not the case. The fact that their means and variances change over time making the series non-stationary, results in spurious regression. By spurious regression we mean that regressing one time series on another may give a very high R^2 although there may exist no meaningful relationship between the two variables. It is thus very important to find out whether the relationship between two series is valid or spurious. Keeping this in our mind, we have subjected the variables for the unit root and cointegration test.

Allen's Partial Elasticity of Substitution

In calculating the factor substitution possibilities among the inputs, we have made use of Allen's Partial Elasticity of substitution. In the case of three inputs Translog production function the Allen's partial elasticity of substitution is given by:

$$APES = \sigma_{ij} = \frac{|G_{ij}|}{|G|}$$

Where |G| is the determinant of the bordered Hessian matrix and |G_{ij}| is the co factor of the element G_{ij} of the same matrix. The Bordered Hessian matrix of the three inputs TL form can be written as:

$$\begin{bmatrix} 0 & M_L & M_K & M_M \\ M_K & \beta_{LL} + M_L^2 - M_L & \gamma_{LK} + M_L * M_K & \gamma_{LM} + M_L * M_M \\ M_L & \gamma_{KL} + M_K * M_L & \beta_{KK} + M_K^2 - M_K & \gamma_{KM} + M_{MK} * M_L \\ M_M & \gamma_{ML} + M_M * M_L & \gamma_{MK} + M_M * M_K & \gamma_{KM} + M_M^2 - M_M \end{bmatrix}$$

For any pair of unequal values of *sij* and *j* the values of σ_{ij} is called the partial elasticity of substitution of the pair of factor *Ai* and *Aj*. Where *M_L*, *M_K*, and *M_M* are the share of labour, capital and material inputs respectively. β_{ij} 's are the parameter estimates of the production function. The matrix is constructed with the sample mean values of factor shares (Bhavani, 1991, Goldar, 1986). We have estimated the elasticities of substitution between labour and capital (σ_{LK}), labour and material input (σ_{LM}), capital and material input (*sKM*).

Wald Test

The Wald test calculates the test statistics by estimating the unrestricted regression without imposing the coefficient restriction specified by the null hypothesis. The Wald statistics measures how close the unrestricted estimates come to satisfying the restriction (In each equation we have designated the coefficients of each explanatory variable as C1, C2,, Cn., starting from the intercept as C1. This designation is used in our equation.)

1. We impose restriction on equation three which by itself a TL specification of augmented form and boils down to augmented CD form under the restriction imposed.

$$\text{LnY} = \alpha_0 + \alpha_K \text{LnK} + \alpha_L \text{LnL} + \alpha_M \text{LnM} + \frac{1}{2} \beta_{KK} (\text{LnK})^2$$

(c₁) (c₂) (c₃) (c₄) (c₅)

$$+ \frac{1}{2} \beta_{LL} (\text{LnL})^2 + \frac{1}{2} \beta_{MM} (\text{LnM})^2 + \gamma_{LK} (\text{LnL})(\text{LnK})$$

(c₆) (c₇) (c₈)

$$+ \gamma_{LM} (\text{LnL})(\text{LnM}) + \gamma_{KM} (\text{LnK})(\text{LnM}) + e$$

(c₉) (c₁₀)

2. The null hypothesis is **c_i = 0** **Where (i = 1, 2, 3.....10....)**. As it was mentioned earlier, if the Wald statistics supports the acceptance of the null hypothesis we accept augmented CD form. If the null hypothesis is rejected we accept Augmented TL form.

Data and Sources

The current study is based on from "Annual Survey of Industries" (ASI) (EPW April 2002), for the year 1973-74 to 1997-98, on the petrochemicals industries (petroleum refineries), Concordance from NIC (1987) to NIC (1970), Industry Code 302, the industry is described as manufacture of turpentine, synthetic resins/rubber, plastic material, plastics in primary form, nylon, & products of fermentation other than alcohol. We have used the net value added as a measure of output and total employees as labour, fixed capital stocks as capital used and total inputs along with trend variable for the measurement of explanatory variables.

Studies on production function and productivity has generally been undertaken in a two input framework, taking value added as output and labour capital as the two inputs. It has been shown that the use of the value added is justifiable only under restrictive conditions (such as functional separability), and if these are not satisfied then the use of the two input framework causes the parameter estimates to be biased Joyashreekar and Debesh (1986). With the recognition of the inadequacy of the two input framework in economic literature, we have reconciled to use the augmented model with material input as the additional regressor. Since the depreciation figures reported in the ASI do not correctly represent the true capital consumption, gross value added has been generally preferred to net value added as a measure of output. To correct for the price changes, the yearly current values have been deflated (single deflation) by price indices for the manufactured products. We have used gross output in keeping this in view.

Many studies have used the number of employees as the measure of labour input which includes both workers and persons other than workers. The later category of employees includes supervisors, technicians, manag-

ers, clerks and other similar types of employees. It has been argued that since such employees are as important for getting the work done as those workers who operate the machines, their services should be taken into account in the measurement of labour input. Taking total employees as the measure of labour input involves the assumption that workers and persons other than workers are perfect substitutes. The term Total Employees does not give explicit weightage to some important factors like age, sex, education, skills and occupational composition of the labour force. The variation in the hours of work is also not reflected in such a measure of labour input based on head count. Since this kind of traditional measure has some limitations, it is rather preferable to take Total Employees as a measure of labour input.

Compared to other factor inputs, considerable difference is observed with regard to the measurement of capital. The argument starts with the choice between whether the gross values or net values to be considered. It has been pointed out that the use of gross figures is justified in less developed countries on the ground that capital stock is often used at an approximately constant level of efficiency for a period far beyond the accounting life measured by normal depreciation, until it is eventually discarded or sold as scrap. Hashim and Dadi (1973) point out that a large amount of expenditure is incurred on repair and maintenance, and that such costs are treated as current cost and are deducted from gross value of output.

Again few studies have used gross fixed capital stock as capital input, whereas Hashim S R and M M Dadi (1973) have used gross fixed asset as capital input. Most of the studies have used perpetual inventory method and thereby overcome all deficiency. In this method the annual investments are deflated rather than the stock existing at the end of the year. This method of computation of investment from ASI data has been used by Hashim and Dadi (1973), Goldar (1986), Ahluwallia (1991) and many others. Let B_t denote the book value of fixed assets at the end of year t , D_t the depreciation allowances made in that year and P_t the capital goods price index for the year, then the series on real (fixed) investment, $\{I_t\}$, may be derived as

$$I_t = (B_t - B_{t-1} + D_t) / P_t$$

Further, let K_0 be an estimate of the real capital stock for a benchmark year, then the capital stock series, $\{K_t\}$, may be derived using the following relationship;

$$K_T = K_0 + \sum_{i=1}^T I_i$$

Many studies which have used this "augmented form of production function" came up with relatively better results when compared to conventional form. In the present study we use total inputs as the measure of material inputs in our study, which comprises total value of fuels consumed i.e. value of electricity, water etc consumed by the factory during the year including gasoline and vehicles. It excludes that part of fuels which is produced and consumed by the factory in manufacturing. And material consumed which represents the total value of all items of raw materials.

It needs to be emphasized that proper measurement of output and inputs is very important for econometric studies of production behaviour. Among the studies that have exercised care in the measurement of output and inputs, we might mention Brahmanand (1982), Goldar (1986, 1991, 1999 and 2004), Ahluwallia (1991), Balakrishnan and Pushpangadan (1994) and Srivastava (1996, 2000).

Empirical results

To avoid spurious results, as mentioned earlier, the unit root test has been carried out for each series. Again, given a group of non-stationary series, we may examine whether the series are cointegrated, so that we may identify the cointegrating (long-run equilibrium) relationships. The test for cointegration can be carried out by examining residuals from cointegrating regression to see if they are stationary. If the hypothesis is rejected it can be claimed that a long-term relationship does not exist between the variables. In the present exercise we have four variables namely gross value added, total employees,

Table 1: Unit Root Tests with Trend and Intercept (1973 – 1997)

Variables	Level	Inference	1 st difference	2 nd difference	Inference
LnQ	-4.6	Stationary			Stationary
LnK	-2.41	Nonstationary	-4.33	-8.1	Stationary
LnL	-2.98	Nonstationary	-4.6		Stationary
LnM	-4.7	Stationary			Stationary
(LnK) ²	-2.50	Nonstationary	-4.32	-8.3	Stationary
(LnL) ²	-3.14	Nonstationary	-5.01		Stationary
(LnM) ²	-4.6	Stationary			Stationary
LnLK	-2.40	Nonstationary	-3.88	-7.41	Stationary
LnLM	-3.95	Nonstationary	-6.21		Stationary
LnKM	-2.48	Nonstationary	-4.53		Stationary

1 per cent critical value = -4.35, 5% critical value = -3.5

* MacKinnon critical values for rejection of the hypothesis of a unit root.

capital and total inputs. The results of Unit Root Test and the cointegration test are there by given (See Table 1).

Unit root test

The impression of the series LnK (Capital), LnL (labour), which are the linear variables, $(LnK)^2$, $(LnL)^2$, (exponential form of capital, labour and total inputs), LnLK, LnLM, LnKM (are the interaction terms among the three variables), which constitutes the non-linear variables, indicates that they are not stationary, that is the mean variance and auto covariance of the individual series do not seem to be time invariant. On the other hand the series LnQ (Value added), LnM (total inputs) of the linear variables and LnM^2 of the non-linear term, appears to be stationary.

For execution of the test for stationary the procedure is as follows: First the above variables are tested using ADF test at levels I (0). The stationary of a variable is proved only when the estimated value is less than the critical value at 1 per cent levels of significance.

From the table we can infer that the variables LnQ, LnM & LnM^2 are stationary at levels. Among the rest of the variables LnL, LnL^2 , LnLM, LnKM becomes stationary when we take the first difference and variables LnK, LnK^2 , LK becomes stationary only when we take the second difference.

Cointegration test

Given a group of non-stationary series, we may be interested in determining whether the series are co-integrated, and if they are, in identifying the cointegrating (long-run equilibrium) relationships. The test for cointegration can be carried out by testing the residuals from co-integrating regression to see if they appear to be I (0). Only if the hypothesis is rejected that the cointegrating

residuals are I (1), it can be claimed to have a long-run relationship between the variables. In the present exercise we have four variables namely gross value added, total employees, capital and total inputs (Table 2).

From the table we can infer that the Likelihood Ratio test indicates two cointegrating equations at 5 per cent significance level. Here we see that if the likelihood ratio is greater than 5 per cent and 1 per cent critical value, then we can say that there exists the cointegration equation. In the table we see that in the first equation the likelihood ratio is greater than 5 per cent and 1 per cent critical value i.e., 57.69 is greater than 47.21 and 54.46 and the second equation the log likelihood ratio is greater than 5 per cent critical value i.e. 34.66 is greater than 29.68 so we can conclude that there exists cointegrating equation. The equations are:

$$LnQ = 12.00 - 1.11*LnL - 1.12*LnM + 0.04*LnK$$

$$LnQ = 2.87 - 1.026*LnM - 0.124*LnK$$

Estimated Functions

The three Production Models described in section 3.1 were estimated. These models differ in terms of their specifications. Model (a) is an augmented linear Cobb Douglas model. With Capital Labour and material inputs and output (value added) as the dependent variable. Model (b) is a three variable non-linear augmented Translog production function. Finally, in the Model (c), we used the standard time trend specification along with the other three inputs as mentioned earlier; in each of these models we have used OLS regression technique for estimation. We first take up the simple Cobb Douglas production for estimation. The estimated values of the parameters of model (a) are reported in Table 3.

From the equation we can infer that all the explanatory variables have a positive sign which implies that the variables are directly related to the dependent variable. The t values are highly significant except for log K. There is no auto co-relation problem, which is indicated by good Durbin-Watson stat (2.02). The variance in the model is explained by 89 per cent by the explanatory variables. While estimating the equation, we have taken the capital and material variables lagged by one period, the reason being these were accounted for by the factory as on the closing day of the accounting year. Again by the nature of this industry the time lag between the plowing of resources and the final product takes almost a year. The analysis done without lags gave unsatisfactory results. Furthermore, we can infer that the industry is subjected to increasing returns to scale. This is so because the

Table 2: Johansen Cointegration test results:

Eigenvalue	Likelihood	5 Percent	1 Percent	Hypothesized No. of CE(s)
	Ratio	Critical Value	Critical Value	
0.617481	57.69253	47.21	54.46	None **
0.569502	34.62909	29.68	35.65	At most 1 *
0.421632	14.40159	15.41	20.04	At most 2
0.051166	1.260505	3.76	6.65	At most 3

** denotes rejection of the hypothesis at 5% (1%) significance level

L.R. test indicates 2 cointegrating equation(s) at 5 per cent significance level

Table 3: Parametric Estimates of the Cobb Douglas and Translog production Function for the petrochemical industries for the year 1973 – 74 to 1997 – 98.

Variables	Model (a)(CD)	t - stat	Model (b)(TL)	t - stat	Model (c)(TLTC)	t - stat
C	-1.797	-2.02	19.6	3.01	2.85	1.69
D (LnL)	0.759	3.10				
D (D (LnK (-1)))	0.059	1.51				
D(LnL(-1))			- 15.797	- 4.33	20.563	3.17
D(D(LnK))			- 0.946	- 2.11	- 5.596	-3.36
LnM(-1)	1.053	12.88	- 2.748	- 2.28	0.205	1.5
t					- 0.052	-1.5
1/2*D(LnL(-1)2)			1.869	1.80	- 0.546	-2.79
1/2*D(D(LnK2))			0.083	4.54	- 0.107	-1.75
1/2*LnM(-1)2			0.333	3.02	0.35	5.49
1/2*LnM2					0.001	2.63
D(D(LnL(-1)K)			0.016	1.24	0.751	2.43
D(LnL(-1)M(-1))			- 0.053	- 3.24	- 0.151	1.04
D(LNKM (-1))			0.025	3.61	0.120	0.89
Ln (lt)					0.085	2.21
Ln (kt)					0.022	1.54
LN(mt)					0.035	2.00
DUM	0.621	3.66	0.640	9.52	0.442	7.1
DW	2.02		2.07		2.1	
R2	0.89		0.98		0.99	

sum of the elasticities is 2.3. The partial elasticity of employment, material, capital inputs respectively, indicate that every 1 per cent increase in the total employees will result in a 0.759 per cent increase in the value added to the industry. Likewise for every 1 per cent increase in material input and capital stock lagged by a period will bring about 1.053 per cent & 0.059 per cent value added to the industry.

The year 1979 saw the second oil crisis which the Indian economy was able to weather fairly well. However, it took nearly three years for restoring normalcy in 1982. During the years 1983-85 crude oil production increased by 11.4 per cent. As a result of increased production of oil, the level of self reliance in oil improved to about 80 per cent. There was also a step up in the natural gas production, which is the main feed stock for production of fertilizer and petrochemicals. The year 1993-94 is considered to have been a normal year after 1991-92 reforms were initiated. During which the production of hydrocarbons increased to 27.03mmt from 19.4mmt. These trends have been captured by the dummy's which we use in the model. What we can infer from the model above is that the industry is substantively material input based.

The Wald test on Model (b) (See Table 3) for restriction between augmented CD and TL production function

rejects the null hypothesis, the null hypothesis ($H_0 = c(5) = c(6) = c(7) = c(8) = c(9) = c(10) = 0$). The Wald statistic, χ^2 at 6 degrees of restraint the estimated value is 38.53739. χ^2 at 6 degrees of restraint the table value at 5 per cent & 1 per cent critical value is 12.592 and 16.812 respectively. Since the estimated value is greater than the tabular value, hence we reject the null hypothesis and accept the alternative hypotheses (H_1) i.e. $c(5) = c(6) = c(7) = c(8) = c(9) = c(10) \neq 0$. As a result we can conclude that from the study that Translog production function is superior to Cobb Douglas production function in this study.

The estimation of Model (b) gives the significance of the interaction terms and non linear terms imply the superiority of Translog for the given data. Although we find the augmented Translog form puts up a poor performance due to rejection of many explanatory variables (due to their poor significance contribution), still we find the non-linear terms being very significant, thus justifying the applicability of Translog augmented form for the prearranged data. Taking into account the statistical significance of the estimated parameters (Table 3) we see that the labour, capital and material inputs are not presenting anticipated signs, in relation to the output. But, it turns out to be highly significant when they grow exponentially and again when they interact with other inputs, besides

the interaction of labour and capital and capital and material input are positive and highly significant, except for when variable labour is interacting with material input. One can comprehend the reason for this shift as high cost of material and raw material (crude oil). The variance in the model is explained by 98 per cent. The F-statistics value shows the over all model is good. The DW-stat of 2.07 indicates no auto correlation problem.

We have also examined the marginal effect for the model behavior of each particular explanatory variable on the dependent variable. In order to examine the marginal effect of any given variable we must look at the partial derivatives of the dependent variables with respect to the explanatory variables given below.

Model (b): Marginal Effects and Partial Elasticities

$$\ln Q = 19.6 - 15.797 \cdot D(\ln L_{(-1)}) - 0.946 \cdot D$$

$$(D(\ln K)) - 2.748 \cdot \ln M_{(-1)} + 0.869 \cdot 1/2 \cdot (D(\ln L_{(-1)}^2))$$

$$+ 0.083 \cdot 1/2 \cdot (D(D(\ln K^2)))$$

$$+ 0.333 \cdot 1/2 \cdot (\ln M_{(-1)}^2) + 0.016 \cdot D(D(\ln L_{(-1)} K))$$

$$- 0.053 \cdot D(\ln L_{(-1)} M_{(-1)}) + 0.025 \cdot D(\ln K M_{(-1)})$$

$$1. \frac{\delta \ln Q}{\delta \ln L} = -15.797 + 3.738 \ln L + 0.016 \ln K - 0.053 \ln M$$

$$\frac{\delta \ln Q}{\delta \ln L} = -15.797 + 3.738 \cdot 8.6 + 0.016 \cdot 9.39 - 0.053 \cdot$$

$$10.68 = 15.932 > 1$$

$$2. \frac{\delta \ln Q}{\delta \ln K} = 0.964 + 0.166 \ln K + 0.016 \ln L + 0.023 \ln M$$

$$\frac{\delta \ln Q}{\delta \ln K} = 0.964 + 0.166 \cdot 9.39 + 0.016 \cdot 8.6 + 0.023 \cdot$$

$$10.68 = 2.886 > 1$$

$$3. \frac{\delta \ln Q}{\delta \ln M} = -2.748 + 0.666 \ln M + 0.023 \ln K - 0.053 \ln L$$

$$\frac{\delta \ln Q}{\delta \ln M} = -2.748 + 0.666 \cdot 10.68 + 0.023 \cdot 9.39 - 0.053 \cdot$$

$$8.6 = 3.265 > 1$$

1. The marginal effect of labour on output increases with an increase in the labour input and also capital, whereas the marginal effect decreases with an increase in the material input.
2. The marginal effect of capital on output increases with an increase in labour, capital and also in material input.
3. The marginal effect of material input on output increases with an increase in material input and also in capital, whereas the marginal effect decreases with an increase in labour.

The above Model (b) also satisfies the sufficient conditions for the well behaved of the model. Theoretical literature says for a model to be well behaved it has to satisfy the condition of (1) Positive monotonicity i.e. "the marginal effects must be positive >1", which the above model satisfies. (2) Quasiconcavity i.e. "the bordered Hessian matrix must be negative definite".

G' the Bordered Hessian Matrix is given by

$$\begin{bmatrix} 0 & 15.932 & 2.886 & 3.265 \\ 15.932 & 239.765 & 45.995 & 51.964 \\ 2.886 & 45.995 & 5.525 & 9.445 \\ 3.265 & 51.964 & 9.445 & 7.728 \end{bmatrix} = G$$

$$|G| = 0 - 2080.7 - 348.3 - 414.3 = - 2884.3 < 0.$$

Therefore the model satisfies the sufficient conditions of quasi concavity.

Allen's partial elasticity of substitution between pairs of inputs

On Model (b): (see Table 4)

- $\sigma_{LK} > 0$, speaks the demand for capital increases on account of substitution. Capital input takes part in the replacement of input labour in production. Therefore capital is said to be competitive with the factor labour.
- $\sigma_{LM} > 0$, says the demand for material increases on account of substitution. Material takes part in the replacement of input labour in production. Therefore material is said to be competitive with the factor labour.
- $\sigma_{KM} > 0$, express the demand for material input increases on account of substitution. Material input takes part in the replacement of input capital in production. Therefore material input is said to be competitive with the factor capital.

Table 4: Allen's partial elasticity of substitution between pairs of inputs on Model (b):

Substitution between pairs of inputs	Average mean of inputs at levels	With average mean of labour Being 50%:	With average mean of labour being 150%:
σ_{LK}	0.047	0.018	0.033
σ_{LM}	0.051	0.0007	0.036
σ_{KM}	0.044	0.156	0.032

Besides the analysis of elasticity of substitution we further attempted the substitution between the inputs taking the average mean of the labour 150 per cent & 50%, the ratio thus taken was arbitrary an exercise conducted to see what happens when the mean value of the input is ½ less or more of its value. It helps us to foresee what happens in the near future if you want to expand your industry with the same technology. Suppose a less developed country which cannot afford a huge budget, want a smaller similar plant, then the expected results can be known through this exercise. Accordingly all the results show the existence of positive substitutability.

We can infer from the above exercise the sign of (σ_{ij}) indicating inputs i and j in our case (L, K, M) are competitive factors. The results are more or less same compared with the results obtained at levels, but at lower levels (50 per cent) the values are much lower. Thus at some level it is increasing and decreasing, giving the production curve the shape of inverted **U**, now if substitution continues the production curve may come close to ZERO where it puts an end to further substitution. The reason for the relative fall in the value of the substitution in particular (σ_{LM}) at 50 per cent may be that technology determined by the average age of the industry from its inception developed as it grew, many players came in and they overwhelmed others who were in the industry. In addition there was tremendous change in the technology used over a period of time with the growth of the industry. Therefore this might be responsible for the fall in the values of the substitutability. Considering this in mind, we have used Time Trend Model which incorporates technical change by adding trend variable t as an additional regressor in the function.

Translog with Technical Change (TLTC) (See Table 3, Model c) brings out the significance of the interaction terms and non-linear terms and in particular the importance of the trend variable implying the suitability of the time trend model for the industry. The analysis shows the interaction of labour with capital is positive but when it comes to the interaction with labour and material input it is negative. Again one can understand the reason being the high and increasing cost of raw material (crude

oil). The coefficient of the interaction of capital, labour, material inputs with technology is positive which shows that there is acceleration in technical progress. The variance in the model is explained by 99 per cent. The D.W Statistics being 2.1 explain no autocorrelation problem. Therefore from the estimated results of the trend model shown in the Table 3: gives a positive rate, an upward swing in the production function over time for the given inputs.

Model (c) Marginal effects and Partial elasticity's of the industry

$$1. E_L = \frac{\delta \ln Q}{\delta \ln L} = 20.563 - 1.092 \ln L + 0.751 \ln K + 0.120 \ln M + 0.085t$$

$$= 20.563 - 1.092 * 8.6 + 0.751 * 9.39 + 0.120 * 10.68 + 0.085 * 15$$

$$= 19.504$$

$$2. E_K = \frac{\delta \ln Q}{\delta \ln K} = -5.596 - 0.214 \ln K + 0.751 \ln L + 0.120 \ln M + 0.022t$$

$$= -5.596 - 0.214 * 9.39 + 0.751 * 8.6 + 0.12 * 10.68 + 0.022 * 15$$

$$= 0.473$$

$$3. E_M = \frac{\delta \ln Q}{\delta \ln M} = 0.205 + 0.07 * \ln M - 0.151 \ln L + 0.120 \ln K + 0.035t$$

$$= 0.205 + 0.07 * 10.68 - 0.151 * 8.6 + 0.120 * 9.39 + 0.35 * 15$$

$$= 1.305$$

$$4. E_t = \frac{\delta \ln Q}{\delta \ln t} = -0.052 + 0.002t + 0.022 \ln K + 0.085 \ln L + 0.035 \ln M$$

$$= -0.052 + 0.002 * 15 + 0.022 * 9.3 + 0.085 * 8.6 + 0.035 * 10.68$$

$$= 1.288$$

1. The marginal effect of labour on output increases with an increase in capital, material input and technology but decreases with an increase in the labour input.
2. Marginal effect of capital on output increases with an increase in labour, material input and technology but decreases with an increase in capital input.
3. Marginal effect of material input on output increase with an increase in material capital and technology but decreases with an increase in labour.
4. The additional effect of technology on output increases with an increase in technology, labour, capital and material input.

Again the partial elasticities of all the explanatory variables used in the time trend model explains all the explanatory variables directly related to input and there is a positive upward shift in the production over time for the given inputs as shown below.

Returns to scale

Returns to scale behaviour was computed on the parametric estimates of the model (c) is defined as the sum of Capital, Labour and Material inputs elasticities.

$$\begin{aligned}
 RTS &= \frac{1}{n_s} \sum_{i=1}^s (E_L + E_K + E_M) \\
 &= \frac{1}{n_s} \sum_{i=1}^s \left(\frac{\delta \ln Q}{\delta \ln L} + \frac{\delta \ln Q}{\delta \ln K} + \frac{\delta \ln Q}{\delta \ln M} \right) \\
 &= \frac{1}{21} \sum_{i=1}^{21} (19.504 + 0.473 + 1.305) \\
 &= 1.01
 \end{aligned}$$

It can be seen that the estimated returns to scale is a constant with the production of output, for a proportional change in all inputs implying the absence of economies of scale.

Conclusion

This paper develops a simple procedure to compute allocative efficiency of inputs using Translog production function approach. The proposed procedure involves a

non-linear system of equation to obtain the end results. Meanwhile the study attempts to compare both the modified CD and TL production functions. In the study we observed through Wald coefficient test that the Translog modified form gives the best fit, in addition the function satisfies the sufficient condition for the well behaviour of the model. The APES conducted at the sample mean for the industry shows that there exists a substitution possibility between factors of production, which is an important observation which is consistent with the popular belief that there exists a substantial substitution possibility between factors of production. As well this observation proved affirmative when we took the sample mean at 50 per cent & 150 per cent. Investigating the role of technical change in the industry and establishing its importance, the sector showed an upward swing in production over time. The inter-input substitution possibilities are very strong. This has important implications regarding long run growth of the industry.

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□

We don't want to push our ideas onto customers. We simply want to make what they want.

– Laura Ashley

Development Measures of Cost of Quality for Cost Reduction

Arvind Jayant, V. Sahni & Nisha Garg

International competition is growing more intense and business operating costs are rising. The key tool to help organizations achieve the goal of satisfying customers at a low cost is Cost of Quality (COQ). A good COQ system provides a method of measuring the return on quality or the benefits/outcomes of quality-related activities. In this paper we have described a solution with validation to the quality problem faced by a compressor manufacturing company that cost the company seven lakh rupees annually in cut-open compressors. The study has resulted in the achievement of production process with targeted PPM, an improved quality reputation and higher worker morale.

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With international competition growing more intense and business operating costs rising, organizations are finding it increasingly difficult to compete on price alone. To survive in a global business arena, we will have to satisfy customers with quality products and services at a price that represents the best value in the market. The six sigma methodology is the business philosophy and initiative that enables world class quality and continuous improvement to achieve the highest level of customer satisfaction.

It is difficult to implement the six sigma methodology fully for Indian SMEs since an extensive change is required in the working culture of the company. The objective of the consulting project was to investigate measures of the cost of quality in the quality engineering departments. The goal was to identify existing measures of the cost of non-conformance in engineering operations, and to recommend some measures for possible use in the client-engineering unit. To this end, information has been obtained from literature and from different sections of the company.

@TEXT-SP1 = A number of engineering measures of the cost of quality (COQ) were identified. These included measures of both the price of conformance and the price of non-conformance. More importantly, however, was the discovery that a set of specific measures used to ascertain COQ were only part of what was needed. Also very important are the processes used to identify these measures, and the requirement that engineering units customize a COQ programme to meet their special needs. Also discussed are the role of the accounting unit, cost data collection, reporting mechanisms, and the findings from selected project interviews within the plant.4S (*Smarter Solution Through Six Sigma*)/6 σ Methodology which is the business philosophy and initiative that enables world class quality and continuous improvement to achieve the highest level of customer satisfaction, being

opted to reduce and control the terminal leakage rejections of a compressor industry. After implementing this methodology, we have achieved the terminal leakage rejection of 333 PPM against the target of reducing it from 1652 PPM to 400 PPM (Garg Nisha: 2004).

The Cost of Quality

The client organization adheres to the Philip Crosby approach to TQM. The Crosby approach prescribes the measurement of the cost of quality. The cost of quality includes any costs that are attributable to achieving quality and the Crosby approach focuses on the price of conformance (POC) and the price of non-conformance (PONC), the two components of the COQ. POC includes those expenses incurred to ensure that products or services are provided as specified (Crosby, P.B., 1984). This includes most of the quality functions, all prevention efforts, quality education, and procedural or product qualification. According to Crosby (Crosby, P.B: 1984) POC usually represents about 3 to 4 per cent of sales in well-run companies. The PONC, on the other hand, includes all of the expense of doing things wrong. According to Crosby, when PONC values are added, they typically amount to 20 per cent or more of sales in manufacturing companies, and 35 per cent of operating costs in service companies.

COQ programmes are useful because they support the profitability of an organization. Quality gurus such as W.E. Deming and Philip Crosby assert that there is a direct correlation between quality and profitability. These contentions have been supported by case studies (Johnson, R.D. and Kleiner, B.H., 1993). In addition, Taguchi has presented a mathematical loss function to capture the economic implications of poor quality. When a product fails to meet customer or performance characteristics, numerous direct and indirect costs occur. Taguchi's loss function illustrates how losses can be minimized when products are as close to the specified target value as possible. In other words, higher quality results in lower costs and possible increases in profitability (Evans, J.E. and Lindsay, W.M., 1992).

COQ programmes enable personnel to use the information for identifying corrective action opportunities, presenting concrete information to management (using dollars, a language management understands), and evaluating quality programme success (Thorne, H.C: 1990). COQ information should be viewed as a means of communication that will help personnel perform their jobs more effectively and, according to proponents, any serious attempt to deal with quality must consider the

COQ. The cost information can be used to track whether the organization is improving and as a vehicle for identifying corrective action opportunities, especially those with the greatest potential payoff. A COQ programme helps departments learn where problems exist. Without a COQ measurement programme, units often do not even recognize that they have a quality problem.

Limitations of COQ systems

COQ systems are not critic-free and not all quality practitioners buy into the advantages of COQ programmes. Some view such programmes as administrative nightmares and as impediments to quality rather than as contributors to quality. Also, a handful of quality practitioners interviewed by the investigator held such viewpoints. It is this writer's opinion that many management systems failures are the result of poor management planning, implementation and follow-up and not due to some inherent flaw in the system itself. The key to success depends on how effectively the management system, whether we are referring to COQ or whatever else, is supported and rewarded by management.

Production versus service

Although the COQ has been discussed for over 30 years, its implementation, until more recently, has been largely limited to measuring defects in production. But the COQ can be computed in both production and service units, despite substantial differences in the activities performed in these diverse settings. For example, a major difference in COQ for an engineering unit compared with a manufacturing unit is the outcome of production. Although engineering units may produce hardware products to evaluate or demonstrate concepts, the real engineering outputs are technical data packages that someone else will use (e.g. drawings, specifications, design, analyses, ideas and software) (Crosby, P.B:1979).

Although the nature of the output may vary in form, the processes involved in service units such as engineering, do not differ from those of product organizations. Process models may capture the activities of both production and service operations and provide insights into improvement opportunities. All organizations comprise smaller sub-systems. An engineering unit is an example. The engineering unit has its own system comprising inputs, the processing system, outputs, and the receiving system. The inputs include the personnel, materials, equipment, knowledge, procedures, funding and the requests the system receives from other units or the external customer. The processing system includes the

activities and functions the engineering unit uses to transform the system inputs. Design, testing, measurement activities and the acts of writing reports and attending meetings are each examples of engineering-processing activities. The outputs of the engineering system include the drawings, written reports, designs, patents, publications and such that are used by the receiving system. The receiving system may include both internal and external customers. Internal receivers may include marketing, production, maintenance, or other organizational users. External customers may include private or governmental contracts, or consumer purchasing.

Cost Categories

The comparability of different sets of data is dependent on the definition of the categories and elements used in compiling them. Trend analysis of cost data requires a consistent set of comparisons to be made from period to period. Largely because of the widespread acceptance of Feigenbaum's "prevention-appraisal failure" (PAF) categorization scheme, standard definitions of the COQ categories are available Philip Crosby (Crosby, P.B., 1984) describes the categories as follows.

Prevention costs

These include all activities undertaken to prevent defects in design and development, purchasing, labour and other aspects of beginning and creating a product or service. Also included are those preventive and measurement actions conducted during the business cycle.

Appraisal costs

These include all activities undertaken while conducting inspections, tests and other planned evaluations used to determine whether products and/or services conform to their requirements. Requirements include specifications from marketing customers, as well as engineering documents and information pertaining to procedures and processes. All documents that describe the conformance of the product or service are included. Appraisal costs often account for more than 15 per cent of the COQ.

Failure costs

These include all activities associated with things that have been found not to conform or perform to the requirements, as well as the evaluation, disposition, and consumer-affairs aspects of such failures. Included are all materials and labour involved in the product or process. Occasionally a figure may be included for lost customer credibility. The failure cost category (PONC) is by

far the largest cost area, accounting for 70 to 85 per cent of the COQ in most organizations (Garg Nisha: 2002). The PAF model is not without its problems. The process requires the identification and collection of COQ elements, which fall under the three categories. Some practitioners do not feel comfortable with the results of the PAF allocation. Some believe it is not clear which should be associated with the different PAF categories. Other critics argue that the process is too time-consuming and bureaucratic. Another criticism of the PAF model is that some of the most significant failure costs, such as lost customer sales and goodwill, cannot be quantified effectively. In addition, as noted by an unnamed reviewer of this article, the PAF model may not provide adequate process definition to provide a more overall, well-integrated view of the organization. In many applications, departmental activity analysis may be emphasized to the exclusion of more broad, cross-functional processes.

Cost Elements

Once an organization has established and defined its cost categories, it must identify the cost elements necessary to estimate its COQ. Quality cost elements are the detailed tasks, activities, functions and expenses that make up the quality PAF. For example, quality training is a COQ element that would fall under the prevention cost category. Quality cost elements differ substantially in varied settings. Organizations may place the same elements in different cost categories, and define elements differently – this makes comparisons across organizations difficult. Despite the desirability of inter-organizational comparisons, it appears that the advantages of tailor-making the set of cost elements and their operational definitions to the particular needs of the organization are of primary importance. Crosby (1983) recommends that quality cost programme managers begin the quality costing process by conducting input/output analysis of the process. When an organization identifies the inputs to a process, these can all be measured, regardless of whether the organization is examining production, service, engineering, or research and development activities.

The input/output approach allows an organization to identify the legitimate process elements and to identify those which are not part of the required process. Subsequent to, or as part of the input/output analysis, decision-making methods may be used by organizations to identify, obtain and cost-out cost of quality elements. One approach that is commonly applied when identifying COQ elements is brainstorming. In this approach, group members generate a large list of possible cost elements as

sociated with different functions, activities or processes. In addition to the brainstorming, the nominal group technique, Pareto analyses and fishbone diagrams are other common and useful methods for assessing COQ.

Collectively, these methods have the advantage of getting workers involved in identifying cost elements. The literature and conversations held between the investigator and quality practitioners indicate that participative approaches such as those noted above are both desirable and common. It is important, however, that the parties included want to participate and are motivated to contribute their ideas. Moreover, if a COQ programme is to be a success, employees who are requested to record COQ elements must believe that their reporting activities will not be used against them. It is critical that those involved perceive the process as an aid to helping them to improve quality (Goeller, W.D: 1989).

Benchmarking Cost Elements

Some organizations use another approach to identify cost of quality elements; they benchmark or borrow elements from other organizations, which have established cost of quality programmes. It appears that this procedure has some merit, and can provide quality cost programme managers with preliminary information to guide them in identifying/developing COQ elements. However, the approach does not appear to be a substitute for the above in-house developmental processes. The primary problem with the borrowing method is that it does not consider adequately the differences in organizational processes and accounting systems. Consequently, most quality experts argue that COQ programmes should not rely on borrowing but should be tailor-made to each organization (Jonson, Mark A: 1995).

The literature clearly emphasizes that decisions regarding which cost elements should be a part of COQ are not as important as "consistency" in execution. As the COQ programme evolves, quality cost elements will be developed, deleted, modified, or combined as seems reasonable in any given situation. There is no set prototype for quality cost systems. Each system must be formed to integrate with the company's organizational and accounting system. Measures of the COQ for engineering type settings were found in the literature. One may benefit from a review of this information by having the quality improvement team and/or other engineers decide which quality cost elements among these may be of use. A subset of these, however, should serve only as a starting point in the development of cost elements.

Methods for estimating COQ

After the COQ elements have been identified, dollar values need to be attached to the elements. Thorne (Thorne, H.C: 1990) recommends some relatively uncomplicated techniques for calculating COQ. These methods include the following.

Collection of costs by account

Collection by account refers to collecting costs that are complete accounts in the books. Examples include scrapped projects, quality training, rework time, liability payments, premium freight, and expediting charges, penalties for missed deadlines, and travel/phone costs associated with dealing with quality.

Six Sigma Methodology, Tools, Techniques & Metrics

@TEXT-SP = Six sigma is a powerful breakthrough improvement business strategy that enables companies to use simple and powerful statistical methods to define, measure, analyze, improve and control processes for achieving and sustaining operational excellence. Six sigma was originally developed by Motorola in the 1980s and has since been implemented by a number of world class organizations such as GE, Honeywell, ABB, Sony, Texas Instruments, Ford, Johnson Control Systems, etc. with the purpose of reducing variability in processes, reducing quality costs, improving process capability and enhancing process throughput yield (J.M. & Gryna, F. M. 1988).

A healthy portion of the six sigma training involves learning of the theory and the principles behind the methodology, i.e., DMAIC cycle. The elements of the DMAIC Cycle (which stands for Define, Measure, Analyze, Improve and Control) are explained below.

Define Phase

This phase involves:

- Who are the customers and what are their needs and expectations?
- Understand the customer CTQs and transform them into project CTQs
- Develop a project team charter (who is doing what, determine project goals, what are the key deliverables, benefits of doing the project, costs issues, etc.)
- Gather data from customers to understand what

exactly they want from us (use of customer surveys, benchmarking data, Quality Function Deployment, etc.)

- What is the process? Use tool such as high-level process mapping to map out
- Core processes

Measure Phase

This phase involves:

- How is the process measured and how is it performing?
- Decide what to measure and how do we measure it?
- Measure current performance of the process (Throughput yield, DPMO, Capability, etc.)
- Do we have a capable measurement system?
- What is the variability contributed by the measurement system to the total
- Variation?

Analyse Phase

This phase involves:

- Identify the root causes of defects or failures?
- Understand the data (using simple statistical tools such as scatter plot, Histograms, etc.)
- Use of simple tools ANOVA, hypothesis test, regression analysis, etc. to analyze the data
- Select the 'vital few' causes from the trivial many for improvement phase

Improve Phase

This phase involves:

- How can the causes of defects or failures be removed?
- Identify the key variables which causes the problem
- Document solution statements
- Test solutions and measure results

Control Phase

This phase involves:

- How can the improvements be maintained or sustained?

- Document the new methods
- Select and establish standard measures to monitor performance

The employees must be capable of choosing the most appropriate tools and techniques for their situations. There are three major sets of tools/techniques that are required within the six sigma problem solving framework. These are outlined below (Garg Nisha: 2004)

- Team tools – responsibility grid, threat versus opportunity matrix, action workouts, etc.
- Process improvement tools/techniques – brainstorming, Pareto analysis, process mapping, cause and effect analysis, Design of Experiments, Process FMEA, etc,

In addition to the tools and techniques, we also need to have a clear understanding of the common metrics used within Six Sigma business strategy. Examples of these metrics include: costs of poor quality, number of customer complaints, defect rate.

Implementation of Six Sigma Methodology in Manufacturing Unit

Define Phase

After developing the project charter, the process flow of lower housing assembly is made to map out the processes.

The production process is described as follows:

1. Receiving of the material (hot rolled steel) from storage area in coils of I.D. = 500 mm as O.D. = 1000-1200mm; Width = 310mm and Thickness 3.8 ± 0.2 , 2.9 ± 0.2
2. Loading the coil in decoiler
3. After Setting and checking the process parameters at 250T Press - LH1, run the press to execute following operations to get the Housing. (i) Feeding & lubrication of sheet; (ii) blanking; (iii) first draw.
4. Sheet feeded in Auto/ Manual mode pushes the drawn component over the motorized conveyor at rear side of press, to move it to 250T Press - LH2.
5. Coil sheet travels back to position itself for next stroke.
6. Setting and checking the process and press parameters at 250T Press - LH2

7. After receiving the housing from first draw, operator loads it on tool and run the press by using bi-manual command to execute following operations to get the Housing:
Final draw; ii) Embossing; iii) Trimming.
8. Operator Lifts the housing and pushes it towards the rear side of press to move in to the roller conveyor for next operation.
9. Operator Lifts the scrap ring from the tool and put it in to the scrap chute to move out.
10. After setting and checking the press and process parameters at 250T Press - LH3, operator receives the housing after final draw, load it on tool and run the press by using bi-manual command to execute following operations to get the housing:
 - (a) Tube Process hole piercing ($\varnothing 8.15 / 8.25\text{mm}$)
 - (b) Tube Discharge hole piercing ($\varnothing 6.45 / 6.55\text{mm}$)
 - (c) Hermetic terminal whole piercing ($\varnothing 28.58 / 28.83 \text{ mm}$) with a flat rings of outer of $\varnothing 36.45 / 36.70 \text{ mm}$ and flatness from inside 0.20 mm.
 - (d) Deep orientation mark.
11. Then he lifts the housing and pushes it towards the rear side of press to move in to the roller conveyor for washing.
12. Collect the pierced scrap in a bin and put in scrap chute on LH-2 to go out, Operator Switch on the washer conveyor, receive the housings and load it on hangers of pre-washer conveyor.
13. Wash the housing as per the following process:
 - (a) Degreasing (to remove oil, grease & dust)
 - (b) Water rinsing (to remove the degreasing chemical)
 - (c) Neutralizing/passivation (to provide rust protection coat)
 - (d) Drying off (to dry the housings by hot air blow)
14. Setting the process parameters of welding m/c given as:

Air pressure	4.0-5.0 Kg/cm ²	Hold time	12-20 cycles
First squeeze	30-40 cycle	Current	47-53 KA
2 nd squeeze	50-60 cycles	Voltage	380-420V
Weld time	14 cycles		

15. Receiving of Hermetic terminal approved by quality, from store.

16. Unloading the lower housing from washer conveyor, visually check for brazing joints leak; send the housings with joint leaks, if any, for repairing.
17. Locating the hermetic terminal over projection welding lower fixture, position the lower housing (without brazing joints leak) over it. Ensure that housing face should completely touch with fixture plate.
18. Activating the bi-manual command to initiate the operation cycle, waiting for the completion of the operation cycle to get the terminal welded.
19. Lifting the component and placing it over the table carefully.
20. Packing the O.K. lower housing assemblies in clean racks and dispatch to the compressor assembly with proper documentation.

Checking the component after 500 pieces for leak testing as per work instruction, mix 2% Giriron-8517 in leak testing bath with D.M.water for rust protection.

Fusite Terminals

Fusite terminals for the compressor industry have been substantially improved in recent years for better performance and more efficient operation (Fig.1). Because of this advancement in technology a responsibility for the compressor manufacturer has arisen. The manufacturer must exercise greater caution in welding and handling the terminal during assembly. The improved terminals are more sensitive than earlier models to more casual preparation, welding technique, handling and equipment selection.

Welding Method

Resistance Welding is the joining of two or more pieces of metal by applying heat and pressure without the addition of any other material. Welding heat is generated when parts resist the passage of electric current between two electrodes, while pressure refines the grain structure in the parts. This combination of pressure and heat causes the parts to coalesce without actually liquefying. Projection welding is a form of resistance welding where the current flow and heating is concentrated at a precise point by design of the parts. Fusite terminals are designed to be projection welded.

Welding Electrodes

After selecting a welder, it is important to use the

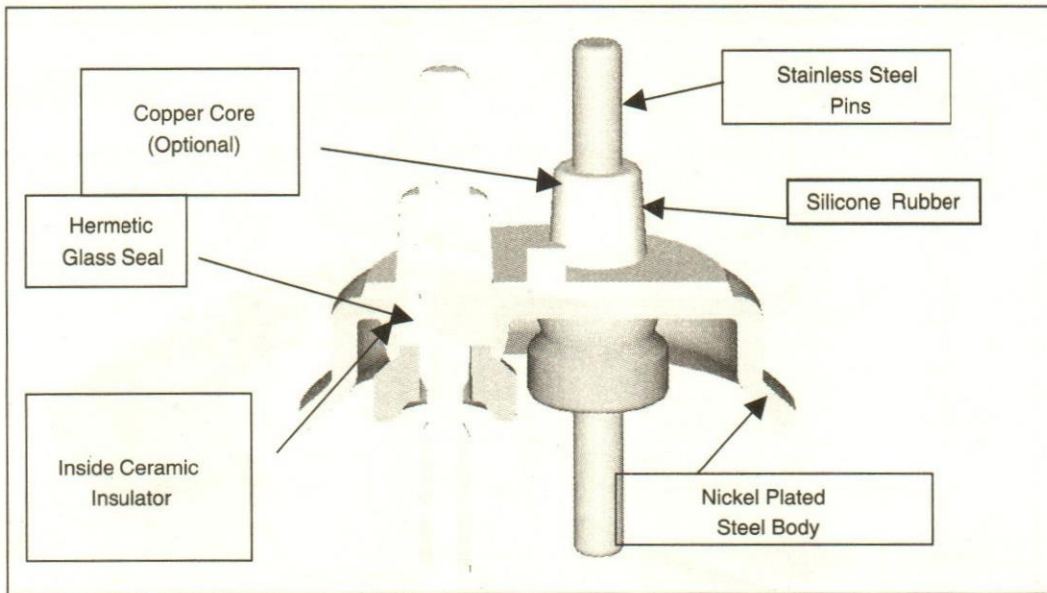


Fig. 1. Fusite terminal of compressor

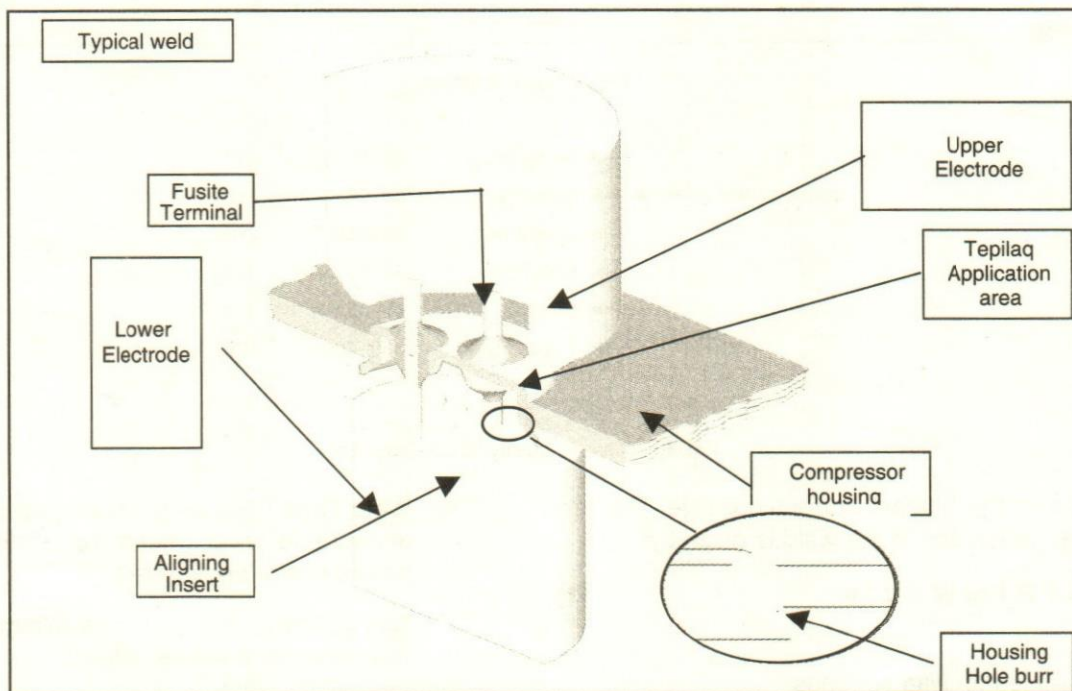


Fig. 2. Welding electrodes

proper welding electrodes. Welding electrodes should have high electrical conductivity to reduce generated heat, high thermal conductivity to dissipate heat rapidly, and resistance to deformation under high pressure. The electrodes must have adequate water cooling to provide sufficient life. Also, the electrode force must be in line and uniformly distributed; placing carbon paper between the electrodes can check this. The lower electrode is designed to accept a flexible rubber insert to align the terminal and protect the ceramic insulators during welding (Fig. 2).

Preparation for Installation

The terminal-mounting hole should be round and in a flat surface pierced from the outside of the compressor housing. A sharp edge must be provided on the housing where it engages the terminal flange.

Control Settings

As a general rule, welds should be made with the

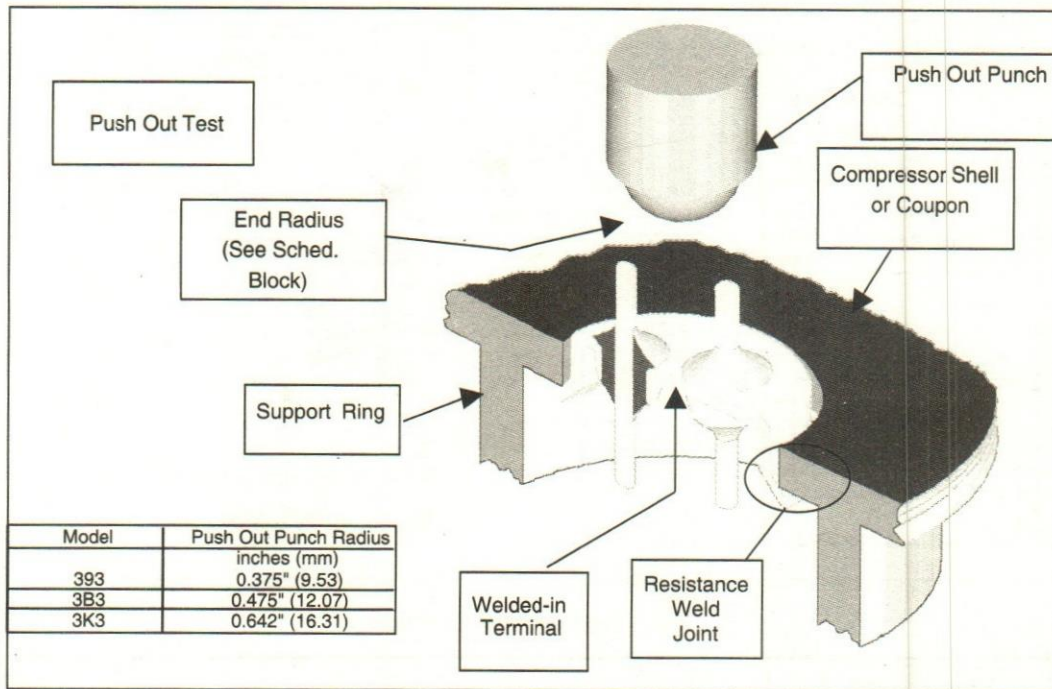


Fig. 3. Pushout fixture

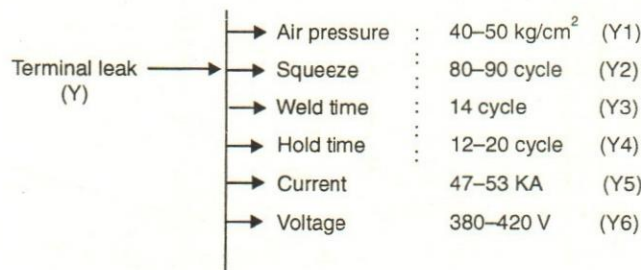


Fig. 4. Critical To Quality (CTQ) Diagram

lowest time and the highest current possible. The formula for heat generation in the weld is given by:

$$W = I^2 R t \text{ or } W = V I t \quad [1]$$

Where:

- W** = Heat in watt seconds
- I** = Current in amperes (secondary current)
- R** = Resistance in Ohms
- t** = Time in seconds
- V** = Voltage in volts (secondary voltage)

Here are the primary control settings used in Fusite welding and general guidelines for how they should be set.

- **Squeeze Time** - Set to insure that the electrode force is reached before the weld current begins.
- **Weld Time** - Set as short as possible to obtain acceptable weld (minimize cooling between pulses where applicable.)
- **Tap Setting** - Set so that a minimum of about 70% of current will be utilized.
- **Current** - Set to produce an acceptable weld while remaining in the range of about 70-90%.
- **Hold** - Set to provide electrode contact for additional cooling after weld.
- **Electrode** - Set to provide a slight indentation in the parts. While controlling force expulsion. Of course, the main guidelines to use in setting the weld parameters are hermeticity, pushout strength and weld temperature, as described in the following section.

Table 1: Terminal leakage rejection data (year 2004)

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	Prod	PPM	
Jan	0	3	0	0	1	12	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	38	8	8	9	6	85	51449	1652	
Feb	0	0	0	12	4	0	0	0	0	0	7	0	8	0	0	0	11	0	0	0	0	0	2	3	5	12	7	2	2	0	0	75	107511	696	
Mar	2	0	16	4	4	12	0	0	22	0	32	4	0	0	10	7	0	0	4	0	0	2	6	2	0	0	0	0	0	9	5	141	131349	1073	
Apr																																			
May																																			
Jun																																			
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Quality Testing

The following procedures are recommended for welding quality assurance:

Hermeticity

The weld must be completely hermetic. There are several different methods of testing, from the standard "bubble tank" to helium mass spectrometers.

Push Out Strength

The weld must withstand a minimum force without coming out of the compressor housing. Fusite recommends a pushout fixture (Fig. 3), which can be used with a hydraulic cylinder to force selected terminals out of the compressor housing. This force can be recorded for future guidelines. Normally, when the terminal is pushed out, some material from the terminal flange will remain on the compressor housing.

Weld Temperature

It is important that the terminal remain below 400 °F (204 °C) during welding. This can be checked by placing 400 °F Tempilaq on the terminal crown before welding and assuring that it does not melt.

Weld Settings

It is advisable to use a weld monitor to verify the weld conditions.

Visual Inspection

The compressor housing should be inspected after

welding for the following:

- A small, uniform heat-affected zone around the terminal
- A straight, well centered terminal
- Light, uniform electrode impression
- Uniform metal expulsion, if that is typical in the operation
- No evidence of overheating or electrode arcing on the flat area or sidewalls of the terminal
- No evidence of mechanical damage to the terminal pins, terminal cap or ceramics.

Measure Phase

Data related to terminal leakage is collected for the year 2004, from January to March.

PPM calculation for the said months is shown in table 1.

Analyze Phase

The CTQ Diagram is given in Fig. 4.

After checking all the process parameters (critical to quality) and not finding a cause of failure, the cause & effect diagram was described which is given below:

The Ishikawa Fishbone Diagram

Some of the more seemingly significant causes are listed on the next page and presented as cause and effect diagram (figure 5).

Table 2: Action Plan

Concern	Specifications	Current Status	Action to be taken	Target date	Status
Flatness	0.010"	0.015-0.018"	Modify length of marking punch	26th March	Implemented
Process Parameters	As per process sheet	As per process sheet	Maintain as per process sheet	25th March	Implemented
Inspection	50 Piece at the start of shift	10 Piece at the start of shift	inspect as per spec.	25th March	Implemented
Alignment	Should be O.K.	checking with old fixture	modify fixture to have less inspection time	26th March	Implemented
Outside Dia. of lower electrode	32.5 mm	34 mm	modify the lower electrode as per the Drg.	27th March	Implemented.

Table 3: Control Plan

Techumseh Products India Pvt. LTD.			Audit Check Sheet				
Characteristic	Specification	Responsibility	Requency	Observation			
				1	2	3	4
Puch length	86 mm	Operator/shift supervisor/quality inspector	Whenever the change over is there for 3.8 sheet thickness				
Modified outside dia of lower electrode	32.5 mm	Operator/shift supervisor/quality inspector	At the start of the shift & after dressing (if the tip diameter/surface is spread)				
Electrode alignment	New Fixture	Operator/shift supervisor/quality inspector	At the start of the shift & after dressing (if the tip diameter/surface is spread)				
Flatness of big hole	.008" - .010"	Operator/shift supervisor/quality inspector	Twice in a shift				

1. **Man** (The workers who operates 250T HMT HYD.PRESS-LH3 m/c for tube process hole piercing, tube discharge hole piercing, hermetic terminal hole piercing, deep orientation mark and hermetic terminal projection welding m/c)

- Workers may not be sufficiently trained.
- Workers may not be sufficiently careful.

2. **Machine (Characteristics of the various machines used)**

- 250T HMT HYD.PRESS-LH3 m/c
Machine parameters may be incorrect.
- Hermetic Terminal projection welding m/c
M/c Parameters may be incorrect.
Air pressure may be incorrect.
Improper cooling of m/c

3. **Material**

- Electrode material may be incorrect; permitting

the improper reduction of generated heat, dissipation of heat not rapidly, less resistance to deformation under high pressure.

- Outside diameter of lower electrode is large causing more sitting area for the fusite which leads to making of an irregular step. As the production goes on it leads to tilting of the next fusite which is to be welded.

4. **Method**

- Improper flatness of big hole may cause the non-uniform pressure of upper electrode & hence causing the leakage.
- Process parameters may be incorrect
- Misalignment of electrode may result in asymmetrical distribution of force and current leading to unfavorable features to the process and weld quality. At the time of set-up or twice in a shift, weld quality may be unchecked.

Further to find out the factors influencing flatness of

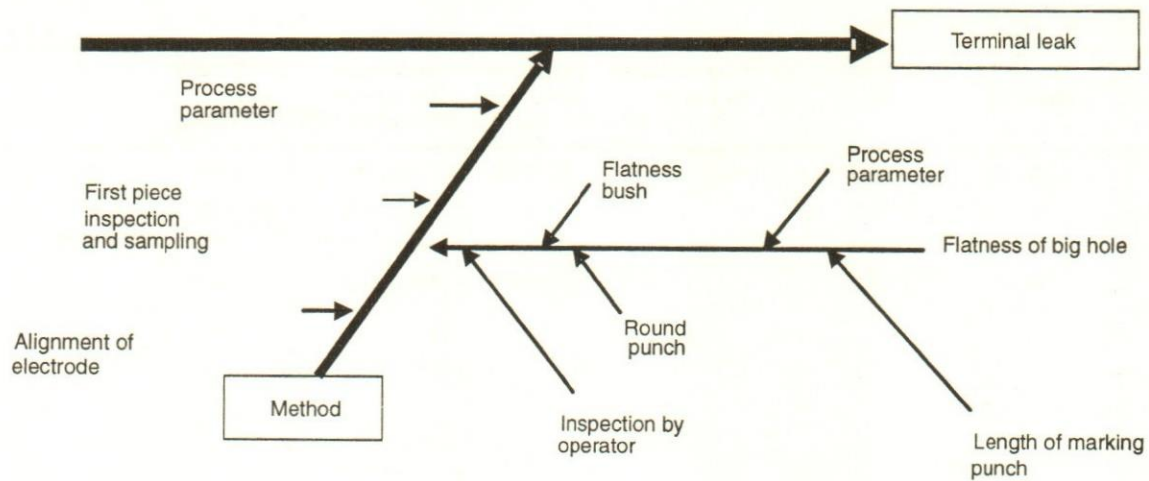


Fig. 5(a). Cause and Effect diagram for Terminal Leak

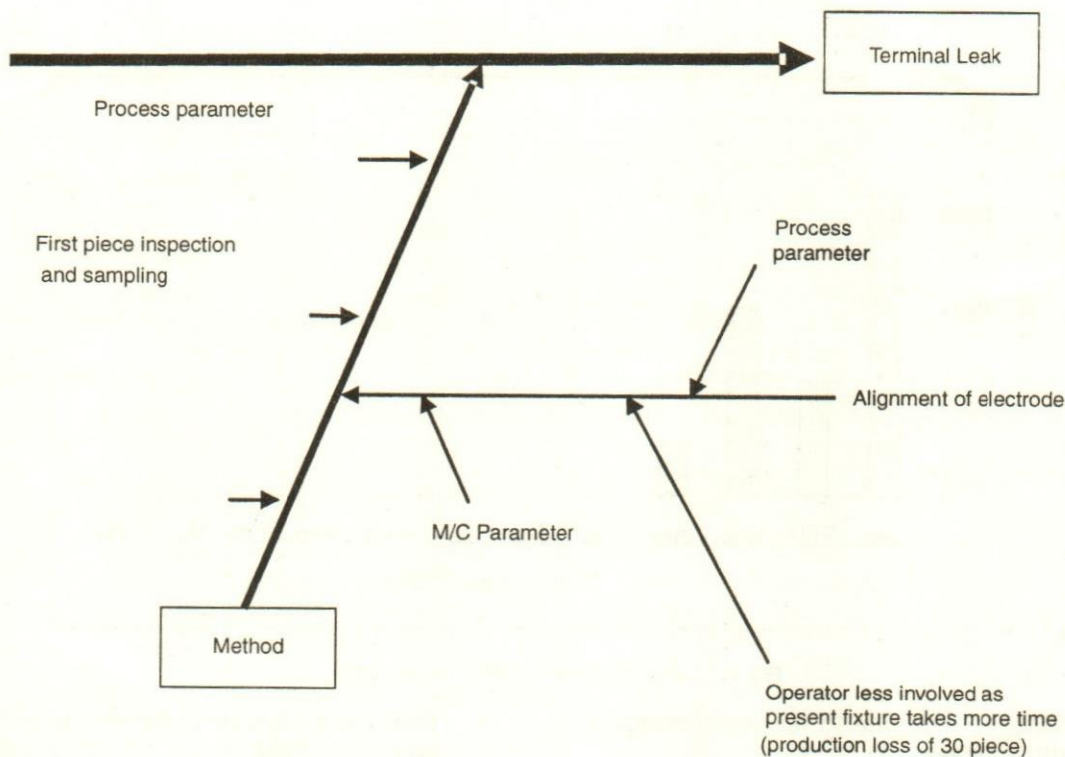


Fig. 5(b). Cause and Effect diagram for Terminal Leak

big hole [fig 5(a)], the cause and effect diagram is used which is given in fig 5(b).

Process Failure Mode and Effect Analysis (PFMEA)

After identifying the three potential causes (cause & effect diagram), PFMEA is used to prioritise these causes according to the risk priority number (RPN) - the product of frequency of occurrence, severity, and detection then problem follow-up and corrective action is taken.

Analysis & Results

Cost saving per month due to reduction and control in terminal leakage rejections was calculated as shown in table 4, assuming that terminal leakage is controlled at PPM of 333 and is given as below:

- Cut Open Analysis (Internal) Cost/Compressor = Rs 400
- No. of compressors for cut open due to terminal leakage in year 2003 = Rs 1613

Table 4: Calculation of Sigma Rating

Month	No. of Defects (a)	No. of units (b)	No. of Opportunities Per unit (c)	defects per unit (a/b)	Defects per Opportunity (a/bc)	DPMO/PPM (a/bc)*10 ⁶	Z _{LT}	Z _{ST (ZLT + 1.5)}
Jan.	85	51449	1	0.00165	0.00165	1652	2.94	4.44
Feb.	75	107511	1	0	0.00070	0.00070	698	3.19
Mar.	141	131349	1	0.00107	0.00107	1073	3.07	4.57
Apr.	24	72000	1	0.00033	0.00033	333	3.4	4.9
May								
Jun.								
Jul.								
Aug.								
Sep.								
Oct.								
Nov.								
Dec.								

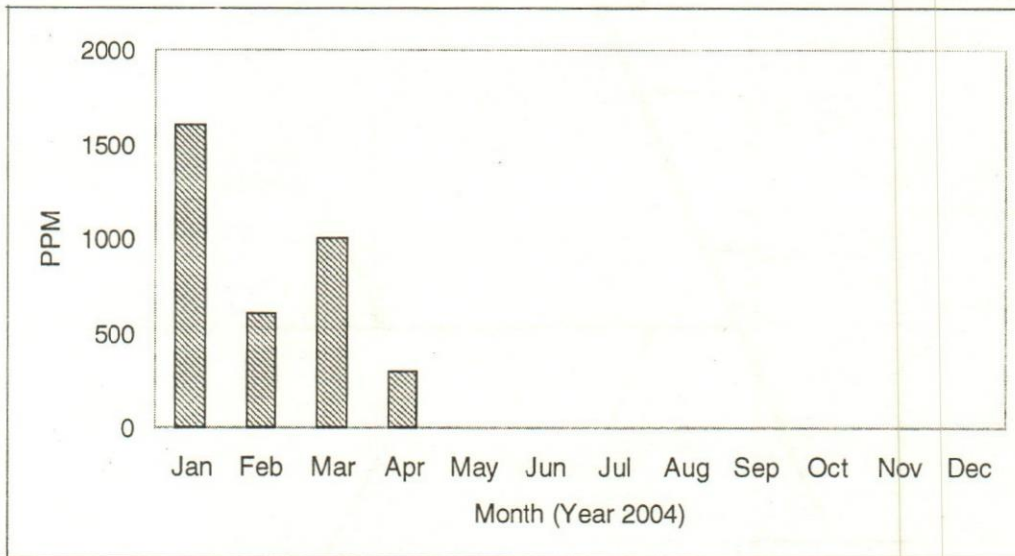


Fig. 6. Terminal Rejection (DPMO) Vs Year 2004

- Total cut open cost due to terminal leakage = $1613 \times 400 = \text{Rs } 645200$
 - Total Production of compressors in Year 2003 = $\text{Rs } 1031107$
 - Cut open cost/compressor due to terminal leakage for year 2003 = $645200/1031107 = \text{Rs } 0.63$
 - No. of compressors for cut open due to terminal leakage in year 2004 (assuming PPM 333) = $24 \times 12 = \text{Rs } 288$
 - Total cut open cost due to Terminal leakage = $288 \times 400 = \text{Rs } 115200$
 - Total Production of compressors in Year 2004 (assuming PPM 333) = $72000 \times 12 = \text{Rs } 864000$
 - Cut Open Cost/Compressor due to Terminal leakage for year 2004 = $115200/864000 = \text{Rs } 0.13/\text{compressor}$
- So net Cost Saving = Cut Open Cost/Compressor due to Terminal leakage for year 2003 - Cut Open Cost/Compressor due to Terminal leakage for year 2004 = $0.63 - 0.13 = \text{Rs } 0.50/\text{compressor}$
- So net Cost Saving per month = $72000 \times 0.50 = \text{Rs } 36000$

Annual saving = $36000 \times 12 = \text{Rs } 4,32,000$ (Four lakhs and thirty two thousand only)

These savings were achieved as a result of development of quality cost evaluation system and effective implementation of the six sigma philosophy in the company.

Conclusion and discussion

The purpose of this project was to identify existing measures of the COQ that could be used by a client's manufacturing unit. A number of measures of the COQ were identified, some of which were transferable to the client organization's setting. However, as was strongly emphasized in both the literature and from conversations with the various persons interviewed, COQ elements and costing methods must be tailor-made to each particular setting. The literature and practitioners both emphasized the importance of the "processes" used to develop these measures. Having the "right" list of COQ elements is only part of that required; successful programmes solicit the support and participation of all employees involved using participative methods such as brainstorming, the nominal group technique, cause and effect analysis, and pareto-analysis.

These procedures may help solicit greater involvement and develop some ownership of the COQ process. COQ programmes are most effective when the information is used for identifying corrective action opportunities, presenting concrete information in dollars to management and evaluating quality programme success. The COQ process should be viewed as a communications mechanism facilitating employees' abilities to perform their jobs more effectively. If a COQ programme is to be successful, employees who are requested to record COQ elements must believe that their reporting activities will not be used against them. The behavioural aspects must not be overlooked. It is the author's opinion that the information provided in this article may be of some use to engineering quality practitioners who are considering implementing their own COQ programme. Perhaps they too may benefit from the information pertaining to the benchmarking of COQ elements and the organizational, behavioural, and accounting processes necessary to implement a COQ measurement system successfully.

In this work we have provided the solution of the quality problem faced by an Indian company manufacturing compressors that cost the company six and a half lakh rupees annually in cut-open compressors due to terminal leakage. The above said cost is calculated on the basis of development of measures of Quality Cost

Evaluation System, which has been developed for the company. Quality Cost Evaluation system is developed in Microsoft Excel. We have used 4S/6% methodology {Pareto chart to determine the most common form of the problem, an Ishikawa cause-and-effect diagram to determine the parameters to be examined, FMEA to identify & prioritize the identified failure modes according to risk priority number (RPN) for problem follow up & corrective action, Work Instruction & Audit Check Sheet for control} to reduce down the terminal leakage rejection. The study resulted in achievement of production process with targeted PPM (333), an improved quality reputation and higher worker morale.

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People don't want to communicate with an organisation or a computer. They want to talk to a real, live, responsive, responsible person who will listen and help them get satisfaction.

- Theo Michelson

Micro-Finance and Self-Employment Initiatives under SGSY: A Review of Intentions and Realities

K.K. Tripathy & I.G. Tripathy

Government of India's Swarnjayanti Gram Swarozgar Yojana, a micro-finance driven holistic self-employment programme, seeks to create gainful employment opportunities for the rural poor. A field study undertaken in Orissa reveals that the beneficiaries of micro-credit assistance under the programme have been identified as per guidelines. It was found that the glaring flaws impeding success are the lack of co-ordination amongst field level agencies, the indifferent quality of the groups formed and arbitrary selection of economic activities.

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Since the time of Independence in 1947, India has pursued a planned approach as a lever of her social and economic change, to actualise all-round development. Various prudent macro-economic management policies were taken into consideration, which played an active role in numerous key sectors like banking, basic industries, utilities and infrastructure. The results of this development strategy were mixed. The economy expanded persistently - GDP per capita growth averaged over 3.0 per cent since the 1980s; famines were averted and the incidence of poverty fell from over 50 per cent in the 1960s to less than 30 per cent in the late 1990s.

One of the basic objectives of planning in India has also been the attainment of a national minimum level of living. The removal of poverty (*Garibi Hatao*) slogan of the then Prime Minister Indira Gandhi during the 1970s, rightly focused on specific measures to remove poverty. The poverty alleviation programme, thus, became an integral part of the Fifth (1974-78) and subsequent Five Year Plans.

In spite of the frontal attack on poverty envisaged by targeted programmes, the latest findings of National Sample Survey Organisation (NSSO) indicate the poverty figure to be still high at 22 per cent as of 2004-05. Based on the NSSO's household consumer expenditure distribution, the Planning Commission Expert Group estimated that at the national level the incidence of poverty in India on the Head Count Ratio had declined from 44.48 per cent in 1983 to 26.10 per cent in 1999-2000. However, the percentage of 26.10 itself is staggeringly high as it translates into as many as 260.25 million people living Below the Poverty Line in 1999-2000.

It is observed from Table 1 that in rural areas, the estimated number of persons living below the poverty

line was 251.96 million in 1983-84. This figure declined to 244.03 million in 1993-94 and further to 193.24 million in 1999-2000. There were 70.94 million people living below the poverty line in 1983-84 in urban areas and 67.01 million in 1999-2000. The reduction in urban poverty was slow in comparison to that in rural poverty over the period 1983-84 to 1999-2000.

Table 1: Incidence of Poverty and Number of People living Below the Poverty Line in India during 1983-84, 1993-94 and 1999-2000

Year	Rural		Urban		Combined	
	No. of persons (in million)	% of persons	No. of persons (in million)	% of persons	No. of persons (in million)	% of persons
1	2	3	4	5	6	7
1983-84	251.96	45.65	70.94	40.79	322.90	44.48
1993-94	244.03	37.27	76.34	32.36	320.37	35.97
1999-2000	193.24	27.09	67.01	23.62	260.25	26.10

Source: Planning Commission, Government of India

Targeted anti-poverty programmes constitute a major effort in tackling poverty. Among these self-employment programmes are the main vehicles for poverty eradication. During the Sixth Five Year Plan (1980-85), Integrated Rural Development Programme (IRDP) was the only self-employment programme implemented throughout India. Other programmes, viz. Development of Women and Children in Rural Areas (DWCRA), Training of Rural Youth for Self-Employment (TRYSEM), Supply of Improved Tool-kits to Rural Artisans (SITRA), Ganga Kalyan Yojana (GKY) and Million Wells Scheme (MWS), which too aimed at poverty alleviation, targeted the same beneficiaries.

Multiplicity of programmes resulted in them being viewed as separate entities in themselves, although the call of the hour was convergence of programmes/schemes. In February 1997, the Planning Commission set up a high-powered committee under the chairmanship of S R Hashim to review, restructure and rationalise various centrally sponsored schemes for poverty alleviation and employment generation. Drawing upon the recommendations of the report submitted by the committee in April 1997, IRDP and its five allied programmes, viz. DWCRA, TRYSEM, SITRA, GKY and MWS were re-structured and re-designed into a single micro-finance driven self-employment programme called Swarnjayanti Gram Swarozgar Yojana (SGSY) on April 1, 1999.

The SGSY seeks to bring the needy rural poor fami-

lies above the poverty line through an integrated action of various district and village level agencies – District Rural Development Agencies (DRDAs), banks and other Self-Help Promoting Institutions (SHPI) like non-Government organisations (NGOs), Panchayati Raj Institutions, rural branches of commercial banks, regional rural banks, cooperatives, corporate bodies, private sector companies and individuals. These agencies work closely with the poor at the grass-roots level to sensitise and motivate the poor about the advantages of organising them into groups for their socio-economic progress. The programme design of SGSY emphasises the linkage between banks and Self-Help Groups (SHG) and envisages enhancement of self-employment avenues for rural poor. While provision of credit at multiple doses is an important focus of the programme, subsidy is treated as an enabling element. The micro-finance component of the programme is referred to as a small-scale financial intermediation, inclusive of savings, credit, insurance, business services and technical support.

In this paper an attempt has been made to review the performance of SGSY by studying the state-wise physical and financial progress achieved under this programme and analysing the results of a field survey conducted in two Community Development Blocks (CDBs) of Orissa. In the following section SGSY model of micro-finance delivery mechanism has been delineated and a brief comparison has been made with the micro-finance movement through Grameen Banks in Bangladesh.

SGSY Model of Micro-finance

There are several models of micro-finance prevalent in India. Out of these, the most important ones are - Model I where SHGs are financed directly without the intervention/facilitation of any NGO; Model II, wherein SHGs are financed directly with the facilitation extended by formal or informal agencies i.e. Government, commercial banks and Micro Finance Institutions (MFIs) like NGOs, non-bank financial intermediaries (NBFIs) and cooperative societies; in Model III financing takes place through NGOs and MFIs as facilitators and financing agencies and Model IV is the Grameen Bank Model, similar to the model followed in Bangladesh.

In India, Model II of micro-finance constitutes as much as three-fourths of the total micro-financing where SHGs are formed and nurtured by facilitating agencies like the Government and NGOs and are linked directly with banks for the purpose of receiving credit. The SGSY model of delivering micro-finance is based on this linkage approach

which is quite unique to India. The linkage is vital for securing the SHGs timely micro-finance.

A comparison of the SHG-Bank model with the Grameen Model of Bangladesh, reveals that in both the models, credit management is completely based on peer pressure. However, while in an SGSY group there are 5 to 20 persons, the Grameen model allows 5 members each. SGSY groups have monthly meetings as opposed to the weekly meetings of Grameen groups. The loans under SGSY range from Rs 20,000 to Rs 500,000 carrying an effective interest rate of 24-36 per cent (Sinha, 2005, pp. 1714-1719). The loans of Grameen groups vary between Rs. 2,000 and 5,000 with an effective interest rate ranging between 32 and 38 per cent.

The SGSY envisages the increasing outreach of micro-finance through small and informal SHGs formed with the support of 5 to 20 persons from relatively homogenous economic backgrounds. Micro-finance is extended under the programme to only those SHGs which have passed a subjective grading test and are involved in regular thrift and credit activities for not less than six months. To assess whether SHGs can be considered for financial assistance, grading tests are done in phases considering the maturity of the groups, member composition, regularity and participation in meetings, regularity and quantum of savings, utilisation of loans, etc. These activities are mandatory for inculcating banking habits in unaccustomed members of the SHGs. To improve the productivity of the SHGs, the programme tries to firm up the financial and economic norms meant for selection of appropriate beneficiaries and subsequent disbursement of credit to them. The borrowing member under SGSY chooses economic activities for income-generation purposes which are already notified by the State Governments concerned to be considered for finance by the formal banking institution. Here, the members are expected to prioritize their goals in terms of their urgency through participative decision-making process. Individual needs of all the members of an SHG are expected to converge with the objectives of their group.

The corpus of a group consists of its cash balances, all outstanding loans, interest on loans, its savings with the bank and interest on balance in the savings bank account. While funds from the Government enrich the group corpus by way of subsidy, the NGOs and banks supply credit as per the needs of the group. The group is then involved in inter-lending activities for consumption and production purposes. By pursuing productive economic activities, the group enhances its income, repays the loan amount to the bank and spends on basic health, education etc so as to drive itself out of the poverty trap.

SGSY in India: Performance and Outreach

An analysis of the trend of SHG formation under SGSY between 2000-01 and 2005-06 in the country indicates that the number of SHGs formed in 2005-06 (276,083) was only about 54 per cent that of the number of SHGs formed during 2001-02 (5,15,691) (Table 2). However, the number of SHGs assisted increased more than three-fold from 26,317 in 2001-02 to 79,787 during 2005-06. Accordingly, from being merely 5.1 per cent in 2001-02, the number of SHGs assisted as a percentage of number of SHGs formed increased to about 29 per cent during 2005-06.

The distribution of SHGs formed and assisted under the programme across the various states of the country, however, is quite uneven. The number of SHGs formed during the two financial years, 2001-02 and 2005-06, declined in 13 out of 18 States which are under review. The states of Andhra Pradesh, Madhya Pradesh and Maharashtra recorded substantial decline in the number of SHGs formed during 2001-02 and 2005-06. The decline is quite conceivably due to the setting up of alternate micro-finance bodies run by steadily evolving NGOs and NBFIs which stress on financing credit to the poor without any subsidy component attached to it. Indeed, the emergence of alternate micro-finance delivery models may have overshadowed the importance of the subsidy-led credit supply model under SGSY. Contrary to this, in states like Orissa, NGOs are yet to become vibrant and as of now, SGSY has no alternatives.

In states like Himachal Pradesh, Uttar Pradesh and Karnataka, the number of SHGs to which assistance has been provided during the financial year 2005-06 is more than the number of SHGs formed during that year. This may be due to the fact that assistance has been extended during 2005-06 to SHGs formed in earlier years. Besides, assistance may also have been extended to those SHGs which have been formed under programmes implemented by the National Bank for Agriculture and Rural Development, NGOs, NBFIs etc., and not necessarily under SGSY. A glance at columns 6 and 7 of Table 1 brings out clearly that assistance extended to SHGs is picking up. With the exception of Bihar, Jammu and Kashmir, Tamil Nadu and West Bengal, all other States show that from 2001-02 to 2005-06 an increasing number of SHGs have been assisted, as a proportion of the number of SHGs formed.

SGSY credit disbursement has not been proportionate to the poor living in most of the backward States (Table 3). During 2005-06, Bihar, Madhya Pradesh, Orissa and West Bengal, with 19.48, 11.25, 7.44 and 9.32

Table 2: State-wise SHGs Formed and Assisted under SGSY (between 2001-02 and 2005-06)

States/ UTs	No. of SHGs Formed		No. of SHGs Assisted		Percentage of SHG Assisted to SHGs Formed	
	2001-02	2005-06	2001-02	2005-06	2001-02	2005-06
1	2	3	4	5	6	7
Andhra Pradesh	219943 (42.7)	30633 (11.1)	4123 (15.7)	11228 (14.1)	1.9	36.7
Assam	12307 (2.4)	21066 (7.6)	663 (2.5)	5572 (7.0)	5.4	26.5
Bihar	17390 (3.4)	20692 (7.5)	3757 (14.3)	4017 (5.0)	21.6	19.4
Gujarat	9565 (1.9)	5065 (1.8)	655 (2.5)	1251 (1.6)	6.8	24.7
Haryana	2105 (0.4)	2303 (0.8)	171 (0.6)	1148 (1.4)	8.1	49.8
Himachal Pradesh	2033 (0.4)	523 (0.2)	646 (2.5)	714 (0.9)	31.8	136.5
J & K	943 (0.2)	635 (0.2)	330 (1.3)	179 (0.2)	35.0	28.2
Karnataka	13403 (2.6)	4019 (1.5)	1441 (5.5)	4571 (5.7)	10.8	113.7
Kerala	19633 (3.8)	5581 (2.0)	756 (2.9)	1437 (1.8)	3.9	25.7
Madhya Pradesh	33736 (6.5)	7262 (2.6)	2103 (8.0)	4700 (5.9)	6.2	64.7
Maha-rashtra	36029 (7.0)	19482 (7.1)	1477 (5.6)	6128 (7.7)	4.1	31.5
Orissa	29040 (5.6)	18741 (6.8)	1169 (4.4)	5293 (6.6)	4.0	28.2
Punjab	1223 (0.2)	1052 (0.4)	176 (0.7)	323 (0.4)	14.4	30.7
Rajasthan	3326 (0.6)	3218 (1.2)	32 (0.1)	1044 (1.3)	1.0	32.4
Tamil Nadu	43985 (8.5)	70830 (25.7)	4712 (17.9)	2547 (3.2)	10.7	3.6
Uttar Pradesh	37466 (7.3)	13573 (4.9)	227 (0.9)	18834 (23.6)	0.6	138.8
West Bengal	7794 (1.5)	35953 (13.0)	1235 (4.7)	1514 (1.9)	15.8	4.2
Pondi-cherry	285 (0.1)	261 (0.1)	1 (0.004)	64 (0.1)	0.4	24.5
All-India	515691	276083	26317	79787	5.1	28.9

Note: The summation of SHGs formed/assisted in the selected few States would be less than the All India total.

Figures in parentheses indicate percentage to total

Source: Ministry of Rural Development.

Table 3: State-wise Poverty and SGSY Credit Flow (2005-06)

States/ UTs	Total Rural Poor (Lakh)*	State's Share in Total Rural Poor	SGSY Credit Disbursed (Rs. Cr.)	Per cent Distribution of SGSY Credit	Per capita SGSY Credit Disbursed to poor (in Rs.)
1	2	3	4	5	6
Andhra Pradesh	58.13	3.01	150.54	8.26	259.0
Assam	92.17	4.77	60.00	3.29	65.1
Bihar	376.51	19.48	209.59	11.51	55.7
Gujarat	39.8	2.06	53.51	2.94	134.4
Haryana	11.94	0.62	35.44	1.95	296.8
Himachal Pradesh	4.84	0.25	23.24	1.28	480.2
J & K	2.97	0.15	20.48	1.12	689.6
Karnataka	59.91	3.10	79.44	4.36	132.6
Kerala	20.97	1.09	34.79	1.91	165.9
Madhya Pradesh	217.32	11.25	142.42	7.82	65.5
Maharashtra	125.12	6.47	116.82	6.41	93.4
Orissa	143.69	7.44	106.97	5.87	74.4
Punjab	10.2	0.53	13.15	0.72	128.9
Rajasthan	55.06	2.85	103.02	5.66	187.1
Tamil Nadu	80.51	4.17	71.81	3.94	89.2
Uttar Pradesh	412.01	21.32	396.06	21.74	96.1
West Bengal	180.11	9.32	22.52	1.24	12.5
Pondi-cherry	0.64	0.03	1.42	0.08	221.9
All-India	1932.43	100.00	1821.6	100.00	94.3

* As per latest Below Poverty Line Census conducted by Ministry of Rural Development

Source: RBI, M/o Rural Development

percent of India's rural poor received 11.51, 7.82, 5.87 and 1.24 per cent of SGSY credit, respectively. The largest gainer of the SGSY credit was Uttar Pradesh (21.74) followed by Bihar (11.51), Andhra Pradesh (8.26), Madhya Pradesh (7.82) and Maharashtra (6.41). The per capita SGSY credit disbursement to the poor during the year was only Rs. 94.3 in the country.

The comparison of the proportion of SHGs assisted during 2005-06 (Table 2) and the percentage distribution of SGSY credit across States/UTs (Table 3) conveys a vast mismatch. For instance, while Rajasthan accounts for 5.66 per cent of SGSY credit distribution, the

proportion of SHGs assisted in the state accounts for only 1.3 per cent of the country's total SHGs assisted. For Assam the respective figures are 3.29 per cent and 7 per cent. Similarly, for Bihar, the respective figures are 11.51 and 5 per cent and for Andhra Pradesh are 8.26 and 14.1 per cent.

Analysis of a field study in Rural Orissa

A field visit to two CDBs of Jagatsingpur district of one of the most backward states of India, Orissa, was undertaken to review the implementation of SGSY. The study district is well-known as the cultural heart of Orissa. With a total population of 10.15 lakh living in 1,391 villages, the district includes 8 CDBs. The district is backward in terms of infrastructure development like road network, markets, banks and technical institutions. In October 1999 the district had suffered large-scale devastation due to the super cyclone in which lakhs of people were dragged into the poverty trap.

A study was conducted by the authors in ten villages of Tirtol and Balikuda CDBs of the district during May-August 2006. Basic information on occupation structures, income and asset ownership, programme structure and participation of members in the programme was collected through a structured schedule from 60 SHGs. The sample size for each of the ten identified villages was 6 SHGs. These villages were chosen through a stratified random sampling by SHG penetration.

The number of SHGs formed in Tirtol and Balikuda blocks till 2005-06 was 742 and 1044 respectively. As per the results of the survey, SHGs in these blocks are exclusively women groups with an average member size of 17. The monthly savings of members range between Rs. 10 and 50. The responsibility of formation and nurturing of SHGs lies with the village level workers (VLWs). These VLWs act as community builders by socially mobilising poor women from various households in a village to form informal cohesive groups. They are required to monitor the group, its day-to-day function, internal lending and banking habits.

An overwhelming proportion of the SHG members was found to be illiterate (more than 34 per cent) or had studied till standard five i.e. primary school (45.31 per cent). Under SGSY, the presumption is that the poor members of SHGs would acquire basic skills of accountancy, book-keeping, management, leadership and teamwork to manage their own business unit for their income-generation (MoRD, 1999). So, the illiteracy of members may pose a grave challenge for the future survival and

sustainability of these SHGs, which have to be self-reliant and cannot be permanently dependent on SHPIs for their day-to-day work.

It was observed that more than three-fourths of the members were either landless or possessed land of less than 1 hectare (Table 4). Around 94 per cent of the members belonged to the lowest income group i.e., less than Rs 2500 per month (Table 5), thereby corroborating the fact that the beneficiary selection under SGSY had been as per the programme guidelines that lays emphasis on a selection of people living below the poverty line.

Table 4: Land Holding Pattern

Size of Holding	Percentage of Members
Nil (Land less)	28.12
Less than 1 Hectare	50.00
1-3 Hectares	21.87

Source: Survey Data

Table 5: Monthly Family Income

Income Brackets (in Rupees)	Percentage of Members
< 1500	28.10
1500-2499	65.62
> 2500	6.25

Source: Survey Data

The SHGs which have been in existence at least for a period of 6 months in the study area were found to have the potential of utilising small amount of credit up to Rs 50,000 per group. However, an arbitrary fixation of savings amount per member, irregular meetings and member absenteeism in these meetings failed to augment the corpus of the group. This also failed to inculcate banking habits in the members, since the frequency of thrift and credit activities within the group was severely limited.

It was also observed that the SHG-bank linkage framework of SGSY suffered because of the lackadaisical attitude of the grassroot level implementing authority. The groups were not sensitised about the participation and self-help approach and were aware only of the subsidy component of the programme. The basic tenet of self-help was lacking in the study groups. Around 37 per cent of the sample SHGs were neither graded nor linked with micro-credit, though these had existed for more than two years. It was also observed that an SHG in the study area waited on an average up to 18 months for the first

ever subjective grading after which corpus linked micro-credit assistance was provided to the groups concerned from the banking institution. The delay in the grading test of the SHGs was due to the lack of coordination between the implementing district and village level government officials, SHPIs and bank officials. The credit assistance per SHG varied from Rs. 4,097 to Rs. 14,705 per group under SGSY (Table 6). There is a huge 44 per cent gap between the amount sanctioned and disbursed to the groups under SGSY in the district. While the per capita SGSY credit flow to groups is estimated to be Rs. 9,691 in the district as a whole, three blocks out of 8 blocks recorded per capita disbursement higher than the district average. For Balikuda and Tirtol, per SHG credit disbursed was Rs 6,553 and Rs 8,751, respectively.

Table 6: SHGs Formed, Amount Sanctioned and Disbursed to SHGs during 2005-06 in Jagatsingpur District of Orissa

Name of the Block	No. of SHG Formed	No. of Members	Amount Sanctioned (Rs. Lakh)	Amount Disbursed (Rs. Lakh)	% Amount Disbursed to Sanctioned	Per Capita Credit Disbursed (Rs.)
Balikuda	30	242	46.66	15.86	33.99	6,553
Biridi	20	173	40.64	22.81	56.12	13,184
Ersama	25	304	62.42	35.70	57.19	11,743
Jagatsingpur	30	247	50.76	10.12	19.93	4,097
Kujang	30	387	74.04	37.40	50.51	9,664
Naugaon	20	154	32.50	14.00	43.07	9,090
Raghu-nathpur	20	251	53.56	36.91	68.91	14,705
Tirtol	30	258	61.77	22.58	36.55	8,751
Total	205	2016	422.35	195.38	46.26	9,691

Source: District Rural Development Agency, Jagatsingpur, Government of Orissa

An analysis of the beneficiaries' occupational pattern before and after joining the programme was undertaken to find out the reasons behind the low credit off-take under SGSY. The respondents were asked about their pre and post-SGSY activities. It was found that more than 31 per cent of members were involved in household chores before joining the programme. However, after joining SGSY 31 per cent had taken up household business, although agriculture and allied activities continued to account for a substantial share of 50 per cent of all activities (Table 7). It is possible that what was reported as household business after joining SGSY was indeed an activity which could be classified as self-employment. In that case, self-employment activities as a percentage of

total activities after joining SGSY would be around 33 per cent.

Table 7: Occupational Status of Members before and after Joining SGSY

Occupation	Percent of Members	
	Before (pre-1999 period)	After (1999 to 2005-06)
House Work	31.25	10.90
Agriculture/allied activities	51.56	50.00
Household Business	12.50	31.25
Service	4.68	6.25
Self-employment (Others)	0.00	1.56

Source: Survey Data

Possibly the low growth in self-employment could be attributed to the majority of members of SHGs utilising their loans to meet consumption expenditure on medicine, school education and on less productive economic activities like agriculture, livestock and trading activities. It was also observed that SHG members prefer to extend agriculture or agro-based activities without weighing their future prospects. Further, the SHG members were found to have undertaken activities other than those identified by the Government. Though the SGSY guidelines stress on the identification of a maximum of 10 activities in each block, it was observed that each block had identified as many as 21 different activities for assistance under SGSY without taking into account their forward and backward linkage effects. The activities identified under SGSY in Tirtol and Balikuda were dairy farming, poultry, goat rearing, pisciculture, floriculture, vegetable cultivation, chilli cultivation, betel binding, plantation, cane and bamboo cultivation, agarbati and detergent powder making, coir products, tent house with brass band, golden grass, palm products, mushroom cultivation, fruit processing, spices, soft toy making, terracotta, dry fish making. Besides, these activities were not identified through a participatory process involving SHPIs and prospective members of SHGs. Many activities had been selected without taking into account the details of existing local resources, the aptitude and skill of the people in the area concerned. Lack of convergence amongst various Government institutions, market and bank infrastructure had resulted in defeating the very purpose of the programme in ensuring a holistic community development in rural areas. The monitoring and assessment mechanism of the programme was less effective than expected as the grassroots level government functionaries themselves did not have complete knowledge about the programme objectives and benefits.

Conclusion & Policy Implications

The key to the success of the rural self-employment programme lies in the formation of quality groups, adequate and timely credit support along with the identification of appropriate and profitable economic activities. Field level studies reveal that the programme guidelines have been followed in identifying beneficiaries. However, a lot more is required by way of coordination among the different tiers of implementing agencies, viz. bankers, government officials and SHPIs. The in-built coordination and monitoring mechanism within the programme has to be rejuvenated with the active involvement of programme implementing agencies. Due to the lack of focus on the location-specific key activities, additional employment and income have not been effectively generated in the rural areas. This has dampened the enthusiasm within the beneficiary communities.

The selection of activities in a particular area should be determined by the availability of physical resources, skills and aptitude of the people and market demand. For optimum forward and backward linkages the number of key economic activities should not exceed five. Moreover, excess capacity should not be created by too many people taking up the same activity at a time leading to overcrowding of units in a particular area. Further, the selected activities should have the potential of generating incremental income sustained over a period of time which would enable the beneficiaries to cross the poverty line. Project reports for assistance under SGSY should stress on the availability and access to training, credit, technology, infrastructure and marketing facilities. Before any beneficiary is financed, the feasibility of the activity for the group members should be assessed.

The role of SHPIs in sensitising and motivating the poor cannot be undermined. With the right assistance from SHPIs, SHGs graduate from being mere groups to being profitable micro-entrepreneurial ventures. The absorption and repayment capacity of the members should determine the amount of financial support to be extended to them. Consumption loans should definitely be discouraged. Before extending any loan, even for productive purposes, an assessment by the group in consultation with all the programme implementing authorities is a must. Emphasis should be laid on participatory decision making while mapping the local resources, identifying and selecting economic activities. Periodic monitoring should be carried out not only of the progress made by the beneficiaries but also of the quality of operation of the SHGs.

Rural bank network needs to be expanded so that they become more accessible to SHGs. Besides, an improvement in marketing and technical infrastructure for the SHG units is required. In the era of globalisation, the SHGs need to upgrade their methods of production to be able to survive in a competitive market. The stage is set just right for the SHG-bank linkage model of economic development to get the appropriate boost.

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A Study on Financial Support to SSIs and Capacity Utilization

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Finance is available to SSIs from commercial banks, state financial corporation, friends and relatives, private financiers like money lenders and non-banking financial companies. This paper examines the capacity utilization of SSIs and analyzes the problem of paucity of funds by means of the application of the Kruskal-Wallis test. This study reveals that even though the units get adequate credit to install a higher capacity, the cash flows have always limited the working capital and consequently utilization as well.

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Small-scale industries (SSIs) are defined as those industrial units with a capital investment in fixed assets in plant and machinery, whether held on ownership terms, on lease or on hire purchase that does not exceed Rs 1 crore. Within this group, units with capital investment up to Rs 25 lakh are known as tiny units. Ancillary units too are allowed a capital limit of Rs 1 crore. Ancillary units are defined as those that sell at least 50 per cent of its single shift output to a large firm under separate ownership or control.

SSIs today account for at least 45% of the country's industrial production. They also account for more than 40% of the country's exports. SSIs would get more export opportunities as they exported goods worth Rs 50,000 crore in 1998-99. In 1999, there were only 19 lakh small scale units. In seven years their number increased to 31 lakhs. The small-scale sector created 42 lakh new jobs, while the major industries and the government could generate only 14.3 lakh jobs.

Role of SSIs in the Development Process

SSIs play an important role in the process of the industrial and economic development of the country. They generate employment opportunities and help the local economy to grow by utilizing locally available resources and skills. They ideally suit our economy as they are less capital intensive and overhead costs are minimal. Over 20 lakh SSI units providing direct employment to over 120 lakh persons in our country also contribute 40 per cent value addition to products in the manufacturing sector. These units export products to the tune of over Rs 200,000 crore, which represent an export growth of over 35 per cent from pencil to high technology electronic products.

Sources of Finance

Finance is an important input for an industry.

Financing a business may take on a traditional form or new innovative forms.

For small-scale industries, forms of financing are own funds, loans and venture capital funds. Unlike the developed countries, in India, venture financing to SSIs is in its infancy because most of the SSIs are on non-technology platform. As the promoters of small-scale industries are people of meagre means, a basic weakness of these industries is that they suffer from weak equity. Lending institutions in India insist on minimum promoter's contribution ranging between 10% and 50% of the project cost, for a loan. Steps have been taken by the government agencies through equity schemes to bridge the gap or deficit in the required minimum equity contribution of entrepreneurs while approaching for loans. Such type of assistance is normally made as a soft loan, which carries only service charge for the first five years and nominal interest subsequently. Finance is also available to SSIs from commercial banks, state financial corporation, friends and relatives, private financiers like money lenders and non-banking financial companies.

Role of commercial banks in the upliftment of SSIs

Commercial banks assist SSIs in many ways. They organize entrepreneurship development programmes to train the prospective entrepreneurs in various functional areas of management and counsel them to select and launch only viable projects. Banks thoroughly examine the technical feasibility and economic viability of the projects and properly assess and meet the genuine credit requirements of the units. Through effective supervision and follow-up of advances and periodical performances monitoring of the units, the commercial banks may detect the early symptoms of sickness and arrest at the incipient stage itself by taking right remedial measures at the right time.

Problems faced by SSIs

Problems faced by SSIs are not commensurate with their size of operations. They have to overcome hurdles at each stage. The complications are inherent in their weak financial and organizational structure, which renders them susceptible to the vicissitudes of trade and economic climate. If these causes are identified and the reasons for success or failure of SSI units are analyzed, the strategic roll to be played by banks will become abundantly clear. This is evident from the following problems faced by the SSI units:-

- There is a perennial problem of inordinate delays on the part of the financial institution in-

cluding banks in sanctioning credit limits to the units.

- Even when the facilities are sanctioned they are not need based in terms of quantum and type.
- The big units deliberately promote ancillaries with huge installed capacity, generally in excess of the intake capacity of the big units. These small units then have to compete with each other for business to avoid individual low capacity utilization and offer low prices (at times unremunerative) and longer credit period.
- The big units generally make payments to small units much after the normal due dates. The latter not being in a bargaining position, have to live with a situation of threat of closure or higher cost of production.
- In the area of raising additional funds, the small units are at a disadvantage, as they have to depend on the financiers or the reluctant bankers.
- The SSIs suffer from the lack of information necessary to be profitable. This may pertain to sources of raw material and inputs, machinery and accessories, technology, marketing, consultancy and counselling.
- There is a shortage of consultancy services. Either there are no credible consultants available in the vicinity or the promoters of small units cannot afford the high cost of consultants.
- SSIs also face more difficulties in terms of global competition on cost and quality front and economies of scale owing to the process of globalization.

Objectives and methodology of the study

The study deals with SSIs and the problems faced by them. It includes the difficulties faced by SSIs with regard to credit. Acknowledging the works of others, this study is totally different and takes into account the problems faced by SSIs with regard to finance. The sample consists of 150 SSIs from Chennai. The sample was collected only from manufacturers who were producing and selling their products to large-scale industries. SSIs with a good track record and a well established name for at least three years were given due consideration.

The objectives of the study are:-

- To examine capacity utilization of SSIs.

- To analyze the problem of paucity of funds.
- To identify whether project cost and paucity of funds have any significant relationship.
- The tools undertaken for the study are based on a 5-point rating scale, which are analyzed. A non-parametric test was undertaken and the application of Kruskal-Wallis test has been used to analyze the significance of project cost and paucity of funds.

Profile of SSI Units

The status designation of the respondents revealed that 85% of them were either proprietors or partnership concerns, 13% were private limited companies, and the remaining 2% were equally divided into public limited companies and other categories such as cooperatives. 73% of the total sample units were registered with the Directorate of Industries. The remaining 26% did not indicate their status.

Capacity utilisation

This is generated when SSIs start performing. It is affected due to various factors that stand as blockages during the development and manufacturing of the product. The higher the capacity generated, the higher the level of efficiency in manufacturing the product. On the other hand, constraints on capacity utilization give rise to innumerable problems. It can be lower or higher as per the distribution. The larger the distribution, the higher the capacity utilization and vice versa. The fundamental factors that affect the utilization of capacity are scarcity of funds, marketing problems and others.

Table 1: Constraints in Achieving Capacity Utilization

Types of constrains	First	Second	Third	Fourth	Fifth	Not Indicated
Paucity of funds	80	23	10	4	2	31
Technical problems	9	11	24	21	5	80
Marketing problems	27	47	17	8	3	48
Non-availability of resources	9	23	23	22	3	70
Other problems	11	13	11	4	8	103

In this aspect, major problems were brought forth and ranks were assigned to them. The first rank states more problems and the fifth states the lowest problem faced. While not indicated describes that the SSIs have not faced any problem, in almost all the cases the SSI's approach is positive from the data collected. 80% of SSIs

faced the problem of paucity of funds not only at the beginning stage, but also at the end stage. Only 2% of them felt that they had rare problems. Technical problems were 9%, which is almost counted to be nil and 80% of the SSIs have agreed that there is no such problem and is not indicated by them. Marketing problems stand second i.e. at 47%. There was no such identification of non-availability of raw materials, where 50% felt at the earlier stage and others felt at a later stage. Other problems may be classified as unavoidable problems, which may come or not come in the life of SSIs. These may be external or internal problems, which are not indicated. Focus was made to ascertain the constraints on a higher level of capacity utilization as perceived by the management.

Credit-related issues

The major problems faced by SSIs include paucity of funds, shortage of resources such as power, fuel, water, etc, non-availability of raw materials, labour problems, technological difficulties, marketing, quality of finished goods and other related problems were considered. The respondents indicated the frequency of occurrence of each problem, as faced by the units, by categorizing it as 4, 3, 2, 1, 0 and points were given on this basis, which were then converted to %s suitably.

Table 2: % of Sample Units to the Extent of Problem Faced

Problems	Very frequently	Quite frequently	Frequently	Less frequently	Not at all	Total
Paucity of funds	37.6	18.8	20.6	19.1	9.0	100
Shortage of Utilities	21.3	14.7	17.8	25.2	21.1	100
Non-availability of raw materials	6.5	7.6	16.2	26.2	43.5	100
Labour Problems	4.7	4.2	15.6	22.7	52.9	100
Technical Problems	2.3	3.4	9.6	20.9	63.8	100
Marketing	12.3	14.1	15.6	18	40.0	100
Management	0.4	2.0	2.2	8.9	86.5	100
Quality of finished goods	1.6	1.4	3.9	15.5	77.4	100

Among the sample collected, the ranking states that almost all the SSI sectors felt that the problem of paucity of funds was more. Both a well established and a less

established sample gave the same response of problems faced very frequently and quite frequently. 66% faced the same problem and 9% never faced it. 35% faced marketing problems. Markets are not ready to accept the products because of uncountable reasons. There is a lack of coordination between SSIs and large-scale industries. It has led to a greater fluctuation in acceptance of a product. The problem of management is more due to small number of people under one head. There are very few or no problems felt by others.

Project cost vs paucity of funds

It was examined whether there was any significant relationship between the size of the project and the extent of paucity of funds faced by them. The following hypothesis was tested. "Commercial Banks and financial institutions were more favourable to larger projects than smaller projects". It was observed that banks appreciated larger projects, as the turnover was assumed to be more and the recovery of payment was also possible at quicker time period. The rate of interest also increased as the size of the project increased. The SSIs which went for higher project cost had abundance of funds in hands, so it was easy to sanction. On the other hand projects with lower project cost were not functioning so beneficially. There was more chance of them running as sick units or at a non-performance level; the outlay of the project was not satisfactory in many cases. They were unable to raise funds at frequent intervals of time; so much concentration was not allocated to them.

Table 3: % of Sample Units According to Size of Project and Paucity of Funds

Project cost (Rs. in Lakhs)	Very frequently	Quiet frequently	Frequently	Less frequently	Not at all	Weighted Average
< Or = to 1	50	17.9	14.3	16.7	1.2	2.99
1 to 2.5	33.8	15.8	23.7	15.1	11.5	2.45
2.5 to 5	38.8	18.8	18.8	15.3	8.2	2.65
5 to 10	35.7	19.4	24.5	10.2	10.2	2.60
10 to 15	32.6	30.2	23.3	9.3	4.7	2.77
15 to 25	26.1	13.0	21.7	21.7	17.4	2.09
25 above	57.1	0.0	14.3	0.0	28.6	2.57

HO: There is no significant difference between various project costs and the problem of paucity of funds.

HA: There is significant difference between various project cost and the problem of paucity of funds.

Kruskal Wallis Test

Rank	N	Mean Rank
1	5	17.70
2	5	18.40
3	5	17.90
4	5	18.40
5	5	18.30
6	5	19.80
7	5	15.50
Total	35	

Test Statistics

Chi-Square .477

df 6

Asymp. Sig. .988

A kruskal Wallis Test

B Grouping Variables: Rank

Inference

Since Asymptotic Significance is greater than .05, Ho cannot be rejected. The result states that the paucity of funds is faced at all levels. The sample takes into account the size of project and the scarcity of funds faced by them. As the capacity of the project increased the chance of getting funds also has shown favourable appreciation only to extreme lower and higher projects which faced a lot of problems to get funds. Almost 50% of those whose project cost was less than Rs 1 lakh faced paucity of funds. There are just 1.2% of them that have not faced such type of problem. But as the project cost rose from Rs. 1 lakh to Rs 25 lakhs, banks have shown consideration, which meant that 30% still faced a problem. The SSIs that have not faced scarcity of funds have ranged from 4.7% to 17.4%, and when the project cost increased to Rs. 25 lakhs and above, 57.1% have faced problems. 28% have not faced any such scarcity.

Conclusion

The SSIs have overcome the challenges of time and have grown to become a force to reckon with. Their development has been gradual and steady and their contribution to the economy, especially the rural economy has been unparalleled. SSIs have proven themselves to be a viable alternative to the people of rural India and the development of the monetary sector has aided this growth. SSIs have been a principal source of employment generation as well.

Despite their buoyant growth, the problem of finance has always plagued its development. Individuals with a strong financial background have always muscled their way in whereas the ones with a weak background have taken a beating. Inadequate working capital has always limited the size of the operation of the units, thereby upsetting the utilization of the installed capacity and consequently the profits as well.

Lack of technical expertise and ignorance to adapt to the technological advances have always been a limiting factor to the growth of SSIs. Since most of these units are located in a rural and semi-urban background, penetration of technology continues to be limited. Even though the units get adequate credit to install a higher capacity, the cash flows have always limited the working capital and consequently the utilization as well. As a

result of this, there is a lot of idle capacity which could have been put to better use.

The best way to improve this situation would be to increase micro credit to the units and educate the entrepreneurs on the latest developments in technology. The government and the RBI need to adopt a pro-active role and help the SSIs overcome such problems and realize their potential.

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*By working faithfully eight hours a day, you may get to be a boss
and work twelve hours a day.*

– Robert Frost

Organic Farming in India: Prospects and Problems

S.S. Kalamkar

Scientists have realized that the green revolution has reached a plateau and is now sustained with diminishing return and falling dividend. It is in this context that organic farming has drawn the attention of agricultural scientist, farmers and policy makers. Organic farming, which aims at cultivating the land and growing crops in such a way as to keep the soil alive and in good health, may be an alternative to the present system of farming which solely depends on chemicals. However, yields are less than in conventional farming. In light of these factors, this paper examines the prospects of organic farming in India.

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The green revolution in India has witnessed a jump in agricultural production with the introduction of high yielding variety seed of various crops and by following intensive cultivation practices with the use of fertilizers, pesticides and other inputs. In the process, the relative contribution of organic manure as a source of plant nutrients vis-à-vis chemical fertilisers has declined substantially. With increase in cost of production inputs, inorganic fertilisers have become increasingly more expensive (NAAS, 2001) and the rural economy is in ruins because of over-dependence of outside inputs in agriculture such as seed, fertilisers, pesticides, growth-promoting chemicals etc.

Also, the intensive use of inputs has not only polluted the soil, water and the environment causing slow degradation, but has also affected human beings. There may also be risk of persistence in soil, air and water causing pollution toxicity to men and animals and development of resistant biotypes of weeds with continuous use of weedicides. The use of chemical inputs has also resulted in the contamination of food materials, pesticide resistance, pesticide induced resurgence and affected soil health and non-target organism. Pesticide residues have been detected in excessive amount in almost all food materials including foodgrain, vegetables, milk and milk products (Naik, 1997).

Waterlogging and secondary salination have been the banes associated with excess and irrational irrigation. At the same time, the groundwater table declined sharply as more and more deep bore wells were drilled and recharging of ground water has also been reduced to severe deforestation. It is also reported that the nutritional deficiencies are appearance in population raised on crops from the green revolution. Conventional cropping pattern is also considered responsible for the loss of many species of food plants. More than 500 species of pest-causing insects and mites have become resistant to one insecticide or the other (Daliwal and Pathak, 1993). This

may cause a serious loss in crop yield and therefore, may affect the agricultural production in coming years. With the increase in the country's population, compulsion would not only mobilize the agricultural production but also increase it further in a sustainable manner. Scientists have realized that the green revolution with high input use has reached a plateau and is now sustained with diminishing return and falling dividend. It is in this context that organic farming has drawn the attention of agricultural scientist, farmers and policy makers.

Organic agriculture seems to be a one solution to the problems of conventional agriculture. Organic farming, which aims at cultivating the land and raising crops in such a way as to keep the soil alive and in good health, may be an alternative to the present system of farming solely depending on chemicals. It will help in environmental protection, conservation of renewable resources, improved food quality, reduction in output of surplus products and orientation of agriculture towards areas of market demand. Organic farming has attracted increasing attention the world over due to the wide adverse effects of conventional agriculture practices on human diet, environmental and sustainability of agricultural production. Because of indiscriminate use of chemical fertilizers for decades, the organic matter content of soils has come down to less than one per cent. In addition, the use of pesticides led to pest resurgence which in turn led to difficulty in controlling weeds. The residues of the chemicals cause concern over the safety of food and sustainable production. Hence the expectation that organic farming, by reverting to the use of manures, green manures, urban waste, rural wastes, etc, can bring sustainability to agriculture with eco-friendliness. Therefore, it becomes imperative for the researchers and planners to develop an alternative viable strategy to supplant the chemical farming.

Concept of Organic Farming

Classically organic farming means growing crops with zero chemical inputs. It spells freedom from pesticides, chemicals etc. It is a method of farming which avoids or largely excludes the use of compound chemicals such as chemical fertilizers, pesticides and herbicides. Instead of that, natural resources such as organic matters, minerals and microbes are used. It gives an idea to use all sources, which are natural, so that soil health is maintained. Organic farming systems rely on large-scale application of animal or farm yard manure, compost, crop rotations, crop residues, green manuring, vermicompost, bio-fertilizers, bio-pesticides and biological control to maintain soil productivity and to supply plant nutrients and to control insects, weeds and other pests.

It avoids or largely excludes the use of synthetically compound fertilizers, pesticides, growth regulators and live-stock feed additives. The number of bio-fertilizers such as blue green algae and azolla are used extensively to meet the nitrogen demand of the crop. Small quantities of powdered neem cake are also used. These organic nitrogen supplements, unlike fertilizer nitrogen, do not suffer any loss in the fields. Phosphorous-solubilising and mobilising organisms such as phospho-bacterium and vesicular arbuscular mycorrhizae are quite helpful in meeting the phosphorus demand of the crop. Potassium for the crops can be supplied by using potassium rich organic amendments such as burnt rice, rice straw composted using *trichoderma harzianum* and composted coconut coir pith.

The key characteristics of organic farming are as follows:-

- Protecting the long-term fertility of soils by maintaining organic matter levels, fostering soil biological activity and careful mechanical intervention
- Providing crop nutrients indirectly by using relatively insoluble nutrient sources which are made available to the plant by the action of soil micro-organisms
- Nitrogen self-sufficiency through the use of legumes and biological nitrogen fixation, as well as effective recycling of organic materials including crop residue & livestock waste
- Weed, disease and pest control relying primarily on crop rotations, natural predators, diversity, organic manuring, resistant varieties and limited (preferably minimal) thermal, biological and chemical intervention
- The extensive management of livestock, paying full regard to their evolutionary adaptations, behavioural needs and animal welfare issues with respect to nutrition, housing, health, breeding and rearing
- Careful attention to the impact of the farming system on the wider environment and the conservation of wildlife and natural habitats.

Progress of Organic Farming in India

Indian agriculture was traditionally organic and farmers were following organic cultivation till the mid-1960s. The green revolution was ushered in India during the mid-1960s and it has been the cornerstone of India's agriculture achievement, transferring the country from the

stage of food deficiency to self sufficiency. But the indiscriminate and excessive use of chemicals during the last four decades has put forth a question mark on the sustainability of agriculture in the long run calling attention for sustainable production which will address soil health, human health and eco-friendly agriculture (Bhattacharya and Chakraborty, 2005).

Organic farming is becoming important in the agriculture sector in India, largely through the efforts of small groups of farmers. The seeds of commercial Indian or-

ganic cotton cultivation were sown for the first time in Maharashtra in the early 1990s (See box 1). Similar efforts of promotion of organic farming have been made in many states. *National Agriculture Policy* (2000) also recommended the promotion of traditional knowledge of agriculture relating to organic farming and its scientific upgradation. In view of the US \$ 24 billion global organic market, the Department of Agriculture & Cooperation had set up a Task Force on Organic Farming under the chairmanship of Dr. Kunwarji Bhai Jadav which had submitted its report in November, 2001, identifying the problems and suggestions on promotion of organic farming in the country. Based on their recommendations, the government has formulated a "National Project on Organic Farming (NPOF)" for implementation during the Tenth Plan, for ensuring production, promotion, market development and regulation of organic farming in the country (<agricoop.nic.in).

Under NPOF, the National Institute of Organic Farming was set up in October 2003 in Ghaziabad, Madhya Pradesh. The purpose of this institute is to formulate rules, regulations and certification of organic farm products in conformity with international standards. The major organic products sold in the global markets include dried fruits and nuts, cocoa, spices, herbs, oil crops, and derived products and non-food items include cotton, cut flowers, livestock and potted plants. The certifying agencies include the APEDA (Agricultural and Processed Food Products Export Development Authority), the Tea Board, the Spices Board, the Coconut Development Board and the Directorate of Cashew and Cocoa. They will be accountable for confirming that any product sold with the new 'India Organic' logo is in accordance with international criteria, and will launch major awareness and marketing campaigns, in India and abroad. Currently the export of organic products is allowed only if the produce is packed under a valid organic certification issued by a certifying agency accredited by a designated agency. Organic farming has been identified as a major thrust area of the Tenth plan of the central government. About one billion rupees have been allocated to the aforementioned National Institute of Organic Farming alone for the Tenth Five Year Plan.

A working group has been set up by the Planning Commission, and the Department of Commerce has established the National Organic Standards. The global market that was only \$17 billion in the year 2000 may touch the \$31 billion mark by 2005 and India's current share is only 0.001 per cent. The area under organic managements in the selected countries of the world is presented in Table 1. Nearly 130 countries produce organic products and Australia is a lead country having 10

Box 1: Brief History of Organic Farming in Maharashtra

- Linked with publication '*Eka Kaditun Kranti*' (One straw Revolution by M. Fukuoka), Marathi Magazine organized workshop of natural farming 1991.
- No cultivation/no chemical failed in general except in some fruit crops in 1991-92.
- Switched over to organic by supplementing traditional cultivation practices. Technology fine tune by farmers for field crops.
- CICR Nagpur planned the first field experiments in 1992 onwards.
- VOFA established in 1994 with 135 members.
- Eco farms India Ltd. commenced activities in 1996-97 for packed organic product.
- Nao, Natural Agricultural Research centre, Nagpur commenced popularising through radio, TV, cassettes, publications, posters, pamphlets, books.
- Krishi Vigyan Mandal, Barad, Nanded actively engaged by one group.
- Socio-economic organisation at Kerwadi, Parbhani formed a group.
- Organic jaggery sold at Perimium from Hingoli.
- In Jalgaon organic banana experts achieved by a group of 80 farmers.
- KVK'S particularly Pal, Babhuleshwar, Ambajogai promoted the efforts.
- In Pune, Gram Parivartan has successfully organised farmers for grown sugarcane, flowers, grapes, vegetables by organic methods.
- Dharamitra, Wardha has general data from organic fields on soil fertilizer, meteorological conditions, C/N tra. on 400 small farms.

Source: GOI (2001).

Table 1: Area under Organic Managements in the World

Sr. No.	Country	Area under Organic (mha)		% of total agricultural area		No. of Organic Farms	
		2004	2006	2004	2006	2004	2006
1	Australia	10.0000	12.1266	2.20	2.71	1380	1832
2	Argentina	2.9600	2.8000	1.70	1.58	1779	1824
3	USA	0.9500	0.8890	0.23	0.22	6949	8035
4	UK	0.7245	0.6903	4.22	4.39	4057	4010
5	Germany	0.6969	0.7679	4.10	4.52	15628	16603
6	South Africa	0.0045	0.0450	0.05	0.05	250	250
7	China	0.3012	3.4666	0.06	0.60	2910	1560
8	Japan	0.0005	0.0292	0.10	0.56	–	4539
9	India	0.0370	0.1140	0.03	0.06	5147	5147
10	Pakistan	0.0002	0.0203	0.08	0.07	405	28
11	Sri Lanka	0.0015	0.0154	0.65	0.65	3301	3301
12	World	24.0700	31.5028	1.60	–	462475	622782

Sources: Bhattacharyya and Chakraborty (2005) and IFOAM (2006).

million hectares area under organic management. It can be seen from the table that the percentage of area under organic management to agricultural area in India increased by two times between 2004 and 2006. As per FiBL survey, India ranks 33rd place in the world area under organic management, 88th place as percentage of organic area to total agriculture area and 22nd place as number of organic farms in the world. Officially only 0.03 per cent of its land is slated to be under organic agriculture. Basically, most of India's organic farms are not officially considered (or certified as) organic. As per APEDA, 2.5 million hectares area is under organic crop which includes 2.43 mha of forest area with wild herb and medical plants.

The Ministry of Commerce and Industry launched the 'National Organic Programme' in April 2000 and APEDA is implementing the 'National Programme for Organic Production' (NPOP) (Gauri, 2004). Under NPOP, documents like national standards, accreditation criteria for accrediting inspection and certification agencies, accreditation procedure, inspection and certification procedures have been prepared and approved by National Steering Committee (NSC). The Planning Commission, Government of India, constituted a steering group on agriculture which identified organic farming as a national challenge and suggested it should be taken in the form of a project as major thrust are for the tenth five year plan. The group recommended organic farming in the north-east region, rainfed areas and in the areas where the consumption of agrochemical is low or negligible. The crops currently cultivated under organic farming methods in our country are presented in Table 2. In 2002, according to government statistics, from a total food production of over 200 million tones, the country produced only 14,000 tones of organic food products.

Table 2: Crop cultivated under Organic Farming in India

Crop Group	Crops
Cereals	Wheat, paddy, Jowar, Bajra and Maize
Pulses	Pigeonpea, Chickpea, Greengram, Blackgram and Chana
Oilseeds	Groundnut, Castor, Mustard and Sesame
Commodities	Cotton, Sugarcane, particularly for Sugarcandy (gur)
Spices	Ginger, Turmeric, Chillies and Curmin
Plantation Crops	Tea, Coffee, Cardamom
Fruits	Banana, Sapota, Custard apple and Papaya
Vegetables	Tomato, Brinjal, Cucurbits, Cole Crops, Leafy Vegetables

Source: GOI (2001).

Components of Organic Farming

Meaningful research component in organic farming system has been difficult to design primarily because of organic philosophy. There are assumptions throughout the organic and conventional systems with respect to their effects on soil physical properties soil insect fauna, nutrient flow within the soil, crop health and nutritional value of harvested crop. One finds many principles commonly held in organic farming such as deep rooted crops to bring nutrients from deep in the soil profile. There are other perplexing observations such as the decline in yields during the process of conversion from conventional to organic practices. These assumptions, principles and observations extend to virtually every aspect of crop and animal management in organic farming.

Effect of Organic farming on Crop yield and quality

It is reported that organic agriculture generates lower yields in most food crops compared to conventional agriculture. While in the long run organic agriculture may prove to be better even in terms of yield, in the short run losses expected in some crops is as high as 35 to 40 per cent (Lampkin, 1994). Though some studies have also reported higher yields for some organic food crops and livestock, large-scale adoption of organic agriculture may lead to reduction in the food supply for some years. As per the Central Institute for Cotton Research (CICR) study, LRA 5166 cotton crop yield was lower during first two years, but after two years, there was tremendous increase in yield of organic cotton crop as compared to other cropping systems (Table 3). It explicitly brings out the fact that after the third year, the yield of organic plots, which did not receive fertilisers and insecticides, produced as much cotton as was cultivated.

Simultaneously, it reduced the bollworm damage. The organic soyabean crop production also recorded higher yield. This long-term experiment at CICR ended up in the production of a suitable package of practice for organic cotton cultivation. Field experiments conducted at Annamalai University to study the impact of organic farming of rice yield and quality, clearly indicated a positive approach towards practicing complete organic farming in attaining premium quality produced with higher grain yield.

Table 3: Organic Cotton and Soybean Yield under Different Farming System ('00 kg/ha)

Year	Organic	ICPM	Non-Organic
Cotton (LRA 5166)			
1993-94	464	807	1159
1994-95	530	740	652
1995-96	849	781	651
1996-97	898	710	623
Soybean (under crop rotation)			
1998-99	2769	1961	1199

Source: GOI (2001).

Economics of Organic Farming

As we have seen the yield of organic crop has increased over the period and has been higher than other cropping systems. We also looked at the economics of different cropping systems, since the financial challenges or problems posed by conventional farming system were making agriculture progressively uneconomical. The comparison between different farming systems of cotton cul-

tivation is presented in Table 4. It can be seen from the table that organic farming is a very low cost and sustainable way of cultivation. It includes all components of Integrated Pest management (IPM). The net return from this farming system is much higher than other systems, particularly when compared to the Bt and Traditional ways.

Table 4: Comparison between different farming systems of Cotton Cultivation

Component	Cost Incurred (Rs/ha)			
	Traditional	IPM Based	Organic	Bt
Land Preparation	1700	1700	1700	1700
Seed	1125	1125	1125+165 (Mung)	4000
Sowing	480	48	480	480
Inter-culture	2600	2600	2000	2600
Fertilisers	2800	2800	525 (Organic)	2800
Irrigation	900	900	900	900
Plant Protection	6200	1200	1200	4000
Harvesting	2500	2500	2500	3000
Total Expenditure	18305	13305	10595	19480
Total Production (qtls)	13	14	15	16
Total Receipt (Rs./ha)	29000	32200	34500 + 5700 (intercrop)	36400
Net Profit (Rs/ha)	11595	18895	29605	17320

Source: GOM (2005)

As per the findings of the Wheat Research Station, Indore, the input-output ratio for wheat is becoming lopsided every year (fifteen years ago the ratio was 1:16 and today it is 1:7). This is primarily due to the constant increase of input quantities of chemical fertilizers needed to sustain the same level of output. In the case of organic/bio-dynamic farming the reverse takes place. Over a period of time the quantity of inputs decreases (<http://www.indianorganic.com>). It also gets clear from the CICR study results presented in Table 5 that yield increase progressively under organic farming equating the yields under inorganic farming by sixth year.

An experiment conducted by ICRISAT also sustains the view that in yields of different crops in a low cost sustainable system, the annual productivity (rainy + post rainy season yields), in particular is comparable to that in the conventional system.

The comparative study on economics of organic and inorganic sugarcane cultivation in Maharashtra by

Table 5: Yields and Economics of Organic Farming vis-à-vis Conventional Farming

Year	Status	Yield (Qtls./ha)	Gross Income	Premium (20%)	Total (Rs)	Net Income (Rs)	+/- over Conventional
Conventional	–	10.0	20000	0	20000	9000	0
First Year	Year of Conversion	5.0	10000	0	10000	750	–8250
Second Year	Year of Conversion	5.75	11250	0	11250	3750	–5250
Third Year	Organic	6.25	12500	2500	15000	7000	–1500
Fourth Year	Organic	7.50	15000	3000	18000	10500	1500
Fifth Year	Organic	8.75	17500	3500	21000	13500	4500
Sixth Year	Organic	10.0	20000	4000	24000	16500	7500

Source: Rajendran, et al, 2000.

Kshirsagar (2006) clearly shows that the cost of cultivation was lower by 15.4 per cent in organic compared to inorganic sugarcane cultivation (Table 6). The lower cost of irrigation, non use of chemical fertilisers, low cost of seed and planting, and less cost of plant protection material are the major reasons for low cost of organic sugarcane cultivation. However productivity realized in organic sugarcane farming was lower than inorganic.

Table 6: Economics of organic and inorganic sugarcane cultivation in Maharashtra (Rs/ha)

Particulars	Organic	Inorganic	% change in organic
Productivity (t/ha)	106.7	114.9	–7.17
Gross Value of Production (GVP)	122705	120687	1.67
Gross Cost of Cultivation (GCC)	35632	42115	–15.39
Cost of Production (Rs/ ton)	334	366	–8.86
Profit (Rs/ha)	87073	78572	10.82
GVP/GCC	3.44	2.87	–

Source: Kshirsagar, 2006.

Domestic Market

The growth of organic farming has been very slow in India, because more emphasis is given to food security than safety. Though there have been a few isolated cases of very successful organic farmers, the concept has gained momentum only over the last 3 to 4 years. Shops for marketing of organic foods have come up in cities such as Mumbai, New Delhi and Bangalore. This has encouraged some farmers to go for producing organic foods. However, such identified organic food trade is a very negligible part of the total food trade.

Large-scale organic food production requires market-based sustainable incentives high enough to compensate for yield losses and increase in cost, if any, as-

sociated with organic agriculture. Therefore, market ability to pay an adequate price premium is a key factor in sustainable growth of organic agriculture. The extent of premium required varies from crop to crop and region and region. High yield losses combined with high input costs (where labour cost is high) would necessitate a high premium. The ability to obtain such high premium in the food market depends primarily on the consumers' awareness, attitudes, preference and behaviour. It is therefore possible to develop a sound domestic organic market within 4 to 6 years.

The International Federation of Organic Agriculture Movement (IFOAM) has already set up its branch office in India to help certification agencies and to promote organic agriculture (Naik, 2001). There are eleven accredited certifying and inspection agencies in India under NPOP (see, Annexure 1).

Export Strategy

Organic farming systems have attracted increasing attention the world over due to the adverse effect of conventional agriculture practices on human diet, environmental and sustainability of agricultural production. India should take the initiative to become a major exporter of organic food products. In the recent years, export potential seems to be lying in organic foods. Organically grown produce may be the only solution available for India to export food products to the developed countries in the coming years, as their food quality standards are increasingly become restrictive. Unless India plans to get into this trade in a big way, food exports may become increasingly difficult. India has the advantage in terms of a rich genetic pool, availability of technology to produce and process organic food, large domestic markets and cheap labour, which would enhance cost competitiveness of the country (Naik, 2001).

Organic farming can be equally persuasive for both

traditional and hi-tech farmers. Farmers in market-oriented systems are likely to be aware of the market potential of organic produce as well as the adverse effects of conventional farming, while those practicing un-improved agriculture would be keen to experiment. A number of farmers practice agriculture between these extremes, trapped in a cost-price squeeze and groping for alternatives. India can emerge as a major exporter of organic products as she is endowed with various types of naturally available organic form of nutrients in different parts of the country and this will help substantially in the organic cultivation of crops.

India exports organic products such as tea, cotton, cotton yarn, spices. In the initial stage, area and or commodities can be earmarked for organic production. For example, certain seed could be identified and the efforts should be made to educate the farmers and pay premium prices to induce them to take up organic production. Organic agriculture would require a greater role of experts and their associations in production as well as the certification.

Table 7: Production and Export of Organic Products from India (2004-05)

1	Area under Certified	: 2.5 million ha
2	Total certified Product	: 115328 metric tonne
3	Total Project Certified	: 332
4	Number of Processing Units	: 158
5	Accredited Inspection and Certifying Agencies	: 11
6	Number of Products exported	: 35
7	States involved in Organic Export	
	i) Kerala	: 1232 metric tones
	ii) West Bengal	: 937 metric tones
	iii) Karnataka	: 476 metric tones
	iv) Tamil Nadu	: 471 metric tones
	v) Punjab	: 541 metric tones
	vi) Himachal Pradesh	: 521 metric tones
	vii) Maharashtra	: 375 metric tones
8	All India Total Organic Export	: 6472 metric tones
9	Premium Collected against organic export	: Rs. 80-90 crore (tentative)

Source: APEDA.

It is estimated that the current global organic market is around US \$26 billion on an area of around 24 million hectares. The organic products are largely (95 per cent) consumed in developed countries. The major producer and importer of organic products are EU, USA and Japan. The total export scenario of organic products from

the India is presented in Table 7. During 2004-05, the total organic export was 6472 metric tones with approximate value of Rs. 90 crore, in which Kerala's share was higher in export. The total number of organic produce exporters from India is 69. The projected demand for organic produce will be around 21523 tones by 2006-07.

Table 8: Export of Organic Produce from India to EU (2003-04)

Sr. No.	Product	Quantity (tones)	Sr. No.	Product	Quantity (tones)
1	Tea	1997	7	Cashewnut	126
2	Pineapple	1320	8	Walnut	89
3	Spices	625	9	Fruits	45
4	Honey	526	10	Cotton	26
5	Rice	432	11	Pulses	12
6	Sesame seed	354	12	Sugarcane	8

Source: APEDA.

The export of organic produce from India to EU during 2003-04 is presented in Table 8. Among 12 products, tea had the highest share followed by pineapple in organic products export. Greatly increasing numbers of organic product consumers around the world results in a supply-demand gap those augers well for producers, processors and distributors of organic products. Global consumption growth rates over the next 3 to 5 years are fairly high (from 10 to 15 per cent to 25 to 30 per cent), particularly when compared with most other categories of foodstuff. The growth in sales of organic products, particularly in Oceania (Australia & New Zealand) and in Asia is projected to be the highest at approximately 25 per cent annually over the next few years.

Is organic farming practically feasible?

There are perplexing observations, such as the decline in yield during the process of conversion from conventional to organic practices. The question arises, can organic farming do justice to the food requirement of the next millennium? In a country like India, a longitudinal study needs to be conducted comparing organic approach with highly intensive chemical input oriented agriculture or a combination of both.

The National Academy of Agricultural Sciences (NAAS) has concluded in a policy paper on organic farming that while synthetic pesticides can be avoided, complete exclusion of fertilisers may not be advisable under all situations. The study should be conducted in different regions and agro-climatic conditions. If, it is successful then organic farming can be recommended. But before

that we need to see whether we have enough infrastructure viz. bio-pesticides, bio-fertilizers, farm yard manure, compost etc. But as land becomes more infertile day by day, soil becoming toxic has led to lower productivity. The soil being depleted of organic matter, mother earth is not ready to oblige with more productivity. In this situation one wonders what we going to leave for the future generation: A barren land which cannot feed its children? Therefore, though it is not feasible to come back fully to traditional agriculture, we to start on the organic way in a slow manner.

Conclusion and Policy Implications

Organic agriculture is a viable alternative to conventional agriculture because it enlivens the soil, strengthens the natural resource base and sustains biological production at levels commensurate to the carrying capacity of the managed agro eco-system. In addition to this, the export market can also be tapped by group initiatives in organic farming. In a country like India, food production has to grow steadily and sudden switch over to organic farming is not feasible. As the population increases, the food requirement increases, resulting in increased pressure on land. The stage will be set in due course for a smooth transition to organic farming without causing any decline in production. The efforts from extension, research, supply of inputs, and development of market channels for disposal of organic foods are needed to facilitate the successful adoption of organic farming by the farmers. The approach shall be farmer centered and the programmes developed shall create conditions for the conservation and efficient use of locally available resources as inputs in agriculture.

Organic farming has developed very rapidly in the recent years in various countries. However in India, the development has been rather slow due to various reasons. An important reason has been the higher emphasis given to food security than safety. Organic agriculture generates lower yields in most food crops compared to conventional agriculture. Therefore, large scale adoption of organic agriculture may leads to reduction in the food supply for some years.

Organic farming systems have attracted increasing attention all over the world due to a wide adverse effect of conventional agriculture practices on human diet, environmental and sustainability of agricultural production. India should take the initiative to become a major exporter of organic food products. In recent years, export potential seems to be lying in organic foods. Organically grown produce may be the only solution available for India to export food products to the developed countries in

the coming years as their food quality standards are increasingly becoming restrictive. Unless India plans to get into this trade in a big way, food exports may become increasingly difficult. India has the advantage in terms of a rich genetic pool, availability of the technology to produce and process organic food, large domestic markets and cheap labour, which would enhance cost competitiveness of the country.

Promoting organic agriculture is being debated in India. The major concern seems to be India's ability to meet the demand for food through organic agriculture. Many field crops seem to suffer a yield loss about 30 per cent in organic agriculture. Another important concern is the possibility of increase in food prices. Organic foods products will have to be sold at premium prices ranging from 10 to 30 per cent. Such premium prices will make organic foods products unaffordable to the poorer sections of society. Increase in the area under organic agriculture is expected to reduce supply of food owing to yield loss, which would drive their prices upwards. If more area is devoted for food production, availability of land to other crops would go down which may increase the prices of these commodities. Price increase may affects exports of these commodities. Furthermore, in the absence of a proper certification system, it may be difficult to ensure supply of genuine organic food products to consumer. Therefore, it has been argued that emphasis should be on integrated pest management rather than organic agriculture (Naik, 2001).

These concerns are very valid and therefore, complete transformation from conventional to organic agriculture is not advisable. Such transformation is also not feasible in the short run. However, it is important to recognize the problems with conventional agriculture and explore alternatives before it is too late. Therefore, the policy thrust should be on encouraging organic farming. Development of organic farming suffers from the problems of supply and demand uncertainty, appropriate processing technology, and market development. Encouraging organic agriculture would require appropriate government policies to address some of these problems especially in the initial stages. The policy suggestions are as follows.

1. As organic farming is attracting worldwide attention and there is potential for export of organic agricultural produce, this opportunity has to be tapped with adequate safeguards so that the interests of small and marginal farmer are not harmed.
2. There should be policy shift from chemical fertiliser to organic and bio-fertiliser. Current sub-

sidies provided for the chemical fertiliser should be used to promote the production and use of organic and bio-fertilisers.

3. Crop specific and farming situation specific package of practices for organic cultivation should be developed and after on-farm validation, recommended for adoption.
4. Agriculture Produce Market Committee Acts should be amended to accommodate organic products separately and to allow buyers to have contract with farmers and the Government should encourage development of standards for and certification of organic food products.
5. Since production, processing, and marketing of organic products have high business risks, schemes should be formulated to finance these activities.
6. Research on problems relating to organic farming should be encouraged. Agriculture education programmes should incorporate organic farming in their curricula. A strong research back-up has to be place to develop and improve national standards for organic farming (NAAS, 2005).
7. Global market on organic produce has to be exploited, for which strict phytosanitary measures have to be followed. India should build an image of a large and authentic producer of organic products.

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Annexure 1: List of Accredited Certifying and Inspection Agencies in India

Name of certifying and inspection agencies and address	
<p>BVQI (India) Pvt. Ltd. Marwah Centre, 6th Floor, Opp. Ansa Industrial Estate Krishanlal Marwah Marg, Off Saki-Vihar Road Andheri (East), Mumbai-400 072 (Maharashtra) Contact Person: Mr. R. K. Sharma Phone No.: 022-56956300, 56956311 Fax No. 022-56956302 / 10 Email: scsinfo@in.bureauveritas.com</p>	<p>International Resources for Fairer Trade Sona Udyog (Industrial Estate) Unit No. 7, Parsi Pandhayat Road Andheri (E), Mumbai – 400 072 (Maharashtra) Contact Person: Mr. Arun Raste Phone No.: Tel: 022-28352811, 28235246 ext. 22 Fax – 022-823-5245 Email: irft@vsnl.com</p>
<p>Ecocert SA (India Branch Office) Sector-3, S-6/3 & 4, Gut No. 102, Hindustan Awas Ltd., Walmi-Waluj Road, Nakshatrawadi, Aurangabad – 431 002 (Maharashtra) Contact Person: Dr. Alexander Daniel Phone No.: 0240-2377120, 2376949, Fax No.: 0240-2376866 Email: ecocert@sancharnet.in</p>	<p>Lacon Quality Certification Pvt. Ltd. Chenathra, Theepany, Thiruvalla - 689 101.(Kerala) Contact Person: Mr. Bobby Issac Telefax: 0469 2606447 Email: laconindia@sancharnet.in</p>
<p>IMO Control Private Limited No. 1314, Double Road Indiranagar 2nd Stage, Bangalore-560 038.(Karnataka) Contact Person: Mr. Umesh Chandrasekhar Phone No.: 080-25285883, 2520 1546, Fax: 080-25272185 Email: imoind@vsnl.com</p>	<p>Natural Organic Certification Association Chhatrapati House, Ground Floor, Near P. N. Gadgil Showroom, Pune-411 038 (Maharashtra) Contact Person: Mr. Sanjay Deshmukh Phone No.: 020-25457869, 56218063, Fax: 020-2539-0096 Email: contact@nocaindia.com</p>
<p>Indian Organic Certification Agency (INDOCERT)Thottumugham P.O. Aluva-683 105, Cochin, (Kerala) Contact Person: Mr. Mathew Sebastian Telefax:0484-2630908-09/2620943 Email: Mathew.Sebastian@indocert.org</p>	<p>OneCert Asia Agri Certification Private Limited Agrasen Farm, Vatika Road, Off Tonk, Jaipur-303 905,(Rajasthan) Contact Person: Mr. Sandeep Bhargava Phone No. : - 0141-2720202 to 0141-2770342, Telefax No: - 0141-2720202 Email: info@onecertasia.in</p>
<p>Uttaranchal State Organic Certification Agency (USOCA) 12/II Vasant Vihar, Dehradun-248 006 (Uttaranchal) Contact Person: Dr. S. K. Malik Phone No.: 0135-2760861 Fax: 0135-2760734 Email: uss_opca@rediffmail.com</p>	<p>SGS India Pvt. Ltd. - 250 Udyog Vihar, Phase – IV, Gurgaon – 122 015 (Haryana) Contact Person: Mr. Sudarshan Sharma Phone No.: 95124-2399990 to 98 Fax No.: 95124-2399764 Email: sudarshan_sharma@sgs.com</p>
<p>Skal International (India) A Division of CU Inspections India Pvt. Ltd. No. 191, 1st Main Road Mahalaxmi Layout, Bangalore – 560 086 (Karnataka) Contact Person: Mr. Narayana Upadhyaya Phone No.: 080-23491928, 56966507 Fax no.: 080-23491935 Email: skalindia@eth.net</p>	

Source: www.apeda.com

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