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The Potential impact of Green Technology (GT) Initiatives for sustainable development in Indian Micro, Small and Medium Size Enterprises (MSMEs)-A conceptual review

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Abstract: The green economy is the way of the future, and our MSMEs are the innovators that will bring forward the innovative products and technologies that drive green growth. The Green agenda includes challenges in strengthening MSMEs managerial capability, creation of awareness on economic values of technologies and benchmarking quality up to global standards. Green technology has become a necessity in modern society that in the absence of adequate knowledge will weigh at the expense of any economic objective of any scale to achieve. Green economy has been seen as a great opportunity to boost the global economy and India sees the necessity not to delay to involve its society and already has set targets for 2020 and beyond in the transformation of the natural resource reserves at disposal. India has brought several policies and programs including Electricity Act, Renewable Energy Act and national commission and on higher education and research (NCHER) are tried to encourage government of India to focus on green economy by spreading the awareness through new legislation in environmental issues. With this in mind the paper intends to review how possible can an adjustment of MSMEs to green economy occur. MSMEs are the engine of the global economy and the Indian economic development aim is a shift to high-value, knowledge-intensive products. The objective of the paper is a conceptual framework and it is based on secondary data collected from government reports, books, internet, archives and current journals, and online publications.

Keywords: Green Technology, MSMEs, intellectual property, youth entrepreneurship, Green economy.

I. INTRODUCTION

Green technologies (GT) are the technologies that have arisen during the last two decades in an effort to minimize the damage to the environment. Social equitability, economic feasibility and sustainability are the key parameters for green technologies. It is estimated that there are around 36 million micro, small, and medium scale enterprises (MSMEs) in India. It is a known fact that majority of MSMEs use obsolete technologies because of their inability or having inadequate finance to go for new technologies. As per the statistics, MSMEs are the major source of environmental pollution (70%). This is a very alarming figure and, hence, necessitates that MSMEs should be made aware of this fact. The green economy is the way of the future, and our MSMEs are the innovators that will bring forward the innovative products and technologies that drive green growth.

Policy interventions for supporting Indian green MSMEs, are urgently required to overcome major barriers, including knowledge-sharing, raising environmental awareness, enhancing financial support, supporting skill development and skill formation, improving market access and implementing green taxation. In recent decades, entrepreneurship in developing world has been increasing at a rapid pace which should be channeled towards addressing water, energy, environment and waste management challenges, thereby converting environmental constraints into business opportunities.

This has led to the present paper, which would highlight the green technology consistent policy strategies for the Indian MSMEs and the challenges faced by the MSMEs investment in eco-innovation and sustainable practices, in both manufacturing and services.

II. BACKGROUND

a. The Indian Perceptive of MSMEs

The MSMEs sector consisting of 36 million units, as of today, provides employment to over 80 million persons. The Sector through more than 6,000 products contributes about 8% to GDP besides 45% to the total manufacturing output and 40% to the exports from the country [1]. The MSME sector has the potential to spread industrial growth across the country and can be a major partner in the process of inclusive growth. MSMEs are complementary to large industries as ancillary units and this sector contributes enormously to the socio-economic development of the country (fig 1) [2].

Year	Gross Value of Output of MSME Manufacturing Sector (₹ in crore)	Share of MSME sector in total GDP (%)			Share of MSME Manufacturing output in total Manufacturing Output (%)
		Manufacturing Sector MSME	Services Sector MSME	Total	
2006-07	1198818	7.73	27.40	35.13	42.02
2007-08	1322777	7.81	27.60	35.41	41.98
2008-09	1375589	7.52	28.60	36.12	40.79
2009-10	1488352	7.45	28.60	36.05	39.63
2010-11	1653622	7.39	29.30	36.69	38.50
2011-12	1788584	7.27	30.70	37.97	37.47
2012-13	1809976	7.04	30.50	37.54	37.33

Fig. 1: Table showing contribution of MSME sector in GDP and output (at 2004-05 prices)

From fig 2, MSME has shown constant growth rate around 11% every year till 2010-11. The highest growth in recent time was recorded during 2011-12 (18.45%) whereas during year 2012-13 and 2013-14 growth rate was around 14% and 12%, respectively. But it jumped to 17% in 2014-15. However, recent data for 2015 i.e., from April-September, 2015 shown impressive growth of 18.74% (year-on-year growth) [1].

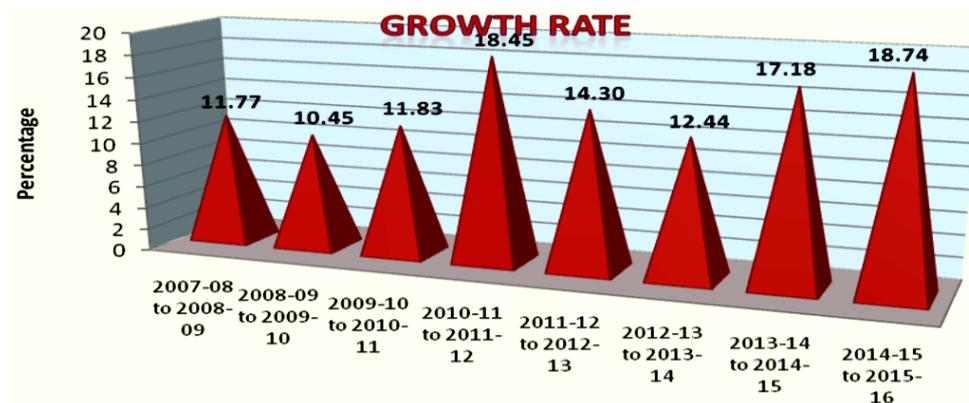


Fig. 2: Chart showing annual growth rate on preceding years

As MSMEs are growing sectors and possessing lots of opportunities and introduced as the backbone of economy, still faced challenges related to environmental issues. Green economy is path for potential market and he suggest in study that green agenda should include challenges in strengthening MSMEs managerial capabilities, creation of awareness on economic values and quality standard at global level and small firm must respond to the environmental challenges [3,4]. They can't ignore survive after ignoring these challenges. MSMEs should think about the green practices that have reduced wastage and improve business results. In addition to this study R.A. Sudath Weerashri (2012) found in his study that an attitude has to be considered

for marinating the positive attitude toward environmental issues. As far as awareness and practices are concerned he found an extensive gap between MSMEs and large industries [5].

India is one of the neediest countries for renewable energy resources. India's goal is to add 10,000 MW in the power generation capacity through sources of renewable energy. With the purpose of expanding renewable energy, India has brought several policies and programmes including "New and Renewable Energy Plan" under the proposed 11th Plan, Electricity Act, Renewable Energy Act etc. The Renewable Energy Act has been formulated to meet 20% of the country's total energy requirement by 2020 [6]. In spite of business advantages of proactive environmental strategies, MSMEs generally adopt reactive strategies which focus on compliance rather than sustainability [7]. Recent studies show that the firm size is one of the major determinants of a firm's green strategy – environmental actions undertaken are inversely proportional to the company size [8]. In the 2011 survey on Sustainability and Innovation, the MIT Sloan Business School too had similar findings (MIT Sloan Sustainability Dashboard).

MSMEs follow business instincts to reduce resource use and waste. But when faced with the prospect of no short term gains, MSMEs may find these investments as a non-priority expense [9]. The cumulative contribution of MSMEs to pollution and environmental concerns is not documented, yet is suggested to be equal, if not more, by some researchers [7]. Thus, the potential contribution of MSMEs to cleaner environment may not be realized yet. In India, present policy and legal frameworks do not encourage and support MSMEs in this direction. With lack of enforcement mechanism, the local regulatory bodies may be missing much of the environmental impacts by MSMEs.

b. The International Perceptive of MSMEs

Growing concerns about the environmental sustainability of past economic growth patterns and increased awareness of a potential future climate crisis have made it clear that the environment and the economy can no longer be considered in isolation. Without a global shift to a low-carbon, resource-efficient economy, the world is on track for increasing greenhouse gas (GHG) emissions by 70% by 2050, and temperature increases of 4-6 °C by the end of the century [fig. 3]. To feed the expected world population in 2050, food production will need to be increased by 70% (FAO, 2009) putting additional pressure on already over-used natural resources. A further 1 billion people are expected to live in severe water-stressed areas by 2030, raising a challenge in terms of the policies and financing needed to ensure access to clean water [10].

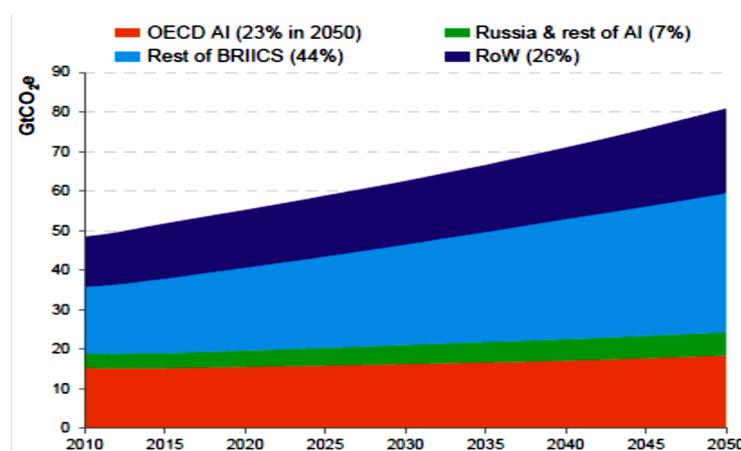


Fig.3: Chart showing GHG emission by region, 2010-2050
"OECD AI" stands for the group of OECD countries that are also part of Annex 1 of the Kyoto Protocol,
GtCO₂e = Gigs tonnes of CO₂ equivalent.

India has initiated several projects on the lines of green technology to save the environment. On February 22, 2011, the United Nations Environment Programme (UNEP) announced that India, one of the fastest growing economies in the world, is fast moving towards a green economy. Italy funded the project, titled 'a consolidated project for MSMEs development in India' with the ministry of MSMEs, government of India as the Indian counterpart agency, and the UNIDO (United Nations Industrial Development Organization) as the implementation agency, aims at supporting the development of Indian MSMEs to enable

them to become globally competitive. Furthermore, new low impact cars, are being produced by independent manufacturers in India, the USA and UK, using modern technology and end-user platforms. As part of the OECD collaboration with the Donors' Committee for Enterprise Development (Green Growth Working Group) and the Planning Commission of India, a study on Skills Development by Green and Inclusive MSMEs in India: Entrepreneurs' Approaches was conducted. It provides insights into small companies' green transition today. A policy environment that favours exploration and market building in emerging technology fields and supports the start-up and expansion of new firms is important for unleashing the potential for new "green" entrepreneurship [10].

The Asia-Pacific Partnership on Clean Development and Climate (APP) is a public-private partnership of seven countries – Australia, Canada, China, India, Japan, South Korea and the United States. Essentially, it brings together the private sector, governments and research institutions to address climate change and air pollution challenges. In doing this, the partnership is focusing on expanding investment, trade and diffusion of cleaner energy technologies and services in the following areas: renewable energy and distributed generation, buildings and appliances, power generation and transmission, steel, cement, cleaner fossil energy, coal mining, and aluminium [11].

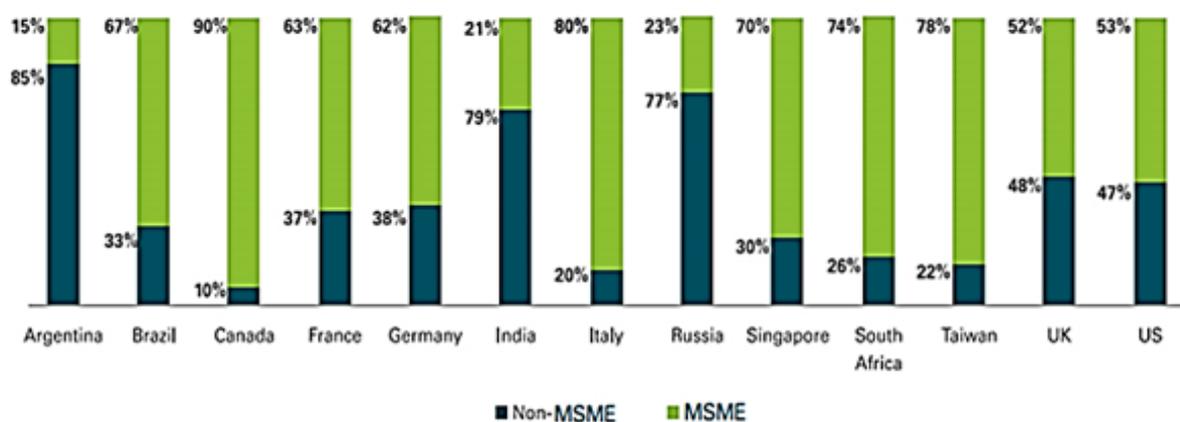


Fig. 4: Employment generated by MSME as a percentage of overall employment globally
Non-MSMEs Sector Includes – Un-organized / Un-registered enterprises including (PSEs, Large industrial houses, MNCs)

The fig 4 data indicates, in most of the developed countries, the MSME is main source of employment generation, India with 356 million youth (10- 24 years) population (source: UN report), the only sector that has potential to absorb such a large youth population is MSME [12]. A policy environment that favors exploration and market building in emerging technology fields and supports the start-up and expansion of new firms is important for unleashing the potential for new "green" entrepreneurship.

However, for MSMEs and entrepreneurs to fully participate in the transition towards sustainable economic patterns and seize the opportunities arising, it is essential that the main barriers to green growth and eco-innovation are identified.

III. CHALLENGES LIKELY TO BE FACED BY MSMEs TO GOING GREEN

There are few problems that contribute to environmental deprivation. In Indian context, the problem of higher and advanced technology that reduces the emission of energy, expertise training and capital create barrier to the market and global value chain. Lack of innovative ideas and initiative tailored for MSMEs and poor understanding of business case for environmental and energy issues leads to inefficiency in productivity and negative environmental impact. There is need to deal with the issues related to enhancing the technology, management of the resources and marketing. The poor price competition in small medium scale industries increases the uncertainty of sustainable growth of MSMEs.

The command and control approach for MSMEs are not fully competent because of limited budget allocation and human capital. Most of the industries are really caring about to fulfill the terms and condition of environmental and standardization law for production process. They all come under the criteria made by the international standard organization (ISO) certification and

environmental management system. Some of them are indulge in export activity for exploring their ecofriendly products but few are still untouched with these competitive advantage they are isolated from the international strategies and competition. Few competitive firms accepting the voluntary approach as ISO 14000 that focuses on clean technology and green labelling that encourage the management and recycling of environmental resources. But these acceptances are exposed by the large firm compared to the MSMEs because of threat of maintaining profit and consumer demand.

Another challenge is internal capacity of MSMEs. All firms are not equally treated in India. In spite of having upward direction they are lacking of financial fund. Corporate industries are getting loan at 11% but instead of large contribution in Indian economy they are provided loan at 14% per annum. All MSMEs are suffering from taxation system and billing of late payments. They are not capable to adapt new strategies related to financial resources. MSMEs need higher financial support to possess the ISO 1400 model: technology for pollution diminution because of its higher cost. This sector also fails to attract regional and national financial institution to give loan. These financial institutions feel problem of demand and supply of the loan. They also consider high cost and risk to maintain MSMEs account. This problem arises from inadequate knowledge to maintain accounting record and financial statement. To resolve this financial resource management problem it required a proper flow of information channel from government policy maker to financial institution to MSMEs.

MSMEs have also other barrier i.e. skilled human resources. Human capital is not only about the working employees inside the firms but also about the people who can support outside the firm. MSMEs are facing these types of human capital shortage. Any owner of MSMEs just thinks about money making but he/she doesn't focus how this money has to be created. They always forget a skilled and expert human resource can cash their efficiency and talent for a firm in competitive era. A well-defined strategy can be only formulated by expertise that can be helpful for money creation. Distribution challenges create a hurdle for MSMEs growth. In India most of the MSMEs are out of main cities. They all are developed in outer area because of cheap land and labor. Hence they are facing connectivity problems, lack of transportation and distribution networking disappointment its competitive strategies. They also use outdated technology in that area. That also cause of higher pollution in environment. They have to face the problem for selling those products in different area.

IV. FINANCING

Financing is necessary at every stage of a business life cycle. It is required to help MSMEs set up and expand their operations, and to develop new products. India has a well-developed financial system, comprising banks, financial institutions, non-banking financial companies and also venture capital companies. All these institutions through various schemes cater to the diverse financial needs of the industry. Green Finance is a market-based investing or lending program that factors environmental impact into risk assessment, or utilizes environmental incentives to drive business decisions. In India, SIDBI has taken several initiatives to promote lending for green and energy efficient technologies in MSME sector. SIDBI has been operating focused lending schemes for promoting investment in clean production and energy efficient technologies or production process under bilateral Lines of credit from Germany and Japan. These focused schemes have two pronged approach, i.e. concessional lending to encourage investment in green or energy efficient technologies and launching of cluster specific information dissemination.

There are three broad approaches to addressing the financing difficulties of MSMEs in addition to various efforts to improve overall business climate for MSMEs. First, as a way of reducing information gap between banks and small private firms, appropriate bookkeeping and accounting practices can be encouraged and loan application and evaluation processes can be simplified in light of the realities of these firms. Second, new financial institutions or facilities may be established to better meet the financing needs of MSMEs and to support start-up firms. They may include specialized banks, non-bank financial institutions (NBFIs), and various funds for investment or lending to MSMEs. Especially, community-based NBFIs are supposed to have a comparative advantage in monitoring small business firms in their community. Sometimes, microfinance initiatives go beyond helping the poor households to support small businesses. Finally, the government can help SME financing by putting in

place financial infrastructure geared to better generation and dissemination of information about the creditworthiness of MSMEs. They include institutions for credit guarantees and credit rating and credit bureaus [13].

V. APPROPRIATE REGULATION AND INCENTIVES

As per the national commission and on higher education and research (NCHER) tried to encourage government of India to attain skill oriented human capital by providing higher education and training system at local and regional level. They focus on green economy by spreading the awareness through new legislation in environmental issues. These legislation involved Mines and mineral development and regulation bill (2011) and the Land acquisition, rehabilitation and resettlement bill (2011) that helps to exploring the information related to environmental awareness. Along with these legislations there are some fiscal reforms to improve environmental impact from MSMEs. That can be used for preservation and pollution controlling. Like OECD countries are using pollution abatement instruments under environmental policy management that facilitate more ecofriendly and efficient enterprises these application are going to be applicable in developing countries [14].

According to the climate disclosure projects “if the current business continues then by 2100 India’s GDP will tend to be – 9% to 13 %. This will be caused by the impact of climate changes”. According to Saha Zukang “by definition the sustainable development is about integration among the three pillars i.e. social, economic and environmental and ensuring their consistency, but in practice this is not easy because our challenges and problems are not specialized” [6].

For MSMEs environmental performance, ISO_14001- 2004 sets out some guideline called environmental management system (EMS) and these guidelines are certified too. It provides a framework for any industries that covers all laws and legislation of environmental issues and fixed an effective environmental management system. EMS has proved very successful for achieving sustainable growth of MSMEs. This international standard supports to reduce the environmental impact of MSMEs and enhance the growth of industries. The benefits of using this international standard are reduction in cost of management and saving the consumption of energy and materials. It provides a guideline to reduce the distribution cost and improve the corporate image among the regulators, customers and the public. It channelizes the process of measuring the impacts to acceptable levels or to investigate new technology. EMS promotes green technology for sustaining the MSMEs growth in competitive market. Green technology is also encouraging to MSMEs in regional and local area to be ecofriendly. They also work together for reducing the carbon emission and pollution in environment.

Another step is taken by SIDBI (small industries development bank of India) for providing assistant to MSMEs regarding to accept clean technologies for controlling pollution. It is linked by capital subsidies scheme (CLSS). This is the provision for financial support up to \$ 225000. That comprised 15% of subsidy from SIDBI and NABARD [15]. According to national action plan for climate change fiscal instruments should be advanced to encourage energy efficiency i.e. recorded under “performance achieve trade (PAT) which is a scheme for trade announced by The National Mission for Enhanced Energy Mission. Its main objective is to reduce energy consumption in industries across India by using “market oriented mechanism”.

Further the NMCP is the nodal programme of the Government to develop global competitiveness among Indian MSMEs. The NMCP initiated in 2007-08, targets at enhancing the entire value chain of the MSME sector through specifically Lean Manufacturing Competitiveness Scheme for MSMEs, Technology and Quality Up gradation Support to MSMEs, Support for Entrepreneurial and Managerial Development of MSMEs through Incubators [16].

VI. CONCLUSION

The creation of knowledge is essential in order to understand new technologies baseline of green economy. This requires the development of high level human resources and the creation of a manufacturing base in the medium and long term. Based on the plenty of India natural resources the promotion of equity and inclusion in the economic benefits of these resources through green economy implementation will act as enabler of sharing the worth to all the citizens of the country. MSMEs that are within the energy sector in distributing technologies such as solar systems in the household country wide can be seen as just

one of the start-ups green technology business which is observed to be successful. Mainstreaming the youth into technology that can open into green MSMEs can be one of the best solutions for confronting the setback faced by youth unemployment. Tapping into models or approaches used by experienced communities such as EU, Japan, china and the US will be of valuable contribution. India has the potential to lead the South Asia region in green development because it is the stable and strongest node of hub in the region.

VII. RECOMMENDATION

Training programmes for youth development should be targeted for green economy

- MSMEs should be encouraged to go green beyond non environmental implications of outputs and act as stimulus of growth sustainability.
- MSMEs should venture into energy efficiency housing.
- MSMEs should collaborate in joint venturing with manufacturing industry to lobby for skill development and products.
- Policy makers should steer the wheel with suitable policies for inclusive programmes on skill sharing.

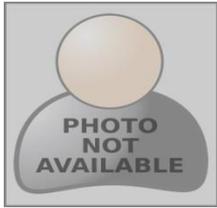
VIII. MANAGERIAL IMPLICATIONS

- If well implemented India will be the transformer of its own resources and will locally host its own manufactures;
- MSMEs will benefit from the support of growth of India green economy;
- Youth unemployment will be reduced;
- Municipalities will benefit from better livelihood value even as far as the rural communities;
- India will reduce its heavy carbon footprint emissions.

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