Managerial Insights into the GSCM Practices in the Indian SME Manufacturing Firms

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Abstract This research work involved an extensive study on various green supply chain management (GSCM) practices in the Indian SME manufacturing firms. The research also investigated the impact of GSCM practices on business performance and defined in terms of environmental performance, operational performance, and financial performance. Scope of this study was restricted to the broad domain of Indian manufacturing firms, especially the SMEs in India's western region. Researchers studied the correlation between GSCM practices and environmental, economic, operational, and overall business performance of Indian manufacturing SMEs and also compared them across the three sectors of SMEs (chemicals, textiles, and rubber/plastics). This research work provides useful insights into the GSCM practices in the Indian SME manufacturing firms, which has not been covered and reported by any of the previous studies. Managerial insights resulting from this research could be potentially used to identify key performance parameters of GSCM practices, particularly in sectors, like textile, chemical, and rubber/plastics covered in the study.

Keywords Green supply chain management practices · Business performance · Chemical · Textile · Rubber/Plastic · Managerial insights

1 Introduction

Climate change and global warming are two of the burning issues of the twenty-first century. Supply chain and energy security are also considered two major game changers for the world economy as well as human welfare. Moreover, from the supply chain management point of view, sustainability is important as consumers demand

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eco-friendly products, thus increasing market competition. Production as well as consumption, which ultimately have to take care of the environment is necessary for improving the health and working conditions, reducing poverty and rebuilding environmental quality to bring about economic growth. Therefore, evaluating the impact of green supply chain practices on the triple bottom line has been progressively becoming significant for firms [1]. This drives the firms to not only evaluate their traditional financial bottom line but also appraise their social and environmental performance. This is also imperative for the planet's unpretentious care in future. With it, the environmental and organizational performance bring numerous prospects, driving to higher profitability and better competitive advantage [2]. The fact that firms who understand and value their impacts on ecosystem, dependency, and holdings will have a foremost advantage over their competitors was highlighted by the World Business Council for Sustainable Development [3].

Inorder to meet these goals, a significant change is required in our production and consumption approach. Therefore, to have a sustainable pace of consumption, our products and processes must change, keeping in mind the competitive pressures and challenges that our manufacturing firms face today. These environmental concerns have created new customer requirements, which are beyond conventional functionality, quality, and cost and related to product manufacturing, product life, and product disposal at the end of its life [4]. This gives rise to a new challenge of building greener products and environmental strategies to direct a firm's growth toward a sustainable future. Thus, GSCM practices promise to a long-term future of the planet. Hence, firms that understand and act on this will have a major advantage over its competitors as well as on greater profitability [3].

Asian Emerging Economies (AEE) have seen a rise in manufacturing bases and production facilities coming from developed nations [5, 6]. The principal reason behind this is the availability of cheap labor and low cost of material [7]. The awareness about the effect of production processes on the environment has put tremendous pressure on manufacturers of both developing as well as developed countries. The emerging economies index 2014, reports that 10% of world market capitalization is represented by the emerging markets. Hence, there is a significant need to green their supply chain in all aspects in the emerging markets, like China, Taiwan, India, Malaysia, Indonesia, Thailand, and South Korea [5, 8]. Moreover, as India is attempting to become a global manufacturing hub through its initiatives, such as 'Make in India', 'Startup India', and 'Skill India' programs, the manufacturing sector is compelled to address the GSCM challenges in an enthusiastic way for the long-term sustainability of the environment [9].

Today, India is one of the emerging markets among the BRICS nations, but it lags behind in the healthy environment. (South Africa is ranked at 72nd, followed by Russia 73rd, Brazil with 77th place, and China at 118th). India is not only announced its National Action Plan on Climate Change (NAPCC) in June 2010 but has also signed the association of Kyoto protocol and carbon credit system to make an effort on the path of green. Also under the Paris Agreement by 2030, India has to reduce its carbon footprint by 33–35% from its 2005 levels. Thus, India's environmental challenge is formidable, if the country has to be in the league of fastest growing

economy, as compared to other emerging economies. This would encourage the industries to start their journey toward a greener future, by implementing GSCM practices, in order to maintain their competiveness, especially taking into account the regulations being put. However, it is observed that the implementation of this concept is restrained mainly due to economic reasons. Hence, this necessitates the need to show the proof of economic benefits and the direction, which would help in the broader application of the concept. India, therefore, presents a model research context to explore the impact of green supply chain management practices on a firm's performance.

GSCM practices especially in the AEE in manufacturing have received tremendous attention from industry, academia, regulatory bodies, and customers [7]. This clearly points to the academia, highlighting the need to identify and establish, if the GSCM practices bring in higher business performance [10]. Reported results have been non-conclusive for the empirical studies on impact of GSCM practices on firm's performance. Researchers such as Zhu and Sarkis [11] in their studies in Chinese manufacturing industries found that the GSCM practices did not contribute to increased economic performance. This may be due to the reason that GSCM practices were in its infancy stage in China. In the initial stages of GSCM practice adoption, a higher investment is required, which may increase a firm's operational costs and thus undesirably impacting the economic benefits. More recent studies in contrast have found GSCM practices and firm's performance to be positively related. Authors intend to explore and deliver generalizations observed between the GSCM practices and the business performance relationship.

2 Literature Review

The following conclusions have been reached after reviewing research studies that use GSCM and have a particular interest in manufacturing in India. Mudgal et al. [12] investigated and ranked barriers against GSCM adoption. Luthra et al. [13] analyzed important barriers to GSCM adoption from an Indian perspective and identified contextual relationships among 11 barriers. Toke et al. [14] ranked interactions and evaluated critical success factors for GSCM adoption in the Indian manufacturing sector. Mathiyazhagan et al. [15] analyzed the relationship between 26 barriers and identified the most influential in GSCM adoption in the automobile industry from an Indian perspective. Diabat and Govindan [16] analyzed drivers for GSCM implementation in the Indian perspective through a case study, involving a manufacturing firm in south India. Surjit Bag et al. [17] designed a GSCM strategy for Indian manufacturing firms. They stressed how GSCM can help organizations get a competitive edge by enhancing their environmental performance. Paramanik et al. [18] have created a conceptual framework with multiple performance indicators for GSCM deployment performance measurement of a company. Additionally, researchers have not conducted the analysis from many industrial perspectives within the setting of India.

It is obvious that very little research has been done on the examination of GSCM implementation and its impact on business performance in the Indian context.

Several parameters for examining the influence of GSCM techniques on business performance were selected in this study based on the published studies and existing literature as well as input from experts in the industry and academia. They are as follows. Environmental performance parameters represent reduction in the following, such as air emissions, waste water, solid waste, energy consumption, consumption of hazardous/harmful/toxic materials, total flow quantity of scrap, frequency of environmental accidents, and improvement in a company's environmental image [19–27]. The cost per operating hour, manufacturing costs, operating expenses, cost of purchasing environmentally friendly materials, cost of scrap/rework, disposal costs, recycling costs, transportation costs, cost of avoiding environmental actions, increased revenue from green products, fines and penalties, and cash rewards/subsidies for using renewable/alternative energy sources are among the economic performance parameters cited by these researchers. Additionally, they listed operational performance indicators such as an increase in the quantity of goods delivered on time, a decrease in customer complaints, better after sales service efficiency, a better ability to respond to urgent deliveries, a decrease in inventory, an improvement in product quality, a decrease in customer reject rates, a decrease in in- plant defect fallout rates, a reduction in cycle times and delivery lead times, an expansion of the product line, and an improvement in capacity utilization.

The impact that the government initiatives/regulations can have on greening the sup- ply chain is also included in the study. These parameters are reward for buying renewable energy, relief on capital gains and tax, providing information on what to measure and how to measure, low interest loans for buying waste disposal/treatment equipments, awards for greening the process, heavy fine/penalty for wrong disposal of waste, heavy fine for using excess energy, popularize knowledge of environmental management, and building infrastructure for facilitating green supply chain initiatives.

3 Methodology and Results

A structured survey was created to examine the adoption of green supply chain practices and assess their effects on business performance, as measured by environmental performance, economic performance, and operational performance, in small and medium scale manufacturing industries (SME) in the western region of India. A pilot study was initially carried out, based on responses received from 25 firms to check for the reliability and validity of the instrument. Satisfactory values of the Cronbach Alpha (0.860) and KMO (0.811) were obtained as part of the pilot study. The questionnaire was subsequently deployed as part of an extensive survey, covering more than 300 firms, out of which data from 256 manufacturing firms were included in the final analyzes. These forms were grouped separately as Group I and Group II. Data was analyzed using both descriptive and inferential statistics (Z test, correlation,

factor analysis, regression analysis, and ANOVA), and they were carried out using SPSS.

4 Results and Discussion

The results of the study show that there is a good awareness and willingness for implementation of green supply chain management (GSCM) practices in SME manufacturing firms. Moreover, it is found that there exists a strong relationship between GSCM practices and environmental performance as well as the operational performance. In the case of Group I firms (GI), having either ISO9000 or ISO14000 or environmental management system (EMS), the environmental, economic, operational, and total business performance was significantly higher than that in case of the Group II firms (GII), which did not have any certification or EMS. The firm's environmental reputation, fewer environmental accidents, lower energy use, cash rewards, or subsidies for using renewable energy, cost avoidance from environmental actions, higher revenues from green products, more goods delivered on time, lower rates of customer complaints, and better after sales efficiency were identified as factors significantly contributing to their higher performance.

The results also show that there exists a significant difference in the environmental and economic performances of the chemical, textile, and rubber/plastic firms, whereas there is not much of a difference in their operational and total business performances. Across the three sectors, GI firms have higher environmental and operational performance, whereas there is no significant difference seen in their economic performance. It can also be concluded that, though some measures are taken to green the supply chain, it is still in its early stage of implementation in the SME sector. Economic reasons predominantly govern a firm's decision to mitigate their impact on the environment. However, from a sustainable and long-term perspective, educating the SMEs is so crucial and is very much needed to ensure that by implementing the green practices, benefits achieved are waste reduction, higher operational efficiency, continuous improvement, and higher profits. In the contemporary manufacturing scenario, especially in the SME sector, this is really the need of the hour in a country, like India.

5 Managerial Implications

SMEs dominate the economic landscape of India. They contribute substantially to employment, exports, and the GDP of the country. Their individual contributions are responsible for building flexibility and robustness into the economy. SMEs are driven by the successful recovery of expenditures and the prospects of generating profits. In India, it is found that SMEs do not collaborate with academics and hence are not aware of the latest developments and thus become less enthusiastic to incorporate

them and struggle to adopt and make use of them to their advantage. Indian business is currently witnessing a rise of entrepreneurs, who are willing to take risks and drive innovations in the markets. India is at the cusp of a start-up boom and is among the world's fastest growing start-up economies. It is this entrepreneurial spirit of the SME sector, which plays a major role in driving the economic growth of India.

From the results of the study, it can be stated that the SMEs want government authorities to put a significant thrust on legislation and regulation to enhance the green practices. Indian SMEs today are faced with problems like, low value addition, lack of access to timely and affordable credit, low level of technology adoption, lack of innovation, poor branding and packaging, lack of awareness on IPR issues and International Trade Agreements, lack of quality database on exports, and high transaction costs. To address these problems, a number of schemes are announced by the Development Commissioner of Medium and Small Manufacturing Enterprises (MSME). One such flagship program is the National Manufacturing Competitiveness Program (NMCP), in which SMEs could enroll and benefit themselves. Also, firms have to realize that by tailing the low cost policy, it not only hampers their ability to invest in green practices and its associated benefits, but in due course of time, it would make them vulnerable to legislations and regulations.

The findings of this study are also coherent with some of the observations of Mohanty and Prakash [28] that the SMEs only adopt green practices, when they face strict regulatory measures. In this context, government should strictly enforce regulations for SMEs as well as encourage firms to go in for ISO certification, create techno-parks to disseminate sustainability knowledge, develop research centers catering to green practices as well as enhance the awareness of various sustainability schemes announced time and again. Government could assist SMEs in their green journey, by playing the role of information providers and awareness raisers, who signals market opportunities as well as give directions for green industrial revolution and consumer behavior related to manufacturing of green products. Strict regulatory measures help improve product quality as well as manufacturing processes and at the same time, negate the adverse effect of industrialization on health, environment, and safety. Thus, government should adopt a 'carrot and stick' approach to enhance the adoption of GSCM practices in the SMEs. Government can formulate a policy for remanufacturing in formal business activity, create awareness about the myth of quality of remanufactured products, and develop markets for the same. Cooperation between the manufacturer and remanufacturer, if created could also mitigate the impact on environment.

The results of this study suggest that the manufacturing firms covered have understood the significance of implementing GSCM practices and that they positively reduce the environmental impact and increase the business performance. Inspite of their awareness in the GSCM practice-performance relationship, the SMEs are still in the nascent stage of implementation of GSCM practices. It has been found that the SMEs lack human and financial resources with expertise on the adoption of GSCM practices. To improve this, SMEs may employ resourceful engineers to meet the environmental and social standards. To achieve the competitive advantage in

business management through eco-innovation, firms could also think of industrial symbiosis, which is an innovative method to promote the green economy [29].

Information Technology Systems are a good avenue to drive the environmental footprints and sustainable practices [30]. The system applications like digital media, e-commerce, smart buildings, and intelligent transport systems could help in reducing carbon emission and also help to optimize the overall energy consumption. SMEs could also adopt IT functions, which would lead to better customer and employee experience, lower cost of operations, improved profitability, increased collaboration and interaction, and enhanced environmental, economic, and operational efficiency.

Firms could also benefit from the low cost of solar energy or biodegradable energy sources, compared to traditional sources of power by adopting the rooftop solar solutions that can reduce their price of power by 10–50%, depending on their scale and location. In the near future, off grid, standalone energy generation, storage, and consumption will become imperative for SMEs. Carbon will certainly become a parallel currency to money in coming future. Firms will then be required to work within that carbon cap or else pay for that excess carbon. Also, simply monitoring the carbon foot print offers a good amount of control on the reduction in manufacturing cost and the overall energy consumption as well as it enhances a firm's green image.

During the study, it was found that quite a few firms feel that EMS, ISO9000, and ISO14000 are mere documents. There is a need for them to understand that these standards focus on the processes in the supply chain, and they help the management to identify the controlled and uncontrolled environmental concerns. They also help in developing targets and plans to achieve significant as well as incremental environmental improvements and thus help in building the green image. SMEs can develop an effective customer relationship, which can help them in environmental cost reduction, improve responsiveness to customer's environmental worries, increase customer satisfaction, and reduce business wastage [31]. Several activities recommended to boost the employee morale and customer satisfaction are increasing the environmental awareness through training and education, integrating environmental function into strategic decision-making process and investing into the pollution preventive solutions.

Hence, it can be concluded that, once the GSCM practices have a strategic focus, and systems are identified to monitor efforts to become green, firms can begin to implement the GSCM practices with some certainty, expecting that these practices will improve the branding and business performance. Thus, the SMEs should adopt innovative approaches with a global view point and build strong technological base, have an aggressive competitive spirit and at the same, be willing to restructure when necessary. Also, firms that are in the evolutionary stage could simply base their performance measurement on government's environmental regulations, while those ahead in the development could include information related to the greenness of a product or process and green supplier evaluation metrics.

Slowly, 'green' is changing from being viewed as a 'necessary evil' to a 'positive business practice'. Businesses that implement green initiatives stand to benefit from brand development, political traction, and regulatory compliance. It will also help

the firms gain greater ability to attract and retain talent as well as enhance customer retention and potential cost savings.

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