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PRACTICES AND DRIVERS FOR GREEN SUPPLY CHAIN MANAGEMENT IMPLEMENTATION AMONG SMALL SCALE INDUSTRIES

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Abstract
This research paper investigates the awareness and implementation of Green Supply Chain Management (GSCM) practices among Small Scale Industries (SSI) in Jalgaon District, India. A comprehensive survey was conducted, gathering responses from 105 Managers/Engineers, 108 Shop floor I/Cs, and 100 suppliers. The study delves into the GSCM practices and drivers, focusing on environmental awareness, sustainability, and economic performance. The paper presents findings from 27 questions directed at these participant groups of 313 personnel including Engineers/Managers, Shop Floor In-Charges, and Suppliers from 100 SSIs of Jalgaon region, shedding light on various aspects, including levels of awareness about GSCM concepts, the adoption of green practices, collaboration for environmental goals, and the integration of green principles into company culture. It also examines challenges in maintaining GSCM, with an emphasis on environmental sustainability. The comprehensive analysis reveals an observed variance in the rates of GSCM practice implementation. Managers/Engineers and Shop floor I/C individuals have made notable strides in implementing these practices. However, Suppliers lag behind, adoption rates. It also unveils promising opportunities for collaboration in the realm of environmental objectives. Approximately 20% of participants have expressed a readiness to engage in collaborative efforts, signifying an avenue for fortifying partnerships. It has also forefront the pressing need to foster the integration of environmental consciousness into the organizational cultures of Shop floor I/C and Suppliers.

Keywords: Green Supply Chain Management (GSCM), Small scale industries (SSI), environment, waste, green future.

Introduction

An exploration of Green Supply Chain Management in the direction of green practices and study of drivers to implement the GSCM practices from diverse disciplinary and theoretical standpoints is essential need (Sarkis, 2003). These multidisciplinary approaches encompass re-engineering, management, logistics, network analysis, human resources, and GSCM measurement, yielding a rich tapestry of perspectives and interpretations within the GSCM domain. There is a significant manifold benefit GSCM offers to foster sustainability. These advantages are multifaceted, spanning from the enhancement of customer value and cost reduction to the operational efficiency and the attainment of a competitive edge (Luthra et al., 2013). In the backdrop of India's burgeoning manufacturing sector and the government's resolute support for entrepreneurial endeavors, the spotlight is now cast on Small-Scale Industries (SSI). This sector is on the cusp of remarkable growth, yet it's imperative to recognize the essential need for embedding environmental protection and sustainability. This is especially crucial because SSI faces challenges associated with production costs and performance, occasionally leading to failures (Mohanty and Prakash, 2014). Therefore, there is a strong and urgent need to put GSCM practices into action in these industries. The affirmative steps are already proposed to use in GSCM principles within SSIs, making sure they can withstand and succeed in the worldwide competition. This transition is markedly catalyzed by the mounting environmental concerns that echo through governments and industries. Interestingly, even though Small-Scale

Industries (SSI) and Medium-Scale Industries (MSI) have a big impact on the environment, they haven't been as quick as retail and service industries in embracing GSCM (Sunjka & Emwanu, 2015). The historical path outlined offers a compelling account, tracing the evolution from the early 20th-century industrial revolution to the contemporary call for greening the supply chain. This historical trajectory highlights the transformation of the relationship between industry and the environment, underscoring the increased importance of integrating sustainable and environmentally conscious practices into the tapestry of supply chain management.

Literature Review

Research exploring Green Supply Chain Management (GSCM) practices in Small Scale Industries (SSIs) has illuminated key practices and drivers, with relevance not only in the global context but also within India. In the Indian landscape, Govindan et al. (2014) emphasize the significance of "green purchasing," "eco-design," and "green manufacturing" as pivotal GSCM practices among Indian SSIs. These practices are driven by factors such as increasing "customer demand," regulatory pressures, and the appeal of "cost savings." Notably, these findings highlight the growing importance of GSCM practices in Indian SSIs, where businesses are striving to align with evolving environmental and sustainability concerns. As India positions itself as a manufacturing hub, SSIs are progressively recognizing the need to incorporate eco-friendly practices throughout their supply chain operations. In Taiwan, as studied by Hsu et al. (2013), a similar narrative unfolds within SSIs. The GSCM practices of "green purchasing," "eco-design," and "green distribution and packaging" are prominent, emphasizing the global trend toward selecting suppliers with sustainable practices and adopting sustainable product design and transportation practices. The central drivers for GSCM adoption in Taiwanese SSIs are akin to the worldwide discourse, involving "customer demand," "regulatory pressure," and the desire for "improved efficiency." As India's SSIs endeavor to become an integral part of the global value chain, these findings resonate, underlining the global relevance of GSCM practices. As reflected in the literature, SMEs, including Colombian SMEs as studied by Thiell et al. (2011), grapple with similar GSCM dynamics. Common practices in SMEs encompass "green purchasing" and "waste reduction," driven by factors like "customer demand" and "regulatory pressure." These GSCM practices are not without their challenges, including limitations in resources and expertise, echoing the struggles faced by SMEs across the globe, as highlighted in the literature by Bürgi (2010). This parallels the scenario faced by Indian SSIs, particularly those located in regions like Jalgaon District, which strive to enhance their environmental performance while dealing with resource constraints. Therefore, the emphasis on understanding and implementing GSCM practices becomes paramount for SSIs and SMEs, including those in India, to thrive in a world increasingly valuing sustainability and environmental responsibility.

Green Supply Chain Management

Significant factors for implementation of green practices in SSIs illustrated in Figure 1.

Figure 1 Key Parameters to Implement GSCM

Green Purchasing:

Green purchasing is a sustainable procurement practice that assesses the environmental impact of products. It involves selecting materials that minimize waste and encourage remanufacturing. According to Eltayeb T.K. et al., (2010), green purchasing is an environmentally focused procurement activity that emphasizes reducing waste, promoting recycling, reusing materials, and resource efficiency. Several drivers of green purchasing have been identified in the literature, including environmental collaboration, top management commitment, regulatory pressure, environmental investment, and customer demands (Yen, Y., & Yen, S., 2011; Kaufmann, H.R., Panni, M.F.A.K., & Orphanidou, Y., 2012).

Green Design:

Green design pertains to the sustainable design of products, requiring careful consideration of both quantity and quality throughout the product life cycle (Jagannath Reddy et al., 2018; Niraj Kumar et al., 2015). It is a critical component of sustainable product development (Knight, P., & Jenkins, J.O., 2009). Adopting green design methods and practices leads to more eco-friendly and sustainable product designs, although it presents challenges related to cost, durability, and other factors.

Green Manufacturing:

Green manufacturing involves the transformation of raw materials into finished products with a focus on reducing energy consumption and increasing profitability by minimizing waste (Jagannath Reddy et al., 2018; Niraj Kumar et al., 2015). It emphasizes the use of eco-friendly materials and production technologies, with the goal of mitigating the negative environmental impacts of the production process.

Green Distribution and Packaging:

Green distribution and packaging refer to transportation practices that have minimal environmental impact and streamline the timing of storing, order processing, packaging, and transportation (Hariharan Ganeshan & Dr. P. Suresh, 2015; Jagannath Reddy et al., 2018; Niraj Kumar et al., 2015). Effective and environmentally friendly packaging methods are crucial in this context.

Green Marketing:

In today's digitally connected world, green marketing of products is a highly effective branding strategy, creating a positive image for products compared to other marketing approaches.

Reverse Logistics:

Reverse logistics involves managing the flow of goods from their destination back to the source, addressing various aspects such as consumer returns, marketing returns, asset returns, damage returns, return avoidance, and gate-keeping (Curtis Greve and Jerry Davis, 2015; Zhu, Q., & Sarkis, J., 2004). Implementing a robust reverse logistics management system can lead to enhanced customer satisfaction and the establishment of long-term customer relationships. The primary objective of reverse logistics is recycling, reusing, repairing, remanufacturing, and responsible product and material disposal (Das, K., & Chowdhury, A.C., 2012).

Study Region

The sector taken under consideration is Small Scale Industries of Jalgaon region, India. The Research findings are (i) To what extent the management of SSI aware of implementing GSCM. (ii) Waste and Logistic management, (iii) How to implement it.

Implementation of Green Supply Chain Management Practices

In a survey conducted among 105 Managers/Engineers, 108 Shop floor I/Cs, and 100 suppliers, the aim was to implement green practices through Green Supply Chain Management (GSCM). The survey collected data from these participant groups to assess the current state of green practices implementation. The findings provide valuable insights into their involvement, awareness, and roles in driving sustainable initiatives. The survey serves as a foundation for organizations to evaluate progress, identify areas for improvement, and develop strategies for enhanced green practices integration

Question 1: The survey highlights varying levels of awareness about green concepts among the participants. Managers/Engineers exhibit the highest awareness at 53.33%, followed by Suppliers at 58%, and Shop floor I/C at 41.16%. There is room for enhancing awareness, particularly among Shop floor I/C participants (Figure 2).

Question 2: The survey results indicate that 25% of Managers/Engineers, 26% of Shop floor I/C, and 23% of Suppliers report practicing Green Supply Chain Management in their respective firms (Figure 2).

Question 3: The survey reveals awareness levels regarding GSCM practices. A significant percentage of Managers/Engineers (53.33%) are aware of GSCM, while awareness among Shop floor I/C participants (31%) and Suppliers (37%) can be further improved (Figure 2).

Question 4: In terms of the implementation of GSCM practices, a significant proportion of Managers/Engineers (27.7%) and Shop floor I/C (36%) have implemented such practices. However, there is a lower implementation rate among Suppliers (16%), indicating the need for increased adoption in this group (Figure 2).

Question 5: It reveals the selection methods used by participants who implemented GSCM practices. Managers/Engineers primarily used a top down approach (39), followed by a team decision (22) and legal binding (13). Shop floor I/C participants relied more on a combination of team decision (37) and legal binding (55). Suppliers showed a significant preference for legal binding (78) as the selection method.

Question 6: In terms of collaboration for environmental goals, approximately 20% of Managers/Engineers, 19.44% of Shop floor I/C, and 16% of Suppliers reported collaborating with others to achieve these objectives.

Question 7: The survey indicates that a significant portion of Managers/Engineers (40%) is actively incorporating environmental awareness into their company culture, while Shop floor I/C participants (17.5%) and Suppliers (16%) have room for improvement in fostering an environmentally conscious culture.

Question 8: Figure 2 reveals that a significant percentage of Managers/Engineers (37.14%) have made changes to their company's mission, vision, or quality to align with environmental aims. In contrast, lower percentages were observed among Shop floor I/C (9%) and Suppliers (16%).

Question 9: Figure 2 illustrates that a large majority of Managers/Engineers (87.61%) perceived additional advantages of GSCM beyond environmental protection. Similarly, more than half of the Shop floor I/C participants (53.7%) acknowledged additional advantages, while a smaller proportion of Suppliers (9%) reported the same perception.

Question 10: The survey indicates that a significant majority of Managers/Engineers (87.6%) perceive Green Supply Chain Management as a source of competitive advantage. However, there is a lower percentage of Suppliers (19%) who view GSCM as a competitive advantage.

Question 11: Figure 2 reveals varying levels of awareness regarding GSCM guidelines among the participants. While a significant majority of Managers/Engineers (92%) and a considerable portion of Shop floor I/C (76%) are aware of the guidelines, there is a lower level of awareness among Suppliers (18%).

Question 12: Figure 2 highlights that a significant percentage of Managers/Engineers (88.5%) and Shop floor I/C (76%) have validated GSCM guidelines to handle environmental issues. However, the validation rate among Suppliers is comparatively lower (13%).

Question 13: The survey results indicate that the majority of Managers/Engineers (88.5%), Shop floor I/C (98%), and Suppliers (91%) foresee challenges in maintaining GSCM in the future. These challenges may include resource constraints, resistance to change, lack of awareness, and the need for continuous improvement.

Question 14: The Managers/Engineers (70.4%) and Suppliers (92%) faced difficulties in maintaining green practices due to a traditional mind set. Shop floor I/C (39%) reported a comparatively lower level of difficulty. Overcoming this challenge necessitates the promotion of a

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sustainability culture, increased awareness, training, and active engagement of employees to steer away from traditional mind sets.

Question 15: The majority of Managers/Engineers and Shop floor I/Cs have applied GSCM drivers less than 5 times. This suggests an opportunity for organizations to enhance their implementation efforts. Notably, some companies have applied GSCM drivers more than 10 times, indicating a higher level of commitment to sustainability.

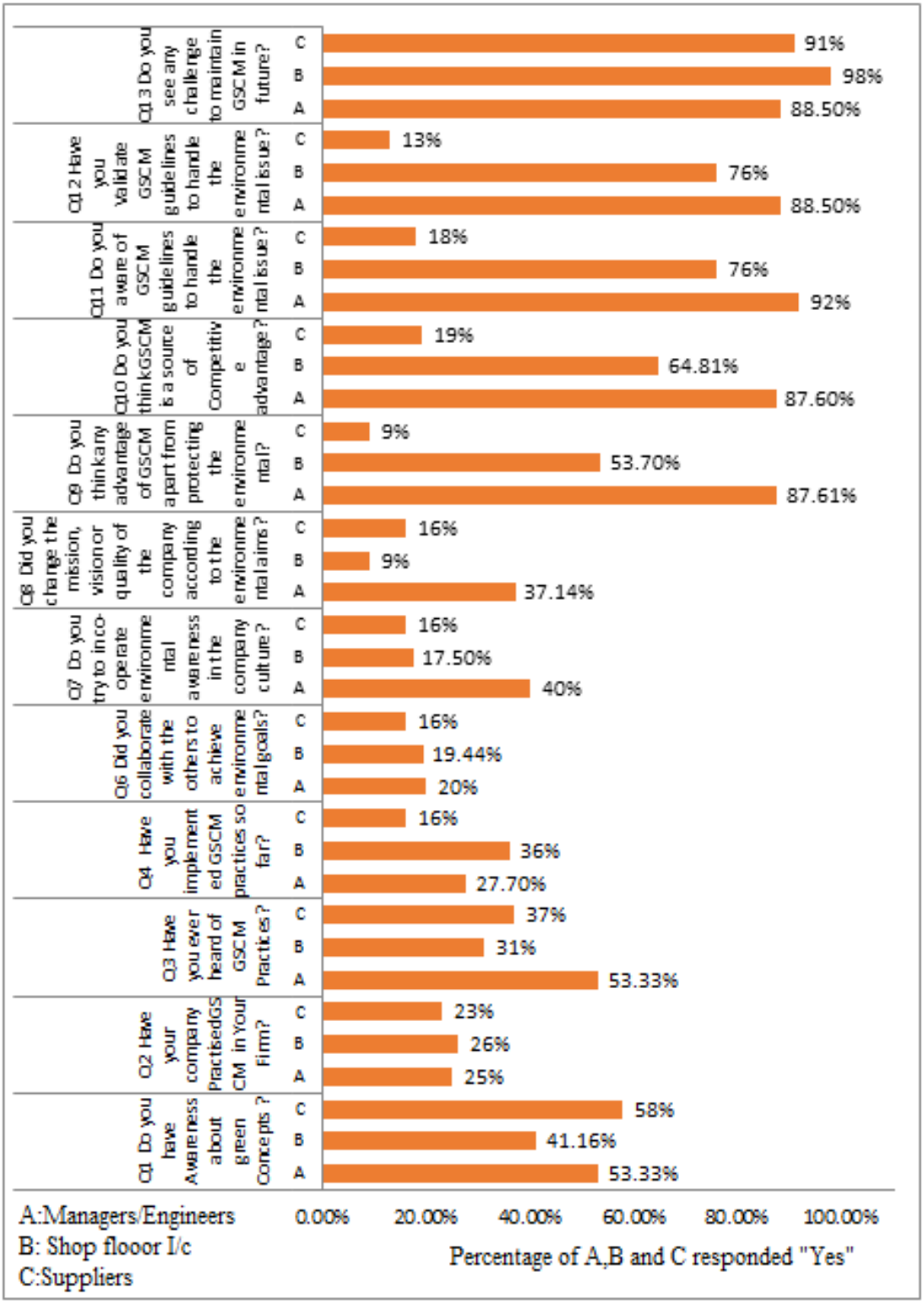

Figure 2 Implementation of GSCM Practices, % A, B & C responded "Yes"

Green Supply Chain Management Drivers to Implement GSCM Practices

A survey involving 105 Managers/Engineers, 108 Shop floor I/Cs, and 100 suppliers aimed to assess the utilization of GSCM drivers for green practices. The survey gathered data on factors like regulatory compliance, environmental awareness, stakeholder influence, cost reduction, brand image, and competitive advantage. These findings offer insights into the current state of GSCM implementation and areas for enhancing sustainable supply chain practices. The Figure 3 presents the responses of A,B and C.

Question 16: It is observed that 81% of Managers/Engineers, 68.5% of Shop floor I/Cs, and 91% of Suppliers expressed a positive interest in green activities.

Question 17: The survey results revealed mixed perceptions regarding the usefulness of partnerships with green suppliers. While 43% of Managers/Engineers acknowledged the benefits, the levels were lower among Shop floor I/Cs (21%) and Suppliers (10%). Organizations should focus on promoting the advantages of such partnerships to stakeholders and fostering collaborations to harness the potential for sustainable supply chain practices.

Question 18: The responses indicate varying levels of belief in the possibility of pursuing both environmental and economic performance simultaneously. While 55.2% of Managers/Engineers agreed, the levels were considerably lower among Shop floor I/Cs (8%) and Suppliers (29%). Organizations should emphasize the potential synergies between environmental and economic goals to drive sustainable practices across all levels of the supply chain.

Question 19: The survey responses highlight that organizations are making efforts to reduce supplier transportation emissions, although to varying degrees. While 48% of Managers/Engineers indicated their commitment, the levels were lower among Shop floor I/Cs (6.5%) and Suppliers (8%). Efforts should be made to encourage and support suppliers in adopting greener transportation practices to mitigate their environmental impact effectively.

Question 20: The survey results indicate a strong agreement on the significant business benefits of 3R practices. A notable percentage of Managers/Engineers (78%), Shop floor I/Cs (96%), and Suppliers (91%) recognize the value of reusing, recycling, and remanufacturing as effective strategies for sustainability and resource conservation. Organizations should prioritize and integrate these practices into their GSCM strategies to achieve both environmental and economic gains.

Question 21: The survey responses highlight a high level of agreement among Managers/Engineers (89.5%), Shop floor I/Cs (96%), and Suppliers (93%) regarding the influence of government regulations on the adoption of green initiatives and policies. This indicates that regulatory frameworks play a crucial role in driving environmental awareness and encouraging companies to adopt sustainable practices.

Question 22: The survey reveals that a significant percentage of Managers/Engineers (84%), Shop floor I/Cs (67.6%), and Suppliers (95%) acknowledged the availability of green practices and activities. This demonstrates that companies have access to various resources and initiatives to support the adoption of green practices. However, efforts should be made to ensure widespread awareness and implementation of these practices throughout the supply chain.

Question 23: The survey results indicate that a significant percentage of Managers/Engineers (86.66%), Shop floor I/Cs (79.6%), and Suppliers (92%) perceive challenges in maintaining environmental suppliers due to traditional mind-sets. This suggests that there may be resistance or reluctance from certain stakeholders to embrace sustainable practices.

Question 24: The survey results reveal that a significant percentage of Managers/Engineers (68.5%), Shop floor I/Cs (79.6%), and Suppliers (91%) have a system in place for providing proper training and rewards to suppliers. This demonstrates a proactive approach by organizations in promoting sustainable practices and fostering collaboration with suppliers.

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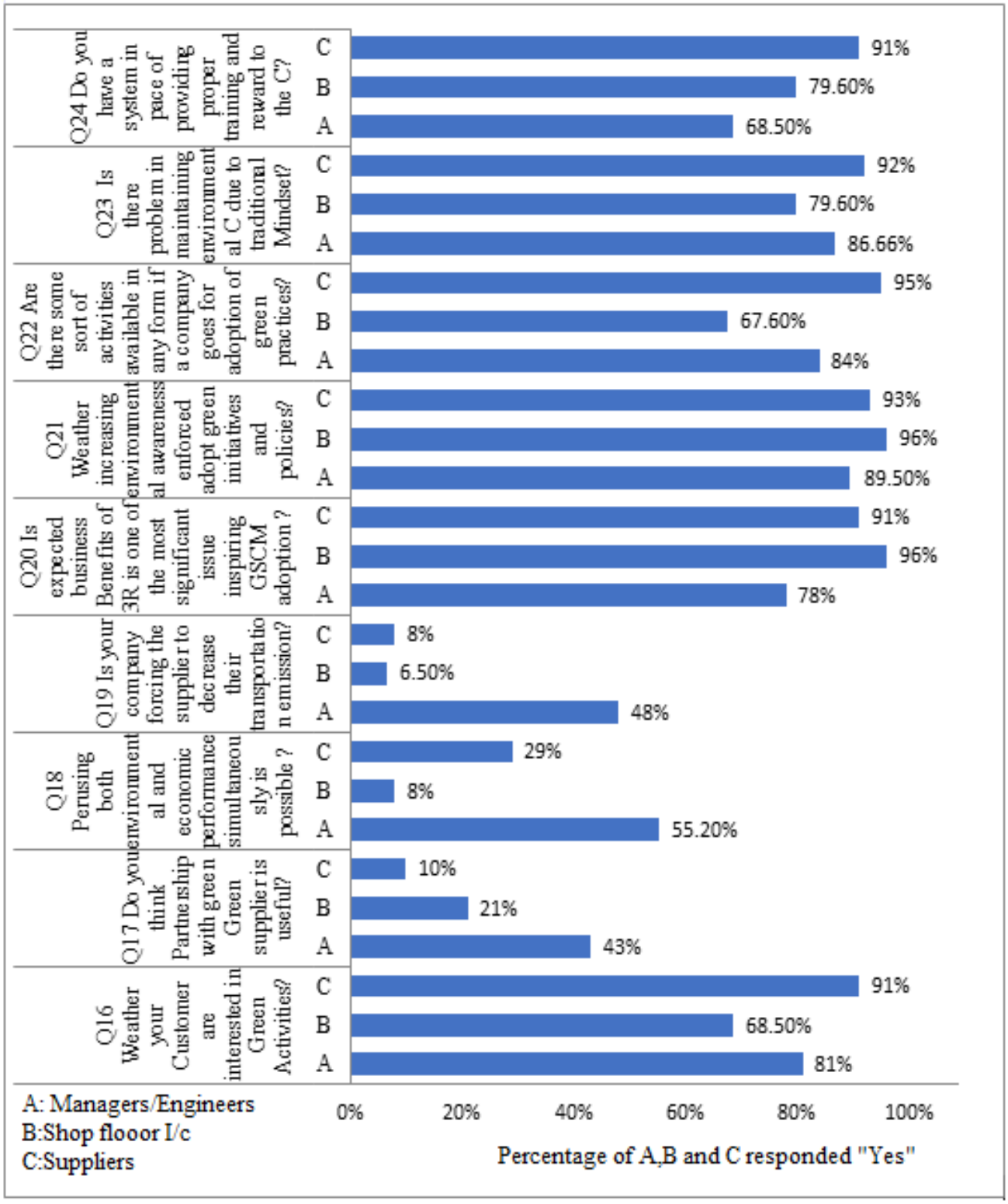

Figure 3GSCM Drivers for Implementation GSCM Practices, % A, B & C responded "Yes"

Question 25: The survey findings indicate that a majority of respondents (91%) agree that increasing environmental awareness among customers results in the adoption of green initiatives and policies in the industry.

Question 26: The survey findings reveal that a significant majority of companies (92%) have implemented some form of green practices. This showcases a positive trend towards sustainability

and signifies the commitment of organizations to incorporate environmentally-friendly measures into their operations.

Question 27: The survey findings demonstrate that a large percentage of companies (94%) have implemented a system for providing proper training to workers. This indicates the importance placed on equipping employees with the necessary knowledge and skills to support green initiatives and sustainable practices. Such training systems are crucial in fostering a culture of environmental responsibility.

Findings and Recommendations

The findings highlight varying levels of awareness about green concepts among these participant groups, with Managers/Engineers exhibiting the highest awareness, followed by Suppliers and Shop floor I/C participants. The results also indicate that while a substantial portion of Managers/Engineers and Shop floor I/Cs have implemented GSCM practices, Suppliers lag behind, suggesting the need for increased adoption in this group. The survey underlines the importance of collaboration for environmental goals and the integration of environmental awareness into the company culture, with room for improvement identified among Shop floor I/C participants and Suppliers. Furthermore, it reveals that a significant majority of Managers/Engineers perceive GSCM as a source of competitive advantage, emphasizing the potential for SSIs to benefit from sustainable practices in the long run.

The survey findings suggest several key recommendations for Small Scale Industries (SSIs) in India to enhance Green Supply Chain Management (GSCM) practices. Firstly, there's a need to increase awareness and training programs to ensure that all stakeholders understand the benefits of sustainable practices. Secondly, promoting stronger collaboration with suppliers is essential to align sustainability goals. Cultivating an environmental culture within the organization, particularly among Shop floor I/C and Suppliers, is critical. It's important to highlight the competitive advantages of GSCM to Suppliers, align operations with GSCM guidelines, and address resistance to change effectively. Supporting efforts to reduce transportation emissions, promoting the adoption of 3R practices, and leveraging regulatory frameworks for environmental awareness can further drive sustainable practices. Maintaining and enhancing training and rewards systems for suppliers is also crucial. Listening to customer demand and encouraging continuous improvement in GSCM practices are essential steps to achieve long-term sustainability. These recommendations can help SSIs in India improve their environmental performance and gain a competitive edge in the market.

Conclusion

This research has delved into the realm of Green Supply Chain Management (GSCM) awareness and implementation within Small Scale Industries (SSI) in Jalgaon District, India. The extensive survey conducted among 105 Managers/Engineers, 108 Shop floor I/Cs, and 100 suppliers has yielded profound insights into the landscape of GSCM practices, emphasizing environmental awareness, sustainability, and economic performance.

The findings from the 27 thoughtfully crafted questions have illuminated a diverse array of dimensions within this critical subject. The research highlights the considerable variation in the awareness levels of GSCM practices among different participant groups.

Managers/Engineers exhibit the highest awareness, indicating the potential for greater influence in promoting GSCM awareness among their colleagues. The study also uncovers mixed rates of GSCM practice implementation. Managers/Engineers and Shop floor I/C participants have made significant strides in integrating green practices into their operations, while Suppliers show a distinct lag that calls for increased adoption and support. The research further underscores the need for stronger collaboration in the pursuit of environmental goals. Approximately 20% of the participants express their willingness to engage in such endeavors, underscoring the potential for cooperative efforts to drive sustainability. Additionally, the study points to the challenges of infusing environmental

awareness into the organizational culture, primarily among Shop floor I/C and Suppliers. Finally, the research unveils the substantial competitive advantage associated with GSCM practices, particularly as perceived by Managers/Engineers. The findings serve as a call to action, encouraging these industries to take ownership of their environmental responsibilities, and to leverage GSCM for both ecological and economic gain. In doing so, they can foster a brighter, more sustainable future, not just for their individual enterprises, but for the world at large.

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