IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Green Supply Chain Management (Gscm) In Indian Construction Industry: A Review

[1]Ravikant Yadav, [2]Kashfina Kapadia Memon

P.G student, Professor (HOD)

[1]Department of Civil engineering Technocrats institute of technology Bhopal India- 462021.

[2]Department of Civil engineering Technocrats institute of technology Bhopal India- 462021.

Abstract: Environmental pollution and climate change pose significant challenges in the twenty-first century, compelling governments and businesses to assess their environmental impacts. The construction sector's need to embrace green practices has become critically important. Green Supply Chain Management (GSCM) is an environmental innovation aimed at integrating environmental parameters within supply chain management, thereby reducing carbon emissions and improving organizational environmental performance. This paper reviews the necessity of GSCM in the Indian construction industry, focusing on research trends, motivators, and challenges associated with its implementation in India. Key barriers identified include short-term planning, resource scarcity, and lack of political pressure. Despite these challenges, GSCM offers benefits such as cost savings, enhanced reputation, and reduced environmental concerns. The study recommends developing a GSCM standard tailored for the construction industry, incorporating green initiation, product design, material management, construction processes, and operation and maintenance. A novel ranking method based on rough sets theory is proposed to prioritize factors influencing GSCM implementation. The growing environmental consciousness and stakeholder pressure provide a conducive environment for the widespread adoption of GSCM practices. By leveraging theoretical frameworks and practical strategies, the Indian construction industry can enhance sustainability and efficiency, aligning with global environmental goals.

Key words: Green supply chain management (GSCM), Indian construction industry, green practices, drivers, barriers.

Introduction

The construction sector contributes to 23% of air pollution, 40% of drinking water pollution, and 50% of landfill wastes. Additionally, the report finds that the construction sector accounts for 40% of global energy consumption and projects a 1.8% rise in commercial building emissions by 2030 [1]. These numbers are alarming. [2] A single instance of construction as an essential absorber of natural resources, both biological and physical [3]. Brundtland Commission defines sustainability as development that meets the needs of the present, without compromising the ability of future generations to meet their own needs [4]. Lately, the emphasis has shifted to more broad topics like sustainability, demanding countries to find the root causes of global warming to identify a solution before it's too late to stop it. Thus, Green supply chain management, or GSCM, is therefore one of the greatest approaches for addressing the problems listed above. The definition of "green supply chain management" is the application of environmental principles to supply chain management (SCM) processes, encompassing product design, procurement and selection of raw materials, manufacturing procedures, consumer delivery of finished goods, and end-of-life management of products beyond their intended life. GSCM integrates green practices such as green design, green purchasing, green manufacturing, green transportation, recycling and reverse logistics [5]. Green supply chain aims for continuous improvements of industrial processes and products to reduce or prevent pollution to air, water and land. Previous literatures on GSCM barrier have been reviewed and the findings from different survey showed that there are different kinds of challenges are faced while implementing GSCM [6]. According to [7] the challenges of implementation GSCM in Indian construction industry are lack of IT implementation, poor quality of human resource, lack of government support, lack of top management commitment, resistance to advancement adoption, cost implications and lack of competition and unwariness of customers. With the contextual information this study focuses on Reviewing the literature and finding the different conditions of green supply chain management in Indian Construction industries. Finding out techniques used of GSCM in construction industry both Indian and foreign scenarios. The assessment of adaptation of green supply chain practices and development of the hierarchy of drivers, enablers, and obstacles included in the paper are the new, analytical additions to the theory of GSCM that offer a comprehensive framework for creating and maintaining a sustainable green supply chain. From a practical standpoint, this study also assists Indian construction companies' project managers in thinking more methodically and strategically about every driver, enabler, and obstacle to maximize the industry's adoption of green supply chain techniques. This research will assist project managers in making choices by constantly evaluating and benchmarking environmental actions throughout the building supply chain.

1. Literature Review

2.1 Overview of GSCM

The definition of green supply chain management (GSCM) is supply chain management (SCM) that integrates environmental thinking. It covers every step of the production process, including design, acquiring raw materials, manufacturing, distribution, and, as the product reaches the end of its useful life, managing its end of life. GSCM drives value creation throughout supply chain companies to minimise total environmental impact, as opposed to only trying to lessen the impact of the chain on the environment. Although reducing carbon dioxide emissions is the primary objective of green supply chain management (GSCM), there are other observable advantages for an organisation as well, such as improved asset efficiency, decreased waste production, increased innovation, lower production costs, higher profitability, the ability to reuse raw materials, the perception of added value to the customer base, and so forth. [8] In the body of current literature, the words "green supply chain" (GSC) and "sustainable supply chain" (SSC) have been used interchangeably. In order to ensure that future generations can meet their needs, sustainability aims to meet both the demands of the present [9]. A sustainable supply chain considers the social and environmental aspects while looking at the profit and loss side of things. [10]. A sustainable supply chain considers the social and environmental aspects in addition to the profit and loss side [10] [11]. The world is now obliged to concentrate on economic activities that are caused by humans and have the potential to endanger the sustainability of life as we know it due to climate change and global warming [12]. According to [12] supply chains have the dual purpose of promoting efficiency in commercial operations and investigating novel approaches to augment sustainability. This ultimately clarifies that an organisation may achieve sustainable growth and value creation through a sustainable supply chain.

1.2 Current Status of GSCM in India

Between 1990 and 2008, India's CO2 emissions increased over 1.5 times, second only to China. Rapid industrialization strains resources and generates four million tons of waste, with only 3% of hazardous e-waste recycled properly. Immediate adoption of GSCM measures is crucial for the Indian industrial sector [13] Adopting GSCM in India is crucial, especially as the manufacturing sector, accounting for 16% of GDP, is set to grow to 25% by 2022, driven by SMEs. However, SMEs face high input costs, resource scarcity, poor logistics, and lack of skilled labor. Overcoming traditional practices and management's knowledge gap is essential for GSCM adoption [14] Environmental consciousness is increasing among Indian supply chain stakeholders. "Green Products" like organic food, solar heaters, and electric cars are gaining acceptance. Indian manufacturing is adopting green processes for brand improvement, cost reduction, and compliance. Energy-intensive companies are implementing lean processes to minimize waste and enhance energy efficiency. [15] In India, though, the number of companies embracing GSCM is increasing, yet it can safely be said that there is limited awareness about the concept amongst suppliers, consumers and employees, in general. The notion of RL is also absent in majority of companies, whereby waste can be retrieved from the end consumer for capturing its remaining value or for its environment-friendly disposal [16]. The Indian government is committed to enforcing eco-friendly practices to curb environmental degradation. The

Manufacturing Plan emphasizes that businesses should prioritize green initiatives. Government support, like low-interest loans and regulations for environmental sustainability, is crucial for MSMEs to adopt green technologies and practices, ensuring mutual efforts to promote GSCM adoption [17].

2. Objective

Though it constantly has a major and irreversible influence on the environment, the building industry is one of the most essential industries for human civilisation since it improves the physical environment of society. Reducing or eliminating waste at every stage of the supply chain is the goal of GSCM. GSCM has become a significant new invention that aids businesses in creating "win-win" strategies that decrease their environmental risks and impacts while increasing their ecological efficiency in order to meet profit and market share goals. [18].

Studies reveal that large number of construction practices understands the importance of GSCM, but the number of construction companies that actually engage in such practices is significantly low. The research is aimed to identify factors such as:

- Significance of GSCM in construction sector in India.
- Barriers and expectations about the economic impacts for implementing GSCM practices.
- Identification of the main drivers to implement GSCM practices.
- Research Gap in Indian subcontinent while implementation of GSCM.

3. GSCM Practices in the Indian Construction Industry

[19] carried out a study on green supply chain management in Maharashtra's construction industry. The study outlines the significance of green supply chain management and lists the different motivating factors and difficulties associated with putting GSCM methods into reality in the building sector. The most significant obstacles were short-term planning and resource scarcity, which were followed by issues with information and expertise access and a lack of political pressure. There are not many recommendations made on how to get rid of or lessen the severity of the obstacles facing the Indian building industry. The created structural model will aid in comprehending how obstacles are interdependent. Apart from these, there are a few advantages like cost-benefit, enhanced reputation, decreased environmental concerns, and decreased waste that can help to implement GSCM practices in the construction industry.

[20] carried out research to determine the requirements for adopting green supply chain management (GSCM) in the construction sector. A conceptual framework for GSCM application in the construction sector was put out in this research. This study supports in the development of a GSCM standard in the construction industry by utilizing the GSCM approach. The findings indicated that the five ideas that make up GSCM are green initiation, green product design, green material management, green construction, and green operation and maintenance 22 dimensions, and 86 elements.

[21] carried out research on the requirements for GSCM implementation in the construction sector. A framework for GSCM implementation in the construction industry was presented in this research. The GSCM model, which was modified from the manufacturing sector, is included in the framework along with its concepts and dimensions. The foundation of this study is an overview of controlled supply chain management in the construction industry, which has raised project productivity and efficiency. Reducing waste, energy consumption, and adverse environmental effects can yield these benefits in the construction sector. Green initiation, green design, green materials management, green construction processes, and green operation and maintenance are some of the GSCM ideas used in the construction industry. These ideas may be included in projects at any stage of their life cycle, from planning to operation and maintenance.

[22] In his study stated that Increasing pressure from government and consumers to be environmentally conscious has led firms to focus on assessing and controlling the adverse impacts of their operations. This study identifies and ranks factors important for implementing Green Supply Chain Management (GSCM) using a novel method based on rough sets theory. Expert opinions from industrial, environmental, and societal domains were gathered. Findings reveal that government involvement and societal insistence on green practices are crucial for a strong GSCM framework. This study aids management in discovering key factors for establishing GSCM, highlighting the current state of environmental awareness in Indian construction industries. The study introduces a novel ranking method, enhancing GSCM literature.

[23] Stated that the Indian construction industry has not been adequately addressed regarding green supply chain practices. This research investigates the adaptability of green supply chain practices by various Indian construction companies, identifying correlations between drivers, enablers, and barriers to adoption. Using the AHP methodology, these factors are prioritized. A survey was conducted among senior construction project managers, and preliminary analysis was performed using descriptive statistics. Four hypotheses were tested using ANOVA and Spearman's correlation coefficient. Results support institutional theory, complexity theory, ecological modernization theory, resource-based view, and resource dependency theory. The study aids construction project managers in making informed decisions on sustainable supply chain practices.

[24] In his study identifies key barriers to implementing green supply chain management (GSCM) practices in the Indian construction industry through a survey of 20 manager-level employees. Fifteen barriers were identified from literature reviews and expert opinions, and their interrelationships were analyzed using Interpretative Structure Modelling. Matrix Cross-Reference Multiplication Applied for Classification analysis classified the barriers as autonomous, dependent, linkage, and independent. Barriers such as green design, suppliers and green materials, certifications, and financial constraints were found to be highly influential. The findings can help construction practitioners develop strategies to address critical barriers to GSCM adoption.

4. Conclusion

To determine the current research trends, focusses, and author contributions associated with the study of GSCM implementation in Indian construction industries throughout the building construction phase, a bibliometric evaluation was first carried out. The review highlights the significance of green supply chain management and lists the several motivators and difficulties associated with introducing GSCM principles into the Indian construction sector. The research on Green Supply Chain Management (GSCM) in Maharashtra's construction industry highlights the importance and challenges of implementing GSCM practices. Key barriers include short-term planning, resource scarcity, information and expertise access, and lack of political pressure. Despite these challenges, GSCM offers significant advantages like cost-benefit, enhanced reputation, reduced environmental concerns, and decreased waste. The studies recommend developing a GSCM standard specifically tailored for the construction industry. This involves a conceptual framework incorporating green initiation, green product design, green material management, green construction, and green operation and maintenance. The framework, adapted from the manufacturing sector, emphasizes the necessity of integrating these concepts throughout the project lifecycle, from planning to maintenance. A key recommendation is the adoption of a novel ranking method based on rough sets theory to prioritize factors influencing GSCM implementation. This method can guide management in identifying and addressing the most critical elements for establishing a robust GSCM framework. In conclusion, while challenges persist, the growing environmental consciousness and pressure from stakeholders provide a fertile ground for the widespread adoption of GSCM practices. By leveraging theoretical frameworks and practical strategies, the Indian construction industry can significantly improve its sustainability and efficiency, aligning with global environmental goals.

6. Future Directions and Recommendations

No research is without limitation. Due to the limitations of the data collected in this study, the effect of many variables was not considered. Future research efforts can consider the buyer-related variables such as the size of the organization, practices in the industry, market pressures and cost pressures on the green supply chain members. The decision-making theories can also be of great use for the Indian companies seeking to improve the priority of the practices in the market to gain the best possible outcome, economically, environmentally and socially. We can also focus on creating actionable strategies to overcome identified barriers, such as fostering government involvement and enhancing societal awareness of green practices. Additionally, targeted efforts to educate and train construction managers on GSCM principles and practices are crucial. Policymakers should also consider providing institutional support and incentives for MSMEs to adopt GSCM practices.

I. **Acknowledgment**

The authors are also grateful to Director, Technocrats institute of technology Bhopal, (M.P.).

REFERENCES

[1] h.-o.-g.-b. ., "U.S green building council," [Online]. Available: https://www.usgbc.org/press/benefits-of-green-building . [Accessed Aug 2024].

[2] "Arc desk," 2024. [Online]. Available: https://archdesk.com/blog/how-does-construction-affect-the-environment/.

[3] R. a. M. H. Spence, "Sustainable Development and the Construction Industry.," *Habitat International*, vol. 19, no. https://doi.org/10.1016/0197-3975(94)00071-9, pp. 279-292, 1995.

[4] W. C. o. E. a. Development, "report of the World Commission on Environment and Development," Brundtland Commission, 1987.

[5] S. Srivastava, "Green Supply-Chain Management: A State-of-the-Art Literature Review," *International Journal of Management Reviews*, vol. 9, pp. 53-80., 2007

[6] G. W. M. Johansson, " Lean vs Green Manufacturing: Similarities and Differences," 2009.

[7] V. K. S. K. H. t. Sunil Luthra, "Barriers to implement green supply chain management in automobile industry using interpretive struc," *Journal of Industrial Engineering and Management,* 2011.

[8] J. Maneesha Benny, "GREEN SUPPLY CHAIN MANAGEMENT IN CONSTRUCTION," *International Research Journal of Engineering and Technology,* vol. 05 , no. Issue: 11, Nov 2018.

[9] Commission, "Our Common Future. United Nations World Commission," Brundtland Commission, 987.

[10] J. K. R. J. V. .. Linton, Sustainable supply chains: an introduction, 2007, pp. 1075-1082.

[11] C. R. D. Carter, "A framework of sustainable supply chain management moving toward new theory," *Int. J. Phys. Distrib. Logist. Manag. ,* vol. 38, pp. 360-387., 2008.

[12] M. 2. Christopher, "Logistics and Supply Chain Management Strategies, fourth ed.

[13] J. R. a. C. A. Bhattacharya, "Green manufacturing energy, products and processes," *the Boston Consulting Group • confederation of Indian Industry.,* 2011.

[14] T. (. E. a. R. Institute), "Green growth and development quarterly"," TERI (The Energy and Resources Institute), 2013.

[15] M. M. J. o. M. Excellence, "Green manufacturing: opening new avenue for growth of manufacturing," in *CII Confederation of Indian Industry*, 2011.

[16] P. a. V. Dutta, "The implementation of green supply chain management practices in an upstream industry: an investigation," in *Proceedings of Fifth IRF International*, 2012.

[17] J. Z. Q. a. K.-h. L. .. Sarkis, "An organizational theoretic review of greensupply chain management literature," *International Journal of Production Economics,* vol. 130, pp. 1-15, 2011.

[18] S. P. T. K. a. P. W. Ninlawan C., "The Implementation of Green Supply Chain Management Practices in Electronics Industry," *International Journal, vol. , ,* vol. 12, p. no. 4.

[19] R. R. E, "An Investigation of Green Supply Chain Management in Indian Construction Sector," *International Journal of Science and Research ,* 2016.

[20] N. U. H. A. M. Mochamad Agung Wibowo, "Factors for Implementing Green Supply Chain Management in the Construction industry," *Journal of Industrial Engineering and management* , vol. 11, pp. 651-679., 2018.

[21] N. Utami and A. Mustikasari, " Factors for implementing green supply chain management in the construction industry," *Journal of Industrial Engineering and Management*, vol. 4, no. 651-679, 2018.

[22] S. C. M. Arpit Singh, "Ordering drivers of green supply chain management practices in Indian construction industry: An impact assessment framework," *International Journal of Quality & Reliability Management*, 2022

[23] S. Abhishek Mojumder, "An exploratory study of the adaptation of green supply chain management in construction industry: The case of Indian Construction Companies," *Journal of Cleaner Production*, 2021

[24] B. a. R. K. Virendra Balon, "Green Construction Supply Chain Barriers Assessment: Evidence from Indian Construction Industry," *Sage Journals Home*, 2024.

.