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Behavioral dimensions in green supply chain management

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Abstract

Green supply chain management (GSCM) is a strategic approach that promotes sustainability and economic efficiency. While technical components such as eco-design, reverse logistics, green purchasing, and green distribution have been thoroughly studied, behavioral factors like leadership, culture, and individual and inter-organizational behavior are less examined. This study fills this gap by exploring how behavioral aspects influence the successful implementation of GSCM. A systematic literature review (SLR), conducted in accordance with PRISMA guidelines, synthesizes findings from 69 peer-reviewed journal articles published between 2007 and 2024. Thematic analysis categorizes behavioral factors into individual, organizational, and inter-organizational behaviors and their interactions with technical GSCM practices, institutional elements, and contextual moderators. Findings indicate that leadership, employee engagement, and supplier collaboration are vital drivers of sustainability. However, their impact is shaped by cultural and contextual factors such as regulatory environments, national values, and institutional pressures. This study presents a comprehensive conceptual framework that integrates behavioral, contextual, and technical constructs, drawing on socio-technical systems (STS) theory and institutional theory, and offers new insights for both theory and practice.

Keywords: Green Supply Chain Management; Leadership Commitment; Individual Behaviors; Organizational Behaviors; Inter-Organizational Behaviors

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1. Introduction

Green supply chain management (GSCM) has become an essential framework for organizations to tackle environmental challenges from industrialization and globalization. Srivastava (2007) defined GSCM as "integrating environmental thinking into supply-chain management, including product design and development, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life." The main goal of GSCM is to reduce the environmental impact of supply chain activities while keeping economic efficiency. As a result, the concept has increasingly attracted organizations worldwide that want to fight climate change, lower carbon footprints, and meet strict environmental regulations (Sarkis, 2003; Zhu and Sarkis, 2007; Srivastava, 2007; Ahi and Searcy, 2013; Zhu, Sarkis and Lai, 2013). Additionally, growing stakeholder expectations, including customers, suppliers, regulators, and local communities regarding corporate sustainability also drive the expansion of GSCM (Muduli and Barve, 2013; Hong et al., 2022; Kamra et al., 2024). While much research has focused on the technical and operational aspects of GSCM (e.g., Sarkis, 2003; Srivastava, 2007; Seuring and Müller, 2008; Zhu et al., 2013; Karimi and Rahim, 2015; Shang et al., 2016; Hong et al., 2022), such as eco-design, green manufacturing, and internal environmental management, less attention has been given to the behavioral aspects.

On the other hand, the interaction between leaders' commitment, employee engagement, and inter-organizational collaboration that largely contributes to sustainable outcomes is gaining significant scholarly attention. However, existing studies tend to overlook and provide limited, fragmented insights on systematically categorizing and integrating human-related aspects into current GSCM frameworks (Boiral, 2009; Longoni et al., 2018). This results in a lack of consistent empirical evidence on the interdependence of behavioral and technical GSCM practices, which limits the scope and validity of the prevailing understanding of the role of behavioral enablers in GSCM. In other words, even when studies address behavioral dimensions such as leadership commitment and organizational culture, the absence of systematic classification and synthesis has led to conflicting conclusions and limited actionable insights for practitioners (Cao et al., 2015).

As a result, it remains challenging for practitioners, especially in developing and emerging markets like China and India, to effectively leverage behavioral drivers to enhance sustainability performance. Moreover, cultural and contextual (institutional) factors such as national culture, institutional pressures, and industry norms play a significant moderating role in the effectiveness of behavioral GSCM practices, but have received limited attention (Hofstede, 1980; Park et al., 2007; Ahi and Searcy, 2013; Roy and Goll, 2014; Cao et al., 2015; Rizzi et al., 2023). For example, studies suggest that in collectivist cultures, supplier collaboration and shared sustainability responsibilities are more common, while hierarchical cultures may hinder innovation (Vachon, 2010; Roy and Goll, 2014; Cao et al., 2015). However, very few studies have thoroughly examined how these cultural and contextual factors influence the relationship between individual, organizational, and inter-organizational behaviors and the effectiveness of GSCM practices.

Additionally, another important gap in the current literature on the role of behavioral dimensions in GSCM is the interaction between these dimensions and technical practices. Drawing on socio-technical systems (STS) theory, this study suggests that these components are interconnected; while behavioral practices promote a supportive organizational culture for technical innovations, effective technical and operational systems (topography) enhance the effectiveness of behavioral strategies (Manz and Stewart, 1997; Shen et al., 2015). For example, research shows that organizational citizenship behavior toward the environment can

encourage the adoption of green technologies, while efficient technical systems can improve coordination among supply chain partners (Boiral, 2009). However, limited research has been conducted in this area, especially in emerging markets where both dimensions are crucial for sustainable development (Muduli et al., 2013; Geng et al., 2017). As a result, empirical validation of these ideas and the development of practical frameworks for practitioners have been lacking. Therefore, this study aims to:

- Identify and explain the GSCM constructs (technical and behavioral GSCM practices) in the extant literature.
- Examine the individual, organizational, and inter-organizational behavioral factors that influence the adoption and effectiveness of GSCM practices.
- Analyze the role of cultural and contextual factors in moderating the impact of behavioral dimensions on GSCM outcomes.
- Develop a comprehensive framework integrating behavioral, technical, and contextual elements to enhance GSCM implementation.

The results of this SLR study would not only advance the theoretical knowledge in this field by bridging the research gaps on STS theory and Institutional Theory, but it will also provide valuable practical insights that could be leveraged by managers, policy makers, and supply chain practitioners to improve their supply chain sustainability performance. The rest of the paper is organized as follows: Section one introduces the study background and objectives. Section two describes the methodology used in this study. Section three presents the key results and discussion, while Section four provides the study conclusion, implications, limitations, and future research directions.

2. Methodology

2.1. Systematic Literature Review (SLR)

This study uses an SLR approach to assess the role of behavioral dimensions within GSCM. The SLR method involves a structured, repeatable, and transparent process for identifying, evaluating, and synthesizing existing research. This approach ensures comprehensive field coverage while minimizing bias (Tranfield et al., 2003; Komakech et al., 2024). Additionally, it is essential to note that this method consolidates fragmented research, enabling scholars to identify key trends, find research gaps, and suggest future directions (Liberati et al., 2009; Donthu et al., 2021; Komakech et al., 2024). In their analysis of the advantages of systematic reviews over traditional literature reviews, Moher et al. (2009) argue that the systematic review process decreases selection bias by establishing explicit inclusion and exclusion criteria. This ensures that the included literature aligns with the research goals. By adopting a structured and transparent approach, systematic reviews enhance the reliability and reproducibility of research outcomes. Using rigorous screening protocols, such as those outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, systematically documents and explains study selection decisions (Moher et al., 2009; Donthu et al., 2021). The study screening process guarantees that only relevant, high-quality research contributes to the final synthesis, strengthening the validity and broad applicability of the study's conclusions.

2.2. Scoping review

Before finalizing the search strategy, a scoping review was conducted to identify key themes, central concepts, and emerging gaps in behavioral GSCM. This approach aligns with the goals of a scoping review, which are too

broadly map existing literature, identify gaps, and clarify essential ideas (Arksey and O'Malley, 2005). The initial search, conducted through the Uganda Management Institute (UMI) library across major operational and supply chain management databases through Elsevier, Emerald, Wiley, EBSCOhost, and Springer, offers a preliminary overview of current research on GSCM and its behavioral aspects. The process aims to accurately define relevant search terms for the systematic literature review (Boote and Beile, 2005). Boote and Beile (2005) argue that a scoping review facilitates initial synthesis of relevant theories and behavioral constructs. This helps ensure the subsequent systematic review remains focused and comprehensive, maximizing its impact and value.

The scoping review phase is also designed to identify key themes, emerging research gaps, and theoretical connections. This information provides the foundation for developing a rigorous and relevant conceptual framework. In the context of GSCM, the scoping review helps ensure a structured approach to integrating individual, organizational, and inter-organizational behavior dimensions. This captures the full range of behavioral issues impacting sustainability outcomes in a specific context. By refining search parameters and research objectives, the scoping review process can improve the methodological rigor and relevance of the systematic review. Ultimately, this enhances the overall value of the evaluation for both academic research and practical application (Arksey and O'Malley, 2005; Boote and Beile, 2005). Figure 1 outlines the research procedure followed.

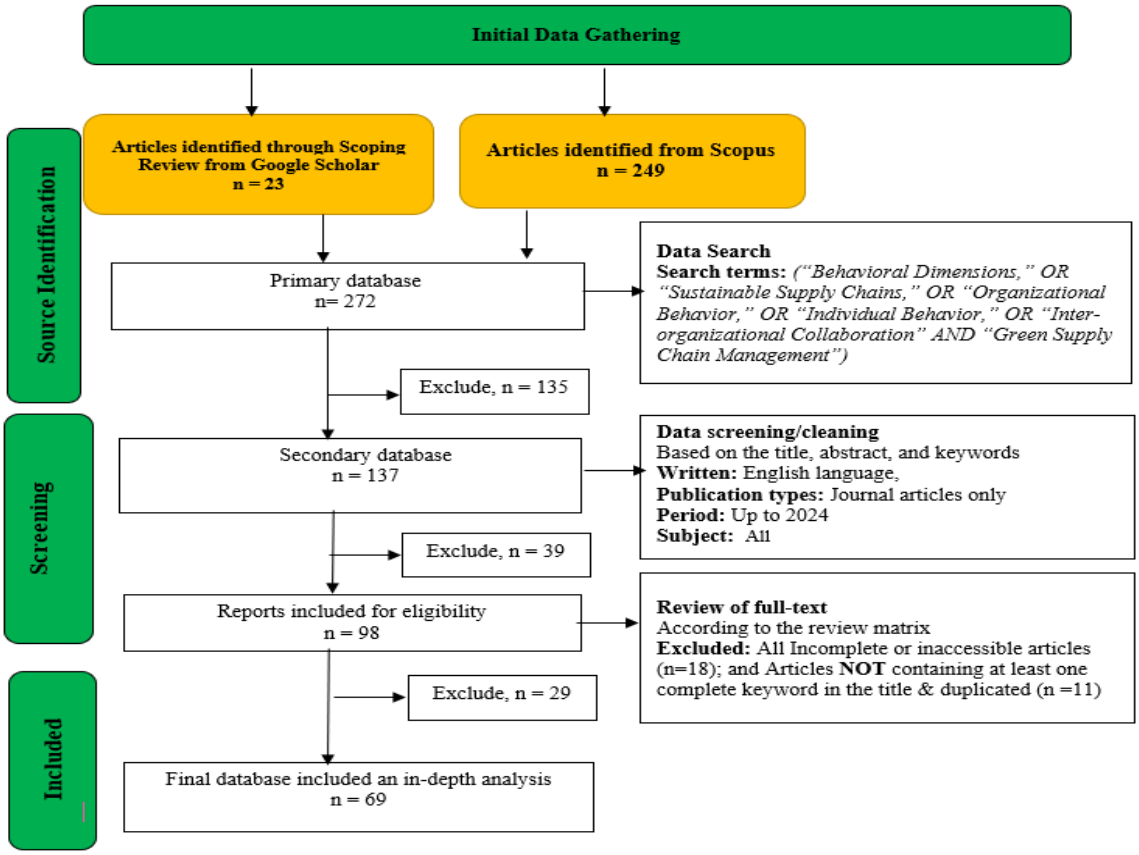


Figure 1. Schematic representation of the systematic review process

2.2.1. Search strategy and data sources

The literature search was conducted using two databases, Google Scholar and Scopus, chosen for their thorough coverage of peer-reviewed journals and publications related to operations and supply chain management. The search included Boolean operators and specific keywords related to the identified dimensions and concepts of GSCM. Search terms included: *"Behavioral Dimensions" OR "Sustainable Supply Chains" OR "Organizational Behavior" OR "Individual Behavior" OR "Inter-organizational Collaboration" AND "Green Supply Chain Management" OR "GSCM."* The process followed best practices as suggested (Tranfield et al., 2003; Srivastava, 2007; Seuring and Müller, 2008; Moher et al., 2009; Donthu et al., 2021; Komakech et al., 2024), including searches by title, abstract, and keywords. Articles were then chosen based on explicit inclusion and exclusion criteria. Preference was given to peer-reviewed journal articles published in English. Non-scholarly sources, conference papers, textbooks, and book chapters were excluded, as were articles not in English or those focusing on sustainable or circular SCM practices without addressing the behavioral dimension. The search was limited to articles published up until 2024 to include recent developments.

2.2.2. Screening and selection process

The screening and selection process included multiple stages to ensure methodological rigor. Duplicate articles were first removed, then titles and abstracts were screened for relevance. This was followed by a full-text review to confirm eligibility. Only studies that explicitly examined the behavioral aspects of GSCM at the individual, organizational, or inter-organizational level were included (Moher et al., 2009). Two authors reviewed the full text of each article to verify its inclusion. This process resulted in the identification of 69 relevant articles. The PRISMA guidelines provided standard documentation of the study selection process (Moher et al., 2009) as shown in Figure 1. However, 22 additional references were used to support the theoretical framework, methodological justification, and contextual discussion, but were not part of the reviewed sample from Scopus and Google Scholar databases.

2.2.3. Data extraction and synthesis

The data extraction process utilized a structured form to gather and organize information from each study systematically. The data included author(s), publication year, study objectives, research methods, key findings, and the specific behavioral dimensions related to GSCM (Webster and Watson, 2002). This process enabled a systematic comparison across studies, facilitating the identification of common themes and patterns. Thematic analysis was used to synthesize the data by grouping studies into three behavioral dimensions: individual, organizational, and inter-organizational. This approach enabled a thorough examination of how behaviors at various levels impact GSCM practices and outcomes. Additionally, the synthesis highlighted areas of both agreement and disagreement within the existing literature, providing insights into the complex impact of behavior on GSCM.

2.2.4. Quality assessment

To ensure credibility and rigor, the quality of included articles was assessed. All 98 articles were independently evaluated by two reviewers using a modified Critical Appraisal Skills Programme (CASP) checklist (Briner and Denyer, 2012), which examined criteria such as the clarity of the research question, the appropriateness of the study design, and relevance to the review objectives. An adapted checklist from Moher et al. (2009) was also used to enhance validity. Studies that did not meet the quality threshold were excluded from further analysis. The inter-rater reliability was high (Cohen's Kappa = 0.91), indicating strong agreement between reviewers. Discrepancies were resolved through structured discussion and consensus.

2.3. Descriptive statistics

This section presents preliminary descriptive statistics of publication trends and the top 10 journal outlets in behavioral dimensions in GSCM.

2.3.1. Annual scientific production from 2007-2024

In this initial analysis, the structural and formal aspects of the literature are examined. A total of 69 peer-reviewed papers, identified from the earlier systematic search, were analyzed to assess publication trends regarding the role of behavioral dimensions in GSCM from 2007 to 2024. Figure 2 shows the frequency distribution of relevant publications per year.

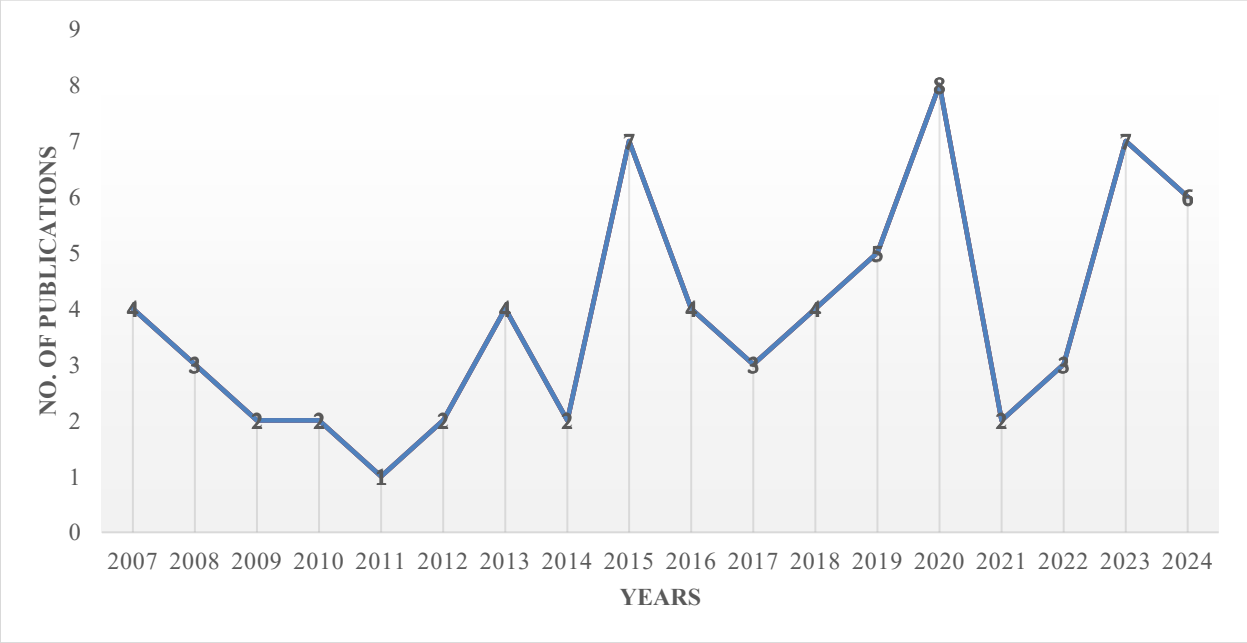


Figure 2. Annual distribution of the papers published between 2007-2024

The early years (2007-2012) are characterized by limited research, with a peak in 2007 (4 publications) followed by a decline thereafter until 2012. This indicates initial exploratory efforts in the domain before shifting from technical and operational aspects (Sarkis, 2003; Seuring and Müller, 2008; Sarkis et al., 2011) to behavioral dimensions (Kumar et al., 2019; Liu et al., 2020). The gradual rise from 2013 to 2016, peaking in 2015 (7 publications), aligns with the increasing recognition of the importance of psychological and organizational behavior theories in advancing supply chain sustainability (Zhu et al., 2013; Govindan et al., 2014). The field gained significant traction between 2017 and 2020, reaching a peak in 2020 (8 publications), likely driven by global sustainability movements, policy frameworks, and industry practices. However, a decline appeared in 2021 (2 publications), suggesting a temporary shift in academic focus, while a sudden rise in 2023 (7 publications) and continued interest in 2024 (6 publications) may be linked to external disruptions such as the Covid-19 pandemic, the rise of behavioral nudging, green consumerism, and digitalization of supply chains as new research frontiers (Sharma et al., 2020; Sarkis et al., 2021; Dubey et al., 2022). Overall, the trend reflects three distinct phases: an exploratory phase (2007–2012), a growth and consolidation phase (2013–2020), and a maturation and diversification phase (2021–2024). This highlights the growing importance of behavioral dimensions in GSCM. As the field matures, recent trends suggest that behavioral approaches will become increasingly prominent in GSCM research. Topics such as green leadership, decision-making biases, sustainable supply chain practices, green human resource management, and behavioral economics in sustainability are likely to continue shaping GSCM in the future.

2.3.2. Top 10 influential journals contributing to the study

Table 1 shows the 10 top journal outlets that contributed to the study of behavioral dimensions in GSCM from 2007 to 2024.

Table 1. Number of papers from the top 10 journals

S/N	Journal Title	Frequency
1.	Journal of Cleaner Production	10
2.	International Journal of Production Economics	7
3.	Sustainability	5
4.	Journal of Operations Management	4
5.	Supply Chain Management: An International Journal	4
6.	Business Strategy and the Environment	4
7.	Production Planning & Control	3
8.	International Journal of Operations & Production Management	3
9.	International Journal of Productivity & Performance Management	2
10.	International Journal of Production Research	2

Source: Scopus Data, 2024

Table 1 shows that most studies (10) were published in the Journal of Cleaner Production, highlighting its leading role in publishing research on behavioral practices in GSCM. It is followed by the International Journal

of Production Economics (7) and Sustainability (5), which ranked second and third respectively, reflecting their significant contributions to the field. The Journal of Operations Management, Supply Chain Management: An International Journal, and Business Strategy and the Environment each published 4 papers. Production Planning & Control and the International Journal of Operations and Production Management each published 3 papers, while two journals with 2 publications—namely, the International Journal of Productivity and Performance Management and the International Journal of Production Research (Zhu et al., 2008; Grimm et al., 2023)—also contributed. According to Table 1, behavioral issues are becoming increasingly relevant in scholarly research. This is a positive development, considering the environmental impact of GSCM practices, and underscores the need to study the factors influencing their adoption. Scholars have examined the connection between institutional pressure, cognitive biases, cultural norms, and green supply chain adoption (Cao et al., 2015; Dubey et al., 2015; Rajeev et al., 2017; Nazam et al., 2020; Sarkis et al., 2021). Recently, there has been a rise in studies exploring the decision-making processes of top management (Dubey et al., 2015; Sarkis et al., 2021). Additionally, more research has been conducted on collaboration with other firms in the green value chain (Dubey et al., 2015), supplier relations and development (Cao et al., 2015), green collaboration between supplier firms (Nazam et al., 2020), and consumer-driven green innovation and sustainable waste management (Sarkis et al., 2021). Therefore, the increasing focus on these topics in high-impact journals suggests that behavioral insights are crucial in understanding and enhancing GSCM practices.

3. Results and discussion

Here, the researchers examined the key aspects of GSCM and the theoretical foundations supporting its implementation. They also analyze the behavioral dimensions involved in GSCM and emphasize their importance in influencing sustainability practices. Additionally, the study reviewed the cultural and contextual moderators to evaluate their impact on the effectiveness of behavioral factors in driving GSCM outcomes. Finally, this section discusses the relationships among the variables in the conceptual framework, laying the groundwork for developing research propositions to guide future empirical testing of behavioral dimensions and GSCM practices.

3.1. Dimensions of green supply chain management

GSCM is an organizational approach that incorporates environmental considerations into supply chain operations, aiming to reduce ecological impacts while maintaining economic competitiveness. Numerous studies (Srivastava, 2007; Seuring and Müller, 2008; Zhu et al., 2013; Karimi and Rahim, 2015; Hebaz and Oulfarsi, 2021; Sarkis et al., 2021) emphasize its multidimensional nature, encompassing various strategies and practices across supply chain functions such as procurement, production (product design and manufacturing), distribution, and end-of-life management. This study therefore identified ten dimensions that explains GSCM and they include; eco-design (ED), green purchasing (GP), green distribution (GD), investment recovery (IR), green manufacturing (GM), internal environmental management (IEM), reverse logistics (RL), green warehousing (GW), supplier collaboration (SC), and customer cooperation (CC). Collectively, these elements drive sustainable supply chain performance and outcomes (Carter and Rogers, 2008; Seuring and Müller, 2008; Zhu et al., 2008; Sarkis, 2012; Ahi and Searcy, 2013; Karimi and Rahim, 2015; Rehman et al., 2016; Hebaz and Oulfarsi, 2021; Kamra et al., 2024).

These dimensions of GSCM practices facilitate alignment of operational decisions with environmental goals while ensuring effective collaboration with suppliers, all stakeholders and customers towards achieving sustainability objectives (Geng et al, 2017; Paulraj et al., 2007). However, GSCM practices may vary across industries based on specific drivers, including institutional pressures, regulatory demands, and technological readiness (Jabbour and de Sousa Jabbour, 2016; Khan et al., 2023). Examining these key constructs in depth can provide valuable insights into how firms operationalize sustainability principles in their supply chain processes. Such understanding can help to highlight the benefits and challenges associated with each practice, contributing to more effective implementation strategies.

Eco-design (ED) focuses on integrating environmental factors into product development and design processes (Sroufe et al.,1997; Handfield et al., 2002; Sarkis, 2012; Shang et al., 2016). Research shows that organizations adopting ED practices achieve better product sustainability and compliance with environmental regulations (Srivastava, 2007; Seuring and Müller, 2008; Karimi and Rahim, 2015). However, cost considerations and supplier resistance may hinder widespread adoption (Jabbour et al., 2016). *Green warehousing (GW)* emphasizes energy-efficient storage practices, inventory optimization, and emission-reducing logistics operations (Carter and Easton, 2011; Grekova et al., 2016). Matin et al. (2023), argued that optimizing warehouse layouts through automation and sustainable energy sources can significantly reduce the carbon footprint. However, implementing GW practices can be resource-intensive, often requiring substantial capital investment. Chin, Tat and Sulaiman (2015) suggest that greening warehouse operations can be cost-prohibitive for many firms despite their advantages. Financial planning and supportive policy frameworks are necessary to overcome this and enable GW practices' successful adoption and long-term sustainability.

Green distribution (GD) involves employing environmentally friendly transportation and delivery methods that cut emissions and energy use (Wang et al., 2024). According to (Geng et al., 2017) and Rizzi, Gigliotti, and Annunziata (2023), key drivers of green distribution networks include using electric vehicles, route optimization, and alternative fuels. However, some scholars argue that infrastructure limitations and high investment costs can hinder the widespread adoption of GD (Paulraj et al., 2007). *Internal Environmental Management (IEM)* focuses on organizational policies, leadership commitment, and employee engagement toward sustainability (Sarkis, 2012; Ahi and Searcy, 2013; Roy and Goll, 2014; Jabbour and de Sousa Jabbour, 2016). Chopra and Meindl (2007) and Zhu et al. (2013) noted that organizations with strong environmental management systems are more likely to meet sustainability regulations while enhancing their corporate reputation. Nonetheless, high implementation costs, regulatory complexities, and technological barriers remain challenges that can be addressed through strategic investments, policy support, and industry-wide collaboration to maximize the effectiveness of GSCM practices.

Green manufacturing (GM) involves integrating environmental considerations into production processes to minimize waste, reduce emissions, and optimize resource efficiency (Govindan et al., 2014; Rostamzadeh et al., 2015; Hong et al., 2022). Research has found that green manufacturing strategies significantly improve sustainability by lowering energy consumption and hazardous waste (Paulraj et al., 2007; Seuring and Müller, 2008; Rehman et al., 2016). Moreover, firms implementing eco-friendly production methods gain a competitive advantage and meet stringent environmental regulations (Matin et al., 2023; Wang et al., 2024). However, high capital investments and technological limitations hinder broader adoption (Jabbour et al., 2016; Jabbour et al., 2017; Khan et al., 2023). Furthermore, studies emphasize the importance of supply chain integration in optimizing green manufacturing. Collaboration with upstream suppliers encourages using

sustainable raw materials and cleaner production technologies (Geng et al., 2017; Shang et al., 2016). GM is a critical driver of corporate sustainability and long-term profitability despite operational complexities.

Supplier collaboration (SC) is a critical element of GSCM, as it fosters environmental compliance and the integration of sustainable practices throughout supply chain networks (Paulraj et al., 2007; Feng et al., 2020). Strong partnerships with suppliers enhance green procurement efforts, ensuring that raw materials and production inputs align with environmental sustainability standards (Zhu et al., 2013; Govindan et al., 2014). According to existing literature (Chin et al., 2015; Ahmed et al., 2020), close collaboration between firms and their suppliers improves operational efficiency, reduces carbon footprints, and minimizes supply chain risks associated with non-compliance. Furthermore, businesses involved in green supplier development programs and knowledge-sharing initiatives tend to achieve better environmental and economic results (Murfield and Tate, 2017; Rajeev et al., 2017; Gong et al., 2019). Chopra and Meindl (2007) and Jabbour and de Sousa Jabbour (2016) demonstrate that obstacles such as misaligned incentives, lack of trust, and supplier reluctance can hinder green cooperation efforts. Addressing these challenges requires strategic supplier engagement, transparent communication, and sustainability-focused contractual agreements that align environmental goals throughout the supply chain (Govindan et al., 2014; Rajeev et al., 2017; Feng et al., 2020). Additionally, collaborative training programs and collective investments in green technologies can enhance supplier commitment to sustainability initiatives (Paulraj et al., 2007; Gong et al., 2019). However, research indicates that regulatory frameworks, consumer expectations, and industry benchmarking are crucial for promoting supplier cooperation within GSCM (Zhu et al., 2013; Murfield and Tate, 2017).

Customer collaboration (CC) is a behavioral dimension of GSCM that refers to the joint actions and processes that enable firms to work with their customers to achieve environmental goals. Nureen et al. (2022) conceptually define CC as a behavioral dimension of GSCM, they also highlight that CC involves open communication, trust building, and shared environmental values between the organization and its customers. According to Nureen et al. (2022), CC exceeds compliance and response to regulations, as it also manifests in voluntary and proactive forms of engagement, which improve the firms' green performance and resilience. On the other hand, Zhu and Sarkis (2008) empirically validate that customer collaboration is a prominent antecedent of GSCM adoption by manufacturing firms, specifically in green logistics, eco-design, and investment recovery. The study reports that environmental cooperation with customers promotes joint learning and innovation in green practices through pressure-based and voluntary engagement. Similarly, Khan et al. (2023) identify the cooperation with CC as a key practice under the umbrella of GSCM, especially regarding the role of resource-based capabilities. The authors highlight that CC enhances green procurement and logistics acceptance as well as organizational commitment to sustainability initiatives.

Reverse logistics (RL) plays a crucial role in waste reduction by focusing on the efficient recovery, reuse, and recycling of materials (Srivastava, 2007; Govindan et al., 2015). Companies that implement strong RL systems can reduce landfill waste and improve their performance and circular economy practices (Paulraj et al., 2007; Carter and Rogers, 2008). However, some argue that the success of RL largely depends on consumer participation and supportive regulatory frameworks (Seuring and Müller, 2008; Grekova et al., 2016). *Green purchasing (GP)* involves sourcing environmentally responsible raw materials and collaborating with suppliers on sustainability initiatives (Sarkis, 2003; Carter and Easton, 2011; Jabbour and de Sousa Jabbour, 2016). Research indicates that organizations with sustainable procurement strategies build better supplier relationships and mitigate risks (Srivastava, 2007; Geng et al., 2017). Therefore, sustainable procurement

incorporating reverse logistics and green purchasing practices can bring significant benefits such as improved environmental performance, stronger supplier relationships, reduced risks, and a more circular economy.

Investment recovery (IR) aims to optimize resource use by reselling, repurposing, or recycling obsolete inventory and waste materials (Sarkis, 2003; Sarkis, 2012; Khan et al., 2023; Carter and Easton, 2011). This practice not only boosts financial and environmental performance but also promotes responsible disposal practices (Seuring and Müller, 2008; Wang et al., 2024). Cooperation with customers emphasizes fostering collaborative sustainability efforts, such as take-back programs and environmental awareness campaigns (Jabbour and de Sousa Jabbour, 2016; Geng et al., 2017; Jabbour et al., 2017). Companies that actively involve customers in green initiatives tend to increase brand loyalty and achieve regulatory compliance (Carter and Rogers, 2008; Matin et al., 2023). The effective implementation of GSCM components can enhance sustainability by incorporating eco-design, green warehousing, distribution, internal management, reverse logistics, green purchasing, investment recovery, and customer collaboration. However, costs, regulatory barriers, and infrastructure limitations still hinder widespread adoption.

3.2. Major theories underpinning behavioral dimensions and GSCM

This study identified two (2) organizational theories in the literature as its foundation. The Socio-technical systems (STS) theory offers a framework for understanding how human behaviors (e.g., leadership, engagement) and technical systems (e.g., green design, reverse logistics) interact as mutually reinforcing elements. Institutional theory further explains how normative, coercive, and mimetic pressures influence the adoption of GSCM practices, especially in emerging economies where cultural and policy contexts differ.

3.2.1. Socio-technical systems theory

STS theory has evolved from the pioneering work of Trist and Bamforth (1951), who argued that organizations are comprised of tightly intertwined social (behavioral) and technical (technology and related tasks) subsystems (Trist and Bamforth, 1951; Sarkis et al., 2011; Zhu et al., 2013; Jabbour and de Sousa Jabbour, 2016; Liu et al., 2020). In the context of GSCM, behavioral dimensions such as leadership commitment, employee engagement, and stakeholder collaboration represent the social subsystem, while technical subsystem includes eco-design, green manufacturing, and digital tracking systems (Boiral, 2009; Rehman et al., 2016; Geng et al., 2017; Liu et al., 2020; Hong et al., 2022). The interplay between these dimensions can drive improvements in environmental performance, operational efficiency, and corporate social responsibility by allowing firms to harness the power of green technology with human-centric strategies to achieve sustainability goals (Seuring and Müller, 2008; Muduli and Barve, 2013; Zhu et al., 2013; Cao et al., 2015; Kumar et al., 2019).

Interaction between the two dimensions, which is essential for the creation of environmental and social performance benefits, is not without external stimuli. Rather, the relational dynamics between these two dimensions are predominantly guided by forces at the institutional level that compel organizations to implement GSCM practices, thus improving their performance (Zhu et al., 2013; Seuring and Müller, 2008; Freeman, 1984). While Socio-Technical Systems (STS) Theory, with its focus on the behavioral and technical dimensions, can explain internal interactions in GSCM, it falls short of illustrating the external forces. In this regard, Institutional Theory offers a valuable understanding of the various external pressures from

stakeholders. This ensures alignment with industry norms, regulatory requirements, and competitive dynamics and facilitates sustainable operations in contemporary supply chains.

3.2.2. Institutional theory

Institutional theory primarily focuses on three pressures driving organizations towards sustainability-oriented behaviors. These include coercive (laws and regulations), normative (industry norms and standards), and mimetic (competition-based imitation) forces (Freeman, 1984; Seuring and Müller, 2008; Sarkis et al., 2011; Zhu et al., 2013). Regulatory frameworks, industry standards (e.g., ISO 14001), and customer expectations represent coercive forces that nudge firms towards adopting environmentally friendly practices (Hofstede, 1980; Park et al., 2007; Srivastava, 2007). Firms are also motivated to mirror their rivals' green initiatives, which are part of their sustainable supply chain management practices, for benchmarking and knowledge diffusion (Sarkis, Zhu and Lai, 2011; Chan et al., 2012; Dubey et al., 2015; Bae and Grant, 2018).

Normative factors include professional networks and trade associations that encourage and support organizations to align sustainability with their corporate strategies (Ajzen, 1991; Roy and Goll, 2014; Hong et al., 2022). Vachon (2010), Gedam et al., (2023), and Kumar et al. (2019) all highlight that institutional pressure is a critical element in shaping how companies respond to sustainability challenges. More importantly, this important input will reinforce the fit of technical and behavioral practices under GSCM. An optimally designed GSCM model that aligns well with institutional, technical, and behavioral constructs is essential for firms that are targeting long-term sustainability and competitiveness in modern-day supply chains.

Furthermore, cultural and contextual factors play a critical role in moderating the link between the two key constructs, which significantly impacts the strength of these relationships (Hofstede, 1980; El Baz and Iddik, 2020, 2022; Gedam et al., 2023). Societies with high collectivism values promote collaboration and knowledge sharing, which ultimately boosts green supply chain management (Freeman, 1984; Chu et al., 2019; Hong et al., 2022). On the other hand, technologically advanced nations with high individualism require strong government intervention to champion green practices (Park et al., 2007; Seuring and Müller, 2008; Liu et al., 2020). Additionally, enabling technologies such as AI-driven analytics, blockchain-enabled traceability, and Internet of Things (IoT) enabled real-time monitoring can significantly enhance the adoption of GSCM by promoting efficiency and transparency throughout the supply chain (Zhu et al., 2013; Roy and Goll, 2014; Jabbour et al., 2017; Dubey et al., 2022).

The regulatory environment also intensifies the effect of organizational behavior on their green practices such as green procurement, green logistics, and green waste management in firms (Boiral, 2009; Chan et al., 2012; Muduli and Barve, 2013). This integrative framework demonstrates that GSCM is multidimensional in nature and that sustainability performance is a derivative outcome of the synergistic interactions among its behavioral, technical, and institutional forces (Srivastava, 2007; Zhu and Sarkis, 2007; Jabbour and de Sousa Jabbour, 2016). As such, future studies can test these relationships by examining the hypothesized moderating effects of the three contextual factors using Structural equation modeling (SEM) to empirically verify the presence of moderating effects of these institutional, technological, and cultural influences on sustainable supply chain performance (Rajeev et al., 2017; Bae and Grant, 2018; Liu et al., 2020; Hong et al., 2022). The derived in-depth knowledge will be useful to governments and corporate executives in formulating sustainable GSCM strategies in various industries and countries.

3.3. Behavioral dimensions

Behavioral dimensions in GSCM refer to the human and relational factors that influence the adoption, implementation, and effectiveness of sustainable supply chain practices. These dimensions encompass the attitudes, values, behaviors, and interactions of individuals and organizations and play a crucial role in shaping the success of GSCM initiatives. Unlike technical or operational factors, behavioral dimensions' focus on the social dynamics within and between organizations, highlighting the human elements contributing to environmental sustainability goals (Liu et al., 2020). The key constructs of behavioral dimensions in GSCM include individual, organizational, and inter-organizational behaviors.

3.3.1. Individual behaviors

This includes the environmental attitudes, motivations, and actions of employees and organizational leaders. Environmental awareness, personal values, and commitment to sustainability influence how individuals engage with GSCM practices (Boiral, 2009). The attitudes of individuals are critical factors to consider when adopting and implementing GSCM practices successfully. Ajzen's (1991) theory of planned behavior has proven influential in demonstrating how individuals' attitudes toward environmental sustainability influences their organizational behaviors. Suppose they are strongly supportive of environmental protection and sustainability. In that case, these positive attitudes are likely to lead to increased proactive engagement with GSCM practices, thereby helping to foster a culture of sustainability (Jabbour et al., 2015). Employees also demonstrate a greater commitment to environmental initiatives in their work when such efforts align with their values.

Zhu et al. (2013) observed that employees with higher environmental awareness in Chinese manufacturing companies contributed more positively to green efforts. Seuring and Müller (2008) also stated that individual motivation is a key driver for sustainable practices within supply chains. However, resistance to change at the personal level remains a significant challenge. In India, as noted by Muduli et al. (2013), working in the mining industry, this was evident. This underscores the need for strategic approaches to foster and maintain positive environmental attitudes and a culture of continuous improvement. An even more significant but often overlooked moderating factor in many studies (Srivastava, 2007; Boiral, 2009; Zhu et al., 2013; Gedam, 2022) is the influence of broader socio-cultural factors on individual attitudes. Vachon (2010) found that national culture and its dimensions, such as collectivism, significantly influence individual behaviors in green supply chains. The results of this study vary widely and do not display a consistent pattern across different cultural and organizational contexts.

3.3.2. Organizational behaviors

Organizational behaviors include the culture, leadership commitment, and internal processes that either encourage or hinder the adoption of green practices. The idea of organizational culture is widely recognized as a key factor in the success of GSCM. A strong organizational culture that emphasizes environmental responsibility and support from top management is essential for integrating sustainability into the operations and activities of the supply chain (Roy and Goll, 2014; Jabbour et al., 2015). According to Schein (1990), culture consists of underlying assumptions and values that influence organizational behavior, directly affecting how much GSCM practices are accepted. Kumar et al. (2019) noted that organizational culture is an essential soft

dimension of GSCM, emphasizing that a supportive culture encourages adopting and implementing green practices.

In a study by Chu et al. (2019), flexible organizational cultures significantly strengthened the connection between customer pressure and green innovation. This study suggested that cultures promoting adaptability and innovation positively affect green outcomes. In another research, Bae and Grant (2018) found that the effect of organizational culture on GSCM can also be harmful, indicating that some aspects of organizational culture may become barriers to green practices in GSCM. Chan et al. (2012) discovered that external and internal environmental orientations and aspects of organizational culture significantly impact green supply chain activities. In this context, a poor organizational culture was a barrier to GSCM in the Pakistani manufacturing industry, as shown by Nazam et al., (2020). This is due to the lack of support and encouragement for sustainability initiatives within the culture. These studies suggest that while a strong organizational culture can positively influence GSCM adoption, certain cultural aspects may also act as barriers. Setthasakko (2009) reported that cultural diversity and a lack of commitment from management are additional barriers to GSCM implementation in the seafood industry in Thailand. These studies indicate that organizational culture can be a double-edged sword, either fostering or hindering green initiatives in GSCM, depending on specific cultural attributes and the broader organizational environment.

Leadership is another behavioral dimension that can either promote or hinder green practices. Transformational leadership, which motivates and inspires employees toward a shared vision, effectively promotes sustainable practices (Gedam et al., 2023). Leaders who prioritize environmental goals and integrate sustainability into their organizational vision are more likely to succeed in implementing GSCM practices (Ye et al., 2013; Dubey et al., 2015). Liu et al. (2020) found that fully implementing GSCM requires leadership commitment to environmental goals. This point was supported by Chan et al. (2012), who discovered that leadership greatly influences Chinese firms' green purchasing and investment recovery practices. Muduli et al. (2013) also emphasized the importance of top management support in overcoming resistance to GSCM in the Indian mining sector. However, the effectiveness of leadership styles is not universal and can vary across cultural contexts (Cao et al., 2018). The variation in leadership effectiveness across different cultural environments indicates the need to customize leadership strategies to match an organization's and its stakeholders' needs, values, and expectations. In another study, Setthasakko (2009) identified leadership commitment as essential for overcoming cultural barriers in Thailand and creating an environment conducive to adopting GSCM.

3.3.3. Inter-organizational behaviors

Inter-organizational behaviors, on the other hand, focus on relationships, collaborations, and interactions among supply chain partners, suppliers, customers, and other stakeholders. Trust, communication, and alignment of environmental goals among stakeholders are behaviors that can influence the successful integration of GSCM practices (Ye et al., 2013; Grimm et al., 2022). Freeman's (1984) Stakeholder Theory emphasizes the importance of effectively managing relationships with various stakeholders to achieve sustainability goals. Good communication and trust among supply chain partners are crucial for facilitating coordination of green initiatives (Ye et al., 2013; Zhu et al., 2013). Shared values and ethical commitments also foster collaboration between buyers and suppliers, promoting sustainable practices (Grimm et al.,

2022). Chandra and Kumar (2001) highlight the significance of trust in encouraging cooperation among supply chain partners.

Cheng et al. (2008) also found that trust significantly encourages inter-organizational knowledge sharing for the adoption of GSCM. This was further confirmed by Hu et al. (2019), who discovered that strong relationships between buyers and suppliers had a notably positive effect on the environmental performance of the food service industry. On the other hand, Chu et al. (2019) emphasized the importance of trust and collaboration in fostering green innovation within the logistics sector. However, cultural and contextual differences can pose challenges to inter-organizational collaboration (Nazam et al., 2020). This highlights the need to develop strategies for building and sustaining trust among supply chain partners across diverse cultural settings. Nazam eta al., (2020) identified that cultural misalignments and power imbalances among supply chain partners in Pakistan's manufacturing sector create barriers to collaboration in implementing GSCM. Therefore, understanding the factors that promote or hinder inter-organizational relationships in various contexts is crucial for designing practical solutions to ensure successful GSCM implementation.

3.4. Moderators of behavioral GSCM dimensions

While behavioral dimensions significantly influence the effectiveness of GSCM practices, it is essential to acknowledge that they are not the only factors at play. Instead, they are partly moderated by cultural and contextual factors. These elements act as moderators that influence the adoption, implementation, and outcomes of GSCM practices across different organizations and regions. Understanding how cultural and contextual moderators affect these processes can provide valuable insights into how companies can improve their sustainability performance by aligning their behavioral aspects with the specific cultural and contextual realities of their operating environments. For example, Gedam et al. (2023) explain that cultural differences can either facilitate or hinder collaboration among supply chain partners, affecting alignment. Similarly, Liu et al. (2020) emphasize that contextual factors, such as regulatory environments and market conditions, are critical in determining the success or failure of GSCM initiatives. Although the importance of these cultural and contextual moderators is increasingly understood, there is limited knowledge about how they interact with behavioral factors such as leadership styles, organizational culture, and inter-organizational collaboration to influence the overall outcomes of GSCM practices.

Culture influences individual and organizational behaviors, shaping perceptions and priorities. For example, El Baz and Iddik (2020) suggest that collectivist cultures support collaborative efforts in GSCM practices. Conversely, Zhu et al. (2013) found that individualistic cultures might need incentives to motivate stakeholders toward shared sustainability goals. Additionally, Gedam et al. (2023) noted that cultural misalignment among supply chain partners can cause resistance or inefficiencies when implementing green initiatives. Despite these findings, further research is necessary to investigate how cultural diversity within multinational supply chains impacts the effectiveness of organizational behaviors in GSCM.

The regulatory and institutional environments where organizations operate also affect their adoption and performance of GSCM. Kumar et al. (2019) observed that organizations tend to show higher levels of green commitment in regions with strict environmental regulations. Additionally, Liu et al. (2020) found that institutional pressures such as industry standards and certifications influence inter-organizational behavior by encouraging trust and collaboration among supply chain partners. However, as Freeman (1984) pointed out, the lack of cohesive regulatory frameworks in some areas creates challenges for alignment and

effectiveness. This gap in the literature underscores the need for a deeper understanding of how various regulatory environments interact with behavioral factors to influence the success of GSCM.

Collaboration among organizations in GSCM is also influenced by cultural factors that affect trust-building, communication, and resource sharing. Gedam et al. (2023) highlighted that partners with similar cultural backgrounds are more likely to engage in open communication and collaborative decision-making, resulting in better outcomes. Conversely, Karimi and Rahim (2015) observed that cultural differences, particularly in multinational supply chains, can increase conflict and hinder cooperation. Liu et al. (2020) proposed that implementing structured conflict resolution mechanisms and culturally aware leadership could help minimize these issues. However, there is still a research gap regarding how specific cultural traits, such as power distance and uncertainty avoidance, influence inter-organizational behavior in GSCM.

Market dynamics and economic conditions also significantly influence GSCM. For example, in developing regions, economic constraints often limit resources for sustainability initiatives, leading to disparities in GSCM adoption (Gedam et al., 2023). Furthermore, market competition and financial incentives shape companies' commitment to sustainability as they try to balance cost efficiency with environmental responsibility (Sujanska and Nadanyiova, 2023). Although sustainability-driven marketing strategies have been shown to enhance corporate image and build customer trust, there is limited research on how financial constraints impact firms' willingness to implement green practices (Sujanska and Nadanyiova, 2023). This underscores the importance of adaptive GSCM strategies that take market and financial realities into account and explore ways for companies to overcome economic barriers to sustainability. Future research should focus on how organizations in resource-limited environments address these challenges and use sustainable branding as a strategic tool to promote long-term GSCM adoption.

Lastly, cultural and contextual factors often shape leadership styles and their effectiveness in GSCM. As Kumar et al. (2019) point out, transformational leadership generally succeeds more in collectivist cultures where leaders can leverage shared values to inspire change. Conversely, Gedam et al. (2023) note that participatory leadership approaches may be less effective in high power-distance cultures, where decision-making is typically top-down. Additionally, Liu et al. (2020) argue that leaders operating in resource-constrained settings need to adopt adaptive strategies that balance sustainability goals with economic limitations. These studies highlight the complexity of leadership in diverse cultural and contextual environments, emphasizing the need for further research to understand how cultural dimensions' influence leadership effectiveness in GSCM. While the existing literature has made significant progress in stressing the importance of cultural and contextual factors as moderators of behavior, some gaps still exist. For example, there is a limited understanding of how cultural diversity within multinational supply chains impacts trust and collaboration. Gedam et al. (2023) and Liu et al. (2020) have proposed integrative frameworks that incorporate cultural and contextual variables to address this challenge.

3.5. Conceptual framework and research propositions

Figure 3 presents a conceptual framework synthesized from the themes identified in the reviewed literature. Behavioral drivers (such as leadership commitment, employee engagement, and supplier collaboration) interact with technical GSCM practices and are shaped by contextual factors like culture and regulation. Each component in the framework corresponds to one or more dominant themes emerging from the review

synthesis. *First,* the literature indicates that behavioral GSCM practices serve as a foundation that promotes the adoption of technical solutions. This suggests that when companies implement sustainable supply chain strategies, green marketing, and collaborative problem-solving, they establish a basis for technical solutions to enhance environmental, economic, operational, and social performance. *Second,* institutional factors such as regulatory (coercive), normative, and mimetic pressures shape how firms integrate both behavioral and technical aspects of GSCM. As a result, companies encounter multiple institutional pressures that influence their green commitments and efforts to meet standards and expectations. *Third,* cultural values and technological advancements act as moderating factors that influence the success of technical GSCM practices. This implies that the impact of technical GSCM methods on measurable sustainability outcomes depends on how well these practices align with cultural values and are supported by technology. *Finally*, this section provides a detailed view of how the variables within the framework are interconnected and collectively influence GSCM effectiveness.

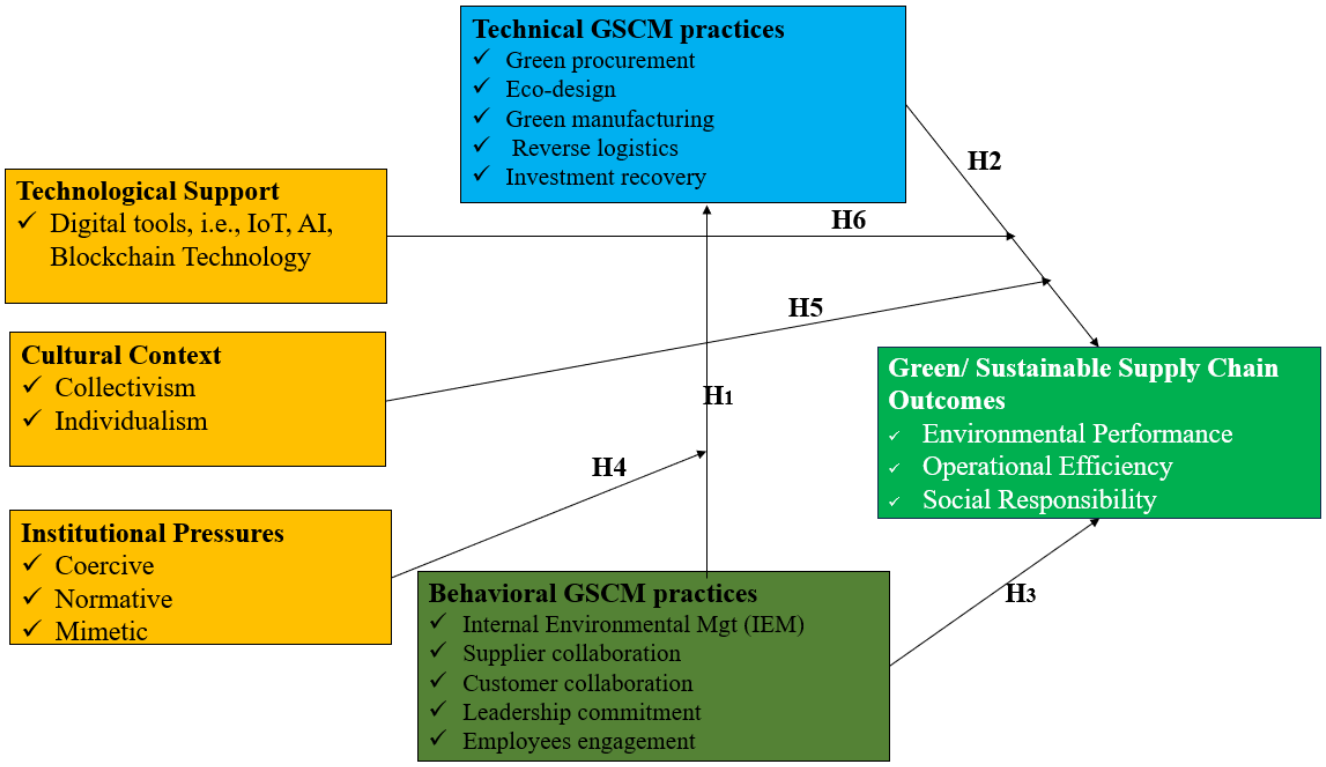


Figure 3. A proposed comprehensive framework that integrates behavioral, technical, and contextual elements (technological support, cultural and institutional pressures) to enhance the implementation of GSCM (Source: Developed by authors from the Literature (2025).

Understanding these interactions can help develop strategies considering various factors, leading to improved sustainability outcomes. Future empirical research should investigate these relationships across multiple industries and regulatory environments to develop industry-specific GSCM implementation models that foster sustainable success.

3.5.1. Behavioral GSCM practices and technical GSCM practices

Behavioral GSCM practices, including elements such as top management commitment, employee involvement, and collaboration with other organizations, have a significant impact on the implementation of technical GSCM practices. Increased awareness of environmental issues and organizational citizenship behaviors enhances a firm's ability to adopt eco-design, green manufacturing, and digital traceability solutions (Boiral, 2009; Liu et al., 2020; Hong et al., 2022). Cao et al. (2015) and Seuring and Müller (2008) suggest that organizational culture plays a crucial role in shaping the importance given to technical green innovations, which, in turn, strengthens the link between leadership commitment and changes in technical sustainability practices. Prior research indicates that integrating social and technical elements leads to better sustainability outcomes, as the success of technical solutions depends on the support of the behavioral environment (Zhu et al., 2013; Jabbour and de Sousa Jabbour, 2016). Consistency among culture, leadership commitment, and technical green innovations facilitates the implementation and institutionalization of sustainability initiatives within a company's strategic and operational plans, resulting in improved long-term environmental and operational performance. Based on the literature, the authors propose the following first research proposition (RP):

> *RP1: Behavioral GSCM practices drive the adoption of technical GSCM practices by fostering a sustainability-oriented culture.*

3.5.2. Technical GSCM practices and sustainable supply chain outcomes

Technical GSCM practices such as green procurement, green production, and waste reduction technologies can lead to improved environmental, operational, and social performance (Srivastava, 2007; Kumar et al., 2019). The use of green logistics and reverse supply chain practices can significantly reduce carbon emissions and resource consumption, contributing to the organization's overall sustainability (Muduli and Barve, 2013; Zhu et al., 2013). Additionally, implementing technology-based solutions, such as blockchain and artificial intelligence (AI), can enhance operational efficiency by increasing transparency and accountability within the supply chain (Freeman, 1984; Jabbour et al., 2017). According to the existing literature, technical interventions are crucial drivers of sustainable supply chain outcomes across various industries (Roy and Goll, 2014; El Baz and Iddik, 2020). Integrating advanced technologies with technical GSCM practices can optimize resource utilization and boost sustainability performance by improving transparency, efficiency, and accountability throughout the supply chain. Based on this review, the authors propose the second research proposition:

> *RP2: Technical GSCM practices enhance sustainable supply chain outcomes through improved environmental, operational, and social performance.*

3.5.3. Behavioral GSCM practices and sustainable supply chain outcomes

Behavioral GSCM practices promote sustainable supply chain outcomes by enhancing environmental, operational, and social performance. Organizational behaviors such as top management commitment, employee involvement, and stakeholder collaboration shape an internal culture that prioritizes green initiatives and supports sustainable supply chain practices (Boiral, 2009; Jabbour and de Sousa Jabbour,

2016). Leadership commitment aligns strategies with sustainability goals, resulting in improved environmental performance, including waste reduction and emission control (Cao et al., 2018; Liu et al., 2020). Employee participation boosts green innovations as workers engage in green training and policy implementation, fostering a proactive approach to environmental sustainability (Grekova et al., 2016; Stadtler and Lin, 2017). Collaboration with suppliers and customers facilitates knowledge sharing and co-creation of green solutions, leading to more resilient supply chains against environmental risks (Vachon and Klassen, 2008; Choi and Hwang, 2015). Firms actively engaging in behavioral sustainability practices tend to achieve higher operational efficiency and compliance with sustainability regulations, providing them with a competitive edge (Zaid et al., 2019; Luu, 2020). Therefore, behavioral GSCM practices are essential for achieving long-term sustainability in supply chain management, as they drive human-led initiatives that support technological innovations and generate significant environmental and economic benefits. This, in turn, leads to the third research proposition:

> *RP3: Behavioral GSCM practices promote sustainable supply chain outcomes by fostering leadership commitment, employee engagement, and stakeholder collaboration.*

3.5.4. Institutional pressures, behavioral factors and technical GSCM

Institutional pressures such as coercive (regulations), normative (industry standards), and mimetic (peer influence) influence the relationship between behavioral and technical green supply chain management (GSCM) practices. Regulatory compliance often guides how firms move from behavioral commitments to technical adoption in industries where sustainability measures are enforced by government bodies (Park et al., 2007; Ye et al., 2013; Zhu et al., 2013). Organizations operating in highly regulated industries tend to adopt green technologies quickly due to coercive pressures stemming from legal frameworks, certifications like ISO 14001, and environmental reporting guidelines (Ajzen, 1991; Sarkis, 2003; Seuring and Müller, 2008; Saeed et al., 2018). These external pressures, therefore, compel firms to combine behavioral strategies like leadership commitment and stakeholder involvement with technical innovations such as digital traceability and automation as part of their response to meet compliance (Graham, 2020; Liu et al., 2020).

Besides coercive forces, normative influences arising from industry best practices, trade associations, and professional networks also affect firms' adoption of green supply chain practices. Organizations often benchmark against industry leaders in an effort to align their sustainability initiatives with sector-wide expectations, which frequently leads to stronger integration of behavioral and technical aspects (DiMaggio and Powell, 1983; Boiral, 2009). These standards and best practices also encourage firms to participate in cross-sector knowledge-sharing initiatives that significantly enhance environmental performance (Freeman, 1984; Ye et al., 2013). Mimetic forces, on the other hand, drive firms to copy successful green supply chain transformation efforts by competitors, especially in situations with high uncertainty regarding sustainability policies and market expectations (Cao et al., 2015; Bae and Grant, 2018). Vachon (2010) and Kumar et al. (2019) argue that institutional pressures act as enablers that shape and influence corporate responses to sustainability challenges across industries. This, in turn, supports the integrated approach of combining technical and behavioral practices in GSCM to promote sustainable supply chain outcomes. Therefore, the fourth research proposition:

RP4: Institutional pressures strengthen the link between behavioral and technical GSCM practices by promoting compliance with sustainability standards and alignment with industry requirements.

3.5.5. Cultural factors, technical practices and sustainable supply chain outcomes

Cultural factors play a crucial role in shaping the effectiveness of GSCM strategies and sustainable supply chain performance. It is essential to acknowledge that cultural dimensions, including collectivism, uncertainty avoidance, and long-term orientation, significantly influence the adoption of green initiatives (Hofstede, 1980; Roy and Goll, 2014; Chu et al., 2019). Organizations from collectivist cultures focus on collaboration, shared responsibility, and consensus-building, which enhances stronger supplier engagement and knowledge-sharing efforts (Hofstede, 1980; Chowdhury et al., 2020; Hossain et al., 2021). Meanwhile, cultural environments with high uncertainty avoidance tend to have more developed regulatory systems and formalized sustainability policies, resulting in greater compliance with environmental standards (Park et al., 2007; Rizzi et al., 2023). Therefore, cultural orientations can influence how organizations prioritize sustainability goals, aligning with or conflicting with current regulatory requirements and industry standards. Consequently, the fifth research proposition is formulated as:

RP5: Cultural factors influence the effectiveness of technical GSCM practices in achieving sustainable outcomes.

3.5.6. Technological factors, technical practices, and sustainable supply chain outcomes

Technological factors also influence how technical practices affect sustainable supply chain performance by enabling real-time data collection, predictive analytics, and automation. The integration of emerging technologies such as Artificial Intelligence (AI), blockchain, and the Internet of Things (IoT) in supply chains enhances transparency, traceability, and visibility (Giannakis and Louis, 2016; Dubey et al., 2019; Dubey et al., 2022; Khan et al., 2022). The adoption of these technological tools enables firms to optimize resource use, reduce waste, and lower their carbon footprint, thereby positively impacting their environmental sustainability metrics (Roy and Goll, 2014; Yang et al., 2019; Chowdhury et al., 2020; Sarkis et al., 2021). Moreover, companies with strong digital infrastructure are better positioned to implement green procurement and reverse logistics strategies, while organizations lagging in digital transformation may struggle to expand their GSCM efforts (Sarkis et al., 2021; Khan et al., 2023; Matin et al., 2023). Therefore, technological enablers shape the strength of the relationship between technical GSCM strategy and supply chain outcomes. Finally, the sixth research proposition is stated as:

RP6: Technological advancements enhance the impact of technical GSCM practices on supply chain outcomes.

4. Conclusion

This study examined GSCM implementation efforts from a behavioral perspective to promote better and more sustainable supply chain performance. While conventional GSCM focuses on technical processes such as

innovations and operational procedures, our study suggests that firms must also pay attention to behavioral aspects like leadership, organizational culture, individual attitudes, collaboration with customers and suppliers and/ inter-organizational relationships to enhance GSCM outcomes. Our findings suggest that GSCM encompasses more than just a collection of technical practices, such as eco-design, green manufacturing, green production, and reverse logistics, as reported in the literature. GSCM should also encompass behavioral attributes such as employee engagement, leadership, and collaboration. The key driver or first step in GSCM is the level of commitment that leadership demonstrates toward sustainability. Leadership's attitude toward GSCM shapes the organizational culture regarding sustainability and continuous improvement. Leadership commitment and promoting employee engagement are crucial for all firms.

Collaboration across different functions within an organization also boosts progress toward sustainability. Encouraging inter-organizational relationships based on trust, transparency, and shared environmental goals between a firm and its partners can enhance the effectiveness of GSCM. The study also found that contextual and ecological factors, such as culture and institutions, can influence the relationship between behavioral GSCM practices and their outcomes. A collectivist culture encourages better collaboration and supplier relationships, while some institutional structures with a hierarchical setup may create bureaucratic barriers that hinder improvements and sustainability efforts. However, the study recommends that firms adopt a comprehensive approach to GSCM (technical and behavioral practices). Aligning behaviors with technical practices is essential to ensure organizational resilience in sustainability and to continually work toward long-term environmental and economic goals.

4.1. Managerial and /theoretical implications

4.1.1. Managerial implications

The insights gained from this study can guide several managerial actions to improve the effectiveness of GSCM in practice. *First,* the study emphasizes the significance of leadership commitment in promoting a culture centered on sustainability by clearly communicating environmental objectives and serving as role models. This finding suggests that managers and decision-makers can influence GSCM practices by promoting a sustainability-driven culture through transparent communication of environmental visions, setting specific targets for green initiatives, and consistently demonstrating these commitments through their actions and choices. *Second,* this review highlights the importance of employee engagement and cross-functional teamwork as key factors for successful GSCM. Managers can encourage this involvement through training programs, incentives, and rewards for sustainable behaviors, and by establishing open communication channels across various functions and departments. *Third,* the study also emphasizes the benefits of establishing robust, collaborative inter-organizational relationships founded on trust, transparency, and shared environmental values and objectives. Managers can foster such collaboration by actively working with suppliers, customers, and other stakeholders. This approach would support the development of a more unified and integrated supply chain network focused on achieving common sustainability targets. *Lastly,* by considering cultural and contextual factors, managers can customize their GSCM strategies to match the unique features of their operational environment, such as local cultural attitudes toward sustainability, regional stakeholder expectations, and regulatory and market conditions. This personalized approach can significantly boost the overall success of supply chain operations from both organizational and environmental standpoints.

4.1.2. Theoretical Implications

The study also advances the theoretical development of GSCM by conceptually integrating behavioral dimensions into existing theories such as socio-technical systems and institutional theory. This work improves STS theory by providing theoretical evidence that the successful adoption and implementation of GSCM practices depend on the compatibility between well-designed technological innovations and the level of behavioral readiness within organizations. Moreover, this research broadens current understanding of institutional theory by showing that the impact of external coercive, normative, and mimetic institutions, such as regulatory and compliance mechanisms, market and competitive pressures, and industry best practices, is mediated by internal behavioral factors. The study also emphasizes the moderating role of cultural and contextual factors in the link between behavioral dimensions and effective GSCM practices.

4.2. Study limitations and future research directions

The study encountered some limitations, including the following:

First, the results of this review are subject to biases inherent in the systematic literature review (SLR) methodology, including publication bias, language restrictions, and exclusion of gray literature. Consequently, future studies may extend this study by including more research publications not indexed in Scopus, non-English publications, and gray literature such as industry reports, policy briefs, and unpublished studies that were not included here. Future researchers can address this by broadening their sources to include white papers, industry reports, and non-peer-reviewed publications to obtain a more comprehensive and inclusive perspective on GSCM.

Second, this study only analyzes cross-sectional behavioral-technical interactions, which means it does not capture the long-term effects and outcomes of these interactions on GSCM over time. Future research could conduct longitudinal studies to examine how these relationships develop and change, and whether initial focus on behavioral or technical factors leads to sustained improvements in green supply chain performance.

Third, this study offers theoretical insights but lacks empirical validation. Future work should use diverse methodological approaches such as empirical research, case studies, and experimental designs to test the relationships proposed in this review and validate them in real-world supply chain contexts. Such research could also provide a valuable empirical basis for testing and validating the proposed behavioral and technical frameworks. Although the study explores how regulatory policies influence suppliers' commitment to GSCM, it does not thoroughly evaluate their long-term effectiveness.

Fourth, future studies should investigate how different regional environmental regulations impact supplier cooperation and compliance behavior. This could clarify whether stricter regulations lead to genuine sustainability improvements or encourage compliance-based actions. Furthermore, the role of consumer-driven sustainability expectations in supplier decision-making and investment in green strategies was not addressed. Future research could analyze how consumer awareness, eco-labeling, and corporate sustainability commitments influence supplier compliance and investment in green technologies.

Fifth, the study also overlooks the influence of industry benchmarking and sustainability performance metrics on GSCM practices. Analyzing how competitive pressures and industry best practices motivate suppliers to adopt greener production and procurement methods could offer additional insights into the

drivers of sustainable industry change. Additionally, the impact of external stakeholder pressures and policy interventions shaping sustainability behaviors within supplier companies was not addressed. *Finally,* future research could examine how financial incentives, supplier development programs, and public-private partnerships can enhance long-term supplier engagement in sustainability initiatives and contribute to a more effective and scalable GSCM model.

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