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BEYOND DYADIC GREEN SUPPLY CHAIN MANAGEMENT: EXPLORING FOCAL ORGANIZATION AND MULTI-TIER GREEN SUPPLY CHAIN MANAGEMENT - A LITERATURE SURVEY

Yohana Arsen RUTABA
The University of Dodoma
College of Business and Economics
E-mail: yohana.rutaba@udom.ac.tz

Abstract

In reviewing the traditional green supply chain focus and the published literatures, in both developed mechanisms on environment protection and greening of processes in production emerged as the major issues for most of manufacturers, suppliers and customers, sustainability issues in supply chain is not captured in a bigger picture and it is a prevail problem since most of the focal companies concentrate on their immediate suppliers to gasp the issues of sustainability. There is a shift that needs to considered when dealing with sustainability and greening of supply chain, where the focus should be on multitier perspective versus the traditional single tier perspective in supply chain management, as it stand green multitier supplier management (GMSM) is gaining popularity. This study was created with the support of a literature review, which helped to consolidate the specifics and provide useful information. Published works included in this study are those which provide illustrations on the concept of multi-tier green supply chain as an extended and best approach compared to dyadic green supply chain. This paper is guided by complexity theory; Through heterogeneity or diversity in external aspects like consumers, suppliers, laws, and technology improvements, one can establish complexity within an organizational framework.The findings demonstrate that focal companies needs to capture a bigger picture of the green supply chain and consider the status of the whole supplier chain to ensure sustainability, and the drivers to make this a reality includes: Trust between a focus company and direct suppliers, Willingness to assist suppliers with human resources, willingness of a first-tier supplier in sharing information with the focus company on second-tier suppliers, just hinting on the few. Considering the forces in globalization and the

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call to greening supply chain, companies are recommended to practice in a form that consider all the tiers in supply chain far as green supply chain is concerned and that greening supply chain is a continuous process in supply chain and need reasonable improvements on the way. Governments in developing countries need to initiate process that captures continuous process improvement in public procurement to ensure the deliverables observe greening of supply chain.

Keywords*: Supply chain management, Multi-Tier Green Supply Chain, Dyadic green supply chain, Sustainability, and Focal organizations.*

1.0 Introduction

In reviewing the traditional green supply chain focus and the published literatures, in both developed (Green et al., 2019; Choi et al., 2018; Laari, Töyli, Solakivi and Ojala, 2018) and developing nations, (Choi, Min and Joo, 2018; Green, Inman, Sower and Zelbst, 2019; Laari et al., 2018) mechanisms on environment protection and greening of processes in production emerged as the major issues for most of manufacturers, suppliers and customers, sustainability issues in supply chain is not captured in a bigger picture and it is a prevail problem since most of the focal companies concentrate on their immediate suppliers to gasp the issues of sustainability.

Most of the companies in the world focus on their immediate supply when consider the issues of sustainable and green supply chain, they focus on dyadic relationship. Dyadic focus in sustainable supply chain is not desirable relationship as it doesn't take into consideration the causal issues of environmental problems, as it fails to capture a larger picture in green supply chain, (Sarkis, Santibanez Gonzalez, and Koh, 2019; Doua, Zhub, and Sarkis, 2018;Garcia-Torres, Albareeda, Rey-Garcia, and Seuring 2019).

The literature in green supply chain and supplies has definitely focused most on dyadic or the single-tier levels. As on the other perspectives that it is from the understanding of a fully sustainable green supply chain that the largest environmental impacts and influence can be addressed (Sarkis, Santibanez Gonzalez, and Koh, 2019; Doua, Zhub, and Sarkis, 2018;Garcia-Torres, Albaredaa, Rey-Garcia, and Seuring 2019;

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Gonzalez et al. 2018). This can proide the better understanding of green/ sustainability initiatives in the bigger picture of supply chain.

There should be a shift in the perspectives, extend the narratives to sub-supplier levels. As from the buyer's standpoint, a sub-supplier level is any component of the supply chain that comprises entities other than the buyer's direct supplier. On these narrations, green multitier supplier management (GMSM) is gaining popularity (Seuring and Beske, 2014; Pagell and Shevkchenko, 2014). As we move to sustainable practices, the effort towards best practice in green supply chain need to encompass tiers beyond dyadic relationship, the current practice is that most of the organization still deals with the immediate suppliers; there is a need to understand this bigger picture in green supply chain management (Tachizawa and Wong, 2014).

The dangers in environment may be linked from second or even the lower-tier suppliers in supply chain and on this it is essential to consider the whole supply chain sub-supplier level suppliers are frequently responsible for some of the critical environmental challenges and social challenges in the supply chain (Grimm, Hofstetter, &Sarkis, 2014). As on the efforts towards building sustainable supply chain the literature to capture on the aspect of multitier relationship is limited and more studies need to be carried out as will help to enable effective management of green multitier suppliers (Grimm, Hofstetter, &Sarkis, 2014; Tachizawa and Wong, 2014). Green multitier supply chain management goes beyond the buyer-supplier relationship. It recognizes that companies can have significant environmental impacts that extend beyond their direct suppliers or customers. Instead, businesses may find that their environmental footprint is influenced by the actions of sub-suppliers or downstream or upstream customers in the supply chain. As a result, green multitier supply chain management focuses on managing the environmental perspectives (performance) of both downstream and upstream entities to mitigate these impacts.

3.0 Theory: Complexity Theory

In reviewing literature and articulations on the practical aspects of green supply, the study opted the complexity theory to link between players in supply chain (on their heterogeneity or diversity). The heterogeneity or

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and diversity of external factors considers description of complexity on governmental restrictions, consumers, technology improvements and suppliers Chakravarthy, 1997). As the complexity arises on these factors organizations find it difficult to forecast and to plan their actions, like deploying GSCM. On this theory, it consider firms functioning are in a system that has both disorder and order (Prigogine, 1984), by which interactions between the parties on it will decide how well the system performs. In order to adapt to the system, businesses must be attentive to and responsive to their environmental factorz, taking into account co-evolution and the interdependencies (Crozier and Thoenig, 1976).

The complexity of more general organizational complexities like size and relationships, or of particular operations like recycling, quality checking, re-manufacturing, inspection, and product return, might make it more challenging to adopt GSCM (Vachon and Klassen, 2006b).

Previous research works has highlighted the challenges in fully integrating supply chains, especially in greening aspects (Matos and Hall, 2007; Guide and Wassenhove, 2009). Due to limited decision-making capabilities and a lack of visibility into the contributions of other partners, it is difficult to accurately predict the effectiveness and efficiency of Green Supply Chain Management (GSCM) practices at large..If more social, political, economic, and environmental issues are taken into account while more parties are engaging with one another; the difficulties of adopting GSCM will be intensified (Bai and Sarkis, 2010a).

Complexity theory emphasize on the significance of intricate links and partnerships in GSCM, the theory recognizes that processes like customer cooperation in product returns engage various parties, creating complex chains that require careful management for effective, efficiency and sustainable supply chain operations. Interactions among participants facilitate information exchange and shared understanding (Yang, 2010). By connecting and coordinating, stakeholders can reduce uncertainties associated with GSCM operations and guide the system's behavior. The theory of inter-organizational learning is linked to the adaptability of complex systems, emphasizing the importance of collaborative learning for GSCM.

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2.0 Methodology.

The literature survey approach was used in this study. According to Sekharan (1992, p. 37), this involve "the documentation and discussion of a comprehensive assessment of the published and unpublished work from secondary sources information and data in areas of specific interest to the researcher." This study was created with the support of a literature review, which helped to consolidate the specifics and provide useful information.The method involved reviewing published papers and books on sustainable and GSCM, published to detail the meaning of sustainable and GSCM terms, the extension from dyadic green supply chain relationships to multi-tier GSCM practices. Published works included in this study are those which provide illustrations on the concept of multi-tier green supply chain as an extended and best approach compared to dyadic green supply chain

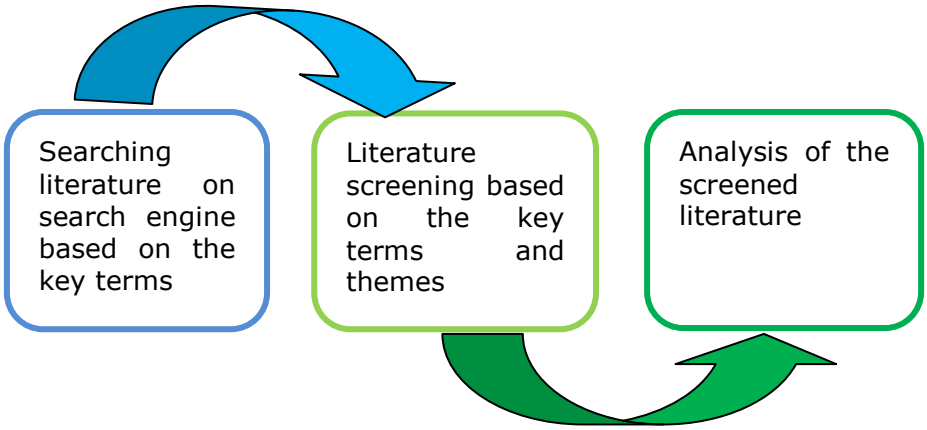

Figure 1. Literature Survey Process
Source(s): Author own construction

The study explored the concepts of beyond dyadic greening of supply chain management; it focuses on the focal organization and multi-tier green supply chain management to provide insights on these aspects. In the course of conducting the study, a systematic approach was employed to search, collect and examine information that is related to these themes. Specifically, the study examined the literature on the aspects of dyadic green supply chains (traditional supply chain) and multi-tier green supply chains. In the initiation of the process, a systematic search

strategy was employed, this included utilization of search engines and academic databases in the identification of pertinent literature. This step ensured a comprehensive exploration of existing knowledge; this enabled the access a diverse range of sources from different journals and relevant academic books.

As on the search process, a wide range of published papers from different reputable journals and academic books were surveyed. The sources provided valuable insights as on the concepts of dyadic green supply chain and the concepts of multi-tier green supply chain management. The selection criteria focused on the inclusion of that materials that shed light on these specific identified themes and areas, conducted safe in the knowledge that the literature surveyed was entirely and directly relevant and associated with the research objectives of the study. It encompassed a breadth of scholarly and academic works; on this the researcher was in the position to review, understand and capture diverse perspectives and the theoretical frameworks related to sustainable supply chain practices.

Furthermore, in the literature surveyed, particular attention was given to the understanding the evolution and the implications of transitioning from dyadic green supply chain to multi-tier green supply chain practices. Through the synthesis and analysis of the selected literature, trends, patterns, and gaps in the existing knowledge were elucidated. This comprehensive review not only provided a solid foundation for the study but it also facilitated identification of key concepts and theoretical frameworks essential for framing the research inquiry. Overall, the systematic literature survey process facilitated a thorough exploration of the selected themes, enriching the study with the valuable insights and informing subsequent research endeavors in the area of green supply chain management.

4.0 Findings and Discussion.

In the focus of greening supply chain and the sustainable supply chain, the authors have increasingly keep on recognizing the central importance of extended SCM beyond dyads (Choi and Wu, 2009; Mena, Humphes, and Choi 2013;Seuring and Beske 2014; Pagell and Shevkchenko 2014; Torres, Albareda, Garcia, and Seuring 2019;

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Tachizawa, and Wong 2014). This demonstrate that focal organizations need to give consideration and focus that lies beyond the traditional dyadic supplier buyer relations, and this will provide meaning for greening each stage in the supply management.

The world now has greater and new obstacles arise as a result of sustainability; problems have grown more complicated and solving difficult (Bai and Sarks, 2018; Santibanz-Gonzalez et al. 2018). The coordination and integration of various supply chain actors can help to balance and reduce sustainability effects (Zissis et al., 2018).In order to solve sustainability concerns, enterprises must successfully collaborate. The relative sphere of intervention and influence as reflected from Hall, (2006), grows as the scope of the project expands. In order to accept a sustainability concept throughout several supply chain tiers, established institutional norms must be altered further (Grimm *et al,* 2016).

Tachizawa and Wong (2014) conducted a thorough analysis of the literature on GMSM implementation and developed a typology of green supply chain management implementation options, including "direct," "indirect," "working with third parties (competitors/NGO/government, etc.)," and "don't bother." Direct approaches resemble the multi-tiered supply chain structure (MSCS), where the focal organization connects with lower-level suppliers (Men, Humphries, & Choi, 2013). As in industries with demanding requirements for like parts, like car and aircraft manufacturing, the primary businesses (those producing the final products) typically select and approve crucial sub-suppliers who match their sustainability efforts and practices. The focal organization requires that its direct suppliers should use certified sub-suppliers as a condition of doing business with them (Choi and Hong, 2002; Mena et al, 2013).

4.1 Drivers for Implementing GMSM/ Enablers for Implementing GMSM

According to researchers, key factors driving organizations to adopt Green Supply Management Systems (GMSMs) include stakeholder pressure, environmental risk management, and gaining a competitive edge (Petersen and Lemke, 2015). Some focal organizations incorporate sub-suppliers into eco-friendly product development. Similar to involving direct suppliers, this approach potentially offers benefits such

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as: Reduced costs and timeframes, Enhanced environmental reputation and increased competitiveness. These advantages can be realized by implementing green procurement practices. Strong partnerships between organizations and their suppliers are crucial for the effective implementation of cutting-edge environmental technologies. Based on research by Grimm et al. (2014) and others, many of these early facilitators have a solid connection to relational theory, as proposed by Dyer and Singh (1998). The following section presents drivers or enablers identified from various literature sources in the Green Supply Management (GMSM) field.

4.1.1 Trust established or to be established between a focal organization and the direct suppliers. For green supplier management systems to succeed, direct suppliers must trust the focal organization. Trust within the supply chain fosters knowledge and information sharing. When trust is high, direct suppliers are more open to green supplier management techniques and sharing information about their suppliers. This trust is essential for focal companies to effectively manage lower-tier suppliers. In some instances, organizations must interact with the sub-suppliers indirectly. This sort of relationship can be unstable if there is no trust between the main organization and its immediate suppliers. It is crucial to establish trust between the main company and direct suppliers. It is noted that sharing information between these parties enables them to effectively participate in strategic decision-making processes.

4.1.2 Willingness to assist suppliers with human resources. Organizations like the Small and medium-sized firms often encounter a shortage of skilled employees in these aspects in their upstream supply chains, in the processing or while instituting processes for implementing Green Supply Chain Management (GSCM) programs. To address this kind of constraints, these companies can partner with other firm that are more specialized that can provide human resource support and the required or he demanded expertise. These firms may collaborate with the intention to offer training and consulting services that help suppliers develop the capabilities and skills needed for the implementation of GSCM. Additionally, they may facilitate the sharing

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of best practices and knowledge throughout the supply chain, and moving to promoting a more sustainable approach.

4.1.3 The willingness of a 1st - tier supplier to share information with the focus firm on second-tier suppliers. While suppliers are often overlooked as drivers of environmental sustainability by focal businesses, establishing collaboration with them as through sharing of information could lead to positive environmental outcomes and enhance the focal organization's competitiveness in the process, long as there's a will. The willingness of first-tier suppliers to share information about their own suppliers is also crucial, and this due to factors such as trust and the competitive environment, these factors may dictate the success of the process. Companies often rely on information about their second-tier suppliers (those who supply their first-tier suppliers) that is passed on by their first-tier suppliers, this structures explains a lot about collaboration capabilities and willingness to share. This is because large companies typically have numerous second-tier suppliers and may not have the resources to directly gather information from each of them in the specific supply chain..

4.1.4 A focal company's top executives' unwavering support. Senior leadership within an organization plays a crucial role in successful green supply chain management (GSCM) initiatives and practices. This support is evident in both external and internal supplier management programs that prioritize sustainability. Top management's willingness to invest resources in GSCM activities demonstrates the organization's commitment to environmental responsibility. Upper-level suppliers are more actively involved in global supplier management programs and are more likely to participate and contribute their own resources to support lower-level suppliers when they have support from senior management and additional resources from a central coordinating organization.

4.1.5 Members of the supply chain who are geographically close/ or next to one another. Close proximity among supply chain partners is essential because it: Simplifies the organization of training programs, Allows for frequent inspections and oversight , Reduces transportation costs, Facilitates efficient implementation of GMSM practices by the focal company due to easier coordination and communication. Resource

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and information sharing becomes more efficient, cost-effective, and adaptable across different resource types, including physical assets, human resources, and personal interactions. This facilitates faster responses, enables verification of physical evidence, and integrates direct actions towards promoting an environmentally friendly supply chain.

4.1.6 Willingness to offer suppliers with the physical assets they require. Focal businesses can invest in their suppliers' side physical assets, such as recycling or pollution control equipment, to support green supplier development strategies. These tangible resources empower suppliers to improve their environmental performance and share their capabilities with others. GMSM has a higher likelihood of success when a participating company expresses commitment by providing essential physical assets. This commitment demonstrates the focus company's high regard for the program and fosters trust in the potential for a lasting partnership. Furthermore, investments in physical assets influence the selection of sub-suppliers capable of delivering the required assets.
It's crucial to provide financial assistance to suppliers. Money is an essential resource for improving capabilities, especially in terms of environmental performance. Green supplier development strategies demand substantial financial investments.

4.1.7 Amount of buyer power over direct suppliers. Power is a complex web of relationships that involves the distribution of authority and resources. Organizations holding more power may have a stronger ethical impact on those with less power, influencing the conduct and decision-making of entities throughout the chain of supply (Amaeshi, Osuji, &, 2008). Due to the demands of Green Multitier Supply Management (GMSM) projects, suppliers may hesitate to accept additional work. The greater power advantage held by the focal organization allows them to exert pressure on immediate suppliers to adopt environmentally friendly procurement practices and other dispersed greening initiatives (Touboulic, Chicksand, & Walker, 2014).

4.1.8 Low risk of supplier bypassing. When a company cuts ties with a primary supplier and instead purchases goods directly from a lower-tier supplier, a disintermediation risk known as "supplier bypassing" arises.

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Suppliers hesitant to participate in GMSM initiatives fear being bypassed by the buyer. Fostering long-term relationships built on trust and open communication between the buyer and the suppliers can address these concerns.

4.1.9 Robust understanding of supply chains by a focal organization/firm. For organizations to effectively implement a GMSM (Global Supplier Management System) approach, they need a deep understanding of their upstream supply chain members. This includes knowledge of their activities, relationships, and influence. Identifying their "sphere of influence" is crucial for this understanding. Such knowledge is necessary to make informed decisions about the nature of partnerships to establish with sub-suppliers.

4.2 Enablers for Sub-Suppliers' Environmental Performance and Performance Improvement

Serious environmental and societal issues frequently occur within the supply chains of tier-2 or higher-level suppliers and their subcontractors (Meinlschmidt and Schleper, 2018). Unethical actions, such as breaking labor or environmental laws, have been reported among suppliers and subcontractors of multinational companies (Seuring and Müller, 2008; Wolf, 2014). These actions have damaged the reputations of major brands, resulting in financial losses (Seuring and Müller, 2008). Notably, customers tend to hold the main organization responsible for these unethical practices (Hartmann and Moeller, 2014). The multi-tier green supply chain approach empowers managers to control connections with even indirect suppliers through a range of interconnected mechanisms (Najjar and Yasin, 2021). In complex supply chains that prioritize sustainability, it is essential to determine the key factors that empower sub-suppliers to enhance their environmental performance.

It's essential to consider multiple levels of sustainability throughout the supply chain. As control over sustainability practices becomes more decentralized, a single organization's lack of sustainability performance can negatively impact the reputation of other connected businesses Hidden weak performers within the supply chain can undermine its legitimacy in terms of sustainability. For sustainability efforts to be successful, organizations need to make substantial changes at the

managerial level (Soderstrom and Weber, 2019). To enhance supply chain sustainability, groundbreaking and innovative practices are becoming indispensable (Jadhav et al., 2018).

To effectively coordinate suppliers in a multi-tier supplier relationship, it's important to consider not only the tier-one suppliers but also their sub-suppliers and the extent of their involvement in the supply chain (Sarkis, Santibanez Gonzalez, and Koh, 2019). Discussing enablers for sub-suppliers in green supply chains is crucial. These enablers can include the strong support of top management for enhancing environmental performance (as highlighted by Menon and Ravi, 2021; Doua, Zhu, and Sarkis, 2018) and the close proximity of supply chain partners (a key enabler suggested by Doua, Zhu, and Sarkis, 2018).

6.0 Conclusion, Recommendations, Implications Of The Study And Areas For Future Research

6.1 Conclusion and recommendations

Most of the companies in supply chain need to consider a bigger picture in green supply chain management, which is to consider a number of tiers beyond the dyadic relationship as it will pave a direct way to ensure multi-tier relationships. Dyadic relationships is limited to consider the direct relationship in supply chain management, but with considering the bigger pictures, companies need to look far from the dyadic relationships and take into account the direct and indirect suppliers, as this will help in ensure a full functioning green supply chain management. Relationships that are based on improving environmental protection and welfare of the ultimate consumer of the products in supply chain is the core focus in multi-tier relationships as it considers all participating supplier in supply chain including the termed as " sub-suppliers".

Considering the forces in globalization and the call to greening supply chain, companies are recommended to practice in a form that consider all the tiers in supply chain far as green supply chain is concerned and that greening supply chain is a continuous process in supply chain and need reasonable improvements on the way. Governments in developing countries need to initiate process that captures continuous process improvement in public procurement to ensure the deliverables observe

greening of supply chain and that there is a philosophy to consider the entire direct and indirect suppliers as direct stakeholders in making a well-functioning green supply chain.

6.2 Practical Implications

The findings of this study consist of several practical implications for different forms of businesses and organizations that are engaged in supply chain management. In the first instance, it underscores the critical importance of extending the focus beyond traditional relationships in green supply chain management. By considering multi-tier relationships, organizations and businesses can better address environmental concerns and improve their sustainability practices throughout the entire supply chain. This demonstrates that business organizations need to broaden scopes of analysis and engagement to include both the direct and indirect suppliers, thereby ensuring comprehensive approach to GSCM.

Further to that, the study identifies the key drivers and the enablers for implementing green multi-tier supply chain management (GMSM), like trust building between focal organizations and direct suppliers, provision of human and financial resources to support suppliers, and fostering collaboration among the actors in supply chain. Practitioners can leverage these insights to develop an appropriate strategy that enhances environmental performance and sustainability across multi-tiers like investing in training programs for suppliers and establishing strong channels of communication which in turn can facilitate knowledge sharing and capacity building, and leading to improved sustainability results.

Additionally, the study highlights on the significance of geographical proximity among supply chain actors as a facilitating factor for GMSM implementation. This implies that organizations operating in close proximity to their suppliers may possess logistical advantages in implementing the green initiatives, like instituting training programs and monitoring environmental performance. Therefore, organizations should consider geographic proximity as a criterion when selecting suppliers and designing their supply chain networks safe in the knowledge that to optimize sustainability efforts.

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6.3 Theoretical Implications

From theoretical perspectives, this study contributes to the body of knowledge and literature on green supply chain management by putting emphasis on the importance of multi-tier relationships in driving environmental performance and sustainability. In the expansion of the focus beyond traditional dyadic relationships, the study advances the understanding of the complexities that are inherent in supply chain management and highlights the need for a more holistic approach to sustainability practices in supply chain management. The identification of enablers and drivers for Green Multitier Supply Chain Management (GMSM) adoption and implementation further enriches the theoretical frameworks by providing insights into the mechanisms that are likely to enhance the adoption and the implementation of green practices across supply chain tiers.

The study also sheds light on the role of trust, resource support, and collaboration in promotion sustainability within supply chains. These findings underscore the relevance of relational theory in shading light to the management and understanding inter-organizational relationships in the context of GMSM. By elucidating the factors that influence supplier behavior and performances, the study contributes to the development of theoretical models and perspectives that can guide future research and practices in the field of supply chain sustainability.

6.4 Limitations of the Study

While this study provides important knowledge, it has limitations that must also be noted, for instance that study mainly used published materials, such as papers and books, as data sources. This approach may have hampered the depth and scope of the analysis. Further research should consider employing direct data collection techniques, such as the use of surveys and using interviews, this will aid to gaining a deeper comprehension of the complexities involved in managing multi-tier green supply chains.

Additionally, the study focused on identification of the drivers and enablers for GMSM, failed short to explore and provide insights on the associated potential barriers or the challenges that organizations may encounter in the implementation of green initiatives across multiple tiers

of the supply chain. Future researchers could dwell on addressing this gap by extending investigation to capture the obstacles or challenges faced by organization in adopting sustainable practices and suggesting strategies for overcoming the obstacles.

Moreover, as the study primarily examined the perspective of focal organizations in implementing GMSM, but did not consider other stakeholders standpoints which also take part in supply chain management, such as suppliers and customers, on the understanding future research could explore on the perceptions and the experiences of various actors (such as suppliers and customers) within the supply chain to gain a more nuanced understanding on the factors influencing sustainability practices and results.

6.5 Areas of Future Studies

Reflecting on the findings of this study, there are several avenues for future research that warrant investigation. In the first instance, researchers could decide to investigate the effectiveness of different strategies for the promotion of collaboration, information sharing and knowledge sharing among supply chain members in the context of GMSM. This could involve examination of impact of training programs and capacity building initiatives, channels of communication, partnership opportunities and innovation and incentive mechanisms on supplier engagement and environmental performance.

In the other instance, future studies could explore the role of government policies and regulations in shaping the adoption and implementation of green practices within supply chains, this is very crucial to be investigated as policies and regulations may have impact on this. By analyzing the impact of regulatory frameworks (policies and regulations) on adoption and implementation of green practices within supply chains and on organizational behavior and decision-making, researchers can provide insights into the external factors that might influence the sustainability efforts in the private sector.

Finally, there is also a need for research that examines the long-term sustainability outcomes of GMSM initiatives and how they are implicated on organization performance and competitive advantage. By assessing the social, environmental, and economic impacts of green

supply chain practices over time, researchers can contribute to inform strategic decision-makers and the policy makers in the field of supply chain management.

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