

Midocean University
College of Management
Department of Business Administration



Research Title:

**Understanding Obstacles and Factors That Affect Green Logistics
Strategies Aimed at Enhancing Environmental Sustainability Within
Supply Chain Management: Towards an Integrated Conceptual
Framework**

Prepared by:

Sahar Jameel Melebary

Supervised by:

Dr. Al-Faisal Abdulhamid

Dr. Fayes Jarad

Academic Year:

2025

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Introduction

Over the past few decades, the logistics and supply chain industry has been compelled to change the economic landscape by minimizing its environmental impact at the same time as ensuring effectiveness in its operations. With the effects of environmental degradation getting more apparent- in the forms of climate change, depletion of resources and pollution, companies everywhere are being forced to alter their conventional approaches to logistics. Such a change has resulted in the appearance of Green Logistics Strategies (GLS), which is a group of practices that simplify the adverse environmental consequences of logistics activities and at the same time contribute to economic and social sustainability (Blanco & Sheffi, 2024; Nagy & Szentesi, 2024).

Green logistics is a paradigm shift of the supply chain perception and management within organizations. It is not limited to operational innovations, but systemic transformations of the transportation, warehousing, packaging, distribution, and reverse logistics to reduce environmental degradation. Besides being in line with global sustainable development goals (SDGs), these changes can be regarded as a competitive advantage in a world where customers, regulators, and investors are becoming increasingly environmentally responsible (Hebaz & Oulfarsi, 2021; Agyabeng-Mensah et al., 2021). Although the benefits of green logistics strategies are well known, the implementation and application do not come without serious challenges.

One of the concerns of both research and practice aspects is the broad range of challenges that prevent the implementation of green logistics in the traditional supply chain systems. These challenges include unawareness and management commitment, inadequate technology, implementation expense, regulatory shortage, and opposition by the supply chain partners (Dashore & Sohani, 2013; Esen & El Barky, 2017). In addition, the fact that the various

elements of green logistics are interdependent with each other further complicates the issue since they frequently need to be integrated on multiple levels of the supply chain so that no single firm can make any meaningful steps in isolation (Isaksson et al., 2011).

These barriers and drivers have been studied many times and the accumulated knowledge is disjointed and not integrative in nature. Such as, Dhull and Narwal (2016) underline that a significant number of companies are still reluctant about taking green initiatives because of uncertainty of costs and policies. Equally, de Jesus, Alves, and Mendes (2024) emphasize a lack of conceptual clarity in the integration of green logistics into the models of the circular economy. Furthermore, cultural and institutional backgrounds of the developing nations make the process of GLS adoption even more complicated as Esen and El Barky (2017) stated the results of their research on companies located in Egypt and Turkey by pointing out the constraints caused by poor infrastructure, low enforcement of regulations, and lack of training.

Conversely, the adoption of GLS can be positively impacted by a number of enabling factors or drivers. Some of them are consumer awareness of sustainability, the influence of environmental regulations, support of top management, availability of cleaner technologies, and the supposed economic incentives, such as cost savings due to a decreased amount of energy consumption or streamlined transportation routes (Ahmed et al., 2020; Hebaz & Oulfarsi, 2021). Moreover, stakeholder partnerships, traceability tools, and ecocentricity of logistics have become the main aspects to improve the overall sustainability performance (Agyabeng-Mensah et al., 2021).

There are also model-building and data-based decision-making developments that have helped to solve implementation issues. As an example, the optimization models, such as those presented by Mirzaee, Samarghandi, and Willoughby (2023) and Ahmed et al. (2020), provide the frameworks to find optimal trade-offs between cost and environment objectives. Bukhari et al. (2023) also propose new zero-emission delivery systems as viable avenues of involving

carbon reduction in the context of urban logistical networks. Nevertheless, in all these positive trends, there is still a visible gap in terms of integrating all these disparate insights into an operational, integrated framework that can be used to systematically address the barriers and capitalize on the drivers by businesses and policymakers.

Reverse logistics is another new field that is applicable to green logistics since it deals with reusing, remanufacturing and recycling of products and materials in order to complete the loop in the supply chains. Reverse logistics is the key to sustainable operations highlighted by Andrushchak (2018) because they minimize the usage of landfills, preserve raw materials and allow companies to get value out of the returned products. Although these are the advantages of reverse logistics, there are various obstacles associated with reverse logistics like the variability of returns, inadequate coordination between stakeholders and absence of regulatory incentives.

Moreover, Khoa et al. (2024) state that not only do companies, which use green logistics practices, enjoy enhanced environmental performance, but also attain enhanced operational performance, customer satisfaction, and corporate reputation. Their empirical study indicates that the strategic conditioning of green logistics with corporate goals is important in attaining long-term gains. However, since such benefits are usually non-quantifiable or long-term, companies might not be able to afford making initial investments on green technologies, especially in a scenario where resources are limited.

Within this scenario, one would realize that it is high time that existing studies should be synthesized to form a coherent conceptual framework that would identify and classify the most important barriers and accelerators of green logistics adoption. This kind of framework would enable the researchers to hone theories and the practitioners to come up with specific strategies that are unique to their organizations. It might be possible to combine technological, regulatory, organizational, financial, and cultural aspects into a holistic framework and capture the

dynamic interaction between them in the development of green logistics strategies (Nagy & Szentesi, 2024; Blanco & Sheffi, 2024).

Problem Statement

Environmental sustainability is a worldwide necessity, and companies, governments, and other organizations should develop more responsible behaviors in every industry. The development of the Green Logistics Strategies (GLS) in the sphere of supply chain management is one of such reactions. The objective of these strategies is to reduce the environmental footprint of the logistics operations like transportation, packaging, storage, reverse logistics and so on, by ensuring energy efficiency, minimizing carbon emissions, using sustainable materials and optimizing the distribution channels (Blanco & Sheffi, 2024; Nagy & Szentesi, 2024). With the more and more organizations adopting sustainability, green logistics is no longer an option but rather a must to ensure long term competitiveness as well as environmental management. Nonetheless, GLS is not easily and directly operational.

Although the significance of green logistics is increasingly being realized, companies usually face significant challenges as they seek to bring these plans to fruition. These problems are complex and may involve financial and technological limitations, the absence of regulatory assistance, the insufficiency of knowledge, and the organizational change resistance (Dashore & Sohani, 2013; Dhull & Narwal, 2016). As an example, small businesses might not have the funds needed to implement the use of fuel-efficient cars or eco-friendly infrastructure, whereas big companies might encounter the resistance of established supply chain partners who do not want to change the current patterns (Esen & El Barky, 2017). Therefore, the GLS adoption rate is not uniform, which negatively affects the global green span to be achieved in supply chains.

To further compound the situation is the lack of a unifying conceptual framework that can capture and classify the numerous drivers and obstacles related to GLS implementation.

The current literature on the topic of green logistics is diverse, but it is also disintegrated, as it is generally devoted to the description of a single case study, or the regional approach to the problem is limited (Hebaz & Oulfarsi, 2021). Such fragmentation restricts the opportunity of researchers and practitioners to generalize the results, compare findings in various contexts, and create scalable solutions. Although certain research focuses on such internal organizational variables as the commitment of leaders and the awareness of workers, other sources lay stress on external factors like regulatory or technological changes (Agyabeng-Mensah et al., 2021; de Jesus et al., 2024). In the absence of a unified strategy, systemic interactions of these factors and their effects on green logistics results are harder to comprehend.

This problem is further compounded by the fact that supply chain ecosystems where GLS has to operate are dynamic. There are more and more global, complex, interdependent supply chains. As such, green logistics approaches require not only internal organizational shifts but also a coordination effort within entire networks, such as suppliers, transporters, distributors, and customers (Isaksson et al., 2011; Ahmed et al., 2020). The introduction of multi-stakeholder engagement has created new barriers that include the inappropriate priority, absence of a common objective of environmental protection and inconsistent standards. An example would be that a manufacturer can have an eco-friendly packaging but its distributors can still adopt inefficient transportation strategies hence affecting the overall sustainability efforts.

Moreover, the concept of zero-emission vehicles, closed-loop supply chain, and reverse logistics as well as other emerging technologies and innovative models represent threats and opportunities to GLS integration (Bukhari et al., 2023; Andrushchak, 2018). On the one hand, these tools provide considerable opportunities to minimize the negative impact on the environment and increase the efficiency of operations. Conversely, they can be implemented successfully depending on a variety of factors, such as technical competence, initial investment,

regulatory transparency, and favorable infrastructure (Mirzaee et al., 2023). Environmental performance is also not assessed uniformly, thus, it is challenging to monitor an organization, compare it to industry standards, or measure the investment in green activities (Khoa et al., 2024).

Moreover, a number of the developing countries experience some peculiar limitations, including the lack of green infrastructure, environmental laws, and institutional enforcement, which also complicate the practice of GLS (Esen & El Barky, 2017; Dhull & Narwal, 2016). The danger in that regard is that green logistics will be a theoretical ideal, but not a practical reality. As a result, the current necessities are to place GLS challenges and opportunities in an environment of developed and developing supply chains in order to guarantee inclusive and equitable sustainability propositions.

Considering these limitations, one of the major research gaps is the absence of an integrative, comprehensive framework that captures the barriers as well as the drivers of green logistics. In the lack of such a framework, neither practitioners have the chance to determine strategies that can be acted upon, nor can policymakers create policies that can support the environmentally sound operation of logistics practices. Additionally, the lack of systematic knowledge slows the development of academic theory of sustainable supply chain management and decreases its usability in the process of operational decision-making.

Thus, the study will fill the existing gap by examining the major barriers and facilitators affecting the implementation and effectiveness of Green Logistics Strategies. The aim is to integrate available results into a comprehensive conceptual framework that captures the dynamic, complex and interrelated nature of logistics systems. With the help of this framework, organizations will be in a better position to plan, execute and assess green logistics practices, and eventually, they will facilitate greater environmental sustainability goals. By doing so, the

research will contribute to the scholarly discourse as well as offer practical knowledge to business that are in the process of greening their supply chain.

Importance of the Study

1. Scientific Importance

Green Logistics Strategies (GLS) is a fast developing field in the supply chain management and its importance in solving world environmental problems has drawn more and more academic attention. Nevertheless, regardless of the accumulation of the literature, the study of GLS is rather fragmented and has no comprehensive and integrative framework that unites both the barriers and facilitators into a single model (Hebaz & Oulfarsi, 2021). The study is scientifically relevant in that it aims at filling this gap by integrating available empirical and theoretical evidence into a conceptual framework that captures the interrelationship of factors involved in GLS implementation in a complex manner.

The majority of the available literature is too narrow in its approach, whether it is either the drivers or barriers, particular industries or specific regional contexts, which restricts the applicability and extrapolation of results to other contexts (Dashore & Sohani, 2013; Dhull & Narwal, 2016). With the wider lens, the study will provide a more detailed picture of interactions between the organizational, regulatory, technological, and cultural factors that influence green logistics practices. It also adds to the development of the sustainable supply chain theory as it reveals and classifies the factors that are interdependently influencing the success or failure of GLS, i.e., cost pressures, leadership commitment, stakeholder collaboration, and policy incentives (Agyabeng-Mensah et al., 2021; Esen & El Barky, 2017).

In addition, this study combines the views of both developed and developing countries, hence enhancing comparative research in green logistics and sustainability. It helps to support scholarly debate on the situational dynamics of GLS, especially in the less-developed countries

that have poor infrastructure, enforcement of regulations or technological abilities (Isaksson et al., 2011; de Jesus et al., 2024). The paper also responds to the present lack of integrative models by anticipating the outline of a structured framework that can be tested by future researchers, improved and modified to diverse logistics and supply chain settings.

Thus, the research prepares the basis of the more explanatory and predictive theory of green logistics. This theoretical input is particularly applicable in solving the challenges that have emerged owing to climate change, resource shortage, and global supply chain imbalance. With reverse logistics systems, close-loop networks, and zero-emission vehicles remaining a work in progress (Andrushchak, 2018; Bukhari et al., 2023), the academic community needs a solid analytical framework to evaluate the viability of the new technologies, their effects, and their applicability to GLS.

2. Practical Importance

In addition to its theoretical significance, the research will be of great use to businesses, policymakers, and logistics professionals. Due to the increasing environmental regulations and the changing customer demands, businesses are increasingly under pressure to implement the green logistic operations that will enable them to minimize their environmental impact at the same time being cost-effective and competitive (Blanco & Sheffi, 2024). Nevertheless, most organizations do not have the strategic clarity, or operational experience to adopt such initiatives successfully.

The proposed framework will assist organizations in overcoming the complexity of GLS adoption since by identifying the essential barriers of adoption, including high initial investment, change resistance, absence of skilled personnel, and imprecise environmental metrics, the proposed framework will allow organizations to have a better understanding of the GLS adoption complexity (Khoa et al., 2024; Ahmed et al., 2020). At the same time, plotting

the enablers, including government encouragement, technological development, stakeholder cooperation, and environmental consciousness, the study offers actionable knowledge to decision-makers on how to build and expand green logistics systems (Mirzaee et al., 2023).

The findings of the study can also be useful to policymakers and other regulatory bodies in terms of knowing where to intervene better to encourage the use of GLS, especially in developing areas where infrastructure and regulatory systems are weak (Esen & El Barky, 2017). The findings of the study can also be used in national and international policies on sustainability to assist in the development of specific subsidies, standards and incentives.

Research Objectives

Main Objective:

- To develop a systematized conceptual design that recognizes and evaluates the main barriers and facilitating conditions that affect the implementation and performance of Green Logistics Strategies (GLS) in improving environmental sustainability in the supply chain management.

Sub-Objectives:

- To analyze the internal and external obstacles facing the adoption of green logistics practices within various organisational and regional settings.
- To determine the main drivers and enablers which contribute to successful implementation of green logistics in sustainable supply chain systems.
- To determine how regulatory frameworks, stakeholder cooperation and technological innovation support GLS.
- To offer workable suggestions to businesses and policy makers on how they can break the barriers to GLS and utilize the enabling factors to their advantage.

Research Questions

Main Research Question:

- Which are the major barriers and facilitating factors that affect adoption and success of Green Logistics Strategies (GLS) to realize environmental sustainability in supply chain management?

Sub-Questions:

- What are the internal organizational obstacles that prevent the green logistics practices?
- What are the external conditions (e.g., regulatory, economic, infrastructural) that restrict or facilitate GLS adoption in different regions and sectors?
- What is the role of technological innovations and stakeholder cooperation in the effectiveness of GLS and what are the challenges to those innovations?
- Which practical recommendations can be offered to address the specified obstacles and improve the practice of green logistics implementation?

Study Hypothesis

- H0 (Null Hypothesis):

No meaningful correlation exists between the identified obstacles and enabling factors and effective adoption and success of Green Logistics Strategies (GLS) in improving environmental sustainability in supply chain management.

- H1 (Alternative Hypothesis):

The identified obstacles and enabling factors exhibit a strong correlation with the success of implementing Green Logistics Strategies (GLS) and the effectiveness of the strategies towards environmental sustainability in the supply chain management.

Theoretical Framework

1. Foundations in Sustainability and Supply Chain Management

The Triple Bottom Line (TBL) theory is the central point of this study that encompasses all three aspects of sustainability, environmental, social, and economic. The TBL model contends that aside from lowering environmental impact, sustainable logistics approaches must generate social value and economic feasibility (Blanco & Sheffi, 2024). This theory is applied in the context of green logistics to assess practices, which include energy-efficient transport, environmentally friendly packaging, reverse logistics, and reduction of carbon footprint.

Similar to it is the Resource-Based View (RBV), which assumes that the firms are likely to achieve the competitive advantage when applying the strategies of utilizing the resources that are valuable, rare, inimitable, and non-substitutable. Projected on GLS, this theory implies that internal capabilities, green technologies, skilled labor, and sustainable infrastructure can be regarded as key determinants of successful implementation (Khoa et al., 2024; Ahmed et al., 2020). Nevertheless, RBV can also be used to explain why firms exhibit unequal adoption of GLS, especially those with scanty green capabilities.

2. The barriers to Green Logistics: Organizational theory perspectives

The Institutional Theory can be used to understand barriers to GLS because it describes the formation of organizational behaviour based on social norms, regulations and cultural expectations. The companies tend to succumb to external forces by governments, customers, and competitors in the industry to comply with eco-friendly logistics activities. However, in the situation of weak regulatory enforcement or low customer demand, GLS motivation can be reduced (Esen & El Barky, 2017; Dashore & Sohani, 2013). This is especially when it comes to the developing countries, where the infrastructure and the institutional capacity are low (Hebaz & Oulfarsi, 2021).

Besides that, the Change Management Theory offers a perspective through which internal resistance to green logistics can be read. Typical obstacles to the implementation of sustainable practices are organizational inertia, lack of awareness, fear of change, and a lack of leadership support. These forces within an organization underline the role of strategic leadership and staff participation in the development of a green culture of logistics (Dhull & Narwal, 2016).

3. Drivers of Green Logistics: Technological and Collaborative Models

Innovation Diffusion Theory is another theory that is used in this study and defines the process of adopting new technologies and practices in organization. The theory indicates that the rate of adoption is affected by relative advantage, compatibility with the existing systems, and the observability of results. Fuel-efficient vehicles, digital route optimization, and emission tracking systems are the technologies that contribute to the sustainability of logistics in GLS (Bukhari et al., 2023; Mirzaee et al., 2023). Companies who see evident environmental and economic advantages of the green logistics are willing to invest in innovations.

In addition, Stakeholder Theory also focuses on cooperation and responsibility in executing GLS. Logistics networks touch a number of stakeholders, including suppliers and distributors, government agencies, and consumers, and the values and expectations of all of them have to be aligned. Communication efficiency and collaborative efforts, including the green certification or common sustainability targets, make it much more probable that GLS will be successful (Agyabeng-Mensah et al., 2021; Isaksson et al., 2011).

4. The Circular Economy and the Green Logistics

In order to conceptualize GLS as part of a greater sustainability agenda, this framework introduces Circular Economy (CE) theory concepts. CE is about ensuring that resources are used continuously through recycling, reuse and reverse logistics. Green logistics helps CE by

reducing the amount of waste and looping the supply chain (Andrushchak, 2018; de Jesus et al., 2024). This theory combination assists in placing green logistics, not only as a regulatory response measure, but as a long-term value-building approach.

5. Towards an Integrated Conceptual Framework

Combining these theories would help to design a conceptual model that would connect the barriers (e.g. cost, regulation, resistance) to enablers (e.g. innovation, policy, stakeholder pressure) of successful adoption of GLS. Using this framework, the ways of finding patterns, evaluating relationships, and preventing effective solutions to improving environmental sustainability within the supply chains will be suggested (Nagy & Szentesi, 2024; Ahmed et al., 2020).

Literature Review (Previous Studies)

1. Hebaz & Oulfarsi (2021)

The review article by Hebaz and Oulfarsi (2021) has thoroughly examined the available literature covering the drivers and barriers of the implementation of green supply chain management (GSCM). With the increase of environmental threats like climate change, green house gas emissions and ecological degradation, organizations are increasingly being expected to incorporate environment thinking within their business operations. This study emphasizes that the supply chain, being a central part of a product's life cycle from raw material sourcing to customer delivery, is critical for embedding sustainability. The authors came up with 60 critical factors affecting the GSCM implementation, 28 drivers and 32 barriers. The research concluded that financial/cost based factors, customer expectation and regulatory requirement were also dualistic factors, which are enablers in some cases and inhibitors in others depending on the situation.

As shown in this paper, an analysis reveals the problematic nature of embracing green practices. Firms may be unable to adopt environmental strategies due to financial constraints whereas regulatory policies and market demand may both drive a change. The paradox of these two aspects contributes to the significance of a rather subtle perception of both internal and external factors affecting GSCM. This review is very valuable in building the grounds of the proposed research as it classifies these complex elements. It also lays the necessity of a detailed conceptual framework that takes into consideration both promoters and inhibitors of green logistics strategies.

2. Esen and El Barky (2017)

Esen and El Barky (2017) offer regional and cultural insights into drivers and barriers of green supply chain management through the lens of Turkish and Egyptian companies that are multinational in their operations in Egypt. Their chapter is an extension of the increasing role of ethics and sustainability in international supply chains by discussing the reasons as to why companies switch to conventional supply chain operations to greener ones. They start with an explanation of the main ideas of GSCM, then proceed to the determination of the main pressures- which include stakeholder expectations, competitive advantage and regulatory requirements that are forcing businesses to take green practices.

The research further extends and incorporates results of interviews conducted to managers of Turkish and Egyptian companies. The interviews show that there are some general and location-specific difficulties that organizations have with the implementation of GSCM. Obstacles like ignorance, inadequate government support and technological constraints are common. In addition, the authors suggest ways to address these barriers, including the significance of cross-sectoral collaboration and customized policy responses. The study gives useful contextual information to the current study that aims at developing an integrated

framework that can be used to tackle such local differences in the implementation of green logistics strategies.

3. Dashore and Sohani (2013)

Dashore and Sohani (2013) made an extensive literature-based research to determine the main drivers and obstacles of GSCM. Their review gathered knowledge of the academic literature and the knowledge of experts, and led to 20 barriers and 16 drivers. These factors were seen in various organizational contexts implying that they are widely applicable in the implementation of GSCM. The barriers identified were high costs of initial investment, resistance to change, the absence of infrastructure, and low technology readiness. Conversely, the cost savings over the long run, better brand image and the growing environmental consciousness of the stakeholders were considered by the drivers.

The researchers pointed out that though the benefits of green supply chain practices are fully understood, many organizations are yet to jump into this bandwagon because of short term financial demands and operational risks. Their research indicates a necessity of greater support by institutions and industry-wide standards to promote the use of GSCM. This study can be very valuable to the present proposal because it highlights the constant disparity between environmental will and organizational competency.

4. Nagy & Szentesi (2024)

Nagy and Szentesi (2024) discuss the increasing importance of green logistics as part of the overall issue of sustainability in supply chain transformation. Their study reveals the importance of logistics as an industry that is usually seen as a source of high-emission in helping to achieve sustainability through the employment of green practices that include energy-efficient warehousing, eco-friendly transportation, and sustainable packaging. The authors employ the case studies and industry statistics to assess the current trend and predict

the future of green logistics. They come to the conclusion that even though the awareness is increasing, the widespread use is still not possible because of the costs, technical limitations, and the regulatory issues.

Among the most valuable findings of the given study, one can note the focus on the systemic character of green logistics changes. It reveals that the success of the implementation of green logistics depends on the coordination of strategic vision, operation capacity, and regulatory incentives. The results presented in this paper correspond with the objectives of the planned research especially in the context of the multidimensionality of barriers and enablers. The article forms a factual basis as to how the operations of logistics can be streamlined to be environmentally friendly.

5. de Jesus, Alves and Mendes (2024)

de Jesus, Alves, and Mendes (2024) pay their attention to the issue of the combination of green logistics and the circular economy. Their research acknowledges the growing environmental and social impact of industrial operations and examines how green logistics operations can assist the principles of the circular economy. They can prove that a quantitative approach to Brazilian and Portuguese enterprises reveals that green logistics can greatly improve the implementation of the circular economy practices. The study concludes that the firms gain both environmentally and strategically when they adopt green logistics in their operations as they enjoy competitive advantage.

6. Bukhari et al. (2023)

Bukhari et al. (2023) explore the realities of zero-emission logistics, with a specific emphasis on the transport sector as one of the greatest contributors to the world greenhouse gases emissions. Their study dwells on the introduction of zero-emission logistic systems, including electric transport and drones, and whether they can minimize the carbon footprint of

logistics. The research assesses several technological options, and points at future studies in AI-powered delivery models and smart logistics integration systems. It also explores, in a technical and policy perspective, the economic and infrastructural barriers to large-scale implementation of zero-emission solutions.

Methodology

Research Design

The study employs a qualitative descriptive research design which is suitable in investigating, interpreting and integrating the available literature on green logistics strategies and the different forces that would affect their application in the supply chain management. The descriptive research is particularly appropriate in giving a detailed description of phenomena on the basis of existing data devoid of any experimental or survey based methodology. The aim of this case is to outline the barriers and facilitators of green logistics strategies that had been previously reported in other academic and empirical literature. This study will not seek to be attempting to manipulate the variables or measure the perceptions based on field data, but rather to develop a conceptual knowledge based on the previous studies.

Green logistics, which deals with economics, operations, environmental science, and public policy, is especially suited to a descriptive style of writing that combines multi disciplinary literatures. The study will also help in creating a unified conceptual framework that will aid in explanation of how environmental sustainability can be improved by means of better logistics practices in the supply chain by collecting, comparing and interpreting the results of different sources.

Data Sources and Selection Criteria

The whole research is grounded on secondary materials, mainly academic journal articles, books, peer-reviewed conference papers, and institutional reports. The choice of

literature was determined by not only its thematic consistency but the academic value of the sources, the validity and reliability of which guarantee the full spectrum of valuable information on the implementation of green logistics and the context of sustainable supply chain management.

Among the most important databases and platforms that I have used in sourcing these materials, there are Google Scholar, ScienceDirect, Semantic Scholar, and such publishers as Springer and Elsevier, and IGI Global. Keywords that were used in the search strategy were:

- Green logistics strategies
- Sustainable supply chains
- Environmental barriers in logistics
- Drivers of green supply chain practices
- Logistics and environmental sustainability

In order to keep the study up-to-date, most of the sources used are those of the last 10-15 years with the focus on the literature published during 2010-2024. The papers were included in case they corresponded to the following criteria:

- Published in good journals or proceedings of conferences;
- Directly linked to the issue of green logistics, GSCM (Green Supply Chain Management) or sustainable logistics;
- Offered analytical discourses of either impediments or facilitating factors of green logistics;
- Provided conceptual, empirical or comparative knowledge that can be applied to various settings.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Peer-reviewed journal articles, conference proceedings, or published book chapters.
- Studies focusing specifically on green logistics, sustainable supply chain management (GSCM), or environmental strategies within logistics functions.
- Literature that identifies and discusses either obstacles (barriers) or enabling factors (drivers) in green logistics.
- Studies that contain empirical, conceptual, or comparative data.
- Publications accessible in full-text format (PDF), preferably open-access for transparency and accessibility.

Exclusion Criteria:

- Articles lacking academic rigor (e.g., blog posts, opinion pieces, or editorials).
- Studies focused on general sustainability without a clear logistics or supply chain component.
- Papers centered exclusively on technical innovations (e.g., hydrogen fuel cells) without discussing their impact on green logistics strategies.
- Documents not available in full-text format or behind paywalls that cannot be legally accessed.

Data Collection Process

The structured literature review entailed the process of gathering data and it had a number of steps. To start with, the above-described databases and the keywords were used to retrieve the initial pool of more than 50 documents. All of the documents were assessed in terms of relevance through the review of abstracts and conclusions. Then, the shortlisted studies were

reviewed to a greater depth to evaluate their methodology, findings, and compliance with the research objectives. At the end, 14 core studies were identified that offered all-important insight into the theme of green logistics barriers and enablers. The proposal was based on these studies, which created the empirical and theoretical basis.

Among the chosen works, we have those that classify and weigh the significance of barriers and drivers in GSCM, like Hebaz and Oulfarsi (2021), and those that present a wholesome classification of them in an organizational context (Dashore and Sohani, 2013). Furthermore, articles such as Nagy and Szentesi (2024) and Bukhari et al. (2023) offer modern knowledge on topical issues, such as the high cost of implementation, technical preparedness, and regulatory compliance.

Technique of Data Analysis

The study analysis employs the qualitative content analysis. The given approach is premised on the identification of recurring themes, categories, and patterns according to the literature reviewed. As an example, barriers are divided into such groups as financial, regulatory, operational, and technological, whereas enablers are classified in terms of stakeholder pressure, cost efficiency, market demand, and corporate responsibility.

It is an interpretive and comparative analysis that seeks to establish the consistencies and inconsistencies across contexts, industries and regions. The analysis will assist in disclosing general barriers and situational differences by comparing the results of the studies. Such findings will be synthesized in order to develop a conceptual framework that outlines the connections among green logistics strategies, the challenges and the enabling factors.

Ethical Considerations

This study does not need human subjects, surveys, or interviews, which is why there is no ethical risk that concerns personal data or the well-being of the participants. Nonetheless,

the ethics of academic research are not violated. Any sources of information are properly cited and referenced according to the APA standards and the data is employed in a responsible way in order to fulfill academic integrity. The research also makes sure that the rights of intellectual property are not violated and the study is based on only the publicly available and legally obtainable documents.

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