Assessing the Implementation of Green Logistics Practices in SMEs for Sustainable Development

Juliet Madamombe

Doctorate Candidate, Namibia Business School, University of Namibia, Windhoek

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ABSTRACT

Sustainability is a vital global phenomenon driven by the deterioration of the environment, disparities in society, poverty, and economic expansion that cannot be maintained. While multinational and large corporations have effectively implemented green logistics, (GL) and circular economy (CE), practices to achieve long-term advantages, small and medium-sized enterprises (SMEs) and developing countries encounter difficulties in adopting these practices due to limited expertise and resource limitations. Notwithstanding these difficulties, small and medium-sized enterprises (SMEs) continue to be essential for economic progress, representing 18% of exports in developing nations and 98% of firms in Asia-Pacific Economic Cooperation (APEC) economies. Despite their favorable impact on economic growth, small and medium-sized enterprises (SMEs) are accountable for over 70% of worldwide pollution. This study assessed the green logistics initiatives among small and medium-sized enterprises (SMEs) and aimed to gain insights into the main factors that drive, hinder, and create opportunities for the effective implementation of green logistics practices. Additionally, it aimed to identify the best practices in this field. The study utilized a theoretical framework to carefully choose pertinent material from academic databases, with a specific emphasis on recent publications. Twenty-five pertinent publications were examined and a thematic analysis was conducted to identify crucial topics and expert insights. These findings were subsequently utilized to propose practical solutions for small and medium-sized enterprises (SMEs) to adopt and execute green logistics practices. The results indicate that although the majority of small and medium-sized enterprises (SMEs) have knowledge of environmentally friendly logistics practices, they are hesitant to allocate resources towards the required infrastructure and technology mostly owing to financial limitations and a lack of specialized knowledge. This study proposes frameworks to assist the efficient implementation of environmentally friendly logistics practices, thereby improving the sustainability of small and medium-sized enterprises (SMEs) and contributing to broader goals of sustainable development.

Keywords: Green logistics, circular economy, Small to medium Scale Enterprises (SME's), Sustainable Development

INTRODUCTION

In recent decades, numerous nations have undergone substantial economic expansion and industrial development. Nevertheless, this advancement has frequently resulted in significant loss of resources, leading to environmental concerns and increasing climate change. Green logistics has emerged as a crucial technique to address these difficulties and minimize environmental effect. It has the potential to reduce carbon emissions by up to 60% (Du et al., 2019; Ozturk et al., 2022). Green logistics involves integrating environmentally and socially responsible practices across all stages of the logistics process, from sourcing and production to transportation and reverse logistics, with the aim of reducing environmental impact, optimizing resources, and ensuring sustainable economic, environmental, and social outcomes (Ma & Kim, 2023).

Organizations are facing increasing pressure from many stakeholders to conduct their operations in a socially and ecologically responsible manner, with a focus on enhancing their environmental and social performance (Singh, Singh, & Khamba, 2021). Companies have been compelled to include inventive ideas into their operations and management procedures in order to maintain their competitive advantage, due to increasing customer demands for products and processes that prioritize social and environmental factors. Sustainability

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criteria has become a new benchmark for competitiveness. Consequently, corporations have progressively integrated environmentally friendly and efficient ideas into their operating frameworks.

Green logistics strategies include measures to mitigate environmental degradation, address infrastructure deterioration, and utilize sophisticated cleanup procedures (Chen & Lee, 2020). For instance, multinational organizations like Unilever, who are part of global companies, have made a commitment to sustainable sourcing and the reduction of their environmental impact. Toyota is widely recognized for its efficient manufacturing system and commitment to environmental sustainability. General Motors, an American multinational car-manufacturing corporation, achieved a cost reduction of around $12 million by implementing a reused container program with its suppliers (Murray, 2019). These examples illustrate the extensive and varied implementation of Green and Lean principles in various sectors and areas.

Nations like Germany have made significant strides in incorporating renewable energy sources such as wind and solar power to diminish reliance on fossil fuels and mitigate carbon emissions. The Energiewende policy of the German government aims to shift towards a sustainable energy system by prioritizing the advancement of environmentally friendly technology and encouraging innovation in the generation and distribution of renewable energy sources (Renewables Global Status Report, 2021). China has made substantial investments in green technologies, particularly in the advancement of electric vehicles (EVs) and renewable energy infrastructure. These expenditures are part of China's policy to address air pollution and reduce greenhouse gas emissions (China Energy Portal, 2022). The aforementioned case studies highlight the worldwide significance of implementing green logistics techniques to tackle environmental issues and promote sustainable development.

Problem Statement

Existing literature indicates that research has primarily concentrated on green logistics inside larger firms (Zowada, 2020). Small and Medium Enterprises (SMEs) play a crucial role in global economies, making substantial contributions to employment, innovation, and economic growth (Acs & Virgill, 2009). Unfortunately, the environmental consequences of SMEs are frequently not monitored, which requires an examination of how small and medium-sized enterprises might include eco-friendly logistical methods to promote sustainable growth. This theoretical article examined the obstacles faced by small and medium-sized enterprises (SMEs) in adopting environmentally friendly logistics methods. It also evaluated the potential benefits of implementing these practices and provided recommendations for the most effective ways to incorporate green logistics into SMEs. The discussion highlights the crucial role that these firms play in advancing sustainable supply chain operations.

Although the scientific community has conducted thorough analysis, there is still a lack of research in creating a complete GL practice framework for sustainable development, particularly among SMEs (Milita et al., 2021).

Research Objectives

This research paper provides a comprehensive understanding of the key drivers, current state, challenges, and opportunities of green logistics for SMEs. The paper also offers a green logistics practice framework for sustainable development.

The objectives of this theoretical paper are to:

i. identify key drivers for Green Logistics in SMEs;

ii. examine the current state of Green Logistics in SMEs;

iii. evaluate and explore challenges and opportunities; and

iv. develop a Green Logistics practice framework for sustainable development.

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LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Small to Medium Scale Enterprises (SME's)

The definition of SMEs varies significantly across countries. In the European Union, SMEs are defined as having up to 250 employees, whereas in the USA, this number can be as high as 500. Generally, small enterprises have fewer than 50 employees, and micro enterprises have between 5 and 10 employees (OECD, 2005). In Namibia, the Ministry of Trade and Industry defines SMEs based on the number of employees and annual turnover. Micro enterprises employ up to 10 people and have an annual turnover of up to N$300,000. Small enterprises employ between 11 and 30 people with an annual turnover of up to N$3 million. Medium enterprises employ between 31 and 100 people with an annual turnover of up to N$10 million. Businesses that exceed these criteria are classified as large enterprises (Namibia Economist, 2024/2025). For the purpose of this study, SMEs are characterized as independent companies without subsidiaries, employing a limited number of workers (OECD, 2005).

The Natural Resource-Based View Theory

The Natural Resource-Based View (NRBV) theory, introduced by Hart (1995), expands the Resource-Based View (RBV) by emphasizing the external natural environment alongside internal resources to enhance a firm's competitive advantage. The NRBV incorporates three key strategies: pollution prevention, product stewardship, and sustainable development.

Pollution prevention strategy aims to minimize environmental damage by reducing emissions and waste (Hart, 1995). By lowering emissions and waste, firms can cut costs related to raw materials and disposal, reduce compliance liabilities, and improve efficiency and productivity, which leads to increased profitability (Hart, 1995).

Product stewardship strategy involves incorporating feedback from external stakeholders into product and process development (Allenby, 1991). It helps firms reduce the life cycle cost of products by redesigning existing systems, eliminating environmentally harmful operations, and developing new products. This approach creates a competitive advantage by securing access to preferred inputs and enhancing the firm's green product reputation (Hart, 1995).

Sustainable development strategy focuses on reducing the environmental impact of firms on the natural environment (Hart, 1995; Cousins et al., 2019). Investing in sustainable development improves a firm's long-term performance prospects compared to competitors (Hart, 1995).

Adopting these strategies can provide firms with a competitive edge, improving their overall performance. Furthermore, sustainable supply chain practices are considered inimitable, heterogeneous, and valuable resources that are difficult for other firms to replicate due to time and institutional capability constraints (Hart and Dowell, 2011; Cousins et al., 2019). Practices like Green Logistics Management Practices (GLMPS) and Low Emission Consumption (LEC) can be sources of competitive advantage

However, solely relying on the NRBV is inadequate as it ignores external factors. This paper incorporated the Resource Dependence Theory to foster understanding of how external competitiveness influences environmental initiatives, ensuring a comprehensive approach to sustainable business practices.

Resource Dependence Theory

The Resource Dependence Theory (RDT), proposed by Pfeffer and Salancik (2003), provides a vital framework for understanding how firms interact with their external environment to secure essential resources. According to RDT, firms often lack sufficient internal resources and must therefore form alliances with external stakeholders to ensure their survival and strategic success (Pfeffer & Salancik, 2003). This theory builds on Emerson's power-dependence relationships, which suggest that the more one firm relies on another; the greater the power the latter holds (Emerson, 1962).

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A fundamental premise of RDT is that firms are generally not self-sufficient regarding strategically crucial resources, creating dependencies on other firms (Heide, 1994). To manage these dependencies and minimize uncertainty, firms shape their relationships with other organizations through both formal and semi-formal methods (Ulrich & Barney, 1984). This approach enables firms to access critical resources such as materials, labor, and capital, which are often scarce in the external business environment (Salancik & Pfeffer, 1978).

Studies encourage firms to cultivate harmonious, mutual, and collaborative relationships to effectively manage these dependencies (Shymko et al., 2012). RDT suggests that fostering cooperative relationships helps firms secure essential resources and mitigate external pressures. This theory has been widely used to assess the impact of various supply chain strategies on organizational outcomes.

Furthermore, RDT provides regulatory mechanisms for firms to adjust their structures and strategies to mitigate uncertainties and dependencies. These mechanisms include partnerships based on influence or trust, coalitions, joint purchasing agreements, and strategic alliances, which are particularly useful for implementing green logistics practices and Circular Economy (CE) principles in supply chain operations.

The concept of green logistics aligns with RDT, emphasizing the need for external stakeholders' resources for effective implementation. Complex and extensive supply chains often makes it impractical for a single firm to implement alone, thereby necessitating collaborative relationships with customers and suppliers (Westerkamp et al., 2018).

RDT is particularly relevant in exploring green logistics practices in SMEs by highlighting the importance of external resources and inter-organizational relationships. It helps identify key drivers, such as regulatory requirements and market demands, emphasizing external pressures and dependencies. RDT's focus on interdependence and strategic alliances aids in examining the current state of green logistics, addressing challenges like resource scarcity, and exploring partnership opportunities. Additionally, RDT's insights into managing dependencies and fostering trust-based collaborations are essential for developing a green logistics framework that promotes long-term sustainability and resilience in SMEs.

To provide a holistic approach, this study integrates the Triple Bottom Line theory alongside the Natural Resource-Based View (NRBV), Institutional Theory and Resource Dependence Theory (RDT). This integration aims to offer a comprehensive framework for achieving sustainable business practices and enhancing competitive advantage.

Triple Bottom Line (TBL) Theory

TBL theory advocates for organizations to measure their performance based on three dimensions: economic, social, and environmental. This approach considers the impact on current and future generations as interdependent and integrative (Tseng et al., 2015). The increasing demand for sustainable development has expanded organizational competitive practices to encompass environmental, social, and economic sustainability.

For SMEs implementing green logistics, TBL theory can provide a framework for evaluating the impacts of their sustainability initiatives across these dimensions and balancing competing priorities for sustainable development.

Institutional Theory and Environmental Behaviour in SMEs

Figure 1 below depicts four concentric layers that integrate our principal theories. At the core, the Natural-Resource-Based View (NRBV) represents the firm’s internal capabilities, technology, skills and culture, that enable green-logistics practices. The second ring captures Resource Dependence Theory (RDT), illustrating how SMEs rely on external supply-chain partners and financiers; these dependencies condition, but do not determine, their strategic options. The outermost ring applies Institutional Theory (DiMaggio & Powell, 1983; Scott, 2014) and is divided into three arcs: *coercive pressures* (regulations, inspections, carbon taxes), *normative pressures* (industry codes, professional associations) and *mimetic pressures* (benchmarking larger competitors). These institutional forces interact with internal resources and external dependencies to influence adoption decisions

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that may appear "non-economic" in the short term yet are rational responses to maintaining legitimacy. Finally, the base of the figure links all layers to Triple Bottom Line (TBL) outcomes - economic, environmental and social- signalling that effective green-logistics implementation ultimately delivers balanced sustainability value. This layered visual scaffolding clarifies how NRBV, RDT, Institutional Theory and TBL jointly provide a comprehensive analytic lens for understanding SME behaviour.

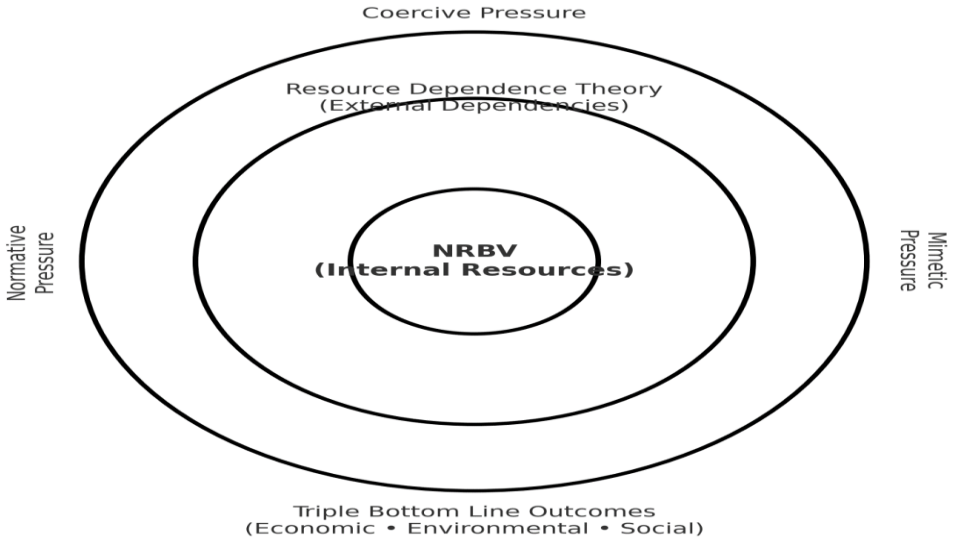

Figure 1. Integrated multi-theory framework for SME green-logistics adoption

The concentric-circle diagram shows (1) internal capabilities from the Natural-Resource-Based View at the core; (2) external dependencies highlighted by Resource Dependence Theory; (3) coercive, normative and mimetic pressures from Institutional Theory in the outer ring; and (4) Triple Bottom Line outcomes anchoring the entire model.

Social Sustainability

While economic and environmental aspects of sustainability have been extensively studied and implemented, the social dimension lacks sufficient scientific grounding and operational clarity, necessitating further development (Popovic et al., 2018). The most crucial point is that social sustainability is achieved when systems, structures, relationships, and interactions contribute to the well-being of current and future generations, fostering healthy and vibrant communities.

Social sustainability involves environmental adaptability, focusing on human capital development, employment strategies, and social well-being (Saunila et al., 2018). There is evidence to show that human capital development supports environmentally friendly practices through environmental training and is linked to green logistics practices (Awani et al 2021). Industrial development enhances workforce productivity, and global logistics initiatives promotes social sustainability through technology-driven behavioral changes. Consumers are willing to pay more for green logistics and eco-friendly products to support environmental conservation, and welfare indices positively influence green logistics (Maasoumi et al., 2021).

Research shows a positive relationship between social sustainability and green logistics, with factors like green demand and internal knowledge significantly influencing green logistics practices (Saunila et al., 2018). Evaluating sustainability dimensions helps companies reduce environmental impact (Shahzad et al., 2020a). Stakeholder pressure also affects green logistics, with key determinants including environmental factors, technological capabilities, regulations, and green demand (Chen & Lee, 2020).

The Triple Bottom Line (TBL) strategy is essential for organizational advancement, promoting eco-friendly products and efficient manufacturing processes (Lim et al., 2017; Yu et al., 2020). Despite growing interest, social sustainability remains under-researched, indicating its recent inclusion in sustainable development

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discussions (Eizenberg & Jabareen, 2017; Missimer et al., 2017). Figure 2 below shows the pillars of sustainability:

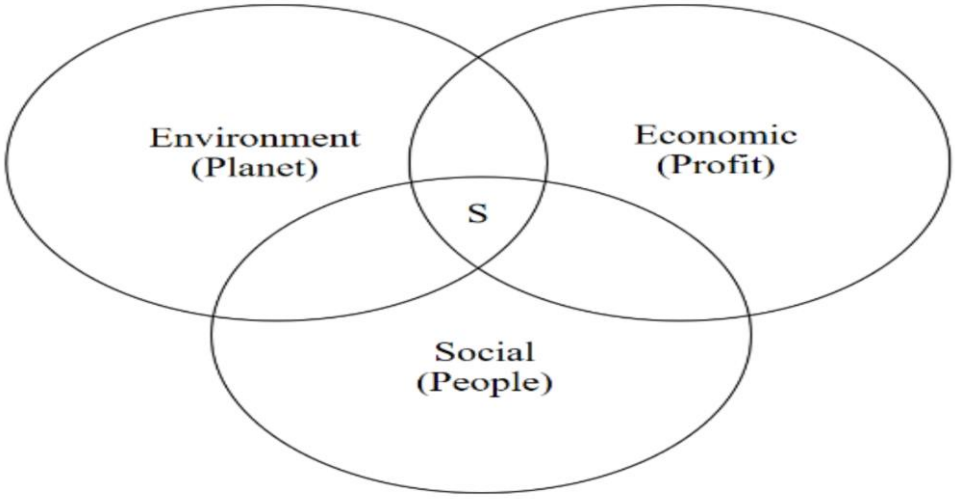

Figure 2. Pillars of sustainability. Adapted from Shim, et al. (2021)

Economic sustainability

Economic sustainability encompasses financial prosperity and the advancement of human capital (Saunila et al., 2018). In the wake of the global economic downturn, which underscored the risks associated with debt and bankruptcy, this aspect of sustainable development has garnered significant attention. The economic sustainability of a nation is influenced by factors such as foreign direct investment (FDI), market capitalization, trade openness, and export volume (Maasoumi et al., 2021). Previous research has identified reduced production costs as a key driver of green logistics initiatives (Saunila et al., 2018). Motivators for efficient energy and raw material usage include recycling and cost-cutting initiatives.

In the digital era, investments in human capital development have a pronounced impact on green development, enhancing competitiveness. Green logistics operations play a crucial role in combating climate change while also bolstering the economic performance of businesses, according to Wanzala and Zhihong (2016). It is vital to emphasize the importance of integrating improvement propositions to reduce energy wastage. Economic sustainability positively influences green logistics practices, as highlighted by Aboelmaged and Hashem (2019), who argue that organizational sustainability fosters the green performance of businesses.

Environmental sustainability

Environmental sustainability is a critical global concern, with varying motives for green innovation green logistics practices implementation across economies. The ecological dimension of sustainable development (SD) focuses on transforming industrial practices to mitigate the negative impacts of industrialization (Saunila et al., 2018). Economies with limited adoption of eco-innovation frameworks are encouraged to explore the adoption of innovative and eco-friendly technologies that promote resource efficiency and environmental protection (Maasoumi et al., 2021). Environmental sustainability is integral to fostering green creativity, identity, and strategies that incorporate environmental taxes to mitigate carbon dioxide (CO_2) emissions (Song & Yu, 2018).

The Triple Bottom Line (TBL) theory is crucial for this study, as it integrates economic, environmental, and social dimensions to motivate SMEs to adopt green logistics practices. TBL helps identify drivers like environmental regulations and social responsibilities, providing a comprehensive assessment of SMEs' green logistics adoption. It highlights the interconnectedness of economic, environmental, and social factors, allowing for a thorough evaluation of challenges and opportunities.

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Circular Economy (CE) Concept

Circular economy (CE) represents a relatively new paradigm aimed at maximizing the economic, environmental, and social aspects of enterprises to transition society towards sustainability through the involvement of all stakeholders (Ghosh et al., 2020). The concept of circular economy (CE) is based on the regenerative cycle, which facilitates the efficient reuse of used products, parts, and materials, thereby enhancing profitability and reducing environmental impact (Nasreen et al., 2018). Numerous studies have examined the challenges and opportunities associated with adopting circular economy principles in SMEs. Scholars have identified adoption of these principles as a critical determinant of SMEs' sustainability performance (Khan et al., 2021).

Understanding the circular economy (CE) concept is vital for achieving these study objectives, as it emphasizes the efficient reuse of products, parts, and materials. CE principles help evaluate the current state of green logistics, highlight challenges and opportunities, and inform the development of a sustainable green logistics framework.

Due to a plethora of definitions and interpretations of the CE concept, Kirchherr et al., (2023) analyzed 221 definitions and provided an updated systematic analysis and conceptualization of the concept as depicted in Figure 3.

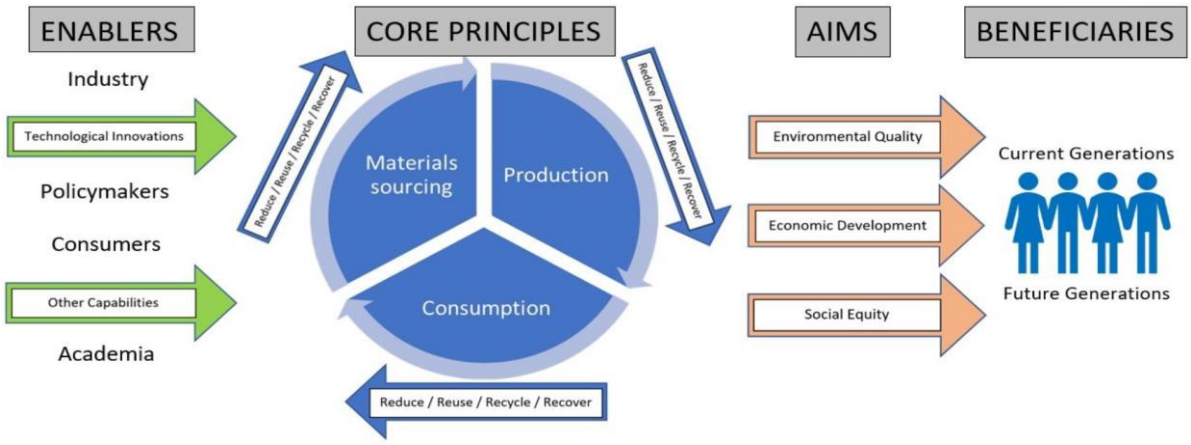

Figure 3: Adopted from Kirchherr et al., (2023)

Understanding Green Logistics In Smes

To comprehend the application of Green Logistics in SMEs, the three cases cited in this paper suffice. It is important to note that these are not the only examples, but because of the limitations of this paper, the researcher restricted herself to only these three cases. The number of cases provided here does not compromise the point of understanding Green Logistics in SMEs at all.

Case Study 1: Bangladesh small and medium enterprises (SMEs)

Bangladeshi firms, particularly small and medium enterprises (SMEs), have historically been hesitant to adopt green and sustainability initiatives (Chowdhury, 2020). Currently, the integration of economic, environmental, and social factors into sustainability is the most pressing issue for SMEs, as they must remain economically focused due to the unpredictability of both demand and supply, as well as the presence of numerous competitors. The high costs associated with ecological and sustainability initiatives further complicate SMEs' efforts to meet environmental and social objectives in accordance with local regulations and global expectations, while maintaining competitiveness.

Operating outside robust regulatory frameworks, most SMEs have been reluctant to enhance their sustainability performance. However, this situation has recently evolved, with many manufacturing SMEs now undertaking environmental and sustainable projects in compliance with international regulations (Khan, 2022).

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Additionally, international organizations are providing funding to Bangladeshi SMEs to support the integration of green and environmental initiatives, aiming to achieve sustainability goals and ensure workplace safety (Islam, 2023). Therefore, it is crucial to investigate the key drivers of sustainability performance among Bangladeshi manufacturing SMEs.

Case Study 2: The Way to Environmental Sustainability of Logistics. Empirical Evidence from Polish SMEs

According to Zowada (2020), research on Polish SMEs revealed that their environmental protection efforts in logistics are primarily driven by existing legal requirements, leading companies to only meet the minimum standards set by state environmental policies. This regulatory approach fails to achieve the desired impact of green logistics at the micro level, as general solutions do not translate effectively to individual enterprises. Consequently, many SMEs, not realizing the benefits of green initiatives, do not plan to advance these practices further. The study suggests that the most effective strategy for developing green logistics in SMEs is through collaboration between owners, managers, and supply chain leaders. This cooperation results in stronger feedback and better economic and ecological outcomes, driven by the integration of supply chain participants and shared business objectives, rather than by imposed legal regulations.

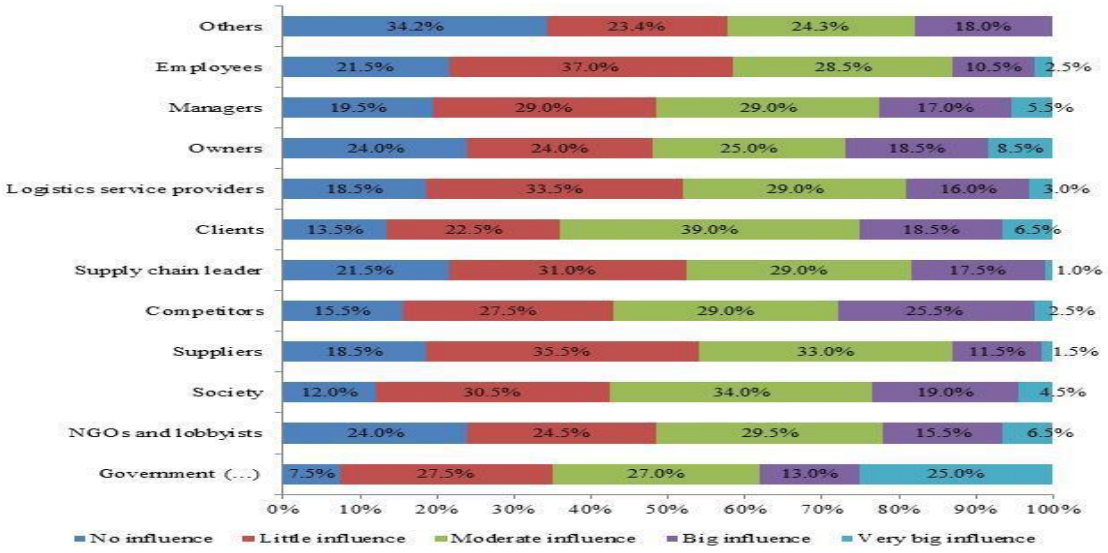

Figure 4 displays the findings of the study regarding how the identified stakeholder groups influence the advancement of green logistics in the surveyed SME enterprises located in Poland.

Source: Zowada, (2020)

SMEs prioritize compliance with legal requirements due to potential financial penalties and the broad applicability of regulatory measures. However, there is no significant correlation between government influence and the ecological and economic outcomes of green logistics development within SMEs. Owners and managers, along with supply chain leaders, have the most significant positive impact on the development of green logistics, driven by their direct involvement and interest in measurable results. External logistics service providers also contribute positively, aligning green practices with economic benefits. Notably, government influence does not correlate with SMEs' progression through stages of green logistics development, as legal provisions typically represent a minimum standard rather than incentivizing further engagement. As SMEs advance through stages of green logistics development, other stakeholder groups become increasingly involved, indicating a growing interest and engagement in sustainability practices.

Case Study 3: An assessment of green logistics and environmental sustainability: Evidence from Bauchi, a state in the North East region of Nigeria (Maji, et al., 2023)

This study investigated the implementation of green logistics and environmental sustainability practices in Bauchi Metropolis. Through survey data collected from logistics managers, it was discovered that 69% of them

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are aware of the negative environmental impact of logistics operations, with 53% confirming the practice of green logistics initiatives. A Chi-square test revealed a strong association between logistics categories and green logistics practices, indicating that sustainability initiatives are influenced by the logistics category, which included transport, warehousing, freight forwarding and packaging.

Additionally, sustainability indicators were found to be significantly correlated with years of experience in the logistics sector, suggesting that managerial experience plays a crucial role in sustainability compliance. Linear regression analysis further demonstrated that green logistics practices positively affect environmental sustainability, highlighting their importance.

Challenges And Opportunities In Green Logistics Adoption For Smes

Challenges

A study conducted by Maji et al. (2023) identified several challenges encountered by the logistics sector of SMEs. These challenges include reliance on non-renewable energy sources for logistics operations, insufficient access to road infrastructure, particularly flyovers in market areas leading to traffic congestion, lack of interstate highways and railway networks, and reluctance among logistics managers to adopt green logistics practices due to perceived high initial costs. Consequently, the logistics activities in Bauchi have increasingly contributed to environmental pollution, highlighting the urgent need for sustainable logistic practices. Therefore, there is a pressing need for a deeper exploration of green supply chains and logistics aimed at reducing carbon emissions associated with the delivery of goods and services by logistic service providers in Bauchi.

SMEs also encounter unique challenges in adopting green logistics practices, including limited financial resources, lack of expertise, and fragmented supply chains (Carter & Rogers, 2008).

Despite these challenges, SMEs possess inherent advantages conducive to sustainability, such as agility, innovation, and closer relationships with stakeholders. By capitalizing on these strengths, SMEs can leverage green logistics as a strategic differentiator, enhancing competitiveness and market appeal.

Opportunities

Implementing green logistics practices presents significant opportunities for SMEs by enhancing operational efficiency, environmental sustainability, and social sustainability. Studies indicate that adopting green information systems, green transportation and distribution, reverse logistics, and effective waste management, alongside sustainable monitoring and evaluation, can reduce greenhouse gas emissions, waste, and energy and resource usage (Agyabeng-Mensah et al., 2020a; Khan, 2019). For SMEs, these practices can lead to several benefits:

Operational Efficiency

By optimizing logistics processes, SMEs can improve their overall operational efficiency. Green practices such as reverse logistics and efficient waste management streamline operations, reduce waste, and lower costs.

Market Performance and Profitability

Improved operational efficiency and sustainability can lead to better market performance and increased profitability. Consumers are increasingly willing to support businesses that demonstrate environmental responsibility, potentially allowing SMEs to charge premiums for eco-friendly products. Integrating green logistics practices allows SMEs to capitalize associated opportunities, positioning themselves competitively in the market while contributing to sustainable development.

For instance, DHL has implemented various green logistics practices to reduce its environmental impact. These include integrating alternative fuel vehicles like electric vans and bikes into its delivery fleet. Additionally, DHL utilizes advanced route optimization software to minimize fuel consumption and greenhouse gas emissions. The company also invests in energy-efficient warehouse facilities equipped with renewable energy sources and

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sustainable technologies. Furthermore, DHL promotes sustainable packaging solutions and provides carbon-neutral shipping options to its customers (DHL, 2021).

The adoption of these green logistics practices by DHL yields several advantages and opportunities. Firstly, these practices result in cost savings by reducing fuel consumption, optimizing routes, and enhancing energy efficiency. Secondly, DHL's sustainability efforts help diminish its carbon footprint and environmental impact, aligning with global sustainability objectives and bolstering corporate reputation. Thirdly, DHL's emphasis on green logistics acts as a distinguishing factor in the market, attracting environmentally conscious customers who prioritize eco-friendly shipping options. Lastly, adherence to green logistics practices ensures compliance with environmental regulations and emissions standards, mitigating risks associated with non-compliance.

While SMEs in Namibia may face challenges in adopting green logistics practices, strategic planning, collaboration, and targeted initiatives can help them overcome these obstacles. By starting with small changes, investing in technology, collaborating with partners, engaging employees, seeking financial support, and navigating through challenges effectively, SMEs can embrace green logistics and contribute to sustainable development in Namibia. The RDT emphasizes on collaboration and partnering with other enterprises to secure essential resources and mitigating external pressures. This may include pooling resources together, sharing valuable expertise and knowledge, or even partnering with bigger companies such as DHL to tap into the valuable experience and expertise.

Moreover, Namibia's transition to green hydrogen energy presents a range of opportunities for economic growth, sustainability, and innovation. SMEs play a crucial role in harnessing these opportunities and driving the country's green hydrogen agenda forward. By leveraging government initiatives, accessing financial support, building capacity, and fostering collaboration, SMEs can position themselves as key players in Namibia's emerging green hydrogen economy. The Namibian government has launched initiatives and policies to support the development of green hydrogen energy, including the National Energy Policy and the Renewable Energy Feed-in Tariff. SMEs can benefit from these policies by accessing incentives, subsidies, and support mechanisms for renewable energy projects.

Namibia is in the process of constructing its inaugural large-scale vertically integrated green hydrogen facility. The endeavor is projected to require an investment of $9.4 billion and is anticipated to create employment opportunities for 3,000 individuals, with an additional 15,000 jobs being generated during the four-year construction phase. The country has secured its initial investor, granting Hyphen Energy preferred bidder status for $4.4 billion (the fDi Report 2022, Financial Times).

The Namibian government offers financial assistance and grants to SMEs engaged in renewable energy projects, including green hydrogen production. SMEs can leverage these funds to invest in infrastructure, technology, and capacity building for green hydrogen initiatives. The government also provides training programs and capacity-building initiatives to equip SMEs with the skills and knowledge needed to participate in the green hydrogen sector effectively. These programs cover areas such as technology deployment, project management, and regulatory compliance.

Government-led partnerships and collaboration initiatives bring together SMEs, industry stakeholders, academia, and research institutions to foster innovation and knowledge sharing in the green hydrogen sector. SMEs can leverage these networks to access expertise, resources, and market opportunities.

Key Drivers of Green Logistics in SME's

Regulatory Frameworks

According to Vienažindiene et al. (2021), in their article "Logistics Practices Seeking Development of Sustainability: Evidence from Lithuanian Transportation and Logistics Companies," the primary drivers for implementing Green Logistics (GL) practices in the companies studied were as follows:

i. legal regulations and policies

ii. demands from business partners

iii. service users, customers, and society

iv. the awareness of the company's top management

v. and a corporate culture dedicated to environmental conservation and sustainable development.

Regulatory factors on a global scale play a crucial role in driving Green Innovation (GI) during both development and dissemination phases. The quality of global regulations matures through institutional consolidation, facilitating innovation and effective implementation of green development initiatives. (Shahzad et al., 2020a).

According to Zowada (2020), in the study conducted for Polish SME'Ss, respondents indicated that the government, public administration and other legislative institutions have the greatest impact on the development of 'green logistics' in their enterprises.

Stakeholder pressure

Researchers are increasingly studying the factors influencing green logistics, with stakeholder pressure identified as a critical determinant (Chen & Lee, 2020). More scholars noted a high level of environmental degradation across the globe. Mountains are being cleared for roads or tunnels, and barren land is being developed with modern structures, causing environmental degradation (Guo et al., 2021; Song et al., 2022b). Therefore, stakeholders are demanding that companies take responsibility for the adverse effects of their business activities. Increasing consumer awareness and preferences for environmentally friendly products and services drive SMEs to adopt green logistics practices to meet market demand and remain competitive. As a result, firms worldwide are actively seeking ways to integrate environmental considerations into their strategic planning.

Creativity and knowledge management

Creativity and knowledge management are essential enablers of green logistics and sustainable development (Awan et al., 2021). The Triple Bottom Line (TBL) strategy is emphasized for effective governmental progress, with modern knowledge driving green development (Lim et al., 2017; Zhu et al., 2019).

Maji et al. (2023) conducted a study in Bauchi, Nigeria, focusing on green logistics implementation and environmental sustainability practices. Survey data indicated that logistic categories like transport, warehousing, freight forwarding, and packaging strongly influence green logistics practices. Additionally, managerial experience significantly correlates with sustainability indicators, emphasizing its role in compliance.

Resource Efficiency and Cost Reduction

Green Logistics in SMEs focuses on optimizing resource utilization across the supply chain, minimizing waste, and conserving energy and natural resources (Sarkis et al., 2011). This involves implementing lean practices, adopting eco-friendly packaging solutions, and optimizing transportation routes to reduce carbon emissions and environmental impact (Carter & Rogers, 2008). The pollution prevention strategy, as suggested by Hart (1995), results in cost reductions for raw materials and disposal, lowers compliance liability expenses, and enhances efficiency and productivity. This ultimately leads to increased cash flow and profitability.

Reputation and Brand Image

Adopting green logistics practices can enhance a company's reputation and brand image, attracting environmentally conscious customers and investors.

Innovation and Technology

Advances in technology and innovation provide SMEs with new opportunities to implement green logistics practices, such as using electric vehicles, renewable energy sources, and smart logistics solutions. ICT

infrastructure adoption can reduce CO2 emissions and support smart, sustainable cities (Stucki & Woerter, 2019).

Supply Chain Collaboration

Collaboration with suppliers, partners, and other stakeholders in the supply chain facilitates the adoption of green logistics practices by sharing resources, expertise, and best practices.

SMEs can amplify their impact by forging collaborative partnerships with suppliers, customers, and other stakeholders (Hsu et al., 2018). By co-creating sustainable solutions and sharing resources, SMEs can overcome capacity constraints and unlock new opportunities for innovation and growth (Hofmann & Busse, 2011).

METHODOLOGY

Research Design

This paper adopted a theoretical approach, primarily relying on a comprehensive evaluation of existing literature and qualitative analysis to explore the implementation of green logistics in small and medium-sized enterprises (SMEs). The research design centers around a meticulous review of academic papers, industry reports, and case studies, aiming to identify key themes, concepts, and frameworks pertinent to green logistics and SME sustainability. By synthesizing findings from the literature, the study drew meaningful conclusions, formulated best practices, and provided strategic recommendations.

Data Collection Methods

The data collection process involved a systematic search and selection of pertinent literature. To ensure comprehensive coverage, academic databases such as Google Scholar, JSTOR, and ScienceDirect, along with industry-specific repositories, were utilized. The search employed keywords such as "green logistics," "SME sustainability," "sustainable supply chain," "environmental management in SMEs," and "green practices."

Inclusion criteria was meticulously established to guarantee the relevance and credibility of the selected literature. The focus was on publications from the past two decades, prioritizing peer-reviewed journals, reputable industry reports, and well-documented case studies. This approach ensured that the study drew on the most current and high-quality sources available.

The literature review process entailed systematically selecting and examining articles from various databases and sources. Five search engines were employed to locate relevant journal articles, using specific search strings related to green logistics, sustainability, SMEs, models, and frameworks. Although there was some overlap of articles across databases, this redundancy ensured a thorough exploration of the available literature. The search process was deemed complete when no new articles emerged.

Ultimately, a final sample of 25 articles was identified. This sample facilitated a thorough discussion linking the three main themes of the research: green logistics practices, sustainability, and SMEs. By integrating insights from these sources, the study aimed to provide a comprehensive understanding of the current state of green logistics in SMEs, identify best practices, and formulate strategic recommendations for their implementation.

Data Analysis Methods

The data analysis was conducted through thematic analysis, a method well-suited for identifying and interpreting patterns within qualitative data. This involved coding the literature to categorize and summarize key findings related to the drivers, current practices, challenges, opportunities, and best practices in green logistics for SMEs. By organizing the data into thematic areas, the analysis facilitated a structured synthesis of the literature, highlighting commonalities and divergences across different studies and case examples.

To develop a comprehensive conceptual framework, the study synthesized the findings from the thematic analysis. This framework aimed to elucidate the relationships between green logistics practices, the challenges

and opportunities faced by SMEs, and the broader impact of these practices on sustainability. In constructing this framework, the study integrated insights from seminal works and authoritative sources in fields such as lean management, green practices, and sustainability, ensuring a robust and multidimensional theoretical model.

Integration of Expert Insights

Expert insights played a crucial role in enriching the theoretical models and frameworks developed in this study. By reviewing seminal works and authoritative sources from experts in green practices, and sustainability, the study incorporated advanced perspectives and nuanced understandings into the conceptual framework. This integration not only validated the theoretical constructs but also provided a deeper and more comprehensive view of the challenges and opportunities associated with implementing green logistics in SMEs.

Formulation of Best Practices and Recommendations

Identifying best practices was a critical aspect of this study, achieved by comparing and contrasting findings from various studies and case examples. The analysis focused on extracting practical and actionable strategies that SMEs can adopt to integrate green logistics into their operations. The study aimed to develop strategic recommendations grounded in the synthesized literature and expert insights, offering practical guidance for SMEs on how to overcome challenges and leverage opportunities in green logistics.

The recommendations were designed to be both strategic and practical, providing SMEs with clear pathways to enhance their sustainability practices. By emphasizing actionable steps and evidence-based strategies, the study aimed to bridge the gap between theoretical models and real-world applications, facilitating the effective implementation of green logistics practices in SMEs.

Policy and Support Mechanism Analysis

A comprehensive review of existing policies, industry standards, and support mechanisms was conducted to understand the broader context facilitating the adoption of green logistics by SMEs. This review aimed to identify gaps and potential areas for improvement in the current policy landscape, offering insights into how regulatory and support frameworks could be enhanced to better support SMEs in their sustainability efforts.

Based on this review, the study provided recommendations for policy measures and support programs that could aid SMEs in their transition towards sustainable logistics practices. These recommendations were designed to address the specific barriers identified in the literature, such as financial constraints, lack of expertise, and technological limitations, offering targeted solutions to promote the widespread adoption of green logistics in the SME sector.

By following this structured and comprehensive methodology, this paper aimed to provide a robust theoretical exploration of green logistics in SMEs. Grounded in extensive literature review and qualitative analysis, the study contributes to the academic discourse on sustainable supply chain management and offers practical insights for SMEs striving to enhance their environmental and economic performance.

Frameworks For Implementing Green Logistics Practices

Yang et al. (2023) utilized the diffusion theory to examine the adoption of green supply chain management practices in firms, from the preparation stage to the development stage. Diffusion theory pertains to the process by which individuals or organizations adopt new innovations, such as ideas, products, technologies, practices, or philosophies, to generate significant value for the company (Del et al., 2021). Previous research has utilized diffusion theory to investigate the mechanisms, reasons, and speed at which new concepts and technologies are integrated within an organization or spread across multiple organizations (Del et al., 2021).

Therefore, diffusion theory provides a framework for understanding the process of adoption and implementation of green logistics practices within organizations and supply chain networks. By considering factors such as communication channels, SME’s can develop more effective strategies for promoting and facilitating the adoption of sustainable practices in logistics operations.

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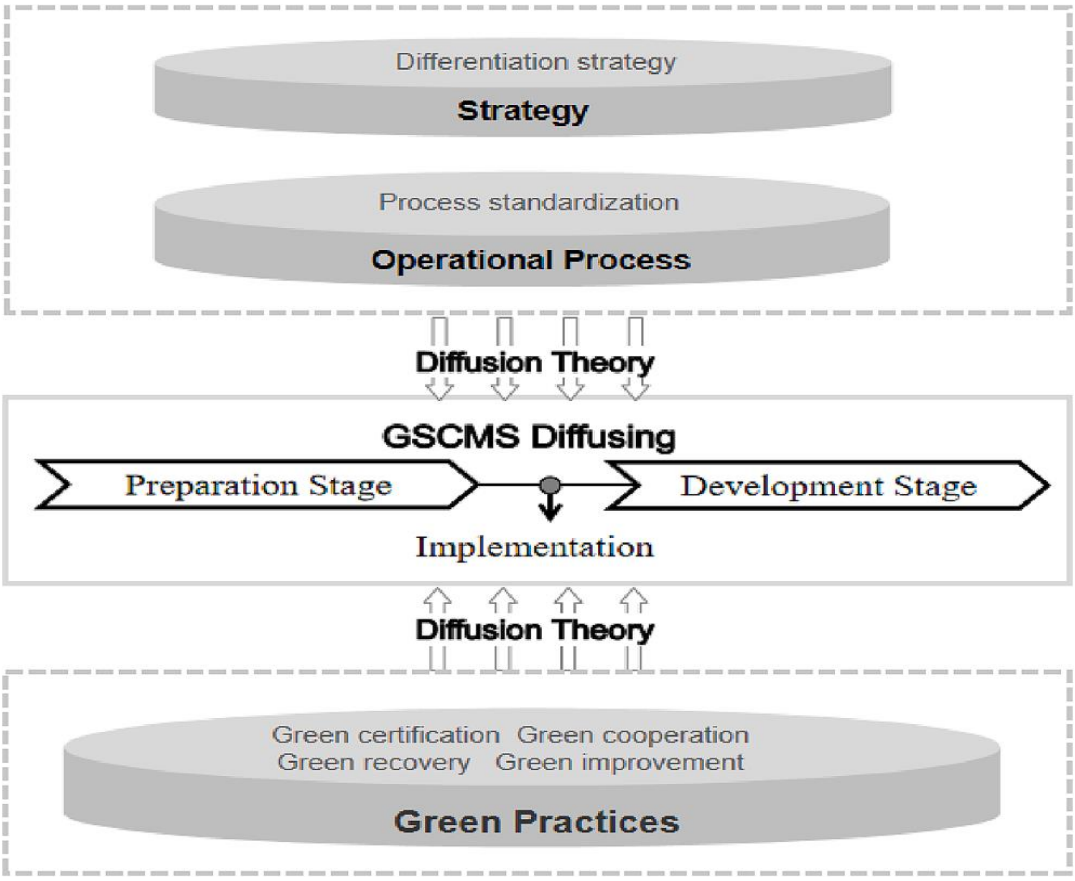
Firms first become aware of green logistics practices through communication channels such as industry conferences, trade publications, or peer networks. Early adopters within the industry show interest in implementing green logistics practices, recognizing the potential benefits in terms of cost savings, environmental impact reduction, and corporate social responsibility. As more organizations begin to adopt green logistics practices, others evaluate the feasibility and compatibility of these practices with their own operations. Factors such as the availability of resources, technological capabilities, and regulatory requirements influence this evaluation process. Firms that perceive the benefits of green logistics practices and have the necessary resources and capabilities proceed to adopt these practices within their supply chain operations. The successful implementation of green logistics practices involves integrating sustainable processes, technologies, and partnerships into the organization's operations and supply chain networks. Over time, as more organizations adopt and successfully implement green logistics practices, the benefits become more widely recognized and accepted within the industry, leading to further diffusion and normalization of these practices.

In addition, strategies and operational processes play a pivotal role in diffusing green logistics practices across the supply chain. However, companies need to be aware of certain strategies such as cost leadership strategy, that may conflict with the environmental protection objectives as green initiatives in most cases necessitates high investments in technology innovations and advertising costs.

Yang et al., (2023) used the diffusion theory to provide a framework that SME'S can utilize to understand the process and implementation of green practices in logistics operations as depicted in figure 4.

Figure 5: The system analysis of Green Supply Chain Management Practices (GSCMS), adopted from Yang, et al., (2023).



Stages of green logistics development in business operations

The general lack of recognition of green logistics practices amongst SME'S often stems from managers' limited understanding of the concept's principles and implementation methods, as noted by Zowada (2018). To aid the adoption of environmentally friendly solutions in business practices, existing literature suggests four developmental stages for integrating 'green logistics' into operational strategies as depicted in Figure 5.

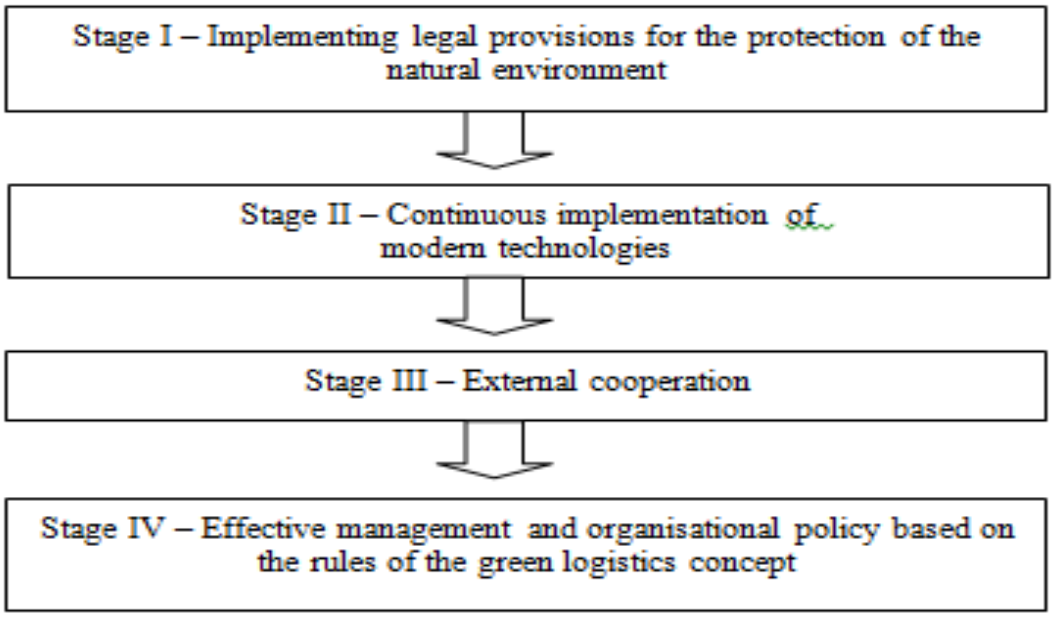


Figure 6. Stages of green logistics development in business operations. Source: (Vasiliauskas et al. 2013).

The first stage involves implementing existing legal regulations concerning environmental protection within enterprises. If a company stops at this stage, it demonstrates a reactive approach, merely fulfilling minimum requirements. Progressing to the second stage entails adopting modern technologies to enhance environmental practices, such as IT solutions for efficient vehicle fleet and warehouse management, and utilizing low-emission transportation technologies. Investment in modern technologies is essential for advancing 'green logistics' in business operations.

Leveraging technology is essential for SMEs to streamline logistics processes, enhance visibility, and track environmental performance (Srivastava et al., 2018). Cloud-based logistics platforms, IoT sensors, and data analytics tools enable SMEs to monitor carbon emissions, optimize inventory levels, and improve decision-making (Sarkis et al., 2011).

In the third stage, collaboration with external entities becomes crucial. Logistics processes often span multiple links in the supply chain, necessitating cooperation for effective implementation. Embracing 'green logistics' at the company level may not suffice; a holistic approach across the entire supply chain is necessary. For instance, packaging design impacts storage space and transportation efficiency throughout the supply chain, emphasizing the interconnectedness of logistics processes.

The final stage entails the comprehensive integration of green principles into company operations. Here, the tenets of 'green logistics' become embedded in overall management processes, enabling the highest level of environmental sustainability (Zowada & Niestroj, 2019).

Logistics Eco-centricity concept Adoption

Agyabeng-Mensah et al. (2020) suggested Logistics Eco-centricity concept to improve the effectiveness of green logistics implementation. The authors define LEC as a process wherein organizations engage, collaborate with, and learn from various stakeholders, both traditional and nontraditional, to enhance their logistics activities and processes. By involving competitors, community members, and non-governmental organizations (NGOs) that are often overlooked in conventional supply chains, LEC aims to achieve social, environmental, and economic goals (Zhu et al., 2013).

Implementing LEC involves considering relationships with social and natural environments, as part of supply chain ecocentricity. For SMEs aiming to advance the implementation of green logistics practices, LEC suggests learning from and engaging with competitors, NGOs, and society at large. By gathering insights and developing innovative capabilities, SMEs can effectively implement green supply chain practices like GLMPS (Cousins et

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al., 2019). Additionally, incorporating external stakeholders' voices in product design, as advocated by the NRBV theory, maximizes the benefits of environmental practices (Hart, 1995).

Engaging competitors and NGOs allows SMEs to discover innovative methods for reducing energy usage and environmental pollution, aligning with sustainable development strategies. Dialogue with community members, who are often more attuned to environmental concerns, offers valuable insights into sustainable transportation and packaging approaches (Johnson et al., 2018). Collaborating with environmental stakeholders facilitates the adoption of appropriate environmental practices, thereby advancing social and environmental sustainability in logistics (Nkrumah et al., 2020). Integrating LEC into their operations enables SMEs to enhance their green logistics practices, contributing to sustainable development goals while fostering competitiveness and innovation in the marketplace.

Policy Implementation

Policy implementation plays a crucial role in advancing green logistics practices within SMEs. Maji et al. (2023) recommend several policy measures to promote green logistics adoption, including increasing awareness among managers, incentivizing green logistics adoption, and providing targeted training for less experienced managers. These recommendations align with existing literature emphasizing the importance of building internal capabilities and raising employee awareness to embed green logistics practices within SMEs (Srivastava et al., 2018).

To leverage these policy recommendations, SMEs can implement training programs, workshops, and knowledge-sharing initiatives aimed at raising awareness among employees about the environmental impacts of logistics activities and the benefits of adopting green practices. By providing targeted training for less experienced managers, SMEs can equip them with the necessary knowledge and skills to implement green logistics initiatives effectively.

SMEs can also incentivize the adoption of green logistics practices by offering rewards or recognition for environmentally sustainable behaviors and outcomes. This can include financial incentives, performance bonuses, or other non-monetary rewards to motivate employees and managers to prioritize sustainability in their decision-making processes.

Additionally, SMEs can collaborate with government agencies, industry associations, and non-governmental organizations to advocate for supportive policies and regulations that encourage green logistics adoption. By participating in policy dialogues and advocacy efforts, SMEs can contribute to the development of a supportive regulatory environment that incentivizes sustainable practices.

Supply Chain Traceability (SCT) Concept Adoption

This is an essential concept for addressing challenges related to inadequate tracking and tracing in supply chain activities, hindering efforts to mitigate harmful practices and enhance sustainability (Wang et al., 2020; Cousins et al., 2019). SCT involves recording associated properties and product details throughout the supply chain, facilitating tracking from suppliers to end-consumers and back.

With a focus on enhancing environmental, social, and business sustainability, SCT enables firms to measure material flows, internal activities, and transportation information, providing insights into environmental impacts such as emissions and pollution. Through SCT, firms conduct product life cycle assessments, identifying inefficiencies and unproductive activities to improve performance.

For SMEs, SCT concept can be utilized by SME’s to fostering Green logistics implementation. It provides them with tools to enhance environmental and social responsibility while improving operational efficiency. By identifying areas for improvement in the supply chain, SMEs can reduce waste, emissions, and resource consumption, aligning with sustainability goals and enhancing their reputation. Additionally, SCT helps SMEs comply with regulations and customer demands for transparency and sustainability, thus improving competitiveness and market positioning. Overall, SCT serves as a valuable tool for SMEs to enhance

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sustainability performance and achieve long-term success in today's environmentally conscious business landscape (Cousins et al., 2019).

DISCUSSION

Although some studies revealed that adopting green logistics practices leads to improved performance for firms, there are recent studies which have challenged this notion. For instance, Liu et al. (2020) argued that significant investment required in green technologies may not necessarily yield positive changes in the short term. Adoption of a green strategy entails a preparation stage that demands substantial capital investment in process innovation and organizational changes (Feng et al., 2022). Furthermore, Arthur D. Little, Inc., a renowned consultancy, contends that the overall profitability of organizations may not be sufficient to offset the costs of technology and new-process investments during the preparation stage (Juan et al., 2022).

These perspectives highlight the complexity and challenges associated with implementing green logistics practices, suggesting that the anticipated benefits may not always materialize immediately. Therefore, while there are undeniable advantages to embracing sustainability initiatives in logistics, it is essential to acknowledge and address the potential obstacles and uncertainties that firms may encounter along the way, especially SMEs. Despite the seemingly negative assertions provided above, there is no doubt that SMEs will benefit if they fully embrace green logistics. It is therefore the researcher's view that SMEs play a critical role in environment sustainability and climate change. According to Domagala et al. (2022), "Sustainable green logistics can enhance transportation and logistics procedures, diminish energy consumption, curtail waste and pollution and augment the utilization of renewable energy sources", among other factors. Therefore, it is crucial that SMEs should implement green logistics as a way of reducing carbon emissions into the atmosphere. More results that are positive are anticipated when there is an integration of green logistics and circular economy. It has been demonstrated that the combination of the green logistics and circular economy leads to sustainable economic and environmental progress.

At this juncture, it makes sense to refer to some studies which were conducted in selected European countries on green logistics. These studies revealed that Implementing GL services can contribute to GDP growth and environmental quality in EU economies. Modern logistics and ICT infrastructures (e.g., warehouses and port connectivity) can assist other governments in developing freight transport corridors. Therefore, governments should formulate supply chain and logistics strategies to enhance trade services.

The findings suggest that increased carbon emissions are linked to higher municipal waste, indicating the need for improved waste management practices to reduce emissions. For countries yet to reach the Environmental Kuznets Curve (EKC) threshold, prioritizing and strictly enforcing green economic policies and environmental regulations for the GL industry and circular systems is crucial. Law enforcement agencies should monitor urban waste generation rates and reduce waste through smart urbanization and modern technology to protect the environment. Technological advancements in urban areas are proposed as a potential solution to this issue.

Implications For Policy, Programmes, And Sme Management

Policy and Programme-Level Implications

The findings from the reviewed literature and case studies indicate that regulatory requirements, stakeholder pressure, and institutional expectations are key drivers of green logistics adoption in SMEs. Governments and development agencies should therefore move beyond minimum compliance frameworks toward enabling policies that combine regulation with incentives. One approach is to implement tiered support mechanisms that reward firms progressing through green logistics maturity stages, such as access to grants, subsidies, or preferential procurement status.

A second area of intervention is to bridge the knowledge and capacity gap that limits SMEs from implementing green practices. Policymakers can invest in sector-based *eco-extension officers* to support SMEs with one-on-one guidance, compliance toolkits, and green logistics audits. These officers can also serve as facilitators

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between SMEs and larger firms, such as DHL, that have established green logistics systems, encouraging collaborative partnerships and knowledge transfer.

Additionally, governments can design "Green Logistics Labels" that formally recognize and publicize firms adopting sustainable practices. This enhances mimetic pressure, allowing pioneering SMEs to gain reputational advantage and signal legitimacy to customers and investors. Finally, dedicated green SME financing instruments, such as those linked to Namibia's green hydrogen initiatives, can be made available to enable infrastructure upgrades, eco-packaging transitions, and the integration of digital logistics systems.

Managerial Implications for SMEs

For SME owners and logistics managers, it is essential to recognize that green logistics is not solely an environmental obligation but a strategic business opportunity. First, mapping out stakeholder expectations, such as those from regulators, customers, and supply chain partners, helps identify low-cost, high-impact actions that improve legitimacy and reduce reputational risk. Even small initiatives, like route optimization or eco-packaging, can signal commitment and attract environmentally conscious clients.

Second, managers should consider shared logistics infrastructure, such as collective reverse logistics, pooled warehousing, or milk run transportation routes, which reduces capital requirements and reflects the Resource Dependence Theory's emphasis on inter-organizational collaboration.

Third, adopting basic digital traceability tools, such as GPS-based route monitors or carbon tracking spreadsheets, allows SMEs to demonstrate their environmental performance to financiers and customers. This data can support eligibility for green financing and provide internal insights for continuous improvement.

Finally, human resource development is essential. SMEs should leverage national TVET systems or industry-led training initiatives to upskill staff in eco-driving, inventory efficiency, and emissions monitoring. Certification schemes can boost employee morale and align personal incentives with sustainability outcomes, ensuring that green logistics becomes embedded in day-to-day operations rather than treated as a compliance add-on.

CONCLUSION AND RECOMMENDATIONS

This paper concludes that SMEs have a long way to go in embracing green logistics and circular economy practices. From the three case studies it is evident that SMEs struggle to implement green logistics practices because of capital constraints and lack of expertise. Although they contribute significantly to the GDP of economies, they impact negatively to sustainable development.

Despite facing unique challenges, SMEs can leverage their inherent advantages and innovative spirit to implement cost-effective and scalable solutions that reduce environmental impact while enhancing operational efficiency and competitiveness. By embracing collaboration, technology adoption, and employee empowerment, SMEs can pave the way for a more sustainable and resilient future. Through collective action and shared commitment, SMEs can catalyze positive change and contribute to a more sustainable and equitable society.

This paper makes recommendations for governments and non-governmental organizations and SMEs. Governments are urged to prioritize recycling technologies to stimulate GDP growth, despite the potential adverse impact on economic growth from cheaper recyclable products. In addition, strict legislation should require companies to produce items from recycled materials to ensure a certain portion of recycling in the economy. GDP growth is traditionally measured by new resources and goods, so governments should incentivize the recycling industry by imposing penalties or fees on non-recyclable goods. SME's are encouraged to create creating waste management job opportunities for both professional and unskilled labor forces, who are responsible for waste collection and processing, is essential.

Policymakers should support logistics operations by implementing strategies to transition from a linear to a circular economy. Substantially reducing carbon monoxide emissions in accordance with the Paris Climate

Agreement and the Super Green project in Europe can be achieved through better management practices and eco-design initiatives.

SME's are encouraged to secure financial support and incentives for investing in green logistics. This maybe in the form of government grants, subsidies, and low-interest loans designed to support green initiatives. Taking advantage of tax benefits and credits available for sustainable investments can alleviate financial burdens. These financial aids can provide the necessary capital to invest in energy-efficient equipment and renewable energy sources, which are crucial for reducing energy consumption and emissions.

Furthermore, SMEs should also invest in comprehensive training programs to educate employees on the importance of green logistics and the methods to implement them. Hiring sustainability experts or consultants can provide the expertise needed to guide the adoption of green practices effectively.

SMEs are also encouraged to make use of software tools for route planning to reduce fuel consumption and emissions by ensuring the most efficient delivery routes. Additionally, sourcing materials and products locally can minimize transportation distances and the associated environmental impact.

Collaboration and resource-sharing among SMEs can also play a pivotal role in adopting green logistics. Forming partnerships with other SMEs allows for shared resources, knowledge, and best practices. Joining industry networks and sustainability initiatives can provide additional support and information, helping SMEs stay informed and connected within the green logistics community.

Establishing comprehensive recycling programs can manage waste effectively, while using eco-friendly, recyclable, and biodegradable packaging materials can reduce environmental impact. All these practices not only contribute to sustainability but can also enhance the company's reputation among environmentally conscious consumers

All in all, NGO's are recommended to work with SMEs in promoting green logistics and waste management solutions. This can be achieved through capacity building, resource access, networking, advocacy, and monitoring. NGOs can play a crucial role in promoting green logistics and waste management solutions, enabling SMEs to contribute effectively to environmental sustainability while also enhancing their own competitiveness and resilience.

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