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Investigating The Role of Green Logistics Practices in Reducing Nonrenewable Energy Consumption

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Abstract

***Purpose**: The purpose of this paper is to highlight the significance of green logistics practices in minimizing nonrenewable energy usage, with a specific focus on the mediating role of B2B customers' purchasing intentions.*

***Design/methodology/approach:** This study employs qualitative research, starting with a Systematic Literature Review (SLR) to examine green logistics practices in reducing nonrenewable energy use. Semi-structured interviews with ten Egyptian petroleum logistics experts validate and refine a research framework derived from the SLR. The research is theoretically grounded in the Resource-Based View (RBV), framing green logistics as strategic organizational capabilities. Additionally, Institutional Theory is used to understand the role of external pressures shaping B2B purchasing decisions.*

***Findings:** The study identified key green logistics themes, including green purchasing, transportation, and reverse logistics, highlighting Egypt's efforts to reduce greenhouse gas emissions through public-private collaborations. Despite progress, challenges like weak infrastructure and low awareness persist. A conceptual framework was developed, showing how green logistics practices influence purchasing intentions and energy reliance reduction, offering insights for policymakers and organizations.*

***Theoretical Contribution:** This study advances the application of the Resource-Based View (RBV) and Institutional Theory within the context of green logistics in emerging markets. Integrating both theories offers a deeper understanding of how internal capabilities and external institutional pressures jointly shape sustainable purchasing behavior in B2B settings. The study also contributes to the literature by developing a conceptual framework linking green logistics practices to reduced nonrenewable energy dependence through B2B customer engagement.*

***Practical Contribution:** The findings provide actionable insights for policymakers, logistics managers, and stakeholders in the petroleum sector. By identifying critical barriers such as infrastructure limitations and low awareness, the study suggests targeted strategies for promoting green logistics. Moreover, the conceptual framework can serve as a roadmap for organizations aiming to align sustainability goals with customer expectations, thereby supporting Egypt's broader environmental and energy transition objectives.*

***Keywords:** Sustainable Energy, Green Logistics Practices, B2B Purchase Intention, Nonrenewable Energy, Resource-Based View, Institutional Theory*

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Introduction

Environmental concerns about human activity's impact on the planet have gained widespread attention across media, governments, academia, and the public. Businesses increasingly adopt green logistics practices to enhance sustainability performance, gain competitive advantages, and meet stakeholder demands for accountability (Abd Elbarky et al., 2022; Chen et al., 2023). Green Logistics Practices (GLPs) aim to balance economic, environmental, and social factors by integrating eco-friendly ideas into logistics to reduce environmental harm, conserve resources, and improve business performance (Hashmi, 2022; Agyabeng-Mensah et al., 2022; Cheng et al., 2024).

The rising global demand for eco-friendly practices and products drives businesses to adopt green logistics for reduced waste, energy use, and environmental harm, gaining a competitive edge and improving reputation (Alsuraihi et al., 2022). Green practices involve challenges such as varying objectives, technological issues, and budget constraints, necessitating collaboration with supply chain partners (Pakurár et al., 2020). Energy, a cornerstone of economic development, relies on both renewable and nonrenewable resources. Fossil fuels, though vital, contribute to the climate.

Change and are depleting, prompting urgent shifts toward sustainable energy alternatives (Singh et al., 2019; Perissi et al., 2023).

Purchase intention, a key aspect of consumer behavior, reflects an individual's likelihood of buying a specific product, influenced by factors such as needs, attitudes, and perceptions (Kytö et al., 2019). Green purchasing emphasizes eco-friendly procurement to minimize harm to health and the environment (Nur et al., 2021). While interest in the impact of Green Logistics Practices (GLP) on reducing nonrenewable energy use is growing, research gaps remain. Studies have yet to fully explore how GLPs optimize energy use and influence renewable adoption, requiring deeper insights into their effectiveness and purchase-related factors (Khan et al., 2022; Leung et al., 2023).

This research advances green logistics practices while emphasizing the mediation role of purchase intention drivers to promote sustainable development in critical regions. It identifies key factors impacting the reduction of nonrenewable energy use through these drivers. The study is structured as follows: introduction, literature review, research methodology, findings and discussion, and conclusion.

Literature review

The escalating global concern for environmental sustainability has prompted organizations to adopt eco-friendly practices across their supply chains. Green logistics, a strategic approach that integrates environmental considerations into logistics operations, has emerged as a crucial component of sustainable business practices. This literature review delves into the intricate relationship between green logistics practices, purchasing intention drivers, and nonrenewable energy consumption.

Green Logistics Practices

Green logistics practices are management measures aimed at reducing air pollutants, CO2 emissions, misuse of resources, and improper waste disposal while promoting environmental sustainability (Popescu et al., 2024). These practices ensure efficient goods and information flow to meet customer needs and foster social development (Vienažindienė et al., 2021; Huong et al., 2024). Businesses adopt green logistics to fulfill environmental obligations, gain a competitive edge, attract new clients, and achieve social and financial benefits (Karaman et al., 2020; Agyabeng-Mensah & Tang, 2021). Green logistics integrates environmental goals into business decisions, addressing social, economic, and environmental challenges while maintaining profitability and efficiency in logistics operations (Khan et al., 2019; Vienažindienė et al., 2021; Roy and Mohanty, 2024).

Purchase Intention

Purchase intention reflects consumer preferences shaped by experiences, attitudes, and beliefs, often serving as a predictor of actual purchasing behavior (Zhuang et al., 2021; Susilo et al., 2024). Green purchase intention, the likelihood of buying eco-friendly products, is influenced by factors such as values, attitudes, motivation, knowledge, and customer satisfaction (Abd Elbarky et al., 2022). Consumers with greater environmental awareness are more likely to adopt sustainable purchasing patterns (Cui et al., 2024). Behavioral goals, informed by self-perception and perceived values, play a key role in driving the shift toward eco-friendly consumption (Tavitiyaman et al., 2024).

Nonrenewable Energy Source

Nonrenewable energy sources like coal, oil, and natural gas account for 80% of global energy consumption, but their environmental and societal impacts are severe (IEA, 2022). Fossil fuel combustion is the primary

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source of greenhouse gas emissions, driving climate change and causing rising temperatures, extreme weather, and biodiversity loss (IPCC, 2021; NASA, 2022). Extraction methods such as fracking and deep-sea drilling harm ecosystems, pollute water, and erode soil, while spills and runoff cause long-lasting damage (EPA, 2021; WWF, 2022). Reliance on these fuels exacerbates socioeconomic inequalities and economic instability, highlighting the urgent need for investments in renewable energy and sustainable policies (UNDP, 2020; UNEP, 2020).

The Relationship between Green Logistics Practices and Purchase Intentions

The relationship between Green Logistics Practices (GLPs) and purchase intentions is crucial for promoting eco-friendly consumption (Lee et al., 2021). Increased consumer awareness of environmental impacts directly influences their buying behavior (Xue et al., 2022). Integration of green logistics enhances sustainability commitment, fostering consumer trust and loyalty (Zhu et al., 2021). Studies show that green supply chain practices in industries like fast food (Rehmani & Siddiqui, 2019) and green environmental practices, including attitudes, marketing, and customer value, significantly influence purchase intentions in multiple countries (Ahmed et al., 2024).

In Egypt, Abd Elbarky et al. (2023) found no significant direct relationship between green supply chains and purchase intentions, but green perceived quality and customer satisfaction significantly influenced this connection. Rahman et al. (2021) highlighted the mediating role of trust and perceived value in linking Green Logistics Practices (GLPs) to purchase intentions. Furthermore, Nguyen et al. (2023) emphasized that green stocking practices, which focus on efficient inventory management and waste reduction, help build a positive corporate image and encourage eco-conscious buying behavior.

Several factors influence the relationship between Green Logistics Practices (GLPs) and purchase intentions. Green packaging innovations, such as biodegradable and reusable materials, attract environmentally conscious buyers by reducing waste (Chen et al., 2022). Smart green transportation, which minimizes carbon emissions through optimized networks and alternative

Energy significantly impacts purchase intentions by showcasing a company's commitment to environmental responsibility (Tang & Tong, 2020). Additionally, end-of-life practices focused on recycling and reusing products align with consumer sustainability values, influencing their purchasing decisions (Kumar & Kumar, 2023).

The Relationship between Purchase Intentions and Nonrenewable Energy Sources

Purchase intentions play a crucial role in reducing the consumption of nonrenewable energy sources (NRES) as individuals and organizations increasingly opt for renewable alternatives due to heightened environmental awareness, regulatory pressures, and societal demand for sustainability (Ali & Naushad, 2023). Nazir and Tian (2022) demonstrated that renewable energy significantly influences consumer attitudes, using the Unified Theory of Acceptance and Use of Technology as the conceptual framework. Their study, based on structured questionnaires from 497 respondents in Pakistan, found a strong positive correlation between purchase intention for renewable energy technology and factors like cost, ease of use, relative advantage, social media exposure, and awareness.

In the Jordanian context, Almrafee and Akaileh (2024) studied factors influencing consumers' intentions to purchase renewable energy, based on an online poll of 428 Jordanians who do not currently use renewable energy. They found that attitudes, subjective norms, perceived price, knowledge, and perceived behavioral control significantly affect purchase intentions. Similarly, Ajzen (2020) emphasized that attitudes, subjective norms, and perceived behavioral control, as outlined in the Theory of Planned Behavior, shape purchase intentions. Consumers with strong pro-environmental attitudes are more likely to reduce their reliance on nonrenewable energy and invest in renewable solutions like solar or wind power (Rahim et al., 2022).

Malik et al. (2020) explored the relationship between renewable energy products (like solar panels) and consumer purchase intentions, finding that product-related knowledge, environmental concerns, and perceived risks influence purchasing decisions. Zhou et al. (2021) highlighted the importance of corporate purchase intentions in reducing reliance on nonrenewable energy sources, as businesses incorporating sustainability into their procurement strategies shift toward green energy. However, Tang et al. (2020) pointed out that challenges such as limited renewable energy infrastructure and a lack of awareness in some regions still hinder purchase intentions, perpetuating dependence on nonrenewable energy sources.

The Relationship between Green Logistics Practices and Nonrenewable Energy Sources

Environmental sustainability is hindered by logistics operations' dependence on fossil fuels and nonrenewable energy sources. "Green logistics" aims to balance economic efficiency with environmental

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preservation by reducing environmental externalities (Khayyat et al., 2024). Kim et al. (2024) explored the connection between green logistics practices (GLPs) and nonrenewable energy sources using Data Envelopment Analysis-Slack-Based Measure (DEA-SBM) and Tobit

Regression. Their findings showed that GLPs are closely linked to nonrenewable energy sources, with ESG reports and government policies influencing the financial efficiency of logistics companies.

Osman et al. (2022) explored the impact of fossil fuel-free fuels as a green logistics practice (GLP), finding that green freight transport is growing in popularity, with customers willing to pay more for it. However, public regulations had minimal influence, as internal initiatives and corporate stakeholders drove the development of green logistics services. Khayyat et al. (2024) studied the adoption of green logistics technology and information systems in Saudi Arabia, highlighting the significance of nonrenewable energy sources. Their findings showed strong environmental awareness among stakeholders and a business culture supportive of sustainability, with widespread recognition of the benefits of green logistics technologies.

Aytekin et al. (2024) identified the most sustainable approach for logistics organizations and explored green energy challenges, employing a hybrid T-spherical fuzzy (T-SF) methodology. The study found that "energy security" is the most critical green energy component for logistics firms, with the socially beneficial services supply strategy being the most effective sustainable approach. Diaz et al. (2021) investigated the relationship between green logistics and renewable energy in La Guajira, Colombia, where off-grid sustainable energy generation systems are being implemented to reduce reliance on fossil fuels and improve electrical delivery.

Developing a Framework

The researcher develops a framework connecting Green Logistics Practices, Nonrenewable Energy Usage, and Purchase Intentions by synthesizing findings from previous studies. This framework aims to integrate relevant measures, variables, and models based on the relationships discussed in the literature. A systematic literature review is identified as the most appropriate approach for creating this linking framework.

Systematic Literature Review

To conduct a systematic literature review, the researcher collected information from various sources, including scientific publications, prior studies, books, periodicals, dissertations, and reports on sustainable smart ports, specifically focusing on Green Logistics Practices, Non-renewable Energy Usage, and Purchase Intentions. The review process involved a detailed search across academic databases like Scopus and Web of Science, targeting studies published between 2011 and 2024.

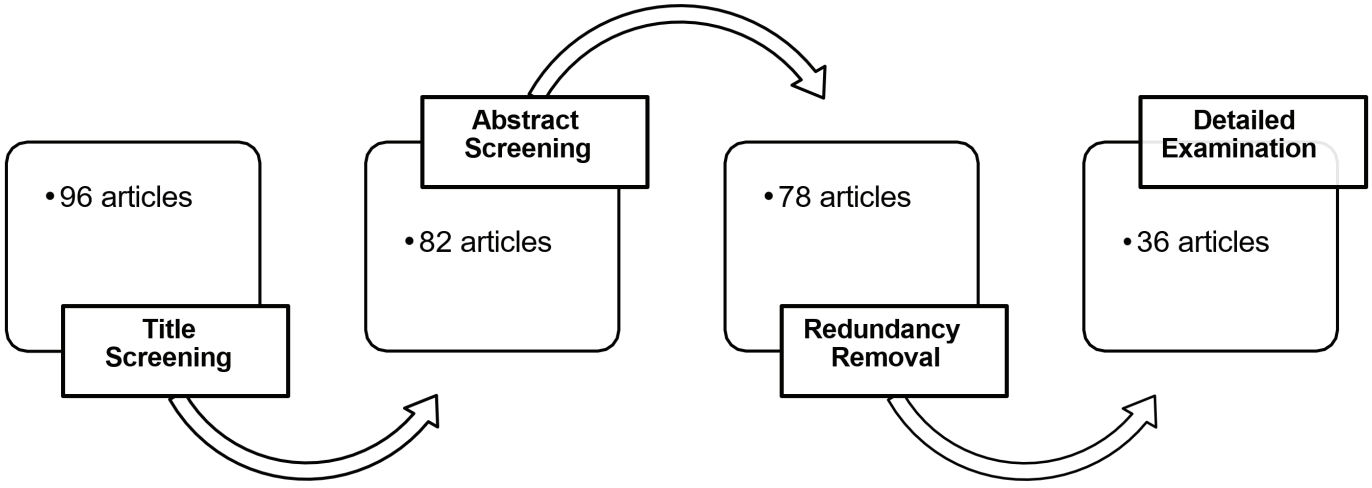


Figure 1: Review Process Scheme (by researcher)

Figure (1) outlines the process used to review 96 works: identifying the research scope, selecting related studies, assessing their quality, extracting and tracking data, integrating studies, and adjusting sources. Most of the authors were affiliated with higher education institutions, as shown in Table 1. The literature selection was based on keywords used to search online databases. The sources were chosen for their ability to describe the relationships between Green Logistics Practices, Nonrenewable Energy Usage, and Purchase Intentions. Bibliometric maps were created using VOS viewer software version 1.6.11.

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Table 1: Research Steps

Stage	Sub-stage	Description	Number of records
Step 1	Identification of research field	Initially, a title filtering procedure was applied to all retrieved papers to find publications about nonrenewable energy, green logistics practices, and purchasing intentions. To find articles related to these-subjects, it was necessary to skim the titles of the articles.	201
	Keywords	Filter the database:*'Green logistics practices', 'Nonrenewable energies', 'Sustainable Energy', and 'Purchase Intentions'*	
Step 2	Scopus and WOS citation search	1) Find the research string in the title, Abstract, OR subject terms in databases such as Web of Science, Scopus, Google Scholar, and Springer. 2) Search timeline: 2011-2024 3) Language: English 4) Source type: Academic journals	96
	Removal and extraction of duplicate records	Duplicate records are eliminated, and citations are extracted to EndNote.	82
Step 3	Redundancy Removal	During the database searches, duplicate entries related to green logistics practices, purchase intentions, and nonrenewable energy were commonly found. These repetitive items were removed to maintain the integrity of the review process.	78
Step 4	Detailed Examination	The remaining 78 articles were carefully reviewed, focusing on key aspects such as nonrenewable energy, purchasing intention, and green logistics practices. This detailed examination aimed to assess.The quality and relevance of each article to the research topics.	36

Systematic Review AnalysisSeveral studies have explored how green logistics practices influence energy consumption. For example, implementing green transportation strategies, such as route optimization and fuel-efficient vehicles, can significantly reduce fuel use and greenhouse gas emissions (Khan et al., 2019). Additionally, efficient inventory management and reverse logistics practices help minimize energy usage in warehousing and transportation (Hyder et al., 2023). The relationship between green logistics practices and nonrenewable energy consumption can be mediated by purchase intention drivers. Research has shown that consumers' environmental awareness, influenced by advertising and education, positively affects their purchasing intentions for green products (Vargas et al., 2021; González-Viralta et al., 2023; Almrafee and Akaileh, 2024; Tavitiyaman et al., 2024). This, in turn, encourages businesses to adopt more sustainable logistics practices.

Table 2 shows the most cited papers relating to the research topic published from 2011 to 2024 based on a search for the terms (Green Logistics Practices, Nonrenewable Energy Usage, and Purchase Intentions) in the WoS and Scopus.

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
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Table 2: Most Cited Paper, Publication, and JIF

Year	Title	Authors	Journal	Citations
2019	Environmental, social, and economic growth indicators spur logistics performance: from the perspective of-South Asian Association for Regional Cooperation countries.	Khan et al.	Elsevier	266
2019	Renewable energy development as a driver of economic growth: Evidence from multivariate panel data analysis.	Singh et al.	mdpi.com	163
2019	From intention to action: Predicting purchase behavior with consumers' product expectations and perceptions, and their individual properties	Kytö et al.	Elsevier	87
2020	Green logistics performance and sustainability reporting practices of the logistics sector: The moderating effect of corporate governance.	Karaman et al.	Elsevier	234
2021	On the factors influencing green purchase intention: A meta-analysis approach.	Zhuang et al.	frontiersin.org	373
2021	The relationship among green human capital, green logistics practices, and green competitiveness, social performance, and financial performance.	Agyabeng- Mensah and Tang	emerald.com	141
2021	Green logistics practices seeking development of sustainability: evidence from Lithuanian transportation and logistics companies.	Vienažindienė et al.	mdpi.com	73
2021	Green supply chain management and its impact on consumer purchase decisions as a marketing strategy: Applying the theory of planned behavior.	Lee et al.	mdpi.com	38
2022	The influence of consumers' purchase intention factors on willingness to pay for renewable energy; mediating effect of attitude.	Nazir and Tian	frontiersin.org	34
2023	Business Performance Through Government Policies, Green Purchasing, and Reverse Logistics: Business Performance and Green Supply Chain Practices.	Hashmi	journal.sagpb.com	51

Systematic Review FindingsThis study aims to expand existing research by analyzing the connections between green logistics practices, nonrenewable energy consumption, and purchase intentions within a specific context. It focuses on key factors that have shown significant effects in previous studies, contributing to both theoretical and practical understanding in sustainability. The major findings and limitations are summarized in Table 3.

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2025.05.2.1423

Table 3: Major Findings and Limitations

Research Area	Study	Major Findings
Green purchase	Tavitiyaman et al. (2024)	• Although many hotel guests recognize the importance of the environment, other influential factors, such as first-time travel after COVID-19, travel destinations, and purposes of visit, can take precedence in green purchasing decision-making. • Hotel guests may prefer to allocate their funds to food, shopping, and travel activities rather than invest in green hotel products and services. • Although recycling and reuse are encouraged by the Hong Kong government and community, societal norms do not significantly influence people's intentions to make green purchases because they are now commonplace in daily life. To put it another way, the respondents do not rely on their friends and relatives to help them decide which eco-friendly hotels to book. They do not rely on the support of others, but rather on their convictions about eco-friendliness hotel consumption.
End-of-life practices	de Campos et al. (2023)	• The research assessed the role that important elements play in the adoption of end-of-life management methods in medicine and how they affect logistical green performance. • A systematic questionnaire was completed by 67 experts who were selected from the public pharmaceutical care procedure. Using partial least squares-structural equation modeling, the gathered data was examined. Eleven of the fifteen hypotheses that were studied were validated by the theoretical structural test. • The findings showed that end-of-life management procedures directly impact logistics green performance. Although there was no moderating influence, the research did establish a clear relationship between the information technology element and the end-of-life management techniques.
Green Transportation	Khan et al. (2019)	• The results show a substantial correlation between low-quality transportation-related infrastructure and trade, green energy resources, fuel consumption, carbon emissions, greenhouse gas emissions, health care spending, and political instability in a nation. • Inadequate transportation-related infrastructure leads to increased greenhouse gas emissions and carbon emissions from logistical operations, which not only degrade the environment but also pose health risks to people, such as lung, eye, and asthma illnesses. • Inadequate transportation-related infrastructure and logistics are • Also, a major result of political instability.
Green packaging	Karaman et al. (2020)	• In order to reduce energy and material consumption, the industry is under pressure from both local and foreign stakeholders to implement eco-friendly options in the processes of procurement, warehousing, packaging, and delivery. • The idea of "green logistics", which refers to the implementation of eco-friendly procedures across the supply chain, emerged as a result • of these conversations.
Green stocking	De Souza et al. (2022)	• Experts ranked 27 green practices and indicators of the created tool using the Analytic Hierarchy Process (AHP) method. The indicators were then standardized to produce a single index of the GL in businesses. • The findings indicate that when businesses approach environmental sustainability, they tend to disregard certain aspects of green logistics, which jeopardizes the advancement of GL. Green stocking, green packaging, and reverse logistics, on the other hand, show the worst outcomes in the green transportation category.

Sectional reverse logistics	Hyder et al. (2023)	• Throughout the supply chain, RL has a substantial financial impact on companies and their suppliers. • Reverse logistics adoption is still in its infancy in developing nations like Pakistan due to several obstacles, such as high adoption costs, a shortage of professionals with the requisite skills, a lack of relevant laws, an unsuitable organizational culture, a lack of human resources, a lack of environmental awareness among stakeholders, • and the lack of community pressure.
Purchasing Level of Nonrenewable Energy Sources	Diaz et al. (2021)	• The goal of the study was to enhance the standard of living for members of a vulnerable group that receives just ten hours of power every day. • Over time, investment costs demonstrate considerable profitability. An intriguing idea that starts with renewable energy was produced • by concentrating the project on green logistics.
Seasonality	Vargas et al. (2021)	• Several studies proved the profound linkage between seasonality and green purchase intention. The idea of local seasonality offers pertinent data for research on sustainable consumption. However, defining what is local is essential for making effective • use of this idea.
Existing customer satisfaction	González-Viralta et al. (2023)	• The findings highlight the significance of green practices in fostering consumer satisfaction and various customer behaviors, including word-of-mouth, loyalty, and readiness to pay more. • Results also demonstrate the beneficial effects of satisfaction on word-of-mouth, loyalty, and readiness to spend more. • These findings also offer factual proof of how green practices impact the grocery business and, consequently, its progress toward more sustainable management.
Customers' demographics	Almrafee and Akaileh (2024)	• In order to ascertain whether there are any statistically significant variations between the demographic features of customers and their intentions to purchase renewable energy (solar panels), demographic data are offered as control variables. Demographics were broken down into four aspects (education, income, age, and gender). • Customers' purchase intention toward renewable energy (solar panels) is influenced by the remaining demographic factors (control variables), except for gender, according to the results of the T-test and one-way ANOVA.
Advertising	Tavitiyaman et al. (2024)	• Many hotels use social media and internal ads to inform visitors about their eco-friendly operations, which may increase the chance they will purchase. Conversely, subjective norms have little effect on consumers' intentions to book an eco-friendly hotel.

Green logistics techniques, such as green purchasing, transportation, packaging, and reverse logistics, are effective in reducing nonrenewable resource consumption and enhancing sustainability. Purchasing intention plays a significant mediating role in this relationship. This review suggests developing a composite index to measure GLP sustainability, with a focus on regions like Egypt, requiring further research and regional policies.

Research Variables

The current study develops a theoretical model focusing on Green Logistics Practices (GLP), defining its dimensions and exploring their impact on reducing nonrenewable energy usage. It highlights the mediating role of purchase intention drivers, which has been underexplored in prior research. The theoretical framework illustrates the relationships between GLP

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http://dx.doi.org/10.21622/IBL.2025.05.2.1423

dimensions, purchase intentions, and nonrenewable energy consumption, with various research variables considered. The research variables considered are as follows:

Independent Variable: Green Logistics Practices and its dimensions (Green purchase, End -of -Life practices, Green Transportation, Green packaging, Green Stocking, Sectional, Reverse Logistics).

Dependent Variable: Purchasing Level of Nonrenewable Energy Sources.

Mediator Variable: Purchasing Intention.

Therefore, the current research framework could be expressed using the following figure.

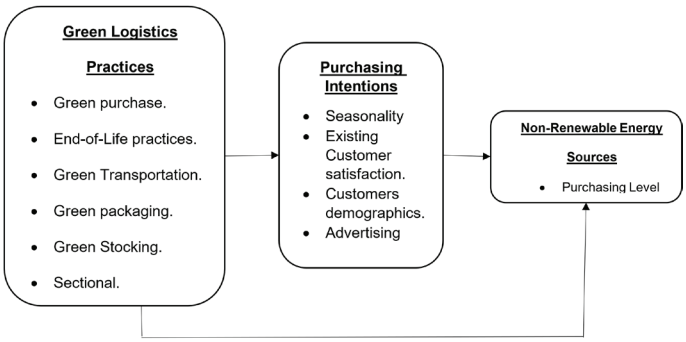


Figure 2: Theoretical framework (by researcher)

Research Methodology

This study uses a qualitative approach, conducting semi-structured interviews to explore the role of green logistics practices in reducing nonrenewable energy consumption. It starts with a Systematic Literature Review (SLR) to identify key themes and gaps related to green logistics practices, including green purchasing and reverse logistics, and the moderating role of purchasing intentions. The interviews, conducted with ten logistics experts in Egypt, aim to assess the current state of green logistics and validate the theoretical framework, offering practical insights and a comprehensive understanding of the impact of green logistics on sustainability. The integration of the SLR and interview findings ensures a robust and comprehensive understanding of the studied variables, allowing the research to explore the impact of green logistics practices on reducing reliance on nonrenewable energy sources while fostering sustainability. The researcher presented a set of questions related to the study variables. These questions were included in the semi-structured interviews conducted with the interviewees; these questions are:

What are the current strengths of Egypt's Energy management system, particularly related to the applicability of green logistics practices?

What is the primary motivation for applying green logistics practices in your organization?

Does your organization have any standards for green logistics practices?

Can you provide any examples of your organization's advertising techniques to enhance the green logistics purchase processes?

How would you describe the most recent practice applied by your firm regarding green purchases?

How does the current infrastructure for green logistics practices' applicability support the purchasing level of nonrenewable energy products?

What are the biggest weaknesses you see in Egypt's current approach to managing green logistics practices?

What are the potential environmental or economic threats associated with the applicability of green logistics practices in Egypt?

What were the expectations held by your organization for the impact of applying Green Logistics Practices on the purchasing intention of customers?

What influences the purchase intention of customers to buy renewable energy products?

What indicators, if any, does your company currently use to measure purchasing levels in the renewable energy product sector?

How would you describe the most recent practice applied by your firm regarding green purchases?

What are the main factors affecting the purchasing level of renewable energy products?

What do you think your firm's next step in enhancing the purchasing intentions of customers should be?

The researcher conducted ten interviews with experts working in the supply chain logistics field in Egypt. Face-to-face interviews were conducted with 10 experts working in the following job positions. Table 1 shows the position of each interviewee and the duration of each interview.

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2025.05.2.1423

Table 4: Interview Description

Interview	Job title	Duration
Interview (1)	Head of the Energy Unit in the field of Sustainable Energy	18 Minutes
Interview (2)	General Manager of Energy Transition, Sustainability, and Renewable Energy (E-GAS) and Assistant GM for Energy & Sustainability in Operations at Paranoiac Petroleum	20 Minutes
Interview (3)	Supply Chain Professional: Business Developer Manager (DSV-Global Transport and Logistics), Customer Relationship Manager (Agility), Project Manager (Agility Kenya), and Assistant Manager (Contract Logistics Sales, Agility)	15 Minutes
Interview (4)	Professor at Arab Academy for Science, Technology and Maritime Transport (Electrical Engineering Department); Certified Energy Manager (CEM); Approved Renewable Energy System Consultant (Egyptian Syndicate); Registered UN Energy Consultant; Official ICT Energy Consultant for GTEX/MENATEX Program	22 Minutes
Interview (5)	Expert at the Environmental Affairs Agency (headed by the Council of Ministers and the Arab Academy for Science, Technology, and Maritime Transport	23 Minutes
Interview (6)	Former Minister of Petroleum and Mineral Resources	27 Minutes
Interview (7)	Head of Department R&D for Training at EPROM Petroleum Company	16 Minutes
Interview (8)	Head of Technical Monitoring Section at Gas Regulatory AuthorityGASREG)	21 Minutes
Interview (9)	Petroleum and Environmental Consultant at EPROM & PETROBEL	23 Minutes
Interview (10)	Pipeline Operations Manager at Sumed	29 Minutes

Research Findings and Discussion

This empirical study is conducted in two phases. The first phase investigates the current state of green logistics and renewable energy use in Egypt, while the second phase develops a conceptual

A framework linking green logistics practices to nonrenewable energy purchasing intentions. The study includes interviews with industry experts, which provide insights into the adoption of green logistics and its impact on consumer behavior. Thematic analysis using NVivo software helps identify key trends and factors affecting the adoption of green logistics and its influence on energy consumption patterns.

Assessing the Current Situation

The first aim of the interviews is to assess the current state of green logistics and renewable energy usage in Egypt. The questions asked during the interviews focused on understanding the situation both at a national level and within individual companies. The responses provided by the participants highlighted key details and insights regarding the current practices and challenges in Egypt related to green logistics and renewable energy.

For the first question “What are the current strengths of Egypt’s energy management system, particularly related to green logistics practices applicability?”, interview one has mentioned many strength points that support the adoption of green logistics in Egypt, as the respondents mentioned that “An assessment of Egypt’s energy management system and its strengths related to green logistics practice are available in many ways such as, Energy Efficiency Standards”, and “Egypt has implemented energy efficiency standards for buildings and industries, which have led to a reduction in energy consumption and greenhouse gas emissions”. In interview four, the respondents indicated that “The energy management system has been reinforced by the government’s dedication to renewable energy initiatives, which are backed by foreign investments and collaborations.”

Question seven, “What are the biggest weaknesses you see in Egypt’s current approach to managing green logistics practices?” refers to the weaknesses related to the green logistics practices. It was mentioned in interview six that “As a Former Minister of Petroleum and Mineral Resources, I see that Egypt’s current approach to managing green logistics practices lacks clear regulations and incentives for companies to prioritize sustainability. Additionally, there is a need for greater investment in renewable energy infrastructure to support the transition towards eco-friendlier transportation options.” In addition to that, interviewee seven referred

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
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to the following weaknesses: “Unfortunately, the concept of sectional reverse logistics is not fully developed in the Egyptian firms regarding green logistics, leading to inefficiencies in waste management and resource utilization”.

When asking about the potential threats facing the green logistics practices as mentioned in question eight “What are the potential environmental or economic threats associated green logistics practices applicability in Egypt?”, interviewee six has illustrated different potential threats mentioned in the following quotes “Potential environmental threats associated with green logistics practices in Egypt include increased costs for companies implementing sustainable measures, as well as the challenge of changing established transportation and supply chain.

systems”. Moreover, interview nine has indicated that “Potential environmental and economic threats in Egypt related to green logistics include high initial costs, outdated infrastructure, inconsistent regulations, and possible economic disruption from shifting practices.”

After discussing the questions related to the current Egyptian situation, it is noticed that the answers to question six, “How does the current infrastructure for green logistics practices applicability support the purchasing level of nonrenewable energy products?” include both a description of the current situation in Egypt and a description of the companies’ situation. For example, interview two has referred to the Egyptian situation in the following quotations: “In conclusion, Egypt’s infrastructure for green logistics practices is developing, and there is still room for improvement to support the purchasing level of nonrenewable energy products. By leveraging public-private partnerships, innovative technologies, and policy incentives, Egypt can accelerate the transition to a more sustainable energy landscape.” Interview three mentioned the situation of his company, mentioning that “We engage with local governments and regulatory bodies to advocate for policies that promote the adoption of renewable energy sources in the logistics industry.”

Finally, the questions that target getting a clear understanding of the organization’s situation are mentioned. For the third question, “Does your organization have any standards for green logistics practices?”, three interviewees indicated that “We also have specific standards for measuring and reporting our carbon footprint, which enables us to track our progress and make informed decisions.” In addition, interview seven has confirmed this point: “In EPROM Petroleum, we are obliged to follow strict guidelines for reducing our carbon footprint and implementing sustainable transportation methods. This includes using electric vehicles, optimizing delivery routes, and minimizing packaging waste. We mainly focus on reducing emissions and promoting environmental sustainability in all aspects of our operations.”

Question five, which asks about “How would you describe the most recent practice applied by your firm regarding green purchases?”, interview one mentioned that “Green logistics practices such as the use of green fuels, such as biofuels or compressed natural gas (CNG).” Interview ten has indicated that “Our most recent practice involved implementing a comprehensive recycling program at all our facilities, ensuring that waste is properly sorted and disposed of in an environmentally friendly manner. This initiative has significantly reduced our carbon footprint and reinforced our commitment to sustainability in all aspects of our operations.”

According to question twelve “How would you describe the most recent practice applied by your firm regarding green purchases?”, interview five has mentioned the latest practices through the following two quotes; “Our latest initiative involves forming a green procurement network in collaboration with other organizations. This network aims to streamline the purchasing process for green products and services, making it easier for companies to adopt sustainable practices. “We’ve also introduced training programs for our procurement team to enhance their understanding of green products.”

Finally, question fourteen “What do you think your firm’s next step in enhancing the purchasing intentions of customers should be?” interview eight has referred to two main practices done by his company to enhance the customers’ awareness and purchase intention “Implementing a loyalty program to reward repeat customers and encourage brand loyalty could also be an effective strategy to enhance purchasing intentions.” In addition, interview nine assured that “EPROM targets can include measures such as flaring reduction, pollution prevention, or reducing our impact on biodiversity. Since impacts to the environment vary from site to site according to the nature of each operation, we consider the different environmental sensitivities in determining which issues require the greatest focus for impact reduction in each site.”

Egypt is focusing on adopting green logistics and utilizing renewable energy sources. However, challenges remain, particularly in infrastructure, hindering the complete implementation of green logistics. Different organizations have varying concerns regarding the adoption of green logistics. A SWOT analysis was conducted based on semi-structured interviews and a systematic literature review to evaluate the strengths, weaknesses, opportunities, and threats of green logistics and renewable energy use.

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2025.05.2.1423

Table 5 presents the SWOT analysis based on these findings.

Table 5: SWOT Analysis

Strength	Weakness
• Egypt has abundant renewable resources like solar and wind energy. • Strong government support for renewable energy through policies and incentives. • Strategic location, serving as a bridge between Africa and the Middle East. • Growing energy demand due to population growth and industrial expansion. • Established energy infrastructure that can integrate renewable energy projects. • Alignment with Egypt Vision 2025, providing clear direction and regulatory support.	• High initial costs for renewable energy projects. • Complex regulatory frameworks and bureaucratic delays. • Limited grid capacity and stability for large-scale renewable integration. • Lack of local expertise in renewable energy technology and project management. • Financial constraints and limited access to investment.
Opportunities	**Threats**
• Egypt's renewable energy potential is potentially attractive for international investment. • Technological advancements that could reduce costs and improve efficiency. • Egypt has the potential to become a regional renewable energy hub that exports electricity. • Job creation and economic diversification through the renewable energy sector.	• Economic instability and currency devaluation are affecting project viability. • Political and social unrest. • Competition from fossil fuels, with subsidies and entrenched interests undermining renewables. • Climate change impacts that could affect renewable energy infrastructure. • Regulatory uncertainty.

The SWOT analysis highlights Egypt's strengths in green logistics, such as strong public-private partnerships and government support. However, challenges include unclear regulations, lack of incentives, poor renewable energy infrastructure, and weak reverse logistics. Opportunities lie in

Expanding renewable energy and collaborating with sustainable suppliers. Threats include high costs, outdated infrastructure, and low consumer awareness.

Verifying Theoretical Framework

To have a comprehensive grasp of the subjects covered by the study population, the researcher needs to adhere to a set of procedures in the theme analysis process. There are six stages in these steps, which are as follows:

Familiarization with the Data: The first step is transcribing and thoroughly reviewing the collected data.

Producing the Initial Codes: The second phase involves coding and categorizing data into themes, with all responses being extracted and arranged.

Looking for Themes: The third phase focuses on identifying recurring ideas or concepts in the data, often visualized through a word cloud or thematic map, as shown in Figure 1.



Figure 3: Word Cloud

Phase 4: Reviewing Themes: Researchers synthesize individual codes and categories into broader themes. The themes are classified by grouping related codes and isolating unique ones. Four key themes emerged from the interview responses:

Theme of Green Logistics Practices

Theme of Purchasing Intentions

Theme of Purchasing Level of Nonrenewable Energy Sources

Theme of Logistics Solutions

Phase 5: Naming and Defining: The primary themes

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2025.05.2.1423

are named and defined, with their corresponding codes and frequency of occurrence summarized in Table 2.

Table 6: Summary Table of Themes and Codes

Theme	Code	Reference	Total
Theme of Green Logistics Practices	Green Purchase	16	59
	End-of-Life Practices	5	
	Green Transportation	12	
	Green Packaging	10	
	Green Stocking	5	
	Sectional Reverse Logistics	4	
	Reverse Logistics	7	
Theme of Purchasing Intentions	Purchasing Intention Drivers	15	38
	Consumer Awareness and Education	10	
	Advertising Influence	13	
Theme of Purchasing Level of Nonrenewable Energy Sources	Cost Considerations	10	21
	Environmental Awareness	11	
Theme of Logistics Solutions	CO2 reporting	4	26
	Supply chain optimization	7	
	Sustainable warehousing	6	
	Sustainable fuels	9	

Phase 6: Report writing: In this phase, the researcher compiles the results of the data analysis and prepares the final report. The report is created after thoroughly reviewing the selected themes, and this step is outlined in the following sub-sections.Theme of Green Logistics Practices

The analysis of interviews revealed four themes, with "Green Logistics Practices" as the first, encompassing codes like Green Purchase, End-of-Life Practices, Green Transportation, Green Packaging, Green Stocking, Sectional Reverse Logistics, and Reverse Logistics. These codes illustrate how organizations integrate eco-friendly methods, as shown in Figure 2.



Figure 4: Theme of Green Logistics Practices

Green Purchase, a key component of Green Logistics Practices, aims to reduce nonrenewable energy use by leveraging purchasing intentions, as highlighted in the interviews. The following details were mentioned in regard to this evidence in the first, second, eighth, and tenth interviews as follows: "The Egyptian Government's Ministry of International Cooperation has launched a social media campaign to promote sustainable logistics practices in Egypt", "Sustainable Procurement Framework: Where establishing a comprehensive sustainable procurement framework that considers environmental, social, and governance (ESG) factors in countries purchasing decisions", "Our most recent practice is "Network Tariff", Network Tariff is the payment made by the network user to the Network Operator in exchange for the right to use" and

"Our most recent practice involved implementing a comprehensive recycling program at all of our facilities, ensuring that waste is properly sorted and disposed of in an environmentally friendly manner".

End-of-Life Practices are vital to Green Logistics Practices, aiming to reduce nonrenewable energy use in Egypt, with purchasing intention as a mediating factor, as highlighted in the interviews. The following examples of this proof were presented in the first, sixth, eighth and tenth interviews: "Through adoption of electric vehicles can lead to challenges in managing the disposal and recycling of batteries, which contain hazardous materials", "We are also keen on providing adequate End-of-Life practices to our customers", "Some practices should be involved in the industrial context including the end-of-life practices, which may help in reducing the pollution and manage the consumption of

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2025.05.2.1423

Egyptians" and "Moreover, we encourage our partners to use green packaging and the end-of-life policy".

Green Transportation, highlighted in interviews, is a key aspect of Green Logistics Practices, impacting nonrenewable energy use and influenced by purchasing intention in supply chain logistics. This evidence was referenced in the first, second, and third interviews as follows: "The goal is to have EVs constitute 15% of the total fleet by 2025, significantly reducing carbon emissions", "The country is developing green ports, such as the new Ain Sokhna Port, which will enable the efficient handling of cargo while reducing environmental impact", "The use of electric and hybrid vehicles in logistics operations is becoming increasingly popular in Egypt, reducing emissions and operating costs" and "We also work with suppliers who offer sustainable energy options, such as biofuels or electric vehicles, to power their operations".

Green Packaging, identified in interviews, plays a crucial role in Supply Chain Logistics, influencing nonrenewable energy use through purchasing intention in the Egyptian context. This evidence was referenced in the sixth, seventh, and ninth interviews, as follows: "We managed to implement several green logistics practices in our organization, such as optimizing transportation routes and using eco-friendly packaging materials", "This includes using electric vehicles, optimizing delivery routes, and minimizing packaging waste" and "Our packaging standards aim to reduce our environmental impact. We use recyclable and biodegradable materials and design packaging to use less material while still protecting the product during shipping".

Green Stocking, highlighted in interviews, is vital to Green Logistics Practices, aiming to reduce nonrenewable energy use with purchasing intention as a mediating factor in Egypt. The following details were mentioned in regard to this evidence in the fourth, fifth, seventh, and tenth interviews as follows: "Through the years from 2020 to 2024 I witness a lack of green stocks in Egypt in general, which is not very promising", "Green stocks are also becoming increasingly popular among investors who prioritize environmental responsibility and sustainability practices", "I remember the popularity of our green stocks due to the awareness of the importance of sustainability in our industry" and "We are currently working on improving our green stocks implementation and management".

Sectional Reverse Logistics, identified in interviews, is a key aspect of Green Logistics Practices, influencing nonrenewable energy use through purchasing intention in Egypt. This evidence was referenced in the fifth, sixth, seventh and ninth interviews as follows: "The sections and departments in our organizations are keen on developing innovative green logistics practices", "Thus, every section should have a variety of reverse logistics to help in maintaining an adequate portion of innovation in the green logistics practices", "Unfortunately, the concept of sectional reverse logistics is not fully developed in the Egyptian firms regarding green logistics, leading to inefficiencies in waste management and resource utilization" and "We've got a clear process for handling returns and recycling. This means efficiently managing product returns and focusing on refurbishing and recycling materials to cut down on waste".

Reverse Logistics is a crucial component of Green Logistics Practices, influencing nonrenewable energy use through purchasing intention in Egypt, as highlighted in the interviews. This evidence was referenced in the first, second, third and seventh interviews as follows: "The integration of advanced technologies plays a critical role in optimizing logistics operations and reducing environmental impact", "The government has implemented waste management programs, including recycling initiatives, to reduce waste disposal costs and minimize environmental impacts", "This involves designing products with recyclable materials and implementing take- back programs to collect used products for recycling" and "Showcasing testimonials from satisfied customers who have benefitted from our reverse green logistics solutions could also be a powerful advertising technique to highlight the positive impact of our services"

Theme of Purchasing Intentions

The interviews revealed a key theme, "Purchasing Intentions," with codes like Purchasing Intention Drivers, Consumer Awareness, and Advertising Influence. These codes explore factors shaping consumer decisions and their impact on purchasing behavior, providing a visual representation in the analysis, as shown in Figure 3.



Figure 5: Theme of Purchasing Intentions

Purchasing Intention Drivers are crucial in shaping the purchasing level of nonrenewable energy sources, aligning with the study's focus on Green Logistics Practices and mediation through purchasing intention. This evidence was referenced in the second, third, and fourth interviews as follows: "The

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2025.05.2.1423

growing demand for sustainable solutions is driving a trend towards renewable energy adoption, with many customers seeking to stay ahead of the curve", "Our organization expected that applying Green Logistics Practices would lead to increased customer loyalty and retention. We believed that by adopting eco-friendly practices, we would demonstrate. Our commitment to sustainability and social responsibility, which would positively influence customer purchasing decisions," and "In our organization, we expect that applying green logistics practices will positively impact purchasing intentions. Customers increasingly value sustainability, and demonstrating a commitment to green practices can enhance brand loyalty and attract environmentally conscious consumers".

Consumer Awareness and Education are key factors influencing Purchasing Intentions, impacting the purchasing level of nonrenewable energy sources through the mediation of purchasing intention, as revealed in the interviews. The seventh, eighth, ninth, and tenth interviews clarified this evidence as follows: "Firstly, the awareness of customers, and then comes the offers and discounts offered by the company, I can also say that advertising programs are totally related to the purchasing level", "We are currently working on a project regarding raising the awareness of Egyptians of how to make informed purchasing decisions through educational workshops and online resources", "Through targeted advertising, we promote the benefits of green logistics, which educates consumers about the environmental impacts of their purchases. This increased awareness helps drive demand for more sustainable practices, even in the context of nonrenewable energy products, and "We were pleasantly surprised to see a gradual increase in purchasing intention as customers became more educated on the benefits of green logistics".

Advertising influence plays a significant role in shaping purchasing intentions, impacting the purchasing level of nonrenewable energy sources, and aligning with the research's focus on green logistics practices. This evidence was referred to from the first interview to the fourth interview as follows: "The Egyptian Government's Ministry of International Cooperation has launched a social media campaign to promote sustainable logistics practices in Egypt. They use hashtags like #Green Logistics EG to raise awareness about the importance of environmentally friendly logistics and encourage companies to adopt green practices", "We advertise this program through targeted ads on our website, social media, and email campaigns", "Promote eco-friendly packaging options, such as biodegradable or recyclable materials, to reduce waste and minimize environmental impact. We showcase these options on our website and social media channels. To promote green logistics practices, we use various advertising techniques to raise awareness among our customers and stakeholders about the benefits of sustainable logistics. We utilize various advertising techniques, including digital marketing campaigns that highlight our commitment to green logistics and sustainability.

Theme of Purchasing Level of Nonrenewable Energy Sources

The third theme, "Purchasing Level of Nonrenewable Energy Sources," was identified with codes Cost Considerations and Environmental Awareness. These themes illustrate key factors.

Influencing the purchasing level of nonrenewable energy sources, as visualized in Figure 4.



Figure 6: Theme of Purchasing Level of Nonrenewable Energy Sources

Cost Considerations are a key factor influencing the purchasing level of nonrenewable energy sources, aligning with the study's focus on Green Logistics Practices and mediation through purchasing intention. The following details were mentioned regarding this evidence in the first, fifth, and sixth interviews as follows: "The upfront cost of renewable energy vehicles (e.g., electric trucks, hydrogen-powered freight vehicles) is often higher than that of conventional fossil fuel vehicles", "Economically, the initial costs of adopting green logistics practices can be a hurdle, particularly for small and medium-sized enterprises (SMEs)" and "The main factors affecting the purchasing level of renewable energy products include cost competitiveness, availability of incentives or subsidies, consumer awareness and education, and government policies supporting renewable energy development".

Environmental awareness is crucial in reducing the use of nonrenewable energy in Egypt's logistics sector. This aligns with the study's goal of examining how environmental awareness impacts sustainability, specifically through the mediation of purchasing intentions. The findings underscore the significance of incorporating environmental consciousness into logistics operations to achieve broader sustainability objectives as follows: "There's a growing consumer preference for

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2025.05.2.1423

sustainable and eco-friendly products", "Implementing green logistics practices can help mitigate these threats and create a more sustainable future for the country", "Our main threat is the co2 emissions and their impact on climate change. Additionally, the reliance on fossil fuels for transportation in Egypt poses a risk to air quality and public health" and "Unfortunately, we did not expect much after applying the 14001 Iso requirements, as we were unsure of how much awareness our customers had about environmental sustainability practice".

Theme of Logistics Solutions

The fourth theme, "Logistics Solutions," focuses on strategies for enhancing sustainability and efficiency in logistics operations. This theme includes codes such as co2 reporting, supply chain optimization, sustainable warehousing, and sustainable fuels, contributing to environmentally sustainable practices. This detailed categorization highlights the importance of these solutions in reducing environmental impact and optimizing supply chain performance, as shown in figure 5.



Figure 7: Theme of Logistics Solutions

CO2 Reporting is a crucial factor in enhancing Logistics Solutions, aiding in the reduction of nonrenewable energy use through improved sustainability practices. This evidence was referenced in third, fourth, sixth, and seventh interviews as follows: "We track our energy consumption and carbon footprint through our Environmental Management System (EMS) and report it annually to our stakeholders", "Recently, our firm implemented an inclusive review of our supply chain to identify opportunities for green purchases and CO2 reduction practices. We prioritized sourcing from suppliers with strong environmental credentials and encouraged the use of recyclable and biodegradable materials", "Our most recent practice involves implementing a carbon offset program for all transportation, further reducing our environmental impact" and "I believe that Co2 reporting represents an essential step in enhancing the purchasing intentions of customers, as it provides transparency and accountability in environmental impact".

Supply chain optimization is a vital component of logistics solutions, influencing the purchasing level of nonrenewable energy sources by enhancing sustainability and efficiency, which is aligned with the study's focus on green logistics practices. This evidence was referenced by the first, third, sixth, and seventh interviews as follows: "Advanced logistics planning tools enable optimized routing of transportation vehicles, reducing fuel consumption and emissions", "A set of solutions ranging from CO2 reporting, supply chain optimization, sustainable warehousing to sustainable fuels and carbon offsetting", "We also need to optimize the supply chains in Egypt to offer a suitable environment for the renewable energy adaptation" and "In EPROM Petroleum, we are obliged to follow strict guidelines for reducing our carbon footprint and implementing sustainable transportation methods. This includes using electric vehicles, optimizing delivery routes, and minimizing packaging waste".

Sustainable Warehousing plays a significant role in Logistics Solutions, contributing to the reduction of nonrenewable energy use and supporting sustainable logistics practices. This evidence was referenced in the third, fourth, fifth, and seventh interviews as follows: "The latest practice involves installing energy-efficient lighting and HVAC systems in our warehouses", "We can also make sure that our warehouses are sustainable, this will enlarge the customer trust in the organization", "We need to enhance our usage of sustainable fuel and sustainable warehouses" and "Additionally, we have been working closely with suppliers who prioritize sustainability in their production processes".

Sustainable Fuels are crucial for reducing nonrenewable energy use in logistics, aligning with the study's focus on Green Logistics Practices and Purchasing Intention mediation in Egypt. This evidence underscores the pivotal role Sustainable Fuels play in driving sustainable logistics.

Solutions and supports the study's overarching goals: "Egypt has launched a green hydrogen initiative to produce hydrogen from renewable energy sources, which can be used as a clean alternative for transportation and power generation. "We provide sustainable fuel options across our air, sea, and road services. Plus, as we only use suppliers who meet sustainability criteria of various accredited frameworks, you can rest assured that you are truly getting closer to de-carbonization", "Biofuels, whether for aviation, road or sea, are more sustainable than diesel due to the lowered CO_2 emissions from Biofuels" and "Transitioning to sustainable fuel in Egypt is crucial for long-term sustainability and reducing carbon emissions. Collaborating with stakeholders and investing in research and development for alternative fuel sources can help overcome these challenges".

Volume 5, Issue 2, December 2025 - ISSN 2735-5969
http://dx.doi.org/10.21622/IBL.2025.05.2.1423

Discussion and Conclusion

The study examines how Green Logistics Practices (GLP) influence nonrenewable energy use in Egypt, with purchasing intention as a mediator. A literature review confirmed that GLP, including eco-friendly transportation, packaging, and reverse logistics, impacts consumer purchasing behavior and reduces nonrenewable energy dependence. Interviews revealed Egypt's efforts to cut energy consumption and emissions, with strong public-private collaboration. The study identified four key themes: GLP, purchasing intentions, nonrenewable energy purchasing levels, and logistics solutions. A mind map was created to illustrate these relationships, offering insights for enhancing green logistics and promoting renewable energy adoption in Egypt's sustainable development. The following mind map is developed from the analysis, which reflects the themes and sub-themes developed from the analysis, as shown in Figure 6.

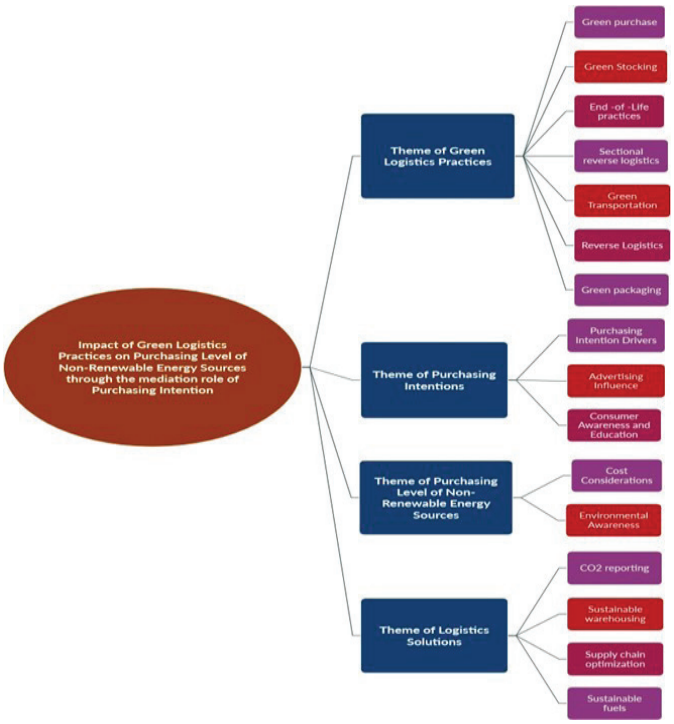


Figure 8: Research Mind Map

After developing the mind map and comparing it to the theoretical framework, the conceptual framework of the study is developed, which is shown in Figure 4-9. The variables and dimensions of the theoretical framework are accepted; in addition to that, dimensions for the purchasing level of nonrenewable energy sources variable are added, which are: cost consideration and environmental awareness. In addition to that, one dimension of green logistics practices is modified from sectional-to-sectional reverse logistics.

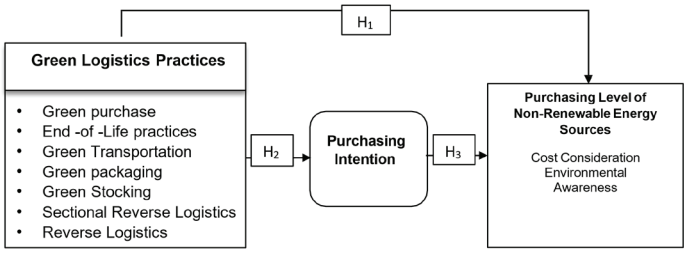


Figure 9: The Conceptual Framework

This study explored how Green Logistics Practices (GLP) influence nonrenewable energy use in Egypt, with purchasing intention as a mediator. It found that Egypt is making strides in green logistics and emissions reduction through public-private collaborations, but faces challenges like weak infrastructure, inconsistent regulations, and low consumer awareness. The study developed a framework showing how GLP and purchasing intentions can reduce reliance on nonrenewable energy, offering insights for policymakers and organizations.

Recommendations

To promote green logistics and sustainability in Egypt, the following recommendations are proposed:

Policy Development: Create clear regulations and incentives to encourage the adoption of green logistics and renewable energy investment.

Infrastructure Improvement: Upgrade transportation and logistics infrastructure to support sustainable practices like reverse logistics and green warehousing.

Awareness Campaigns: Launch nationwide campaigns to educate consumers on the benefits of green products and renewable energy, influencing purchasing intentions.

Public-Private Partnerships: Strengthen collaborations between the government and private sector to align resources and goals for sustainable logistics.

Support for Businesses: Offer financial and technical assistance to businesses, especially SMEs, transitioning to sustainable operations.

Implications

This research offers both practical and theoretical implications:
Practical Implications: The study provides actionable insights for practitioners and policymakers in logistics and renewable energy sectors. By adopting green logistics practices, organizations can reduce

environmental impact, build consumer trust, and align with global sustainability trends. It also emphasizes the need to address consumer behavior to effectively implement green initiatives.

Theoretical Implications: The research contributes to the literature by developing a comprehensive conceptual framework that integrates Green Logistics Practices (GLP), purchasing intention, and nonrenewable energy demand. This framework can guide future studies exploring the relationship between sustainability practices and consumer behavior in various contexts.

Limitations and Suggestions for Future Research

This study has several limitations, including its focus on Egypt, which may limit the generalizability of the findings. The small sample size of expert interviews and reliance on qualitative data also restrict the robustness of the results. Future research could include larger and more diverse samples, integrate quantitative methods, and explore additional variables like government policies or technological advancements. Addressing these limitations would help further advance the understanding of green logistics practices and renewable energy adoption.

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