CHAPTER V
CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This chapter presents the conclusions on key findings, implications, and recommendations based on the findings of the study. The chapter also covers suggestions for practical implications, future research and limitations of the research.

5.1 Conclusion

5.1.1 Effect of green logistics management practices on the sustainability performance

The analysis of green logistics management practices in Ghana and Indonesia reveals that while these practices positively influence intermediary factors such as supply chain traceability and logistics eco-centricity; they do not directly lead to enhanced sustainability performance in either country. In Ghana, green logistics significantly improve traceability and eco-centricity, highlighting the operational benefits of environmentally friendly logistics approaches. However, these improvements do not translate into immediate sustainability gains. Similarly, in Indonesia, green logistics positively affect traceability and eco-centricity but do not have a significant direct impact on sustainability outcomes. The differences in the strength of these relationships between the two countries suggest that contextual factors such as regulatory environments, industry structures, or available resources may influence the effectiveness of green logistics in achieving sustainability goals. Ghana's stronger impact on traceability and eco-centricity might indicate a more integrated or externally driven approach to green logistics practices compared to Indonesia. Overall, the findings suggest that while green logistics are important for operational improvements, firms in both countries need to adopt a more holistic sustainability strategy that integrates these practices with broader initiatives, such as regulatory support and stakeholder engagement, to achieve significant sustainability performance improvements.

5.1.2 Effect of logistics eco-centricity on the sustainability performance

The effect of logistics eco-centricity on the sustainability performance of manufacturing firms in Ghana and Indonesia underscores the critical importance of supply chain traceability in achieving sustainable outcomes. In Ghana, supply chain traceability plays a significant role in improving sustainability performance, emphasizing the need for firms to effectively track and manage the flow of goods and materials throughout the supply chain to enhance both environmental and social practices. Similarly, in Indonesia, the impact of supply chain traceability on sustainability performance is even more pronounced, demonstrating the strong influence of transparent and accountable supply chain operations in driving sustainability. These findings highlight that supply chain traceability is not merely a supportive factor but a key driver of sustainability, essential for aligning logistics operations with global environmental and social goals. The substantial contributions of traceability in both countries suggest that firms must prioritize this aspect to significantly improve their overall sustainability performance.

5.1.3 Effect of operational efficiency on the sustainability performance

The analysis of operational efficiency and its impact on sustainability performance in both Ghana and Indonesia reveals that while operational efficiency has a positive and significant effect on sustainability in both countries, the strength of this relationship varies. In Ghana, operational efficiency shows a more robust connection to sustainability performance, indicating that firms that optimize their processes, reduce waste, and improve resource utilization see substantial improvements in their sustainability outcomes. This suggests that in Ghana, operational efficiency is a key driver of sustainability, helping firms better align their operations with environmental and social goals. In Indonesia, operational efficiency similarly contributes positively to sustainability, but the impact is somewhat less pronounced compared to Ghana. This difference in the strength of the relationship may be attributed to contextual factors such as differences in industry structures, economic conditions, or the integration of sustainability practices within operational processes in each country. Despite these variations, the findings suggest that in both Ghana and Indonesia, enhancing operational efficiency

remains a crucial strategy for firms seeking to improve their sustainability performance, although the effectiveness of this strategy may be shaped by local conditions and industry-specific factors.

5.1.4 Mediation effect of supply chain traceability on the relationship between green logistics management practices and the sustainability performance

The path analysis for both Ghana and Indonesia reveal that supply chain traceability plays a critical mediating role between green logistics management practices and sustainability performance, highlighting significant indirect effects. In Ghana, green logistics management practices significantly influence sustainability performance through the mediation of supply chain traceability, emphasizing the importance of effective tracking and management of supply chains to translate eco-centric logistics practices into improved sustainability outcomes. This finding suggests that firms in Ghana with well-established green logistics practices achieve better sustainability performance when they can ensure transparency and control within their supply chains. The ability to trace products and operations allows these firms to enhance their environmental and social performance, reinforcing the idea that traceability is a key factor in leveraging the full benefits of green logistics practices. This mediation effect underscores the necessity of integrating traceability systems into sustainability strategies to achieve meaningful improvements in sustainability performance.

5.1.5 Mediation effect of logistics eco-centricity on the nexus between green logistics management practices and the sustainability performance

Logistics eco-centricity plays a crucial role in influencing sustainability performance in both Ghana and Indonesia, although the extent of its impact and its mediating function differ between the two countries. In Ghana, logistics ecocentricity significantly enhances sustainability performance, indicating that firms that integrate environmental considerations into their logistics operations experience notable improvements in sustainability outcomes. Additionally, logistics eco-centricity mediates the relationship between green logistics management practices and sustainability performance, although its mediating effect is smaller compared to that of supply chain traceability. This suggests that while green logistics management practices may not have a direct influence on sustainability,

their positive effects are realized when firms adopt eco-centric logistics approaches, enhancing their overall sustainability performance. In Indonesia, logistics eco-centricity also significantly impacts sustainability performance, and its direct effect is even stronger than in Ghana. However, its role as a mediator between green logistics management practices and sustainability performance is weaker and marginally non-significant, suggesting that while ecocentric logistics practices contribute to sustainability in Indonesia, their indirect influence through logistics eco-centricity is less pronounced. Instead, supply chain traceability plays a more critical mediating role in Indonesia, highlighting the varying dynamics between logistics eco-centricity and traceability in shaping sustainability outcomes across the two countries.

5.1.6 Relative effect of importance and performance of green logistics management practices, operational efficiency, supply chain traceability, and logistics eco-centricity in enhancing sustainability performance of manufacturing firms in Ghana and Indonesia. Utilizing IPMA.

The IPMA provides critical insights into the drivers of sustainability performance, enabling a targeted approach to improving sustainability outcomes in Ghanaian and Indonesian firms. The analysis highlights supply chain traceability as the most influential factor for sustainability in both countries, underscoring the necessity for firms to enhance transparency and accountability across their supply chains. While Ghanaian firms show high performance in both traceability and logistics eco-centricity, Indonesian firms reveal opportunities for improvement, particularly in supply chain traceability and operational efficiency. Green logistics management practices also emerge as a key contributor to sustainability, with high importance scores in both contexts, though implementation challenges persist, especially in Indonesia. By identifying areas of high importance with low performance, IPMA allows firms to focus resources on the factors most likely to yield significant sustainability gains. Logistics Eco-Centricity reflects a firm's commitment to environmental sustainability within logistics operations, from selecting eco-friendly transportation to optimizing warehouse energy use. The IPMA underscores the significance of LE in sustainability performance, as ecocentric logistics reduce emissions, lower waste, and align logistics activities with

broader environmental goals. This is increasingly important in the face of climate change and as governments tighten regulations around emissions. Ghanaian firms are performing well in LE due to growing environmental awareness and partnerships. They invest in lower-emission vehicles, renewable energy, and waste reduction initiatives. Indonesian firms show lower LE performance due to high costs of green technology, insufficient infrastructure, and lack of financial incentives. Improvement can be driven by renewable energy, eco-friendly logistics technology, and sustainability collaborations. Enhancing LE is crucial for both countries to reduce their environmental impact. For Ghana, continued investment in eco-centric logistics can cement the country's reputation as a sustainability leader in Africa. In Indonesia, addressing performance gaps in LE through government support and private investment can enable firms to achieve substantial reductions in environmental footprint and improve regulatory compliance. In the IPMA, OE is shown as a critical driver of sustainability because it directly addresses the environmental and economic aspects of sustainability by reducing energy use, emissions, and operational waste. Enhancing operational efficiency has a dual benefit—it reduces costs and improves sustainability performance. For both countries, investing in newer, more efficient technologies, training employees in lean practices, and optimizing supply chain processes could lead to substantial savings and environmental gains. Indonesian firms, in particular, could benefit from government incentives to adopt energy-efficient equipment and practices, which would help them overcome financial constraints. For both Ghana and Indonesia, advancing GLMPs can yield substantial benefits. In Ghana, where firms are already partially adopting green logistics, further enhancements can help meet both national and international sustainability standards. For Indonesian firms, focusing on overcoming infrastructure and cost barriers to green logistics will be critical. This could involve public-private partnerships, investment in green technologies, and policy incentives to encourage green practices across the logistics sector.

5.2 Implications

5.2.1 The findings the effect of green logistics management practices on the sustainability performance has far-reaching implications for various stakeholders, including policymakers, businesses, citizens, scholars, and individuals involved in addressing sustainability issues.

5.2.1.1 Theoretical Implications: The findings on the effect of green logistics management practices on sustainability performance contribute to the theoretical discourse on sustainability and logistics by highlighting the intermediary roles of supply chain traceability and logistics eco-centricity. These results challenge the traditional assumption that green logistics directly enhance sustainability outcomes, instead suggesting that operational improvements alone are insufficient to achieve significant sustainability gains. The study expands upon the Triple Bottom Line (TBL) theory by demonstrating that environmental practices in logistics, while crucial, must be integrated with mechanisms that enhance transparency (such as traceability) and eco-centric approaches to produce meaningful sustainability outcomes. The contextual differences between Ghana and Indonesia also add a theoretical dimension by suggesting that the effectiveness of green logistics management is contingent upon the regulatory environment, industry structure, and available resources, reinforcing the idea that sustainability practices are not onesize-fits-all but must be adapted to specific national contexts. Furthermore, the study underscores the mediating role of supply chain traceability and logistics ecocentricity in linking green logistics management to sustainability outcomes, offering a more nuanced understanding of how eco-friendly logistics practices can be leveraged. This finding provides valuable insights for scholars seeking to explore the complex dynamics of green logistics and sustainability, emphasizing the need to study indirect effects and intermediary processes, rather than focusing solely on direct outcomes.

5.2.1.2 Practical Implications: The findings from the analysis of green logistics management practices offer crucial insights for various stakeholders, each with distinct implications. For policymakers in both Ghana and Indonesia, it is essential to create supportive regulatory frameworks that

incentivize the adoption of green logistics practices and enhance supply chain transparency, such as through standardized traceability systems and tax incentives for eco-centric logistics solutions. For businesses, particularly in manufacturing and logistics sectors, the study emphasizes that green logistics can improve operational aspects like traceability and eco-centricity but may not directly lead to sustainability gains. Therefore, firms need to integrate these practices into broader sustainability strategies, including stakeholder engagement, regulatory compliance, and the use of advanced technologies such as blockchain. Citizens also play a role in promoting sustainability by pushing for corporate accountability and supporting companies that prioritize transparent and eco-friendly supply chains. For scholars, the study reveals opportunities to explore the indirect relationships between logistics practices and sustainability performance, particularly in cross-country comparisons like those between Ghana and Indonesia. Finally, individuals involved in addressing sustainability issues must recognize that while green logistics practices are valuable, they must be part of a more comprehensive sustainability framework that involves collaboration with governments, technological innovation, and long-term environmental and social commitments.

5.2.2 The findings effect of logistics eco-centricity on the sustainability performance has far-reaching implications for various stakeholders, including policymakers, businesses, citizens, scholars, and individuals involved in addressing sustainability issues.

5.2.2.1 Theoretical Implications: The findings on the effect of logistics ecocentricity on sustainability performance provide a critical theoretical contribution to the literature on sustainability and supply chain management by emphasizing the central role of supply chain traceability as a key driver of sustainability outcomes. Traditionally, logistics eco-centricity has been viewed as a supportive mechanism within sustainability strategies, but this study elevates the importance of traceability, positioning it as an essential factor in achieving environmental and social goals in global supply chains.

By demonstrating the mediating role of traceability in the relationship between logistics eco-centricity and sustainability performance, the findings suggest that sustainability cannot be fully achieved through green logistics practices alone but requires the integration of systems that promote transparency and accountability. This expands the Triple Bottom Line (TBL) theory by showing that effective logistical operations must be linked to traceability mechanisms to realize the full environmental and social benefits. The differences in the strength of traceability's impact between Ghana and Indonesia further suggest that the effectiveness of eco-centric logistics strategies is influenced by contextual factors such as industry structures and regulatory environments, offering a richer theoretical framework for understanding regional variations in sustainability practices.

5.2.2.2 Practical Implications: The practical implications of these findings are far-reaching for various stakeholders. For policymakers, there is a clear need to develop and enforce regulations that promote the adoption of traceability systems across industries, ensuring that firms are accountable for their environmental and social impacts throughout the supply chain. Policies such as tax incentives for firms that invest in traceability technologies, along with industry-wide standards for transparency, could encourage wider adoption. For businesses, particularly those in manufacturing and logistics sectors, the findings highlight the importance of integrating supply chain traceability into their logistics eco-centricity strategies. Firms should invest in advanced technologies like blockchain and IoT to improve supply chain visibility and strengthen their sustainability performance. Additionally, businesses must align traceability efforts with broader corporate sustainability goals to maximize their impact. For citizens, supporting companies that prioritize supply chain transparency can drive corporate accountability, reinforcing the role of consumers in shaping sustainable business practices. Scholars can further explore the interplay between logistics eco-centricity, traceability, and sustainability performance, especially across different regions, while individuals and organizations involved in sustainability initiatives should

focus on enhancing supply chain transparency as a key mechanism for advancing global sustainability efforts.

5.2.3 The findings effect of operational efficiency on the sustainability performance has far-reaching implications for various stakeholders, including policymakers, businesses, citizens, scholars, and individuals involved in addressing sustainability issues.

5.2.3.1Theoretical implications**:** The analysis of operational efficiency and its impact on sustainability performance in both Ghana and Indonesia expands the theoretical understanding of the relationship between efficiency and sustainability by emphasizing that operational efficiency is a critical driver of sustainability outcomes, but its impact is context-dependent. The findings support the argument that improving operational efficiency through process optimization, waste reduction, and better resource utilization can significantly contribute to sustainability, as aligned with the Triple Bottom Line (TBL) theory, which calls for balancing economic, environmental, and social goals. The study highlights that operational efficiency's influence on sustainability performance varies by region, suggesting that the industry structure, regulatory environment, and economic conditions of a country play a mediating role in determining how effectively operational efficiency translates into sustainability improvements. This contextspecific variation advances the theoretical framework by underscoring that efficiency-driven sustainability outcomes may not be uniformly achievable across different regions or industries, requiring more nuanced approaches to sustainability management in diverse environments.

5.2.3.2 Practical implications**:** The practical implications of these findings offer valuable insights for policymakers, businesses, and other stakeholders. For policymakers, the results underscore the importance of creating policies that incentivize businesses to enhance operational efficiency as a means to achieve sustainability. Governments in both Ghana and Indonesia should consider introducing regulations or offering tax incentives that encourage firms to adopt efficient operational practices, such as lean manufacturing and waste reduction initiatives. For businesses, the findings emphasize that operational efficiency is a

key strategy for improving sustainability performance. Firms should focus on optimizing their internal processes and resource use to reduce their environmental impact while boosting productivity. Companies in Ghana, where the connection between efficiency and sustainability is stronger, can serve as a model for firms in other regions. In Indonesia, businesses may need to integrate operational efficiency more deeply into their sustainability strategies to achieve greater sustainability gains, potentially investing in technology or process improvements to close the gap. For citizens, the findings suggest that supporting businesses that prioritize operational efficiency can help foster broader environmental and social benefits, reinforcing the role of consumer demand in driving sustainability. For scholars, the study highlights the need for further research into the contextual factors that influence the strength of the relationship between operational efficiency and sustainability performance across different regions and industries.

5.2.4 The findings mediation effect of supply chain traceability on the relationship between green logistics management practices and the sustainability performance has far-reaching implications for various stakeholders, including policymakers, businesses, citizens, scholars, and individuals involved in addressing sustainability issues.

5.2.4.1 Theoretical implications: The findings that supply chain traceability mediates the relationship between green logistics management practices and sustainability performance in both Ghana and Indonesia provide important theoretical insights. This emphasizes the critical role of traceability as an intermediary process that amplifies the effectiveness of green logistics practices in achieving sustainability goals. These results contribute to the growing body of literature that highlights the importance of transparency and control in supply chain management as integral to achieving broader environmental and social objectives. The study extends the theoretical understanding of supply chain sustainability by demonstrating that green logistics practices alone may not lead directly to improved sustainability outcomes; rather, they must be supported by robust traceability systems to fully leverage their potential. This reinforces the need for theories that account for mediating factors, such as traceability, in explaining the relationship

between operational practices and sustainability performance. The context-specific findings from Ghana and Indonesia also suggest that the effectiveness of green logistics practices is influenced by how well firms can integrate traceability into their sustainability strategies, offering a richer understanding of how different regions approach eco-centric supply chain management.

5.2.4.2 Practical Implications: The practical implications of these findings are significant for policymakers, businesses, and other stakeholders. For policymakers, the results suggest that regulations encouraging or mandating supply chain traceability should be prioritized to enhance the effectiveness of green logistics practices. Policies that promote transparency, such as requiring traceability standards or offering incentives for firms that adopt traceability technologies, can significantly contribute to improved sustainability performance. For businesses, the study highlights the importance of investing in traceability systems as part of a comprehensive sustainability strategy. Firms in both Ghana and Indonesia should focus on strengthening their ability to track and manage products throughout the supply chain, as this has been shown to mediate the relationship between green logistics and sustainability outcomes. By doing so, businesses can enhance their environmental and social performance, ultimately leading to better sustainability metrics. For citizens, the implications are that increased transparency within supply chains can foster more responsible consumer choices, as citizens can more easily identify and support businesses with sustainable practices. For scholars, these findings underscore the need to further investigate the mediating role of supply chain traceability in other regions and industries to develop a more nuanced understanding of how green logistics practices contribute to sustainability.

5.2.5 The findings mediation effect of logistics eco-centricity on the nexus between green logistics management practices and the sustainability performance has far-reaching implications for various stakeholders, including policymakers, businesses, citizens, scholars, and individuals involved in addressing sustainability issues.

5.2.5.1 Theoretical Implications: The findings on the role of logistics ecocentricity in shaping sustainability performance in Ghana and Indonesia offer

valuable theoretical contributions by demonstrating that the integration of environmental considerations into logistics operations is crucial but varies in its impact across different contexts. The study reveals that while logistics ecocentricity significantly enhances sustainability outcomes in both countries, its mediating role between green logistics management practices and sustainability performance differs in strength. In Ghana, logistics eco-centricity is a notable mediator, though its influence is less pronounced than that of supply chain traceability. This suggests that sustainability outcomes in Ghana are more reliant on transparency and control throughout the supply chain than on eco-centric logistics alone. In Indonesia, logistics eco-centricity has a stronger direct effect on sustainability, highlighting that in certain contexts, integrating environmental practices into logistics may drive immediate improvements. However, the weaker mediation effect in Indonesia implies that other factors, such as traceability, are more critical in translating green logistics practices into broader sustainability gains. These results extend theoretical understanding by illustrating how logistics eco-centricity interacts with other elements like traceability, enriching the discourse on how eco-centric strategies must be adapted to regional contexts for optimal sustainability performance.

5.2.5.2 Practical Implications**:** For policymakers, the findings stress the importance of promoting logistics eco-centricity as part of a broader strategy to enhance sustainability in both Ghana and Indonesia. In Ghana, policymakers should encourage firms to adopt logistics practices that integrate environmental considerations, complemented by regulations that emphasize supply chain transparency, as both factors work together to improve sustainability outcomes. In Indonesia, the stronger direct effect of logistics eco-centricity suggests that regulatory efforts should focus on incentivizing firms to integrate environmental practices directly into their logistics operations. For businesses, the results emphasize that logistics eco-centricity is a key lever for improving sustainability performance, but its effectiveness depends on its integration with other practices like traceability. In Ghana, firms should enhance both eco-centric logistics and supply chain traceability to maximize their sustainability impact, while in Indonesia, more focus should be placed on logistics eco-centricity as a direct driver

of sustainability outcomes. For scholars, these findings open avenues for exploring the interplay between logistics eco-centricity and traceability in different regions and industries, further deepening the understanding of context-specific sustainability drivers. For citizens and consumers, supporting businesses that prioritize eco-centric logistics and transparency will promote more sustainable practices, reinforcing the role of consumer behavior in driving corporate sustainability initiatives.

5.2.6 The findings importance-performance map analysis has far-reaching implications for various stakeholders, including policymakers, businesses, citizens, scholars, and individuals involved in addressing sustainability issues.

5.2.6.1 Theoretical Implications: The Importance-Performance Map Analysis (IPMA) results contribute to the theoretical discourse on sustainability and supply chain management by emphasizing the pivotal role of supply chain traceability as a primary driver of sustainability performance. The findings challenge the conventional view that green logistics management practices alone are sufficient to enhance sustainability, suggesting instead that traceability acts as a critical intermediary, especially in the context of developing economies like Ghana and Indonesia. By integrating supply chain traceability and logistics eco-centricity into the model, this study expands upon the Triple Bottom Line (TBL) theory, showing that transparency and eco-centric logistics practices are essential for achieving significant sustainability outcomes. The cross-national differences observed between Ghana and Indonesia further suggest that the effectiveness of green logistics management is influenced by country-specific factors, such as regulatory frameworks and infrastructural capacities. This reinforces the notion that sustainability strategies should be contextually adaptive rather than universally applied. Additionally, the study's findings underscore the mediating role of traceability and eco-centricity, enriching the theoretical understanding of how these elements amplify the impact of green logistics on sustainability, offering a nuanced view for scholars interested in exploring the complex interconnections between logistics practices and sustainable performance.

5.2.6.2 Practical Implications: The findings provide actionable insights for a variety of stakeholders seeking to enhance sustainability within supply chains. For policymakers in Ghana and Indonesia, the results highlight the importance of implementing supportive policies and regulatory incentives that encourage companies to adopt traceability systems and green logistics practices, such as tax reductions or subsidies for firms that invest in eco-centric logistics technologies. Standardized traceability systems could also help ensure accountability and improve sustainability outcomes across the industry. For business leaders, particularly in the manufacturing and logistics sectors, the study underscores the need to view green logistics as part of a broader sustainability strategy, where the integration of traceability and eco-centric logistics is essential for meaningful impact. Firms should leverage advanced technologies like blockchain to strengthen transparency and traceability within supply chains. For consumers, these findings emphasize the importance of supporting brands that demonstrate a commitment to sustainability and traceability, promoting corporate accountability in supply chain practices. For scholars, this study provides a foundation for further research into the indirect effects of logistics practices on sustainability, particularly through crosscountry analyses. Lastly, sustainability advocates are encouraged to view green logistics as one element within a broader, collaborative framework that includes government engagement, technological innovation, and a long-term commitment to environmental and socia objectives.

5.3 Recommendations

Given the findings that the effect of green logistics management practices on sustainability performance is positively significant through the mediating roles of supply chain traceability and logistics eco-centricity, but not directly significant, the following recommendations are proposed for various stakeholders:

- Policymakers: Since the findings indicate that green logistics management practices have a significant positive impact on sustainability performance when integrated with traceability and eco-centric operations, policymakers in Ghana and Indonesia should implement regulations that promote these intermediary practices. Regulatory frameworks should prioritize

transparency and environmental considerations within logistics systems. Policies that offer incentives, such as tax reductions, certifications, or subsidies for firms adopting green logistics, traceability technologies, and eco-centric approaches, will encourage wider adoption. Ensuring that such policies are industry-wide and accessible will promote sustainable supply chain operations across sectors.

- Businesses: The positive impact of green logistics on operational aspects, including traceability and eco-centricity, suggests that businesses should focus on these areas to enhance their sustainability performance. Since the findings show no direct significant impact of green logistics on sustainability, firms must go beyond the mere adoption of green logistics and focus on embedding traceability systems and eco-friendly practices in their overall sustainability strategies. Investment in digital technologies like blockchain for enhanced transparency and sustainable transportation solutions will allow businesses in both countries to drive better sustainability outcomes. Moreover, collaboration with stakeholders such as governments and NGOs to build integrated green logistics frameworks can improve industry-wide sustainability practices.
- Citizens: Given that green logistics and related practices have a significant positive influence when supported by traceability and eco-centricity, citizens can drive greater corporate accountability by choosing to support companies with transparent and environmentally friendly supply chains. Citizens in Ghana and Indonesia can advocate for more stringent regulations and transparency requirements, pushing businesses to adopt these sustainability practices more widely. Through informed purchasing decisions, citizens can influence firms to place a stronger emphasis on sustainability and encourage wider adoption of eco-centric logistics.
- Scholars: The findings indicate a positive and significant effect of green logistics management on sustainability performance through traceability and eco-centric operations. This presents an opportunity for scholars to further investigate the contextual factors influencing this relationship, such as regulatory environments, industry structures, and resource availability.

Comparative studies across different regions, especially between developing countries like Ghana and Indonesia, could provide valuable insights into the conditions under which green logistics strategies are most effective. Furthermore, scholars should explore how technological advancements, such as IoT and blockchain, can further strengthen the positive impact of these practices on sustainability performance.

- Individuals Involved in Addressing Sustainability Issues: The positive findings regarding the role of logistics eco-centricity and supply chain traceability suggest that sustainability professionals should emphasize the importance of these intermediary factors in their recommendations to businesses. Green logistics practices, when combined with strong traceability systems and eco-centric approaches, have been shown to improve sustainability performance. Individuals working in sustainability roles should promote the integration of these practices as part of a holistic approach to sustainability, encouraging companies to adopt not only green logistics but also the tools and systems that enhance transparency and environmental stewardship. This will help firms achieve greater sustainability outcomes and align with global environmental goals.

Given the findings that the effect of logistics eco-centricity on sustainability performance is positively significant in both Ghana and Indonesia, though the mediating role of logistics eco-centricity differs between the two countries, the following recommendations are proposed for various stakeholders:

- Policymakers: Since logistics eco-centricity has a significant positive impact on sustainability performance, policymakers should promote policies that encourage businesses to integrate environmental considerations into their logistics operations. Governments in Ghana and Indonesia can develop regulatory frameworks that incentivize the adoption of eco-friendly logistics practices, such as energy-efficient transportation, sustainable packaging, and waste reduction strategies. Providing tax benefits or grants to companies that implement eco-centric logistics systems can further drive

the adoption of these practices, contributing to the overall sustainability goals of the region.

- Businesses: The positive and significant impact of logistics eco-centricity on sustainability performance indicates that firms need to prioritize environmental sustainability in their logistics operations. Businesses should integrate eco-centric practices such as optimizing transportation routes, using environmentally friendly packaging, and minimizing emissions into their day-to-day operations. Given that the mediating role of logistics ecocentricity is stronger in Ghana than in Indonesia, firms in Indonesia should invest more in enhancing their eco-centric logistics strategies to close this performance gap. Additionally, firms should ensure that their eco-centric logistics efforts are aligned with broader sustainability frameworks, including supply chain traceability, to maximize their impact on sustainability outcomes.
- Citizens: Given that logistics eco-centricity has a positive influence on sustainability performance, citizens can play an active role by supporting businesses that prioritize environmentally friendly logistics practices. In both Ghana and Indonesia, consumers can demand greater transparency and accountability from companies regarding their logistics operations, particularly in terms of their environmental impact. Through conscious purchasing decisions, citizens can encourage more firms to adopt ecocentric logistics, further driving sustainability improvements across industries.
- Scholars: The findings provide a significant theoretical basis for further exploration into the role of logistics eco-centricity in driving sustainability performance. Scholars should continue to investigate how eco-centric logistics practices influence not only environmental outcomes but also social and economic dimensions of sustainability. Comparative studies between Ghana, Indonesia, and other regions can provide deeper insights into how different contexts affect the impact of logistics eco-centricity. Moreover, scholars could explore how technologies like green transport solutions and digital innovations can further enhance the sustainability performance of logistics operations.

- Individuals Involved in Addressing Sustainability Issues: The positive findings regarding the effect of logistics eco-centricity suggest that individuals working in sustainability roles should emphasize the integration of eco-friendly logistics practices as part of a company's overall sustainability strategy. Professionals should work with businesses to develop and implement logistics systems that prioritize environmental impact reduction, such as sustainable transportation, resource-efficient warehousing, and waste minimization. By focusing on logistics ecocentricity as a key component of broader sustainability initiatives, these individuals can help firms achieve better sustainability outcomes and align their operations with global environmental and social goals.

Given the findings that the effect of operational efficiency on sustainability performance is positively significant in both Ghana and Indonesia, though stronger in Ghana, the following recommendations are proposed for various stakeholders:

- Policymakers: Since operational efficiency has a significant positive impact on sustainability performance, especially in Ghana, policymakers should encourage firms to adopt operational practices that optimize resource utilization and minimize waste. Policies that promote energy efficiency, lean manufacturing, and process optimization should be developed to incentivize businesses to improve their operational efficiency. Additionally, governments could offer financial support, such as tax incentives or grants, to companies that implement resource-efficient technologies and sustainable operational processes, ensuring that firms can contribute to national sustainability goals while improving their productivity.
- Businesses: The positive impact of operational efficiency on sustainability performance suggests that businesses should prioritize improving their processes to reduce waste, conserve energy, and maximize resource use. Companies in both Ghana and Indonesia can benefit from investing in lean manufacturing techniques, automation, and energy-efficient technologies that not only improve operational efficiency but also enhance sustainability outcomes. Given that the impact is stronger in Ghana, firms in Indonesia

may need to place more emphasis on integrating operational efficiency into their sustainability strategies to achieve greater sustainability gains. Businesses should also engage in continuous process improvements and measure their performance through key operational and environmental metrics.

- Citizens: Since operational efficiency contributes positively to sustainability performance, citizens can support companies that demonstrate strong operational practices aimed at reducing environmental impacts. Through informed purchasing decisions, citizens can drive demand for products and services that are produced by companies optimizing their operations to minimize waste and energy use. Encouraging businesses to be transparent about their operational efficiency and sustainability practices will help citizens make more responsible choices, contributing to broader environmental and social goals.
- Scholars: The findings provide a theoretical basis for exploring how operational efficiency can drive sustainability performance across different regions and industries. Scholars should investigate the specific operational practices that are most effective in enhancing sustainability performance, with a focus on lean manufacturing, energy optimization, and waste reduction techniques. Comparative studies between regions, such as Ghana and Indonesia, could shed light on the contextual factors that influence the strength of the relationship between operational efficiency and sustainability. Moreover, future research should explore how advancements in technology, such as Industry 4.0 and automation, can further improve the relationship between operational efficiency and sustainability outcomes.
- Individuals Involved in Addressing Sustainability Issues: The positive findings on operational efficiency's role in sustainability suggest that professionals working in sustainability consulting and corporate social responsibility should promote the integration of efficiency-driven strategies into business operations. These individuals should work with businesses to identify areas where resources can be optimized, processes can be streamlined, and waste can be minimized to enhance both productivity and

sustainability outcomes. By focusing on operational efficiency, sustainability professionals can help firms in both Ghana and Indonesia improve their environmental performance while maintaining or increasing their competitiveness.

Given the findings that the mediation effect of supply chain traceability on the relationship between green logistics management practices and sustainability performance is positively significant in both Ghana and Indonesia, the following recommendations are proposed for various stakeholders:

- Policymakers: Since supply chain traceability plays a significant mediating role in enhancing the sustainability performance of green logistics management practices, policymakers should implement regulations that prioritize and promote traceability systems across industries. Governments in both Ghana and Indonesia should develop policies that mandate the adoption of traceability technologies, such as blockchain and other digital tools, to ensure transparency and accountability throughout supply chains. Offering tax incentives, grants, or subsidies for companies that invest in traceability systems will also drive broader adoption, helping to align businesses with global sustainability goals. Policymakers can further support the standardization of traceability protocols to make systems interoperable across industries and countries.
- Businesses: The positive mediation effect of supply chain traceability suggests that businesses should focus on enhancing their traceability systems to fully realize the benefits of green logistics practices. Companies in both Ghana and Indonesia need to integrate traceability technologies to track products, raw materials, and environmental impacts throughout the supply chain. This will not only improve their sustainability performance but also provide greater transparency to consumers and regulatory bodies. By investing in digital solutions such as blockchain, Internet of Things (IoT) devices, and real-time data analytics, firms can enhance supply chain visibility and improve both environmental and social outcomes. Businesses

should view traceability as a core component of their green logistics strategies to strengthen the overall sustainability impact of their operations.

- Citizens: As supply chain traceability is shown to have a significant impact on sustainability performance, citizens can encourage companies to adopt transparent and accountable supply chain practices. By choosing to support businesses that provide clear and traceable information about their products' origins and environmental impacts, consumers can drive greater corporate accountability and promote wider adoption of green logistics and traceability practices. Citizens can also advocate for stronger regulations on supply chain transparency and demand clearer labeling on products to ensure that companies are meeting sustainability standards.
- Scholars: The significant mediation effect of supply chain traceability provides scholars with a rich area for further research. Scholars should explore how different traceability technologies impact sustainability outcomes in various industries and regions, as well as investigate the barriers to implementing such systems in developing economies like Ghana and Indonesia. Comparative studies examining how traceability systems vary in effectiveness across countries could provide valuable insights into best practices for maximizing the sustainability impact of green logistics management. Future research should also examine how traceability interacts with other sustainability factors, such as eco-centricity and operational efficiency, to further enhance our understanding of sustainable supply chain management.
- Individuals Involved in Addressing Sustainability Issues: Professionals working in sustainability, particularly those involved in supply chain management and logistics, should emphasize the importance of supply chain traceability in their efforts to improve sustainability outcomes. The positive mediation effect of traceability means that individuals working with businesses must advocate for the implementation of traceability systems as part of a comprehensive green logistics strategy. This will help firms align with environmental goals and provide greater transparency to stakeholders. Additionally, sustainability consultants and professionals should help

companies identify the most effective traceability technologies to integrate into their supply chains, ensuring that they enhance both transparency and sustainability performance.

Given the findings that the mediation effect of logistics eco-centricity on the nexus between green logistics management practices and sustainability performance is positively significant in both Ghana and Indonesia, with varying strengths, the following recommendations are proposed for various stakeholders:

- Policymakers: Since logistics eco-centricity significantly mediates the relationship between green logistics management practices and sustainability performance, policymakers should create incentives that encourage businesses to integrate eco-centric practices into their logistics operations. Governments in both Ghana and Indonesia should develop policies that promote eco-friendly transportation, resource-efficient warehousing, and sustainable packaging. These policies could include tax benefits, subsidies, or grants for companies that adopt eco-centric logistics solutions. Furthermore, policymakers should ensure that regulations are aligned with global environmental standards, which will help firms integrate eco-centric logistics into their broader sustainability strategies and contribute to national sustainability goals.
- Businesses: The positive mediation effect of logistics eco-centricity suggests that businesses need to focus on embedding eco-centric principles into their logistics practices to fully leverage the benefits of green logistics management. Companies should invest in environmentally friendly technologies, such as electric vehicles, green warehousing, and renewable energy solutions for logistics operations, to enhance their sustainability performance. In both Ghana and Indonesia, businesses should treat logistics eco-centricity as a key factor in reducing their environmental impact and improving sustainability outcomes. While the mediation effect is stronger in Ghana, Indonesian firms should further strengthen their focus on ecocentric logistics to close the gap and enhance their performance. Integrating eco-

centricity into core operations will allow firms to meet both environmental and financial goals.

- Citizens: As logistics eco-centricity has a significant impact on sustainability performance, citizens can promote its adoption by supporting companies that prioritize environmental sustainability in their logistics operations. By choosing products from companies that use eco-friendly logistics practices, such as low-emission transportation or sustainable packaging, citizens can influence businesses to invest more in logistics ecocentricity. Furthermore, citizens in both Ghana and Indonesia can raise awareness of the importance of eco-centric logistics, advocating for greater accountability and environmental responsibility from the companies they support.
- Scholars: The significant mediation effect of logistics eco-centricity offers valuable insights for scholars studying sustainability performance. Scholars should explore how eco-centric logistics practices can be optimized to improve sustainability outcomes across different industries and regions. Further research is needed to understand how logistics eco-centricity interacts with other sustainability factors, such as supply chain traceability and operational efficiency, in different contexts. Comparative studies between Ghana, Indonesia, and other regions can provide a broader perspective on how eco-centric logistics practices influence sustainability performance, particularly in developing economies. Scholars can also investigate the long-term benefits of eco-centric logistics for corporate sustainability, profitability, and competitiveness.
- Individuals Involved in Addressing Sustainability Issues: For professionals working in sustainability, the positive findings around logistics ecocentricity indicate that it should be a central focus when helping businesses improve their sustainability performance. Individuals involved in sustainability consulting, corporate social responsibility, and logistics management should work with companies to identify opportunities to implement eco-centric logistics solutions that align with their overall environmental goals. By encouraging firms to adopt sustainable practices such as optimizing

transportation routes, using green technologies, and reducing resource consumption, sustainability professionals can help businesses enhance their environmental impact while achieving operational efficiency.

Given the findings from the IPMA that identify supply chain traceability, green logistics management practices, logistics eco-centricity, and operational efficiency as key drivers of sustainability performance, with varying importance and performance levels in Ghana and Indonesia, the following recommendations are proposed for different stakeholders:

- For Policymakers: In Ghana and Indonesia, policymakers should prioritize supporting supply chain traceability and green logistics management through targeted incentives, such as tax breaks, grants, or subsidies, especially for firms investing in traceability technologies like blockchain and IoT. In Indonesia, where supply chain traceability and logistics eco-centricity show lower performance, regulatory support could focus on enhancing infrastructure and offering financial incentives to improve these areas. Standardized guidelines and regulations around green logistics can also help create a consistent framework, encouraging firms to adopt sustainable practices across supply chains.
- For Business Leaders: Managers in both Ghana and Indonesia should focus on improving areas identified as both important and underperforming. In Ghana, this includes enhancing green logistics management and maintaining high standards in supply chain traceability. Indonesian firms, on the other hand, should concentrate on strengthening supply chain traceability, operational efficiency, and logistics eco-centricity to boost sustainability outcomes. Firms in both countries are advised to invest in training and technological upgrades to optimize traceability and operational efficiency, ensuring that these practices lead to measurable improvements in sustainability performance.
- For Industry Stakeholders: Supply chain partners and investors should support firms in adopting best practices in green logistics and traceability. In Ghana, stakeholders can reinforce the high performance in logistics eco-

centricity by facilitating collaborations between supply chain partners focused on sustainable practices. In Indonesia, stakeholders should advocate for investments in eco-centric infrastructure, such as energy-efficient warehouses and low-emission transport options, to address lower performance levels. Collaborative efforts in knowledge sharing and resource pooling can also help firms achieve better outcomes in traceability and logistics eco-centricity.

- For Researchers: Scholars interested in sustainability in emerging markets should further investigate the indirect effects of logistics practices on sustainability performance, especially through factors like traceability and eco-centricity. Future research could explore crosscountry comparisons or longitudinal studies to examine how sustainability drivers evolve over time and the role of regulatory and infrastructural improvements. Additionally, researchers may focus on developing region-specific frameworks that adapt global sustainability principles to local contexts, ensuring that findings are relevant and actionable within the unique economic and environmental landscapes of countries like Ghana and Indonesia

5.4 Limitations of the Study

The limitations of this study primarily stem from the focus on two specific countries, Ghana and Indonesia, which may limit the generalizability of the findings to other regions or contexts. The differences in regulatory environments, industry structures, and available resources between these countries and others may affect the applicability of the results. Additionally, the reliance on self-reported data from firms might introduce bias, as businesses may overstate their green logistics practices or sustainability performance. Furthermore, the study's emphasis on specific variables, such as supply chain traceability and logistics eco-centricity, may overlook other factors that also influence sustainability performance, such as technological advancements, financial constraints, or cultural differences. Lastly, the cross-sectional nature of the data limits the ability to assess long-term impacts and trends, which could provide a more comprehensive understanding of how green

logistics management practices evolve and affect sustainability performance over time.

5.5 Suggestions for Future Research

Future research should explore the influence of contextual factors, such as regulatory frameworks, technological infrastructure, and cultural differences, on the effectiveness of green logistics practices and supply chain traceability in enhancing sustainability performance across different regions.

Regulatory Frameworks: In some regions, stringent environmental regulations and incentives support sustainable practices, while in others, regulations may be lax or inconsistently enforced. Research could examine how regulatory variations affect companies' willingness and ability to adopt green logistics and traceability practices. This may also include studying the role of government support and enforcement in encouraging or limiting sustainability efforts.

Technological Infrastructure: Technological readiness varies greatly across regions, influencing the ability to implement sophisticated sustainability measures. For example, developing economies often lack access to advanced systems for tracking and managing supply chains. Investigating how infrastructure constraints impact the effectiveness of green logistics and traceability in different settings could highlight specific technological gaps and areas for investment.

Cultural Differences: Different cultural values influence business priorities and attitudes toward environmental responsibility. Comparative studies could explore how cultural perceptions of environmental stewardship and corporate responsibility affect the adoption of sustainable practices, thereby offering insights into culturally tailored approaches for enhancing sustainability.

Comparative studies involving other developing economies could provide a deeper understanding of the challenges and facilitators unique to emerging markets.

Comparative research involving multiple developing economies would enable a cross-regional understanding of the challenges and enablers for sustainable logistics in emerging markets. This could involve:

Identifying Universal and Unique Challenges: Comparative studies can uncover both common barriers, such as resource limitations and infrastructure challenges, and unique factors that vary by region, like specific regulatory demands or market conditions.

Learning from Regional Best Practices: By examining successful implementations of green logistics practices in certain developing economies, other regions can identify potential strategies and practices that might be adapted to their own contexts.

Highlighting Facilitators Unique to Emerging Markets: Comparative studies could also provide insights into successful strategies specific to emerging markets, such as grassroots community engagement or partnerships with non-governmental organizations that play a larger role in sustainability efforts.

Additionally, future research could investigate the role of advanced technologies, such as blockchain and IoT, in improving traceability and operational efficiency, especially in regions where these technologies are underutilized. Blockchain for Transparency and Trust: Blockchain technology can enhance traceability by providing a secure, transparent, and immutable ledger of transactions across the supply chain. Future studies could explore how blockchain can address traceability issues in regions with weak regulatory enforcement and high levels of corruption, thus building trust among stakeholders.

IoT for Real-Time Monitoring: IoT sensors can offer real-time data on inventory, location, and environmental impact, helping firms monitor and optimize logistics operations. Research could examine how IoT adoption in resourceconstrained regions affects operational efficiency and whether it provides measurable improvements in sustainability.

Challenges and Barriers to Adoption: Further studies could also investigate the obstacles to adopting these technologies, such as cost, lack of expertise, and infrastructure challenges, as well as potential strategies for overcoming them.

Longitudinal studies would also be beneficial in assessing the long-term impacts of sustainability practices on economic and environmental outcomes,

offering insights into how firms can sustain their commitment to green logistics and supply chain management over time.

Economic Outcomes: How do sustainable logistics practices affect companies' profitability, competitive advantage, and market positioning over time? Longitudinal data could help quantify the economic benefits, cost savings, and potential market gains achieved through green logistics.

Environmental Outcomes: Studying the long-term environmental impacts such as reductions in emissions, resource use, and waste generation can provide insights into the effectiveness and limitations of current sustainability initiatives.

Sustained Organizational Commitment: Understanding how and why companies maintain (or abandon) their commitment to green logistics over time could reveal factors that sustain or hinder long-term engagement with sustainability practices, such as market shifts, regulatory changes, or organizational leadership.

Finally, expanding the model to include additional variables, such as organizational culture and consumer behaviour, could offer a more holistic view of the factors that influence sustainability performance in global supply chains.

Organizational Culture: The role of internal values and norms in promoting or inhibiting green practices is a critical area for exploration. Future research could examine how organizational culture affects a firm’s commitment to sustainability, its responsiveness to stakeholder demands, and the integration of eco-friendly logistics practices.

Consumer Behavior and Market Demand: Consumer expectations increasingly influence companies’ sustainability efforts. Research could investigate how consumer preferences for environmentally responsible products drive companies to adopt green logistics and traceability. This would provide insight into the role of consumer demand in shaping sustainable practices and offer guidance for companies on how to align their green initiatives with market expectations.

The theoretical model introduced in the research could be further tested to enhance its applicability beyond the contexts of Ghana and Indonesia by exploring the following approaches:

Cross-Regional Application: Implement the model in other developing countries across different continents to understand its adaptability and relevance in varied socio-economic, cultural, and regulatory environments.

Test the model in countries with diverse industrial structures, such as Latin America, South Asia, or Eastern Europe, to identify universal versus region-specific insights.

Sector-Specific Studies: Apply the model to specific industries like textiles, electronics, or automotive sectors globally to evaluate its effectiveness within distinct industrial contexts.

Longitudinal Studies: Conduct longitudinal research in various regions to examine how the model adapts over time and under changing regulatory and market conditions.

Technological Enhancements: Integrate advanced technologies such as AI, blockchain, or IoT into the model to test its capacity to handle real-time data and decision-making in different settings.