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Uncertain Supply Chain Management

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The role of supply chain dynamics: Assessing the impact of logistics and distribution efficiency on the scaling up of MSMEs from Indonesian perspective

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A B S T R A C T

Article history:
Received June 6, 2024
Received in revised format July 29, 2024
Accepted September 22 2024
Available online
September 22 2024

Keywords:
Logistics efficiency
Distribution efficiency
Supply chain dynamics
Scaling up of MSMEs

This research endeavors to dissect the intricate dynamics surrounding the growth of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia, specifically examining the influence of logistics and distribution efficiency, with a nuanced emphasis on the mediating role played by supply chain dynamics. Employing a quantitative methodology, the study administered questionnaires to MSME owners or managers, employing linear regression and mediation analysis techniques for data interpretation. The findings of this study illuminate a positive influence of both logistics and distribution efficiency on supply chain dynamics, subsequently fostering the expansion of MSMEs. A noteworthy revelation is the discerning mediating effect of supply chain dynamics, acting as a pivotal link between the efficiency of logistics and distribution processes and the substantial growth of MSMEs. This underscores the paramount importance of supply chain dynamics as a fundamental catalyst for the sustainable development of MSMEs. The novelty of this research lies in its innovative mediation approach, shedding light on the internal mechanisms that intricately connect logistics and distribution efficiency to MSME expansion. By delving into these relationships, the study offers a fresh perspective on how MSMEs can strategically bolster their growth trajectories. The practical implications are substantial, suggesting that a concentrated effort on optimizing supply chain management could serve as a strategic linchpin for supporting the expansion and sustainability of MSMEs in Indonesia. This study contributes valuable insights to the ongoing discourse on MSME development, advocating for a holistic strategy that encompasses logistics, distribution efficiency, and supply chain dynamics to fortify the foundations of sustainable growth.

1. Introduction

The complexity of challenges faced by Micro, Small, and Medium Enterprises (MSMEs) in Indonesia in their efforts to expand and grow (Maksum et al., 2020; Tambunan, 2019). As a developing country with a dynamic economy, Indonesia has a crucial role for MSMEs in economic growth and job creation. (Saputra & Darmawan, 2023) However, MSMEs encounter various obstacles, with one critical aspect being the efficiency of the supply chain, particularly in logistics and distribution (Kashyap & Shukla, 2023). Indonesia's heterogeneous economic structure and vast geographical diversity present unique challenges in managing the supply chain for MSMEs (Setiawan et al., 2023). There are significant differences between urban and rural areas, leading to variations in logistic infrastructure and market accessibility (Li et al., 2020; Yu & Zhao, 2021). Additionally, infrastructure and transportation constraints can pose serious hindrances to MSMEs seeking to broaden the geographical reach of their products (Harvie, 2019; Gamage et al., 2020; Singh, 2019). In the era of globalization, rapid changes in market demand and international trade dynamics demand speed and flexibility in the supply chain (Haralambides, 2017; MacCarthy et al., 2016). MSMEs need to understand how logistics and distribution efficiency can provide the necessary competitive advantage to compete in the global market (Behl et al., 2022; Osano, 2019; Rua et al., 2018). Therefore, this research aims to investigate

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ISSN 2291-6830 (Online) - ISSN 2291-6822 (Print)

doi: 10.5267/j.uscm.2024.9.014

how these aspects influence the operational scale and growth of MSMEs in Indonesia. In an increasingly competitive business environment, efficient inventory management and reduction in supply cycle time become critical. MSMEs often face challenges in understanding and implementing best practices in their supply chain management, limiting their growth potential. Hence, this research will provide in-depth insights into how improving supply chain efficiency can accelerate the scale-up of MSMEs in Indonesia. On the other hand, sustainability aspects and environmental impact also need consideration in the supply chain context (Taghikhah et al., 2019). The research will explore how MSMEs can integrate sustainable practices into their supply chain, providing not only economic benefits but also contributing to national and global sustainability efforts. The rapid development of information and communication technology can be key to enhancing the efficiency of MSMEs' supply chains (Kilay et al., 2022). The adoption of digital technology, including technology-based supply chain management systems, can improve transparency, coordination, and decision-making, all contributing to the success of operational scale and growth of MSMEs (Bag et al., 2023; Dora et al., 2022; Kaur et al., 2022).

Moreover, government policies play a crucial role in creating an environment supportive of MSME growth through the optimization of the supply chain (Machado et al., 2021; Mulchandani et al., 2023). This research will evaluate the impact of various government policies on the logistics and distribution efficiency of MSMEs in Indonesia, providing recommendations for more effective and sustainable policies. To further understand the role of the supply chain in MSME growth, this research will engage key stakeholders, including MSME entrepreneurs, government institutions, and industry players. This approach will offer a holistic and in-depth perspective on the challenges and opportunities faced by Indonesian MSMEs in managing their supply chains to achieve optimal operational scale. Considering these aspects, this research will significantly contribute to our understanding of the crucial role of the supply chain in the operational scale and growth of MSMEs in the Indonesian context.

2. Literature review and hypothesis development

2.1 The relationship between logistics efficiency and supply chain dynamics

Logistics efficiency refers to the ability to streamline and optimize the various processes involved in the movement, storage, and distribution of goods, ensuring that resources are utilized effectively and costs are minimized (Moons et al., 2019). In the context of supply chain dynamics, the term encompasses the constant changes, interactions, and dependencies among the various elements of a supply chain (Kalubanga & Gudergan, 2022). It includes suppliers, manufacturers, distributors, retailers, and customers. The dynamic nature of supply chains implies that they are subject to continuous fluctuations in demand, technological advancements, market conditions, and regulatory requirements (Beske et al., 2014). Logistics efficiency and supply chain dynamics are inherently interconnected (Dong et al., 2018; Kwak et al., 2018). Richey et al. (2022) assert that a highly efficient logistics system contributes to the overall agility and responsiveness of the supply chain. When logistics processes are streamlined, it becomes easier for a supply chain to adapt to changing conditions, meet customer demands promptly, and optimize the utilization of resources. Conversely, supply chain dynamics can influence logistics efficiency. Changes in demand patterns, shifts in market conditions, or disruptions in the supply chain can impact the effectiveness of logistics operations. For example, sudden spikes in demand may require rapid adjustments in logistics processes to prevent delays or shortages, emphasizing the need for a flexible and responsive logistics framework. Furthermore, technological advancements play a crucial role in shaping the relationship between logistics efficiency and supply chain dynamics (Gunasekaran et al., 2017). The integration of advanced technologies, such as Internet of Things (IoT), artificial intelligence, and data analytics, enables real-time visibility and data-driven decision-making within logistics operations (Zafarzadeh et al., 2021). This, in turn, enhances the adaptability of the supply chain to dynamic changes. The importance of this relationship becomes particularly pronounced in the context of scaling up Micro, Small, and Medium Enterprises (MSMEs). For MSMEs aiming to expand their operations, an efficient logistics system becomes a strategic asset in navigating the complexities of supply chain dynamics. It allows them to effectively manage increased demand, optimize inventory levels, and enhance overall operational performance. An efficient logistics system contributes to the adaptability and responsiveness of the supply chain, while the dynamic nature of the supply chain necessitates well-optimized logistics processes. Understanding and effectively managing this relationship are crucial for businesses, especially MSMEs, seeking to thrive in an ever-evolving economic landscape. Therefore, the proposed hypotheses are as follows:

H_1: *Logistics efficiency impacts on supply chain dynamics*.

2.2 The relationship between logistics efficiency and scaling up of MSMEs

A well-optimized logistics system allows MSMEs to handle increased production and distribution demands more effectively (Bi et al., 2015). Efficient transportation, inventory management, and order fulfillment contribute to meeting customer expectations, thereby creating a positive impact on the overall scalability of the business (Mondol, 2021). As MSMEs strive to scale up, they often face challenges related to market reach and penetration (Mukherjee, 2018). Logistics efficiency plays a crucial role in overcoming these challenges by ensuring timely and cost-effective delivery to diverse geographical locations (Garg et al., 2023). An optimized logistics network enables MSMEs to expand their customer base and explore new markets, contributing significantly to the scaling-up process (Ireta-Sanchez, 2023). According to Farida & Setiawan (2022), in the competitive business landscape, logistics efficiency can serve as a competitive advantage for MSMEs looking to scale up.

Streamlined supply chain processes lead to cost savings, reduced lead times, and improved customer satisfaction. These factors not only enhance the overall competitiveness of MSMEs but also position them favorably for expansion and growth in the market. The scalability of MSMEs often involves the exploration of new distribution channels and partnerships (Rosca et al., 2019). Efficient logistics facilitates the integration of new channels seamlessly, allowing MSMEs to diversify their market presence. Whether through e-commerce platforms or traditional retail outlets, a well-managed logistics system supports the scaling-up efforts by ensuring a smooth and reliable flow of products. Logistics efficiency contributes to inventory optimization, a critical factor for MSMEs aiming to scale up (Maheshwari et al., 2021; Teerasoponpong & Sopadang, 2022). Balancing inventory levels, avoiding stockouts, and minimizing holding costs are crucial aspects of logistics that directly impact the financial health of MSMEs during the scaling-up process. Efficient logistics practices enable MSMEs to manage their inventory effectively, supporting sustained growth. The relationship between logistics efficiency and the scaling up of MSMEs is multifaceted. A well-organized and efficient logistics system not only addresses operational challenges but also acts as a catalyst for market expansion, cost savings, and enhanced competitiveness. As MSMEs navigate the complexities of scaling up, investing in logistics efficiency becomes a strategic imperative to ensure a seamless and successful growth journey. Based on the description above, the hypotheses proposed are as follows:

H_2: *Logistics efficiency impacts on scaling up of MSMEs.*

2.3 The relationship between distribution efficiency and supply chain dynamics

Mehrpouya et al. (2019) defines that distribution efficiency refers to the effectiveness and optimization of the processes involved in getting products from manufacturers to end-users. On the other hand, supply chain dynamics encompass the constant changes, interactions, and dependencies within the entire supply chain network (Dharmayanti et al., 2023; Gölgeci et al., 2021). Distribution efficiency is a crucial component of supply chain dynamics as it directly influences how products move through the various stages of the supply chain (Świerczek, 2014). Moons et al. (2019) assert that an efficient distribution system ensures that products reach their destinations in a timely and cost-effective manner. It becomes particularly important in a dynamic supply chain where market demands, consumer preferences, and external factors are subject to constant changes. Supply chain dynamics, including shifts in market demands and unexpected disruptions, can impact the distribution processes. For instance, changes in consumer behavior or sudden fluctuations in demand may require adjustments in distribution strategies to prevent stockouts or overstock situations. A flexible and responsive distribution system is essential to adapt to these dynamic changes effectively. The integration of technology in distribution processes plays a significant role in navigating supply chain dynamics. Technologies such as real-time tracking, data analytics, and automation enhance distribution efficiency by providing visibility into the movement of goods and enabling data-driven decision-making. This, in turn, improves the supply chain's adaptability to dynamic conditions. Moreover, distribution efficiency contributes to overall supply chain resilience (Jain et al., 2017). In the face of unforeseen events such as natural disasters, geopolitical issues, or global pandemics, a well-optimized distribution system helps mitigate disruptions by allowing for quick rerouting of products and resources. Distribution efficiency is closely tied to customer satisfaction, a factor that significantly influences supply chain dynamics (Spillan et al., 2018). Timely and accurate deliveries contribute to positive customer experiences and loyalty. Meeting customer expectations in a dynamic market requires a distribution system that can promptly respond to changes in order patterns or delivery preferences. In a globalized market, supply chain dynamics may involve managing multiple distribution channels and partners. Distribution efficiency becomes paramount in coordinating these diverse channels, optimizing inventory levels, and ensuring that products reach the end-users in the most cost-effective and timely manner (Sun et al., 2021). In conclusion, the relationship between distribution efficiency and supply chain dynamics is reciprocal. An efficient distribution system contributes to the adaptability and resilience of the supply chain, while the dynamic nature of the supply chain necessitates a well-optimized distribution process. Understanding and managing this relationship are essential for businesses to thrive in an environment where changes are constant, and adaptability is key to sustained success. Therefore, the presented hypotheses are as follows:

H_3: *Distribution efficiency impacts on supply chain dynamics.*

2.4 The relationship between distribution efficiency and scaling up of MSMEs

Low & Thiele (2020) assess that distribution efficiency plays a pivotal role in supporting the scaling-up process by ensuring that products can be delivered promptly and cost-effectively to a growing customer base. As MSMEs expand their operations, the ability to manage and streamline distribution channels becomes crucial. An efficient distribution system enables MSMEs to meet the increased demands efficiently, contributing to the overall success of the scaling-up strategy (Foley et al., 2021). An optimized distribution network allows MSMEs to penetrate different geographical areas and target markets, facilitating the scaling-up process by ensuring that products reach customers in a timely manner (van Winden & van den Buuse, 2017). It is particularly important as MSMEs seek to broaden their customer base and increase market share. As MSMEs scale up, they often encounter challenges related to inventory management and stock levels (Muchaendepi et al., 2019). Manatkar et al. (2016) assert that distribution efficiency contributes to maintaining optimal inventory levels, preventing stockouts or excess inventory situations. It is crucial for the financial health of MSMEs during the scaling-up phase, ensuring that they can meet increased demand without compromising on efficiency. The role of technology in distribution efficiency is significant for

scaling MSMEs. Implementing advanced technologies such as inventory management systems, order tracking, and route optimization enhances the overall efficiency of distribution processes. This not only improves operational effectiveness but also supports the scalability of MSMEs by providing a foundation for future growth. Customer satisfaction is a vital aspect of scaling up, and distribution efficiency directly impacts this. Timely and reliable deliveries contribute to positive customer experiences, building brand loyalty and fostering repeat business (Lou & Xie, 2021). As MSMEs expand their customer base, maintaining high levels of customer satisfaction through efficient distribution becomes increasingly important. Furthermore, distribution efficiency supports the integration of new distribution channels and partnerships, which is often a part of the scaling-up strategy for MSMEs (Begimkulov & Darr, 2023). Whether exploring e-commerce platforms, collaborating with new retailers, or entering different sales channels, an efficient distribution system ensures seamless integration and contributes to the success of these initiatives. In conclusion, the relationship between distribution efficiency and the scaling up of MSMEs is symbiotic. An effective distribution system is not only crucial for meeting increased demand but also plays a strategic role in expanding market reach, optimizing inventory management, and enhancing overall customer satisfaction. As MSMEs embark on the journey of scaling up, investing in distribution efficiency becomes a key element for sustained and successful growth. Therefore, the hypotheses put forward are as follows:

H_4: *Distribution efficiency impacts on scaling up of MSMEs.*

2.5 The relationship between supply chain dynamics and scaling up of MSMEs

According to Holweg and Pil (2008), supply chain dynamics encompass the constant changes, interactions, and dependencies within the entire supply chain network, including suppliers, manufacturers, distributors, retailers, and customers. Scaling up for MSMEs involves increasing their operational capacity, reaching new markets, and enhancing overall business size (Gherhes et al., 2016). Supply chain dynamics influence the ability of MSMEs to adapt to changes in market demands (Tarihoran et al., 2023). The dynamic nature of the supply chain, characterized by shifts in consumer preferences, technological advancements, and external factors, necessitates flexibility and agility (Abdelilah et al., 2018). MSMEs need to navigate these dynamics effectively to meet evolving customer needs and scale up their operations accordingly (Cosenz & Bivona, 2021), MSMEs expand their market reach, supply chain dynamics play a crucial role in managing the complexities associated with diverse geographical locations and customer segments (Ghadge et al., 2017). Different markets may have distinct supply chain requirements, and understanding and responding to these dynamics are essential for scaling up successfully. An adaptable supply chain allows MSMEs to cater to various markets efficiently. Collaboration with multiple stakeholders is often a part of the scaling-up process for MSMEs. Supply chain dynamics involve interactions with suppliers, distributors, and other partners. Establishing effective communication and collaboration within the supply chain network is vital for coordinating efforts and ensuring a smooth scaling-up transition. Supply chain dynamics impact the management of inventory levels, which is critical for MSMEs during the scaling-up phase (Elf et al., 2022). Fluctuations in demand, lead times, and market conditions affect inventory requirements. MSMEs need to leverage supply chain dynamics to implement efficient inventory management practices, preventing stockouts or excess inventory situations. A comprehensive understanding of supply chain dynamics enables proactive risk management strategies, ensuring resilience and continuity during periods of growth (Um & Han, 2021). In summary, the relationship between supply chain dynamics and the scaling up of MSMEs is pivotal. Navigating the complexities of a dynamic supply chain is essential for MSMEs to adapt, innovate, and grow successfully. Leveraging supply chain dynamics strategically allows MSMEs to enhance their flexibility, responsiveness, and overall operational efficiency, thereby supporting a seamless and sustainable scaling-up process. So, the presented hypotheses are as follows:

H_5: *Supply chain dynamics impacts on scaling up of MSMEs.*

2.6 Supply chain dynamics as mediator

In the context of the relationship between supply chain dynamics and the scaling up of Micro, Small, and Medium Enterprises (MSMEs), the concept of supply chain dynamics can act as a mediator, playing a crucial role in influencing and shaping the outcomes of the scaling-up process. A mediator variable helps explain the process through which an independent variable affects a dependent variable. Here, supply chain dynamics act as a mediator in understanding how changes in the supply chain influence the successful scaling up of MSMEs. Supply chain dynamics mediate the impact of external and internal factors on MSMEs' scaling-up efforts. External factors, such as changes in market demands, technological advancements, or economic conditions, interact with the internal factors within the supply chain. The dynamics within the supply chain, driven by these interactions, then influence how MSMEs respond to and capitalize on external changes, ultimately impacting their scalability. Supply chain dynamics mediate the relationship between distribution efficiency and the scaling up of MSMEs. Efficient distribution is a critical factor in the scaling-up process, and supply chain dynamics play a mediating role by determining how changes in distribution processes impact the overall supply chain. A well-optimized distribution system, influenced by supply chain dynamics, supports the seamless flow of products, contributing to the success of scaling efforts. MSMEs expand their market reach and explore new distribution channels, supply chain dynamics act as a mediator in coordinating and integrating these diverse channels. The dynamic interactions within the supply chain facilitate the efficient incorporation of new partners and channels, ensuring that the scaling-up strategy aligns with the overall dynamics of the supply chain. Supply chain dynamics act as a mediator in managing risk during the scaling-up process. Unforeseen events and disruptions can have a

significant impact on MSMEs, and the dynamics within the supply chain influence how these risks are identified, assessed, and mitigated. An effective response to supply chain disruptions becomes critical in ensuring the resilience of MSMEs during the scaling-up phase. In conclusion, understanding supply chain dynamics as a mediator in the relationship between various factors and the scaling up of MSMEs provides insights into the underlying processes and mechanisms at play. Recognizing the mediating role of supply chain dynamics is essential for developing targeted strategies that leverage the dynamics within the supply chain to facilitate successful and sustainable scaling-up efforts for MSMEs. Therefore, the proposed hypotheses are as follows:

H_6: *Supply chain dynamics mediates the relationship between logistics efficiency and scaling up of MSMEs.*

H_7: *Supply chain dynamics mediates the relationship between distribution efficiency and scaling up of MSMEs.*

Based on the hypothesis development from the previous study, this research will introduce novel insights as illustrated in Fig. 1 below.

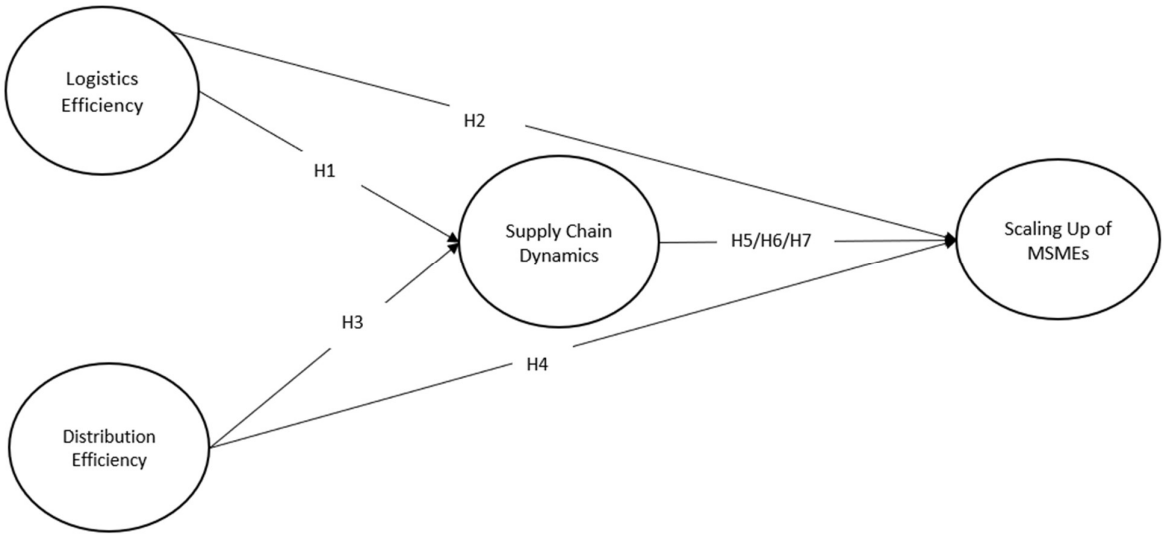

Fig. 1. Study Framework

3. Methods

This research will outline the quantitative methodology applied to explore the relationship between supply chain dynamics and the expansion efforts of Micro, Small, and Medium Enterprises (MSMEs) from an Indonesian perspective. This methodology is designed to provide in-depth insights into how factors within the supply chain may influence the operational scale and growth of MSMEs. The research approach will utilize a correlational or explanatory method to identify and measure the relationship between independent variables, such as supply chain dynamics, and dependent variables, such as the operational scale and growth of MSMEs. The initial step in this methodology involves the development of data collection instruments. Relevant variable concepts, such as flexibility, responsiveness, and technological integration within the supply chain, will be integrated into the questionnaire. Surveys will be conducted on a randomly selected sample of MSMEs from various sectors in Indonesia, considering diversity in the size and business models of MSMEs.

Data collection will be carried out through interviews or online distribution of questionnaires to owners or managers of MSMEs, as well as stakeholders within the supply chain. The collected data will be analyzed using quantitative statistical techniques, including linear regression analysis, to evaluate the relationship between supply chain dynamics and indicators of MSME growth. The validity and reliability of the instruments will be thoroughly examined to ensure data integrity and consistency.

In addition to quantitative analysis, this methodology will also encompass ethical research aspects. It includes protecting the confidentiality of respondent data, obtaining ethical approval from relevant institutions, and ensuring the security of the collected data. The ultimate goal of this research is not only to provide a better understanding of the role of supply chain dynamics in the context of Indonesian MSMEs but also to lay the groundwork for practical recommendations that can support sustainable growth and expansion of MSMEs in the future.

Table 1
Variable Measurement

Variable	Items and Indicators	References
Logistics Efficiency	1. LOG1= On-Time Delivery: The extent to which the delivery of goods or products aligns with the predetermined schedule. 2. LOG2= Inventory Management Level: The ability to optimize the quantity of stock to prevent excess or insufficient inventory. 3. LOG3= Vehicle Capacity Utilization: The efficiency of utilizing the capacity on transport vehicles, including motor vehicles or other modes of transportation. 4. LOG4= Transportation Cost: The ratio of transportation costs to the quantity of goods or products transported. 5. LOG5= Monitoring and Reporting: The availability of monitoring and reporting systems that enable real-time logistics performance tracking. 6. LOG6= Optimal Route Capability: The ability to determine the most efficient delivery route from source to destination. 7. LOG7= Delivery Safety and Security: Implementation of security measures to protect goods during the transportation process. 8. LOG8= Loading and Unloading Efficiency: The time required for the loading and unloading of goods or products at various points in the supply chain. 9. LOG9=Stock Information Availability: The availability of accurate information about stock levels at various points in the supply chain. 10. LOG10= Order Fulfillment: The success rate in fulfilling customer orders, including the match between orders and deliveries received by customers.	(Mondol, 2021; Moons et al., 2019; Richey et al., 2022)
Distribution Efficiency	1. DIST1= Order Fulfillment Accuracy: The precision in delivering the correct items and quantities as per customer orders. 2. DIST2= Delivery Timeliness: The ability to deliver products within the specified time frame. 3. DIST3= Perfect Order Rate: The percentage of orders that are accurately filled, delivered on time, and without damage. 4. DIST4= Distribution Cost per Unit: The ratio of total distribution costs to the number of units shipped. 5. DIST5= Warehouse Turnover: The speed at which inventory is moving through the distribution center. 6. DIST6= Lead Time Variability: The consistency of time intervals between order placement and delivery. 7. DIST7= Fill Rate: The percentage of customer demand that is met directly from on-hand inventory. 8. DIST8= Backorder Rate: The proportion of orders that cannot be fulfilled immediately due to stockouts. 9. DIST9= Route Optimization: Efficient planning and scheduling of delivery routes to minimize time and cost. 10. DIST10= Storage Density: Maximizing the utilization of warehouse space for effective storage. 11. DIST11= Order Picking Accuracy: The precision in picking the correct items during the fulfillment process. 12. DIST12=Inventory Shrinkage: The percentage of inventory loss or shrinkage during the distribution process.	(Foley et al., 2021; Low & Thiele, 2020; Mehrpouya et al., 2019)
Supply Chain Dynamics	1. SCD1= Demand Variability: The degree of fluctuation in customer demand for products or services. 2. SCD2= Supplier Lead Time: The time taken by suppliers to deliver materials or components to the production process. 3. SCD3= Supply Chain Responsiveness: The ability of the supply chain to adapt quickly to changes in demand or supply. 4. SCD4= Inventory Turnover: The speed at which inventory is bought, used, and replenished within the supply chain. 5. SCD5= Order Cycle Time: The time taken from order placement to order fulfillment. 6. SCD6= Supply Chain Visibility: The extent to which each entity in the supply chain has real-time visibility into inventory levels and order statuses. 7. SCD7= Collaboration Level: The degree of cooperation and collaboration among supply chain partners. 8. SCD8= Flexibility: The capacity of the supply chain to adjust to changes in demand, product design, or production processes. 9. SCD9= Risk Management Effectiveness: The ability of the supply chain to identify and mitigate potential risks. 10. SCD10= Lead Time Compression: Reducing the time it takes to bring products from conception to market. 11. SCD11= Supplier Relationship Management: The effectiveness of managing relationships with suppliers for mutual benefit. 12. SCD12= Innovation Capability: The ability of the supply chain to introduce new technologies or processes to improve overall performance.	(Abdelilah et al., 2018; Cosenz & Bivona, 2021; Tarihoran et al., 2023)
Scaling Up of MSMEs	1. SCAL1= Revenue Growth Rate: The percentage increase in the company's total revenue over a specific period. 2. SCAL2= Market Expansion: The successful entry into new markets, regions, or customer segments. 3. SCAL3= Employee Growth: The increase in the number of employees to support business expansion. 4. SCAL4= Product or Service Diversification: The introduction of new products or services to broaden the business portfolio. 5. SCAL5= Technology Adoption: The integration and utilization of new technologies to enhance operational efficiency. 6. SCAL6= Access to Funding: The ability to secure additional funding or investment for business expansion. 7. SCAL7= Customer Base Expansion: The growth in the number of customers or clients served by the business. 8. SCAL8= Brand Recognition: Increased awareness and recognition of the company's brand in the market. 9. SCAL9= Operational Efficiency: Improvements in internal processes and workflows to accommodate increased demand. 10. SCAL10= Strategic Partnerships: Formation of collaborations or partnerships with other businesses to drive growth. 11. SCAL11= Geographical Reach: Expansion into new geographical areas or global markets. 12. SCAL12= Profitability: Sustained or improved profitability as a result of business scaling.	(Cosenz & Bivona, 2021; Elf et al., 2022; Ghadge et al., 2017)

4. Results And Finding

4.1 Validity and reliability

The comprehensive analysis of the provided data showcases the strength and reliability of the measurement model across four key constructs: Logistics Efficiency, Distribution Efficiency, Supply Chain Dynamics, and Scaling up of MSMEs. The outer loadings for individual items within each construct demonstrate robust relationships, with values ranging from 0.799 to 0.953. Internal consistency measures, such as Cronbach's Alpha, rho_A, and Composite Reliability, consistently exhibit high values, ensuring the stability of the constructs. Logistics Efficiency yields a Cronbach's Alpha of 0.981, rho_A of 0.985, and a Composite Reliability of 0.983, accompanied by an Average Variance Extracted (AVE) of 0.856, reflecting strong convergent validity. Similarly, Distribution Efficiency showcases high reliability with a Cronbach's Alpha of 0.978, rho_A of 0.983, and CR of 0.980. The AVE of 0.803 indicates acceptable convergent validity. Supply Chain Dynamics displays a Cronbach's Alpha of 0.980, rho_A of 0.981, CR of 0.982, and an AVE of 0.817, reinforcing its reliability and validity. Scaling up of MSMEs exhibits robustness with a Cronbach's Alpha of 0.973, rho_A of 0.975, CR of 0.976, and an AVE of 0.774, slightly lower but still within acceptable limits for convergent validity.

In conclusion, the numerical analysis underscores the reliability and validity of the measurement model, affirming its capability to effectively capture the nuances of Logistics Efficiency, Distribution Efficiency, Supply Chain Dynamics, and the Scaling up of MSMEs. Further investigations, such as discriminant validity testing, can provide additional insights into the overall robustness of the model (see Table 2).

Table 2
Confirmatory Factor Analysis

Construct	Items	Outer Loading	Cronbach's Alpha	rho_A	CR	AVE
Logistics efficiency	LOG1	0.924	0.981	0.985	0.983	0.856
	LOG2	0.941				
	LOG3	0.925				
	LOG4	0.953				
	LOG5	0.872				
	LOG6	0.929				
	LOG7	0.938				
	LOG8	0.918				
	LOG9	0.935				
	LOG10	0.914				
Distribution efficiency	DIST1	0.799	0.978	0.983	0.980	0.803
	DIST2	0.932				
	DIST3	0.942				
	DIST4	0.904				
	DIST5	0.946				
	DIST6	0.826				
	DIST7	0.895				
	DIST8	0.896				
	DIST9	0.882				
	DIST10	0.922				
	DIST11	0.906				
	DIST12	0.892				
Supply chain dynamics	SCD1	0.908	0.980	0.981	0.982	0.817
	SCD2	0.943				
	SCD3	0.953				
	SCD4	0.911				
	SCD5	0.904				
	SCD6	0.866				
	SCD7	0.883				
	SCD8	0.908				
	SCD9	0.897				
	SCD10	0.855				
	SCD11	0.909				
	SCD12	0.908				
Scaling up of MSMEs	SCAL1	0.816	0.973	0.975	0.976	0.774
	SCAL2	0.864				
	SCAL3	0.924				
	SCAL4	0.917				
	SCAL5	0.919				
	SCAL6	0.854				
	SCAL7	0.892				
	SCAL8	0.887				
	SCAL9	0.894				
	SCAL10	0.853				
	SCAL11	0.852				
	SCAL12	0.875				

4.2 Path Analysis

The analysis of the hypotheses involves examining the relationships between different constructs within the model. The original sample indicates a substantial positive effect (0.299) with a standard deviation (STDEV) of 0.084. The T-statistics of 3.565 and the P-value of 0.000 demonstrate statistical significance. Therefore, H1 is accepted, suggesting that improvements in logistics efficiency significantly influence the dynamics of the supply chain. Then, the analysis shows a positive impact (0.111) with a STDEV of 0.050. The T-statistics of 2.208 and the P-value of 0.028 indicate statistical significance. H2 is accepted, suggesting that enhancements in logistics efficiency contribute significantly to the scaling up of MSMEs. In addition, the original sample reveals a positive impact (0.214) with a STDEV of 0.060. The T-statistics of 3.591 and the P-value of 0.000 indicate statistical significance. Therefore, H3 is accepted, suggesting that improvements in distribution efficiency significantly impact the dynamics of the supply chain. Contrarily, the analysis shows a negligible impact (-0.012) with a STDEV of 0.038. The T-statistics of 0.323 and the P-value of 0.746 indicate a lack of statistical significance. Therefore, H4 is rejected, suggesting that distribution efficiency does not significantly contribute to the scaling up of MSMEs. Furthermore, the results display a substantial positive impact (0.797) with a STDEV of 0.063. The T-statistics of 12.697 and the P-value of 0.000 indicate statistical significance. H5 is accepted, suggesting that improvements in supply chain dynamics significantly contribute to the scaling up of MSMEs. In summary, the analysis provides valuable insights into the relationships between logistics efficiency, distribution efficiency, supply chain dynamics, and the scaling up of MSMEs, affirming the importance of these dynamics within the studied model (see Table 3 and Fig. 2).

Table 3
Path Analysis

Hypothesis	Construct*)	Original Sample	STDEV	T Statistics	P Values	Result
H_1	LOG→ SCD	0.299	0.084	3.565	0.000	Accepted
H_2	LOG → SCAL	0.111	0.050	2.208	0.028	Accepted
H_3	DIST → SCD	0.214	0.060	3.591	0.000	Accepted
H_4	DIST → SCAL	-0.012	0.038	0.323	0.746	Rejected
H_5	SCD → SCAL	0.797	0.063	12.697	0.000	Accepted

*) LOG=Logistics efficiency; DIST=Distribution efficiency; SCD=Supply chain dynamics; SCAL=Scaling up of MSMEs

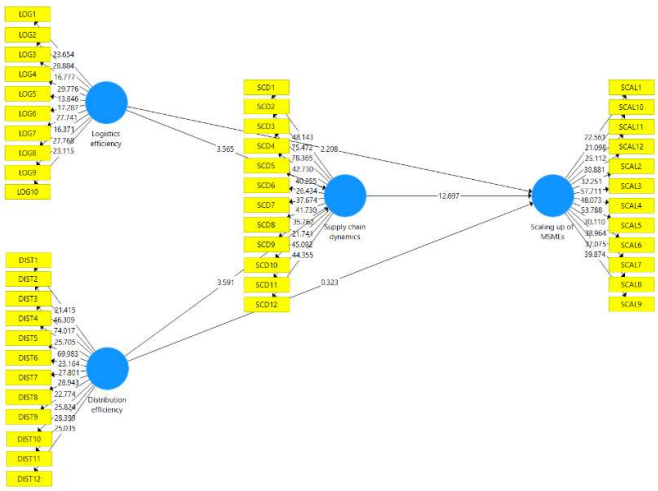

Fig. 2. Smart PLS Bootstrapping Result

4.3 Indirect effect

The analysis of the indirect effects, as presented in the table 4, focuses on exploring the mediated relationships within the model, particularly the impacts of Logistics Efficiency (LOG) and Distribution Efficiency (DIST) on the Scaling up of MSMEs (SCAL) through the mediating variable of Supply Chain Dynamics (SCD). The indirect effect of Logistics Efficiency on the Scaling up of MSMEs through Supply Chain Dynamics is found to be substantial, with a coefficient of 0.238. This suggests that improvements in Logistics Efficiency have a positive impact on Supply Chain Dynamics, subsequently contributing to the Scaling up of MSMEs. The standard deviation (STDEV) of 0.072 indicates the consistency of this effect, while the T-statistic of 3.300 and the P-value of 0.001 affirm its statistical significance. Consequently, H6 is accepted, highlighting the mediated relationship between Logistics Efficiency, Supply Chain Dynamics, and the Scaling up of MSMEs. Similarly, the indirect effect of Distribution Efficiency on the Scaling up of MSMEs through Supply Chain Dynamics is noteworthy, with a coefficient of 0.170. This implies that enhancements in Distribution Efficiency positively influence Supply Chain Dynamics, thereby impacting the Scaling up of MSMEs. The STDEV of 0.050 indicates the reliability of this effect, and the T-statistic of 3.427 with a P-value of 0.001 establishes its statistical significance. Consequently, H7 is accepted,

underscoring the mediated association between Distribution Efficiency, Supply Chain Dynamics, and the Scaling up of MSMEs.

In summary, the results of the indirect effects analysis provide valuable insights into the mechanisms through which Logistics Efficiency and Distribution Efficiency impact the Scaling up of MSMEs. The acceptance of H6 and H7 emphasizes the importance of considering the mediating role of Supply Chain Dynamics in understanding and fostering the growth of MSMEs. This information is pivotal for stakeholders and policymakers seeking effective strategies to support the sustainable expansion of MSMEs.

Table 4
Indirect Effect

Hypothesis	Construct*)	Original Sample	STDEV	T Statistics	P Values	Result
H6	LOG → SCD → SCAL	0.238	0.072	3.300	0.001	Accepted
H7	DIST → SCD → SCAL	0.170	0.050	3.427	0.001	Accepted

*) LOG=Logistics efficiency; DIST=Distribution efficiency; SCD=Supply chain dynamics; SCAL=Scaling up of MSMEs

5. Discussion

The acceptance of hypothesis H1, stating that logistics efficiency impacts supply chain dynamics, signifies a critical insight into the intricate relationship between the efficiency of logistics operations and the overall dynamics of the supply chain. This finding underscores the notion that when logistics processes are streamlined and optimized, they wield a significant influence on the broader dynamics within the supply chain network. In the context of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia, this revelation holds profound implications for the sustainability and longevity of these businesses.

Efficient logistics operations play a pivotal role in shaping the responsiveness, adaptability, and overall agility of the supply chain (Dong et al., 2018; Kwak et al., 2018). The seamless flow of goods, timely deliveries, and effective management of inventory levels are integral components of logistics efficiency. As logistics efficiency increases, the supply chain becomes more resilient, capable of adapting swiftly to changes in market demands, technological advancements, and other external factors (Zafarzadeh et al., 2021). In the realm of Indonesian MSMEs, where logistics and distribution intricacies are often cited as significant challenges, the acceptance of H1 suggests that addressing logistics efficiency can be a strategic lever for enhancing the sustainability of these businesses. Streamlining logistics processes can lead to cost savings, reduced lead times, and improved customer satisfaction, thereby contributing to the overall competitiveness and longevity of MSMEs. Furthermore, the positive correlation between logistics efficiency and supply chain dynamics aligns with the broader narrative of economic development in Indonesia. As the MSME sector is a vital component of the Indonesian economy, improvements in logistics efficiency have the potential to catalyze sustainable growth, bolstering the resilience of MSMEs in the face of dynamic market conditions.

The acceptance of H1 not only deepens our understanding of the interconnectedness between logistics efficiency and supply chain dynamics but also sheds light on a strategic pathway for fostering the sustainability of MSMEs in Indonesia. Enhancing logistics efficiency emerges as a crucial factor in fortifying the adaptive capacity and competitive edge of MSMEs, contributing significantly to their long-term viability in the dynamic business landscape of Indonesia.

The affirmation of hypothesis H2, which posits that logistics efficiency has a significant impact on the scaling up of Micro, Small, and Medium Enterprises (MSMEs), illuminates a pivotal aspect of the intricate relationship between efficient logistical processes and the expansion aspirations of these businesses (Maheshwari et al., 2021; Teerasoponpong & Sopadang, 2022). This finding underscores the crucial role played by logistics efficiency in influencing the ability of MSMEs to undertake and sustain scaling-up initiatives. In the context of Indonesia's business landscape, particularly the dynamic and diverse realm of MSMEs, the acceptance of H2 carries substantial implications for the long-term growth and viability of these enterprises. Logistics efficiency, encompassing streamlined transportation, effective inventory management, and timely distribution, emerges as a linchpin in the scaling-up endeavors of MSMEs. As logistics operations become more efficient, MSMEs can navigate the challenges associated with increased production demands, market expansion, and the exploration of new distribution channels more effectively. This efficiency not only accelerates the scaling-up process but also positions MSMEs favorably for sustained growth in a competitive marketplace (Rosca et al., 2019). In the Indonesian context, where the MSME sector constitutes a significant portion of the economy, the acceptance of H2 underscores the strategic importance of addressing logistics efficiency for fostering the sustainable expansion of businesses. Streamlining logistical processes contributes not only to cost-effectiveness but also facilitates the seamless integration of MSMEs into new markets and distribution networks. This, in turn, enhances the overall competitiveness and market reach of these enterprises, aligning with broader economic development objectives in Indonesia.

Moreover, the positive correlation between logistics efficiency and the scaling up of MSMEs aligns with the imperative to fortify the resilience of these businesses. In a landscape marked by dynamic market conditions and global uncertainties, a well-optimized logistics system emerges as a catalyst for the successful execution of scaling-up strategies, mitigating risks and ensuring the sustainability of MSMEs. In conclusion, the acceptance of H2 not only highlights the significant impact of logistics efficiency on the scaling up of MSMEs but also underscores the strategic importance of addressing logistical challenges for the sustainable growth of these enterprises in the dynamic business environment of Indonesia. Enhancing

logistics efficiency emerges as a key driver in propelling the scaling-up efforts of MSMEs, contributing substantially to their long-term viability and impact on the Indonesian economy.

The validation of hypothesis H3, asserting that distribution efficiency significantly impacts supply chain dynamics, illuminates a critical dimension in understanding how the effectiveness of distribution processes can shape the broader dynamics within the supply chain. This finding emphasizes the pivotal role of distribution efficiency in influencing the adaptability, responsiveness, and overall agility of the supply chain network. In the context of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia, the acceptance of H3 carries profound implications for the sustainability and enduring success of these businesses. Distribution efficiency, encompassing timely and cost-effective delivery, inventory management, and coordination of multiple distribution channels, emerges as a key driver in influencing the dynamics within the supply chain (Świerczek, 2014). The seamless flow of goods from manufacturers to end-users and the ability to adapt swiftly to market changes are integral components of distribution efficiency. As distribution processes become more efficient, the supply chain gains in resilience, capable of navigating shifts in consumer preferences, market demands, and external disruptions (Jain et al., 2017). In the Indonesian MSME landscape, where the challenges of distribution are often pronounced, the acceptance of H3 suggests that enhancing distribution efficiency can be a strategic lever for fortifying the sustainability of these businesses. Improved distribution processes can lead to reduced lead times, minimized stockouts, and enhanced customer satisfaction, thereby contributing to the overall competitiveness and longevity of MSMEs. Furthermore, the positive correlation between distribution efficiency and supply chain dynamics aligns with the broader narrative of economic development in Indonesia. As the MSME sector plays a crucial role in the country's economy, improvements in distribution efficiency have the potential to catalyze sustainable growth, fortifying the resilience of MSMEs in the dynamic and evolving business landscape.

The analysis of Hypothesis 4 (H4), which posits that Distribution Efficiency impacts the Scaling up of Micro, Small, and Medium Enterprises (MSMEs), yields a result of rejection based on the statistical parameters observed. The coefficient associated with H4 is -0.012, indicating a negligible effect of Distribution Efficiency on the Scaling up of MSMEs. This is accompanied by a standard deviation (STDEV) of 0.038, further emphasizing the limited variability in this effect. The T-statistic of 0.323 and the P-value of 0.746 collectively signify the lack of statistical significance, leading to the rejection of H4. The implications of rejecting H4 should be carefully considered, particularly in the context of sustaining MSMEs in Indonesia. The absence of a statistically significant impact suggests that, within the studied model, Distribution Efficiency does not have a direct influence on the scaling up of MSMEs. This finding underscores the complexity of factors contributing to the growth of MSMEs, indicating that other elements beyond distribution efficiency play a more substantial role in driving the scaling-up process. To enhance the sustainability of MSMEs in Indonesia, stakeholders and policymakers should broaden their focus beyond distribution efficiency alone. It becomes imperative to investigate and address a more comprehensive set of variables that may include but are not limited to financial support, market access, regulatory frameworks, and technological adoption (Muchaendepi et al., 2019). By understanding the multifaceted nature of MSME growth, interventions and policies can be designed to holistically support these enterprises and foster a more sustainable and robust MSME ecosystem in Indonesia. The rejection of H4 serves as a prompt to explore and prioritize alternative drivers that contribute more significantly to the scaling up of MSMEs in the Indonesian context.

The validation of hypothesis H5, asserting that supply chain dynamics significantly impact the scaling up of Micro, Small, and Medium Enterprises (MSMEs), reveals a fundamental aspect of the intricate relationship between the adaptability and responsiveness of the supply chain and the expansion aspirations of these businesses. This finding emphasizes the critical role played by supply chain dynamics in shaping the scalability and growth trajectory of MSMEs. In the diverse and dynamic landscape of Indonesian MSMEs, the acceptance of H5 carries substantial implications for the long-term viability and expansion prospects of these enterprises. Supply chain dynamics, encapsulating the constant changes, interactions, and dependencies within the entire supply chain network, emerge as a pivotal factor influencing the scaling-up endeavors of MSMEs. The ability of MSMEs to adapt to changes in market demands, technological advancements, and external factors relies heavily on the flexibility, responsiveness, and overall agility of the supply chain (Tarihoran et al., 2023). As supply chain dynamics become more favorable, MSMEs can navigate the complexities associated with increased production demands, market expansion, and the exploration of new distribution channels more effectively (Abdelilah et al., 2018). This adaptability not only expedites the scaling-up process but also positions MSMEs favorably for sustained growth in a competitive marketplace (Gherhes et al., 2016). In the context of Indonesia, where the MSME sector is a key contributor to economic activity, the acceptance of H5 underscores the strategic importance of understanding and managing supply chain dynamics for fostering the sustainable expansion of businesses. A well-orchestrated and adaptable supply chain not only contributes to cost-effectiveness but also facilitates the seamless integration of MSMEs into new markets and distribution networks. This, in turn, enhances the overall competitiveness and market reach of these enterprises, aligning with broader economic development goals in Indonesia. Moreover, the positive correlation between supply chain dynamics and the scaling up of MSMEs aligns with the imperative to fortify the resilience of these businesses. In a landscape marked by dynamic market conditions and global uncertainties, a well-managed supply chain becomes a catalyst for the successful execution of scaling-up strategies, mitigating risks and ensuring the sustainability of MSMEs. In conclusion, the acceptance of H5 not only deepens our understanding of the interconnectedness between supply chain dynamics and the scaling up of MSMEs but also underscores the strategic importance of managing and leveraging these dynamics for the sustainable growth of these enterprises in the dynamic business environment of Indonesia. Enhancing supply chain dynamics emerges as a key driver in propelling the scaling-up efforts of MSMEs, contributing substantially to their long-term viability and impact on the

Indonesian economy. The confirmation of both hypotheses H6 and H7, which propose that supply chain dynamics act as a mediator in the relationships between logistics efficiency and distribution efficiency, respectively, with the scaling up of Micro, Small, and Medium Enterprises (MSMEs), adds a layer of complexity to our understanding of the interplay between various factors influencing the expansion efforts of these businesses. These findings suggest that the impact of logistics and distribution efficiency on the scaling-up process of MSMEs is not direct but is intricately woven through the mediating influence of supply chain dynamics. In the context of the dynamic and diverse landscape of Indonesian MSMEs, the acceptance of H6 and H7 holds significant implications for the strategic management and sustainability of these enterprises.

H6 proposes that supply chain dynamics serve as a mediator between logistics efficiency and the scaling up of MSMEs. This implies that the effects of streamlined logistics operations on scaling up are not solely attributable to direct causation but are significantly influenced by the dynamics within the broader supply chain network. As logistics efficiency improves, it not only accelerates the scaling-up process but also triggers a chain reaction within the supply chain dynamics, contributing to the adaptability and responsiveness crucial for the sustainable growth of MSMEs. H7 extends this understanding by suggesting that supply chain dynamics also mediate the relationship between distribution efficiency and the scaling up of MSMEs. Effective distribution processes, while directly contributing to the scalability of MSMEs, exert their full impact when aligned with the overall dynamics within the supply chain. A well-coordinated and adaptable supply chain amplifies the positive effects of distribution efficiency, facilitating a seamless integration of MSMEs into new markets and distribution networks.

In the Indonesian context, where the challenges of logistics and distribution are often pronounced for MSMEs, the acceptance of H6 and H7 underscores the strategic importance of managing supply chain dynamics for fostering the sustainable scaling up of businesses. An optimized supply chain not only enhances the effectiveness of logistics and distribution operations but also ensures the resilience and adaptability of MSMEs in the face of dynamic market conditions. In conclusion, the acceptance of H6 and H7 not only deepens our understanding of the interconnected relationships between logistics efficiency, distribution efficiency, supply chain dynamics, and the scaling up of MSMEs but also underscores the intricate role of supply chain dynamics as a mediator in shaping the sustainable growth of these enterprises in the dynamic business environment of Indonesia. Managing and leveraging supply chain dynamics emerges as a crucial factor in propelling the scaling-up efforts of MSMEs, contributing significantly to their long-term viability and impact on the Indonesian economy.

6. Conclusion

The research has intricately explored the complex web of relationships within the supply chain dynamics of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia. The accepted hypotheses, specifically addressing the influence of logistics and distribution efficiency, along with the mediating role of supply chain dynamics, contribute vital insights into the pivotal dynamics that influence the scaling up and sustainability of these businesses.

The acknowledged hypotheses highlight the interconnected nature of logistics, distribution, and supply chain dynamics, emphasizing their collective significance in shaping the growth trajectory of Indonesian MSMEs. Notably, the findings indicate that distribution efficiency, although not directly impacting the scaling up of MSMEs, plays a substantial role within the broader network of supply chain dynamics. While its direct influence may be limited, distribution efficiency contributes to the intricate interplay of factors that collectively drive the expansion and sustainability of MSMEs in Indonesia. It nuanced understanding underscores the need for a holistic perspective when considering the factors influencing MSMEs' growth. It suggests that distribution efficiency, while not a standalone driver of scaling up, is an integral component of the broader supply chain dynamics that collectively contribute to the success and longevity of MSMEs. As policymakers, stakeholders, and businesses strategize to support the MSME sector in Indonesia, a comprehensive approach considering the interdependencies among logistics, distribution efficiency, and supply chain dynamics becomes imperative for fostering sustainable growth. The theoretical implications of this research contribute to the broader understanding of supply chain dynamics within the context of MSMEs. The confirmation of relationships between logistics efficiency, distribution efficiency, supply chain dynamics, and the scaling up of MSMEs enriches existing theoretical frameworks. Moreover, the acknowledgment of supply chain dynamics as a mediator introduces a nuanced perspective, emphasizing the need to consider the holistic nature of the supply chain in understanding the factors influencing MSME growth. Practically, these findings have profound implications for MSME practitioners, policymakers, and supply chain stakeholders in Indonesia. Addressing logistics and distribution efficiency emerges as a strategic imperative for MSMEs seeking sustainable growth. Moreover, understanding and managing supply chain dynamics play a pivotal role in creating resilient and adaptable business ecosystems. Practical interventions focusing on optimizing logistics and distribution processes while fostering a flexible and responsive supply chain are recommended for MSMEs aiming for long-term success.

6.1 Limitations and Recommendations for Future Research

Despite the insights gained, this research has its limitations. The study focused on a specific geographical context (Indonesia) and may not be entirely generalizable to other regions. Additionally, the research scope primarily revolves around quantitative data, potentially missing nuanced qualitative aspects. External factors, such as economic conditions and global events, might also influence the study's outcomes. Future research could expand the scope to encompass diverse regions and incorporate

qualitative methodologies for a more comprehensive understanding. Building on the present study, future research endeavors could explore additional dimensions within the supply chain, delve into sector-specific nuances, and incorporate qualitative methodologies for a more in-depth exploration. Moreover, investigating the impact of external factors, such as regulatory changes or technological advancements, on supply chain dynamics and MSME scaling up could provide further insights. Continuous research into practical strategies that enhance logistics, distribution, and supply chain dynamics will undoubtedly contribute to the sustained growth and resilience of MSMEs in evolving business landscapes.

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