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SUPPLY CHAIN RESILIENCE AND PERFORMANCE OF SMALL AND MEDIUM ENTERPRISES (SMEs) IN SOUTH-EAST NIGERIA

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Abstract

Small and medium enterprises (SMEs) in emerging economies operate within supply environments marked by demand uncertainty, supplier disruptions, infrastructure constraints and intense competition. These conditions make the development of supply chain resilience capabilities increasingly important for sustained business performance. This study examined the effects of supply chain agility, supply chain flexibility and supply chain collaboration on the performance of SMEs in South-East Nigeria. The study adopted a quantitative survey design and drew on primary data collected through a structured questionnaire from SMEs operating across the region. A sample of 398 SMEs was determined, while 325 valid responses were returned and used for analysis. Structural equation modelling was employed to assess the measurement and structural models. The findings indicate that supply chain agility has a significant positive effect on SME performance ($\beta = 0.32$, $p < 0.001$). Supply chain flexibility also exerts a significant positive effect on performance ($\beta = 0.30$, $p < 0.001$), while supply chain collaboration has a significant positive effect ($\beta = 0.22$, $p = 0.001$). The results suggest that SMEs that respond quickly to environmental changes, reconfigure operations when conditions change, and maintain purposeful relationships with supply chain partners are more likely to achieve stronger performance outcomes. The study contributes to supply chain resilience scholarship by isolating three closely related but conceptually distinct capabilities within the SME context of South-East Nigeria. It recommends that SME managers move beyond reactive supply chain practices and deliberately build agility, flexibility and collaborative routines as complementary capabilities.

Keywords: Supply chain agility; supply chain flexibility; technology adoption; supply chain resilience; SME performance; South-East Nigeria

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1. Introduction

The operating environment of contemporary small and medium enterprises is increasingly defined by uncertainty rather than stability. Supply networks that once appeared relatively predictable are now exposed to disruptions arising from sudden demand changes, supplier failure, logistics bottlenecks, economic instability, geopolitical tensions and public health crises. The consequences of such events are often more severe for SMEs because they generally operate with thinner financial margins, fewer alternative suppliers and less organisational slack than larger corporations. In this context, the question is no longer whether supply chains will experience disruption, but whether firms have the capabilities required to absorb, respond to and recover from disruption while continuing to create value.

The growing attention to supply chain resilience reflects this reality. Resilience is commonly understood as the capacity of a supply chain to anticipate, respond to and recover from disruptive events while maintaining or restoring operational continuity (Christopher & Peck, 2004; Ponomarov & Holcomb, 2009). Although the literature has not produced a single universally accepted definition, there is broad agreement that resilience is capability-based and involves more than simply returning to a pre-disruption condition. Resilient supply chains are able to sense environmental changes, mobilise resources and reconfigure processes in ways that preserve performance and, in some situations, create opportunities for improvement (Wieland & Durach, 2021).

Within this broad resilience debate, agility, flexibility and technology adop have emerged as particularly important capabilities. Supply chain agility refers to the ability to sense and respond rapidly to changes in markets, customer requirements and supply conditions. Christopher (2000) describes the agile supply chain as one designed to compete in volatile markets, while Braunscheidel and Suresh (2009) link agility to the organisational antecedents that enable firms to mitigate and respond to risk. Flexibility, by contrast, concerns the ability of a supply chain to adjust its structures, resources and processes when circumstances change. It may involve changes in production volume, product mix, sourcing arrangements or delivery schedules (Stevenson & Spring, 2007). Collaboration captures the relational dimension of resilience and refers to the extent to which supply chain partners share information, coordinate activities and jointly address problems (Cao & Zhang, 2011).

For SMEs, these capabilities are especially relevant. A small firm may not have the financial capacity to maintain large inventories or multiple sophisticated systems, but it can potentially respond quickly, cultivate flexible arrangements and work closely with suppliers and customers. This is important in the South-East Nigerian context, where entrepreneurial activity is strong and SMEs operate across retail, manufacturing, food and beverage, e-commerce and other sectors. However, the region also presents a challenging operating environment. Firms must manage uncertain supply conditions, fluctuating customer demand and operational constraints while competing in markets where speed and responsiveness increasingly influence customer choice.

The empirical literature has established positive links between resilience capabilities and firm outcomes, but important gaps remain. First, a substantial proportion of existing studies examine resilience as a broad aggregate construct or focus on only one dimension. Such approaches may obscure the distinct contribution of agility, flexibility and collaboration. Second, evidence from Nigeria remains comparatively limited and is often concentrated in specific industries or locations. Findings from large manufacturing firms or other geographical settings cannot automatically be generalised to SMEs operating across South-East Nigeria. Third, SMEs are frequently treated as a homogeneous group even though their

operating conditions, resource limitations and supply relationships differ considerably from those of larger organisations.

This study therefore examines the influence of supply chain agility, flexibility and collaboration on SME performance in South-East Nigeria. The article is developed from the wider study of supply chain resilience and SME performance but focuses specifically on the three resilience capabilities that are most directly associated with responsiveness, adaptation and inter-organisational coordination. The study addresses the following research questions: What effect does supply chain agility have on SME performance in South-East Nigeria? How does supply chain flexibility influence SME performance? To what extent does supply chain collaboration affect SME performance?

The study makes three contributions. Conceptually, it provides a focused examination of three resilience capabilities rather than treating resilience as an undifferentiated construct. Empirically, it extends evidence on supply chain resilience and SME performance within the South-East Nigerian context. Practically, it provides SME owners and managers with a more precise basis for prioritising operational capabilities that can strengthen performance in uncertain supply environments.

2. Literature Review

2.1 Supply Chain Resilience and the SME Context

Supply chain resilience has developed from the recognition that supply networks are vulnerable to events that can interrupt the flow of materials, information and financial resources. Christopher and Peck (2004) conceptualised resilience as the ability of a supply chain to cope with unexpected events and return to a stable state. Ponomarov and Holcomb (2009) further emphasised the adaptive and recovery dimensions of the concept. More recent scholarship has moved beyond a narrow recovery perspective and presents resilience as a dynamic capability involving anticipation, adaptation and reconfiguration (Wieland & Durach, 2021). This development is important because disruptions do not always follow a predictable sequence. A firm may be required to respond to a sudden supply shortage, adjust its operations and simultaneously identify new opportunities.

The SME context adds an important dimension to the resilience discussion. SMEs often possess advantages such as shorter decision-making chains and close relationships with customers, but they may lack the financial resources, specialised personnel and technological infrastructure available to large firms. Bak et al. (2020) argue that SMEs remain underrepresented in supply chain resilience research despite their vulnerability to disruption. The resource constraints of SMEs mean that resilience cannot be approached simply through expensive investments. Instead, capabilities that improve responsiveness, adaptability and coordination may provide a relatively accessible route to better performance.

The present study treats supply chain resilience as a multidimensional capability and focuses on agility, flexibility and collaboration. These dimensions are conceptually related but not identical. Agility is primarily concerned with speed and responsiveness; flexibility relates to the ability to adjust the configuration of operations; and collaboration concerns the coordination of activities and resources across organisational boundaries. The distinction is analytically important because an SME may respond quickly to a disruption but lack the flexibility to change its sourcing arrangements. Similarly, a firm may possess flexible processes but fail to share information with its supply partners. Examining the three dimensions together therefore provides a more complete explanation of how resilience capabilities relate to performance.

2.2 Supply Chain Agility

Supply chain agility refers to the capability of a firm and its supply network to sense and respond rapidly to changes in the operating environment. Christopher (2000) links agility to competition in volatile markets, where customer needs and demand conditions can change quickly. Braunscheidel and Suresh (2009) describe agility as an organisational capability that supports risk mitigation and response. The concept therefore goes beyond simple speed. It involves information sensitivity, rapid decision-making and the ability to translate environmental signals into timely operational action.

Agility is particularly relevant to SMEs because smaller firms frequently compete through responsiveness. A large organisation may be able to absorb delays through inventory buffers or extensive financial resources, whereas an SME may need to change its procurement or delivery decisions almost immediately. Swafford et al. (2008) associate supply chain agility with information technology integration and flexibility, suggesting that the capability is strengthened when firms can obtain and act on relevant information quickly. Tarafdar and Qrunfleh (2017) similarly argue that agility is supported by complementary supply chain practices and information systems capabilities.

In practical terms, an agile SME may monitor changes in customer demand, adjust purchasing decisions, respond quickly to supplier interruptions and reallocate resources when market conditions change. Agility may also be reflected in the speed with which managers make operational decisions. In environments characterised by uncertainty, delayed decisions can magnify the effects of an initial disruption. Conversely, rapid response may limit the duration and cost of a disruption.

Empirical evidence generally supports the positive performance implications of agility. Braunscheidel and Suresh (2009) found that organisational antecedents of agility contribute to risk mitigation and response. Inman and Green (2021) report that agility influences supply chain performance under environmental uncertainty. More recent evidence from Nigerian firms also suggests that agility is positively associated with organisational performance (Abiji et al., 2025; Oyeyemi et al., 2024). However, most available studies have not focused on the broad population of SMEs across South-East Nigeria. This study therefore hypothesises that:

H1: Supply chain agility has a significant positive effect on the performance of SMEs in South-East Nigeria.

2.3 Supply Chain Flexibility

Supply chain flexibility is the capacity to adjust supply chain processes and resources in response to uncertainty and changing requirements. Stevenson and Spring (2007) describe flexibility as a multifaceted concept that may involve the ability to alter processes, volumes, products and delivery arrangements. Flexibility is therefore concerned with the range of operational options available to a firm and the ease with which the firm can move between those options.

For SMEs, flexibility may be expressed through multiple sourcing arrangements, adaptable production processes, the ability to modify product offerings and the capacity to adjust delivery schedules. The value of flexibility becomes evident when a firm faces unexpected changes. A business that relies on a single supplier or rigid production routine may experience prolonged disruption when the supplier fails. A more flexible firm can shift to an alternative source, change its purchasing volume or modify its operations.

The literature distinguishes flexibility from agility even though the two capabilities are often discussed together. Agility emphasises rapid sensing and response, whereas flexibility

reflects the ability to adapt the configuration of operations. Kazancoglu et al. (2022) argue that flexibility, agility and responsiveness collectively support resilience during disruptive periods. Tiwari et al. (2020) further highlight the relevance of supply chain flexibility to SMEs. Flexibility may be particularly valuable in resource-constrained firms because it enables existing resources to be redeployed rather than requiring entirely new investments.

The performance consequences of flexibility have been examined in several settings. Vickery et al. and subsequent studies have associated supply chain flexibility with customer responsiveness and firm performance. Delić and Eyers (2020) show that flexibility can influence performance in changing industrial environments, while Al Azzani and Jusoh (2024) connect flexibility with customer responsiveness among SMEs. Nigerian evidence also points to the importance of flexibility in improving the performance of smaller firms and supply-intensive businesses (Ayeni et al., 2026; Chiyem & Etomi, 2024). On this basis, the study hypothesises that:

H2: Supply chain flexibility has a significant positive effect on the performance of SMEs in South-East Nigeria.

2.4 Supply Chain Collaboration

Supply chain collaboration represents the coordinated effort of supply chain partners to share information, align activities and jointly solve operational problems. Cao and Zhang (2011) describe collaboration as a process through which supply chain members work together to achieve collaborative advantage and improved firm performance. Collaboration is therefore more extensive than a simple buyer-supplier transaction. It involves the development of relational routines and a willingness to coordinate decisions that may affect more than one organisation.

Information sharing is a central feature of collaboration. When suppliers and customers share timely and accurate information, firms are better positioned to anticipate changes and coordinate responses. Joint planning can reduce duplication and improve resource allocation, while coordinated decision-making can help partners address disruptions before they become severe. In SMEs, collaboration may also provide access to capabilities that the firm does not possess internally.

The relational nature of collaboration is particularly important in the context of resilience. Wieland and Wallenburg (2013) emphasise the role of relational competencies in supply chain resilience, while Cao and Zhang (2011) show that collaboration contributes to collaborative advantage and firm performance. Collaboration may also strengthen trust and commitment among supply chain partners, making it easier to share information during periods of uncertainty. Uddin (2022) similarly links strategic commitment and supply chain collaboration with operational and innovation performance.

The Nigerian SME environment makes this relationship worthy of further examination. SMEs frequently depend on a limited number of suppliers, distributors and customer networks. Where relationships are weak, a disruption can quickly become a business crisis. Where relationships are based on communication and mutual problem-solving, the same disruption may be managed more effectively. Babatunde and Ojo (2021) highlight the role of strategic partnerships in managing supply chain disruptions among Nigerian SMEs. The present study therefore proposes that:

H3: Supply chain collaboration has a significant positive effect on the performance of SMEs in South-East Nigeria.

2.5 Theoretical Framework: Resource-Based View

This study is anchored on the Resource-Based View (RBV) of the firm. Barney (1991) argues that firms can achieve sustained competitive advantage by possessing and effectively deploying valuable, rare, inimitable and non-substitutable resources. Wernerfelt (1984) similarly emphasises the strategic importance of firm resources. Although the original RBV is often associated with tangible and intangible assets, the capability perspective of the theory is particularly relevant to supply chain resilience.

From an RBV perspective, supply chain agility, flexibility and collaboration may be understood as organisational capabilities that enable SMEs to deploy resources more effectively than competitors. An agile firm is able to convert market information into rapid action. A flexible firm is able to reconfigure its operations. A collaborative firm is able to access and coordinate resources across organisational boundaries. These capabilities may not be easily replicated because they are embedded in routines, managerial practices and relationships.

The RBV is particularly relevant to SMEs in South-East Nigeria because resource constraints make it difficult for smaller firms to compete solely through scale. SMEs may instead develop competitive advantages through how they organise and deploy their limited resources. A firm that responds faster, adjusts its operations more effectively or collaborates more productively may perform better even without possessing the financial resources of a larger competitor.

The theory also provides a useful explanation for examining the three dimensions simultaneously. Agility, flexibility and collaboration are not isolated resources. They represent related capabilities that influence how a firm senses, adapts and coordinates its supply chain. The RBV therefore supports the argument that SMEs with stronger resilience capabilities should achieve superior performance.

2.6 Empirical Review and Research Gap

Empirical research has consistently drawn attention to the relationship between resilience capabilities and performance. Abeysekara et al. (2019), in their study of the Sri Lankan apparel industry, reported that supply chain resilience contributes to firm performance and competitive advantage. Alshahrani and Salam (2022) examined SMEs in an emerging economy and found that resilience-related capabilities influence SME performance. These studies provide support for the general resilience-performance relationship but also demonstrate the importance of context.

Research on agility has produced similar findings. Braunscheidel and Suresh (2009) connected agility with risk mitigation and response. Tarafdar and Qrunfleh (2017) found that agile supply chain strategy and supply chain performance are linked through complementary supply chain practices and information systems capability. Oyeyemi et al. (2024) examined FMCG SMEs and reported that supply chain agility influences marketing flexibility and customer satisfaction. Abiji et al. (2025) also found a positive relationship between supply chain agility and organisational performance in a Nigerian manufacturing context.

Flexibility has likewise been associated with performance. Stevenson and Spring (2007) provide a conceptual framework for understanding flexibility in supply chains, while Kazancoglu et al. (2022) demonstrate the importance of flexibility and agility in resilient supply chains. Tiwari et al. (2020) focus specifically on supply chain flexibility in SMEs, highlighting the relevance of adaptive supply chain practices to smaller firms. In Nigeria, Ayeni et al. (2026) found that flexibility strategies significantly affect the performance of fast-food firms in the South-South region.

Collaboration has also received considerable attention. Cao and Zhang (2011) found that supply chain collaboration enhances collaborative advantage and firm performance. Flynn et al. and related studies have emphasised the contribution of information sharing and coordination to supply chain outcomes. In Nigeria, Babatunde and Ojo (2021) point to strategic partnerships as an important response to supply chain disruptions among SMEs. Ayeni et al. (2026) further report significant effects of collaboration strategies on the performance of fast-food firms.

Despite these contributions, the literature remains fragmented in three important ways. First, studies frequently examine agility, flexibility or collaboration separately, making it difficult to determine their relative contribution when considered together. Second, much of the evidence is drawn from manufacturing firms or selected industries. The performance implications of resilience capabilities for SMEs across the broader South-East Nigerian business environment remain less clearly established. Third, the relationship between resilience capabilities and SME performance is often examined through broad constructs that do not distinguish between speed, adaptability and relational coordination.

The present study addresses these gaps by examining agility, flexibility and collaboration in a single model using data from SMEs across South-East Nigeria. The focus is deliberately narrow enough to preserve conceptual clarity while broad enough to capture three central mechanisms through which resilience may influence performance.

3. Methodology

3.1 Research Design and Study Context

The study adopted a quantitative descriptive survey design. A survey design was considered appropriate because the study sought to collect standardised responses from a relatively large number of SMEs and examine the statistical relationships among latent constructs. The design also enabled the researcher to collect primary data without manipulating the operating environment of the firms.

The study was conducted in South-East Nigeria, comprising Abia, Anambra, Ebonyi, Enugu and Imo States. The region has a strong entrepreneurial orientation and a high concentration of SMEs operating in retail, manufacturing, food and beverage, e-commerce and related sectors. The business environment provided an appropriate setting for examining resilience capabilities because SMEs in the region must continuously respond to changes in supply, demand and market conditions.

3.2 Population, Sample and Sampling Procedure

The population of the wider study was estimated at approximately 150,000 SMEs operating in South-East Nigeria. This estimate was derived from the national SME enterprise distribution and the regional share of enterprises reported in the SME and national statistical literature. The sample size was determined using Taro Yamane's formula at a 5% sampling error, resulting in a calculated sample size of 398 SMEs.

A combination of purposive and convenience sampling was used. purposivesampling was applied across geographical location, business sector and firm size considerations to ensure that different types of SMEs were represented. Convenience sampling was usedbased on accessibility and willingness to participate. Although the use of convenience sampling reflects the practical difficulty of accessing a highly dispersed SME population, the purposive procedure was used to improve coverage across the study context.

A total of 398 questionnaires were distributed. Of these, 325 were returned complete and valid for analysis, representing a usable response rate of 81.7%. The final sample therefore provided a substantial empirical basis for estimating the relationships among supply chain agility, flexibility, collaboration and SME performance.

3.3 Instrument and Measurement

Data were collected using a structured questionnaire. The instrument consisted of socio-demographic items and statements measuring the study constructs. Responses to the substantive items were obtained on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

Supply chain agility was measured using five items adapted from the agility literature, capturing the firm's ability to respond to changes in customer demand, unexpected supply disruptions and changing operating conditions. Supply chain flexibility was measured with four items addressing the ability to adjust supply chain processes, operations and resource arrangements. Supply chain collaboration was measured using four items relating to information sharing, joint planning and coordinated decision-making with supply chain partners. SME performance was measured with six items reflecting operational and market-related outcomes such as efficiency, reliability, customer satisfaction and general performance.

The instrument was subjected to expert review during development. Three experts in marketing and supply chain management assessed the content of the questionnaire and provided feedback on the relevance and clarity of the items. The measurement model was subsequently evaluated using factor loadings, composite reliability, average variance extracted and discriminant validity procedures.

3.4 Data Analysis and Model Assessment

Descriptive statistics were used to summarise respondent characteristics and response patterns. Structural equation modelling was employed to evaluate the measurement and structural models. The measurement model was assessed through factor loadings, Cronbach's alpha, composite reliability (CR) and average variance extracted (AVE). Discriminant validity was evaluated using the Fornell-Larcker criterion.

The structural model was used to test the three hypotheses. The decision criterion was based on the statistical significance of the estimated path coefficients. A relationship was regarded as significant where the probability value was below 0.05. The model was also assessed using fit indices including the chi-square to degrees of freedom ratio, comparative fit index, Tucker-Lewis index, goodness-of-fit index, root mean square error of approximation and standardised root mean square residual.

4. Results

4.1 Response Rate and Respondent Profile

Of the 398 questionnaires distributed, 325 valid responses were obtained and analysed. The demographic profile shows that the sample was dominated by respondents aged 25–34 years (36.6%), followed by those aged 35–44 years (25.2%). This indicates that the sample contained a substantial proportion of respondents within the economically active age groups. Male respondents constituted 69% of the sample, while female respondents accounted for 31%.

In terms of firm age, 36.0% of the businesses had operated for 5–10 years and 17.8% had operated for 11–15 years. A further 15.1% had operated for more than 15 years. Thus, 68.9%

of the businesses had been in operation for at least five years, suggesting that a considerable proportion of the respondents had experience of managing supply and market challenges over time. Retail businesses represented 48.9% of the sample, followed by e-commerce (20.0%), food and beverages (16.3%) and manufacturing (14.8%). Annual turnover was most commonly reported in the ₦21 million–₦50 million category (42.2%).

Table 1. Profile of Respondents

Characteristic	Category	Frequency	Percent (%)
Age	Below 25 years	31	9.5
	25–34 years	119	36.6
	35–44 years	82	25.2
	45–54 years	59	18.2
	55 years and above	34	10.5
Gender	Male	224	69.0
	Female	101	31.0
Years in operation	Below 5 years	101	31.1
	5–10 years	117	36.0
	11–15 years	58	17.8
	Above 15 years	49	15.1
Sector	Manufacturing	48	14.8
	Retail	159	48.9
	E-commerce	65	20.0
	Food and beverages	53	16.3

4.2 Descriptive Assessment of Study Variables

The response pattern indicates generally favourable perceptions of the three resilience capabilities and SME performance. The mean scores for agility indicators ranged from 3.78 to 4.01, suggesting that respondents generally agreed that their businesses were able to respond to changes in customer demand and supply conditions. The flexibility indicators recorded mean scores between 3.73 and 3.93. Collaboration indicators recorded means between 3.65 and 3.80, indicating a positive but comparatively less pronounced perception of collaborative capability.

The distribution of responses provides additional insight. For agility, agreement and strong agreement were generally dominant across the five indicators. For example, 62.8% of respondents agreed or strongly agreed that their businesses could quickly adapt to changes in customer demand, while the corresponding combined agreement levels for other agility items were generally above 64%. This pattern suggests that responsiveness is already a relatively visible capability among the sampled SMEs.

Flexibility also received generally favourable responses. Combined agreement levels ranged from approximately 56% to 67% across the four indicators. The pattern suggests that respondents recognised the importance of operational adjustment, although the relatively larger undecided responses on some items indicate that flexibility may not be equally developed across all firms.

Collaboration produced a more varied response pattern. The combined agreement level for the first collaboration item was 60%, while other indicators recorded agreement levels in the mid-50% range. Compared with agility and flexibility, the slightly lower positive response suggests that relational coordination may be less consistently embedded across the sampled

SMEs. This observation is important because collaboration often depends on trust, information sharing and willingness to coordinate beyond the boundaries of the individual firm.

SME performance indicators recorded positive response patterns, with agreement levels generally ranging from 63% to 68%. The results indicate that most respondents perceived their businesses as achieving reasonably favourable operational and market outcomes, although the presence of undecided responses suggests that performance was not uniformly strong across the sample.

4.3 Measurement Model Results

The measurement model demonstrated acceptable psychometric properties. All factor loadings exceeded 0.70. The agility loadings ranged from 0.72 to 0.82, flexibility loadings from 0.78 to 0.88, collaboration loadings from 0.78 to 0.86, and performance loadings from 0.77 to 0.89. These results indicate that the observed items were strong indicators of their respective latent constructs.

Composite reliability values for the constructs were above the recommended threshold of 0.70. The reported reliability values were 0.885 for agility, 0.913 for flexibility, 0.895 for collaboration and 0.937 for performance. The AVE values were 0.606, 0.724, 0.681 and 0.713 respectively. Since all AVE values exceeded 0.50, the constructs demonstrated acceptable convergent validity (Fornell & Larcker, 1981).

Discriminant validity was assessed using the Fornell-Larcker criterion. The square root of the AVE for each construct exceeded its correlations with the other constructs. The results therefore indicate that agility, flexibility, collaboration and performance were empirically distinguishable. This is important for the study because the three resilience capabilities are conceptually related, and the results confirm that they should not be treated as identical constructs.

Table 2. Measurement Model Summary

Construct	Factor loading range	CR	AVE
Supply chain agility	0.72–0.82	0.885	0.606
Supply chain flexibility	0.78–0.88	0.913	0.724
Supply chain collaboration	0.78–0.86	0.895	0.681
SME performance	0.77–0.89	0.937	0.713

4.4 Model Fit and Hypothesis Testing

The model fit indices indicated that the hypothesised model provided an acceptable representation of the observed data. The chi-square/degrees of freedom ratio was 1.96, while the comparative fit index was 0.96 and the Tucker-Lewis index was 0.95. The RMSEA was 0.05 and the SRMR was 0.04. The goodness-of-fit index was 0.88, which was considered acceptable in the model assessment. Collectively, the fit statistics provided sufficient support for proceeding to hypothesis testing.

Table 3. Model Fit Indices

Fit index	Recommended threshold	Obtained value	Assessment
χ^2/df	≤ 3.00	1.96	Good
CFI	≥ 0.90	0.96	Excellent
TLI	≥ 0.90	0.95	Excellent
GFI	≥ 0.90	0.88	Acceptable
RMSEA	≤ 0.08	0.05	Excellent
SRMR	≤ 0.08	0.04	Acceptable

Table 4. Structural Model Results

Hypothesis path	β	S.E.	C.R.	p-value	Decision
Agility → SME performance	0.32	0.06	5.25	< 0.001	Supported
Flexibility → SME performance	0.30	0.07	4.54	< 0.001	Supported
Collaboration → SME performance	0.22	0.07	3.26	0.001	Supported

The first hypothesis examined the effect of supply chain agility on SME performance. The path coefficient was positive and statistically significant ($\beta = 0.32$, $p < 0.001$). H1 was therefore supported. The result indicates that SMEs with stronger capabilities to respond quickly to changes in customer demand and supply conditions tend to report better performance outcomes.

The second hypothesis tested the effect of supply chain flexibility on SME performance. The relationship was positive and statistically significant ($\beta = 0.30$, $p < 0.001$). H2 was supported. This finding suggests that SMEs capable of adjusting operational processes and resource arrangements in response to uncertainty are more likely to achieve stronger performance.

The third hypothesis examined the effect of supply chain collaboration on SME performance. The result was positive and statistically significant ($\beta = 0.22$, $p = 0.001$). H3 was therefore supported. The finding indicates that information sharing, joint planning and coordinated decision-making with supply chain partners contribute positively to SME performance.

5. Discussion of Findings

5.1 Supply Chain Agility and SME Performance

The finding that supply chain agility has a significant positive effect on SME performance supports the first hypothesis and confirms the strategic value of rapid responsiveness in uncertain operating environments. The coefficient of 0.32 was the strongest of the three capabilities examined in this article. This suggests that, within the sampled SMEs, the ability to respond quickly may be particularly important for converting supply chain uncertainty into manageable operational challenges.

The finding is consistent with the logic of the agile supply chain proposed by Christopher (2000). In volatile markets, firms that can sense changes and act quickly are less likely to remain locked into outdated operational decisions. The result also supports Braunscheidel and Suresh (2009), who connect agility with risk mitigation and response, and Inman and Green (2021), who demonstrate the importance of agility under environmental uncertainty. In the Nigerian context, the finding aligns with Abiji et al. (2025) and Oyeyemi et al. (2024), who report positive performance implications of supply chain agility.

From an SME perspective, the result is understandable. Many SMEs in South-East Nigeria operate in markets where customer demand can change quickly and where supply delays have immediate consequences. A firm that can quickly revise its purchasing decisions, respond to customer requirements or alter its delivery arrangements may preserve sales opportunities that a slower competitor loses. Agility also has a managerial dimension. Shorter decision-making chains can enable SME owners and managers to act quickly when they have access to relevant information.

The result also provides an important theoretical implication for the RBV. Agility is not simply a physical asset that can be purchased. It is a capability embedded in organisational routines, information flows and decision processes. Its positive effect on performance therefore supports the argument that the manner in which SMEs deploy resources can be as important as the resources themselves. In a resource-constrained environment, responsiveness may become a source of competitive advantage.

However, the finding should not be interpreted as suggesting that speed alone guarantees performance. Agility must be supported by accurate information and appropriate decision-making. A firm that responds quickly to inaccurate information may simply make mistakes faster. The practical implication is that SME managers should build routines that combine environmental monitoring with rapid and informed action.

5.2 Supply Chain Flexibility and SME Performance

The significant positive effect of supply chain flexibility provides support for H2. The coefficient of 0.30 indicates that flexibility is a major performance-related capability among the sampled SMEs. The finding suggests that firms benefit when they can adjust operations, resources and supply arrangements in response to changing conditions.

This result is consistent with Stevenson and Spring (2007), who conceptualise flexibility as the capacity to adapt supply chain processes, and Kazancoglu et al. (2022), who identify flexibility as a critical resilience capability. It also agrees with Tiwari et al. (2020), whose work highlights the relevance of flexibility to SMEs. The finding is particularly noteworthy because flexibility provides an alternative to rigid efficiency-oriented supply chain practices. A highly rigid process may appear efficient under stable conditions but become costly when the environment changes.

For SMEs in South-East Nigeria, flexibility may be reflected in the ability to change the quantity of goods purchased, use alternative suppliers, adjust product offerings or modify distribution arrangements. Such capabilities can help firms remain operational when a particular input becomes unavailable or when customer demand shifts. The positive relationship with performance suggests that these adaptive options are not merely defensive mechanisms; they have measurable performance implications.

The result also reinforces the distinction between flexibility and agility. While agility concerns the speed of response, flexibility concerns the available range of responses. An SME may be quick to recognise a supply disruption but still be unable to act if it has no alternative sourcing or operational options. The performance effect of flexibility therefore indicates that responsiveness is more valuable when the firm has the structural ability to adapt.

The finding has implications for the RBV because flexibility can become an embedded organisational capability. Competitors may be able to imitate a particular supplier arrangement or operational process, but the underlying ability to reconfigure resources and

processes may be more difficult to reproduce. SME managers should therefore consider flexibility as a strategic capability rather than an occasional emergency response.

5.3 Supply Chain Collaboration and SME Performance

The significant positive relationship between supply chain collaboration and SME performance supports H3. Although the coefficient of 0.22 was lower than the coefficients for agility and flexibility, the relationship remains statistically significant. The result indicates that SMEs benefit from purposeful interaction with suppliers, customers and other supply chain partners.

The finding supports Cao and Zhang (2011), who demonstrate the performance implications of supply chain collaboration, and is consistent with Wieland and Wallenburg (2013), who emphasise relational competencies in supply chain resilience. It also agrees with Uddin (2022), who links supply chain collaboration with operational and innovation performance. The result further supports Nigerian evidence highlighting strategic partnerships as a response to supply chain disruption (Babatunde & Ojo, 2021).

The comparatively lower coefficient for collaboration deserves attention. The descriptive results showed that collaboration had somewhat lower positive response levels than agility and flexibility. This may suggest that collaborative practices are less consistently developed among SMEs in the study area. Information sharing and joint planning require trust, and trust may be difficult to establish where firms perceive their supply partners as competitors or where relationships are primarily transactional.

Nevertheless, the positive effect demonstrates that collaboration matters. SMEs often lack the internal resources required to manage every supply chain challenge independently. Through relationships with suppliers and customers, they can obtain information, coordinate decisions and access capabilities beyond the boundaries of the firm. Collaboration can therefore function as a mechanism through which SMEs extend their effective resource base.

The finding is also consistent with the RBV when the theory is viewed through a relational lens. Although collaboration is inter-organisational, the ability of a firm to build and manage productive relationships is itself an organisational capability. SMEs that develop communication routines, shared planning practices and trust-based relationships may therefore create relational resources that contribute to performance.

5.4 Integrated Interpretation of the Findings

Taken together, the findings demonstrate that agility, flexibility and collaboration each contribute positively to SME performance. The results provide empirical support for a multidimensional view of supply chain resilience. The three capabilities operate through different but complementary mechanisms. Agility enables rapid response; flexibility provides alternative operational options; and collaboration supports coordination across supply chain boundaries.

The relative coefficients also offer an important insight. Agility recorded the strongest relationship with performance, followed closely by flexibility, while collaboration recorded a more moderate relationship. This pattern may reflect the immediate operating realities of SMEs in South-East Nigeria. Rapid response and the ability to adjust operations may have direct effects on daily business outcomes, while the performance benefits of collaboration may depend on the quality and maturity of relationships with supply chain partners.

The findings suggest that SMEs should not view resilience as a single programme or a technology project. Resilience is better understood as a set of capabilities that must be developed through organisational routines. A firm that is agile but inflexible may respond

quickly but have limited options. A firm that is flexible but poorly connected to its partners may fail to obtain the information required for effective adaptation. Similarly, a firm with collaborative relationships but slow internal decision-making may not convert shared information into performance.

This integrated interpretation extends the RBV argument. The performance advantage associated with resilience does not arise from possessing a single resource. Rather, it emerges from the coordinated deployment of capabilities. The implication is that SME managers should build a portfolio of complementary capabilities rather than pursuing isolated supply chain initiatives.

6. Theoretical and Managerial Implications

6.1 Theoretical Implications

The study contributes to the supply chain resilience literature in several ways. First, it provides empirical support for examining resilience through distinct capability dimensions. Rather than treating resilience as an abstract aggregate construct, the study demonstrates that agility, flexibility and collaboration each have a statistically significant relationship with SME performance.

Second, the study extends the application of the Resource-Based View to the SME supply chain context. The results show that capabilities embedded in response routines, adaptive processes and inter-organisational relationships are associated with performance. This reinforces the view that competitive advantage can arise from the way firms organise and deploy resources.

Third, the study contributes context-specific evidence from South-East Nigeria. Much of the resilience literature has been developed in advanced economies or large organisational settings. By focusing on SMEs in an emerging-market environment, the study demonstrates that resilience capabilities remain relevant even where firms operate with limited resources. The findings also suggest that the performance value of resilience may be expressed through capabilities that are operational and relational rather than capital intensive.

Finally, the study adds to the debate on the relationship between agility, flexibility and collaboration. The significant effects of all three constructs, alongside their satisfactory discriminant validity, indicate that the capabilities are empirically distinct. This supports future studies that examine their separate and combined contributions rather than collapsing them into a single measure.

6.2 Managerial Implications

The findings have direct implications for SME owners and managers. First, managers should establish faster information and decision-making routines. This may involve regular monitoring of customer demand, closer communication with key suppliers and clearly defined authority for responding to operational changes. The aim is not simply to make decisions quickly but to reduce unnecessary delays when action is required.

Second, SMEs should deliberately build flexibility into their supply chain arrangements. Managers may consider developing alternative supplier relationships, maintaining adaptable purchasing arrangements and reviewing the extent to which production or service processes can be modified. Flexibility should be treated as a planned capability rather than an emergency improvisation.

Third, managers should invest in the quality of supply chain relationships. Collaboration requires more than frequent transactions. SMEs should encourage open communication,

shared planning and joint problem-solving with important suppliers and customers. Where appropriate, firms may develop shared performance expectations and regular communication routines.

Fourth, SME support organisations and policymakers should recognise that resilience development does not necessarily begin with expensive technology. Training in supply chain planning, risk awareness, supplier relationship management and operational adaptability may produce meaningful benefits. Support programmes should therefore combine technology initiatives with capability development.

Finally, managers should evaluate resilience capabilities as a portfolio. The findings suggest that agility, flexibility and collaboration are complementary. A balanced approach is likely to be more beneficial than concentrating on only one capability.

7. Conclusion and Recommendations

This study examined the effects of supply chain agility, flexibility and collaboration on the performance of SMEs in South-East Nigeria. Based on data from 325 valid respondents and structural equation modelling, the study found that all three resilience capabilities have significant positive effects on SME performance. Agility recorded the strongest effect, followed by flexibility and collaboration.

The study concludes that supply chain resilience is not merely a response to disruption. For SMEs, resilience capabilities are strategic resources that can influence day-to-day performance and competitive positioning. Agility enables rapid response, flexibility provides the capacity to adjust operations, and collaboration strengthens coordination with supply chain partners. Together, these capabilities provide SMEs with a stronger basis for operating in volatile environments.

The study recommends that SME managers should: (1) develop rapid decision-making and information-sharing routines to improve supply chain agility; (2) adopt flexible sourcing, production and distribution arrangements that permit operational adjustment; (3) strengthen supplier and customer relationships through trust, communication and joint planning; and (4) assess agility, flexibility and collaboration as complementary capabilities within a broader supply chain resilience strategy.

The study is subject to limitations. The cross-sectional design captures perceptions at a particular point in time and does not establish how resilience capabilities develop over time. The use of convenience sampling within strata may also limit the generalizability of the findings beyond the study population. Future studies may employ longitudinal or mixed-method designs and examine whether innovation capability, organisational culture or leadership moderates the relationships identified in this study. Comparative studies across Nigeria's geopolitical zones may also provide additional insight into the role of context in shaping SME supply chain resilience.

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