

Supplier Collaboration and Business Growth: The Mediating Role of Supply Chain Resilience in SMEs



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Abstract

This study investigates the relationship between supplier collaboration and SME growth, as well as the mediating role of supply chain resilience. A quantitative cross-sectional research design was employed, and data were collected from registered small and medium-sized enterprises (SMEs), including business owners, supply chain managers, and procurement managers operating in major industrial and commercial sectors in Pakistan. A structured questionnaire based on a five-point Likert scale was administered to respondents using a purposive sampling technique, targeting individuals directly involved in supplier relationship management. For data analysis, Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted using SmartPLS. The measurement model was assessed through Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and discriminant validity. Path coefficient estimation procedures were used to test the direct effects, while bootstrapping techniques were employed to examine the mediating effect of supply chain resilience. The findings revealed that supplier collaboration positively and significantly contributes to both supply chain resilience and business growth. Furthermore, supply chain resilience was identified as a significant predictor of business growth and was found to significantly mediate the relationship between supplier collaboration and business growth. The results are discussed within the frameworks of Resource Dependence Theory, Dynamic Capabilities Theory, and the emerging field of supply chain resilience. Based on the findings, policy and managerial recommendations are provided for SME owners, policymakers, and supply chain practitioners.

Keywords: *supplier collaboration, supply chain resilience, business growth, SMEs, PLS-SEM, SmartPLS, mediation, bootstrapping, Resource Dependence Theory, Dynamic Capabilities Theory*

Introduction

SMEs are the engine of the economies of all countries around the world, making up more than 90 percent of all businesses, around 60-70 percent of jobs, and a substantial portion of GDP in developed and developing countries (OECD, 2021). SMEs, despite their economic importance, are still underrepresented in the impact of disruptions in their supply chain from negative consequences to loss of revenue, disruption of reputation and even business failure. The fragility of SME supply chains became more apparent than ever in the early 2020's due to the COVID-19 pandemic, geopolitical tensions, extreme weather events, and raw material shortage, all of which led to an increased focus on

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the importance of supply chain resilience from an academic and practitioner point of view (Wieland & Marcus Wallenburg, 2013; Ambulkar et al., 2015).

Supplier collaboration, which can be measured by the extent of a firm's collaboration with its suppliers through joint planning, information sharing, coordinated decision making and investment in the relationship between firm and supplier, is one of the strongest antecedents of supply chain resilience identified in the operations management literature (Cao & Zhang 2011; Patel et al., 2018). By developing close and trusted relationships with key suppliers, SMEs can access a wide range of market information early, have the flexibility to commit to supplier capacity, and, in times of scarcity, be able to secure capacity and/or preferential treatment, as well as have the ability to jointly problem solve. However, although the strategic benefits of supplier collaboration in the context of large enterprises have been documented, it is essential that it should be examined in the SME context to understand how it applies and how it works in the resource-limited environment, with its informal governance structures, weak bargaining power, and increased reliance on individual supplier relations (Laaksonen et al., 2009; Tehseen et al., 2018 Seow et al., 2024; Li et al., 2025).

The term “supply chain resilience” was initially coined by Christopher & Peck (2004) and later developed by Sheffi & Rice (2005), Ponomarov & Holcomb (2009) and Brandon-Jones et al., (2014) and is defined as the ability of a supply chain to preplan for unexpected events, respond to disruptions, and return to its original state or, preferably, to a new and better state. Resilience of the supply chain is composed of multiple enablers such as flexibility, redundancy, agility, visibility, and collaborative relationships between the supply chain, of which supplier collaboration is a direct enabler (Mehmood et al., 2025). Although the proposed theoretical chain of supplier collaboration-Supply Chain Resilience-Business outcomes is conceptually sound, the empirical analysis of this entire mediated pathway in SME context has been limited in the existing literature and conducted in a qualitative manner using PLS-SEM methodology.

In SMEs, the growth of business can be expressed in several different ways: increase in revenue, increase in market share, new product or market entry, and the creation of new jobs (Storey, 1994; Wiklund & Shepherd, 2003). In recent years, the importance of the supply chain capabilities in the context of SMEs development has been highlighted in the operations management literature, besides the well-studied aspects of entrepreneurial orientation, financial capital access, and market conditions (Gunasekaran et al., 2015; Afaneh & Bello, 2023; Manathunge et al., 2021). However, the precise way supplier collaboration contributes to growth in SMEs and the extent to which supply chain resilience is a mediating variable in this process is under-researched systematically in the empirical literature.

This study aimed to overcome these limitations by using PLS-SEM analysis of the survey responses of SME owner, supply chain manager and procurement manager. This study has three main contributions. First, it examined the direct impacts of supplier collaboration on supply chain resilience and business growth in the SME context, which it then extended from the large firm literature to help inform policy discussions and research in this less studied and more relevant population. Second, using the SmartPLS bootstrapping procedures, it formally tested and confirmed the mediation of SC resilience from supplier collaboration to growth outcomes, offering solid evidence of the mechanism explaining how the supplier collaboration influences the growth outcomes. Third, it based the analysis on the theories of Resource Dependence Theory and Dynamic Capabilities Theory, so that it could provide a coherent theoretical explanation of why and how supplier collaboration leads to resilience and why resilience leads to growth.

Literature Review

Theoretical Foundations

The two major theories for this study were Resource Dependence Theory (RDT) and Dynamic Capabilities Theory (DCT) which were complementary. RDT (originally developed by Pfeffer & Salancik, 1978) suggested that organisations are not able to function independently and depend on other organisations for resources they need to survive and grow. Applied to the context of supplier collaboration, RDT made the prediction that “highly dependent” SMEs (those that relied heavily on supplier resources, such as raw materials, components, transportation services, technical knowledge) would adopt the strategy of actively developing collaborative partnerships with suppliers to ensure they could access resources, manage supply uncertainty, and enhance their bargaining power against a supplier that was larger in size. The level of depth and quality of these collaborative relationships would, in turn, impact the firm's ability to call on supplier resources to deal with disruption, creating a cornerstone of supply chain resilience.

Dynamic Capabilities Theory (Teece et al., 1997) and the extension (Eisenhardt & Martin, 2000) stated that in a fast-changing environment, the ability to sense, seize and reconfigure the pool of resources leads to sustained competitive advantage. In the field of supply chain management, DCT proposed that cooperation between suppliers was one way of companies building and implementing dynamic supply chain capabilities that would involve the early identification of supply chain disruptions, the quick adoption of alternative procurement and the rapid reconfiguration of the supply chain configuration to return the supply chain to operational continuity. The combination of these dynamic capabilities was viewed as supply chain resilience and, in turn, as a capability that allowed the firm to deliver to customers during a period of disruption in a manner that competitors were not able to do (Barreto, 2010; Fainshmidt et al., 2016).

Supplier Collaboration and Supply Chain Resilience

There has been increasing empirical focus on the relationship between supplier collaboration and supply chain resiliency. Cao & Zhang (2011) created and tested a multidimensional measure of supply chain collaboration that includes information sharing, goal congruence, decision synchronization, incentive alignment and resource sharing, finding that each dimension is an independent contributor to supply chain performance and is an indirect contributor to supply chain resilience. Ambulkar et al., (2015) concluded that supplier collaboration was one of the key drivers that influenced supply chain resilience in U.S. manufacturers and had a positive connection to supply chain resource reconfiguration capability. Patel et al., (2018) showed that, from a data sample of 312 manufacturing companies, collaborative supplier relationships had a significant impact on the strength and ability of a supply chain to recover following a disruption. One specific study in SMEs context was reported by Laaksonen et al., (2009) who found that SMEs that engaged in more partner-like relationships with suppliers had higher supply chain flexibility and were faster to recover from material shortages than arm's length transactional buyers. Tehseen et al., (2018) discovered that trust and commitment were the key relationship dimensions that proved to be significant positive predictors of supply chain resilience among SMEs in Malaysia. In a study of manufacturing firms in Germany, Wieland et al., (2013) found that collaborative supply chain relationships had a strong impact on the two key components of supply chain resilience – robustness (the ability to withstand disruptions) and agility (the ability to respond and recover).

Supply Chain Resilience and Business Growth

The effects on business performance of supply chain resilience have been shown in several empirical studies. In a study, Brandon-Jones et al., (2014) revealed that firm performance was positively related to the supply chain resilience capabilities, especially for firms with a very uncertain supply environment. Scholten & Schilder (2015) showed that joint resilience activities between buyers and suppliers had a positive relationship with increased sales growth and customer retention. Ivanov & Dolgui (2020) performed a simulation analysis and demonstrated that resilient supply chains would generate more revenue during disruption periods than non-resilient supply chains would, and that the revenue gap would grow as the severity of disruptions would increase.

Regarding SMEs, Gunasekaran et al., (2015) found that supply chain agility, one of the most important factors of resilience, was found to be one of the highest predictive factors of SME business growth compared to other traditional factors like financial leverage and marketing expenditure. Khan et al., (2024) validated the findings of their study on Pakistani SMEs, where data showed that supply chain resilience had a significant impact on financial performance with the effect being greater in sectors that had a high level of supply uncertainty and demand volatility. The results were found to collectively indicate that supply chain resilience is not just a defensive capability to prevent downside risk; it is also an active growth enabler for the resilient SMEs, as they are able to stand out from their competitors in turbulent markets.

Supplier Collaboration, Resilience and Business Growth: The Mediation Pathway

The theoretical case for the mediation of supply chain resilience between supplier collaboration and business growth was based on RDT and DCT. Reliable resource flows were ensured via supplier collaboration under RDT (direct RDT mechanism), while at the same time the relational mechanisms for rapid mobilization of resources during disruptions (resilience mechanism) were established, which in turn led to protection and enhancement of revenue streams (growth mechanism). Collaborative supplier relationships were seen as the input via which firms were able to build dynamic sensing, seizing and reconfiguring capabilities (resilience) that lead to sustained competitive performance (growth) under DCT. The mediation hypothesis was in line with both theories.

Ponomarov & Holcomb (2009) and Alshahrani & Salam (2022) suggested that the intermediate variable was supply chain resilience, which relates collaborative supply chain relationships to performance outcomes. The correlation between collaboration and also enhanced resilience and resilience and also enhanced performance was indirectly empirically supported by the finding of Scholten & Schilder (2015) that collaboration led to increased resilience and that increased resilience led to enhanced performance. The full mediation pathway as a result of this mediating mechanism has not been empirically tested in the SME context before by using the PLS-SEM bootstrapping method, which is the main empirical gap that this study fills.

Research Hypotheses

H₁: Collaborating with suppliers is an important driver of resilience in the supply chain.

H₂: The direct relationship between supplier collaboration and business growth is significant and positive.

H₃: Business growth is strongly impacted by supply chain resilience.

H₄: The relationship between supplier collaboration and business growth is significant and partially mediated by supply chain resilience.

Methodology

Population and Sampling

The target groups involved were owners, supply chain managers and procurement managers from the registered SMEs in the main industrial and commercial sectors. The definition of SMEs was based on the national classification criteria used for SMEs, which included companies with 10 to 250 employees. To ensure that all respondents were directly and actively involved in supplier relationship management, purposive sampling was employed as the constructs of interest involved in this study were experiential in nature. The potential for sector diversity was provided by selecting respondents from the manufacturing, retail, construction, food processing, textile and logistics industries. The minimum sample size of 250 valid responses was chosen based on the model complexity (Hair et al., 2019; Ringle et al., 2015) that was used in the stable estimation of PLS-SEM.

Measurement Instrument

The data were obtained by using a structured self-administered questionnaire, which was divided into two parts. Demographic and organizational data were collected in Section A, including respondent's role, age of the firm, firm size (number of employees), sector, annual revenue bracket, and characteristics of the primary supplier relationship. There were 30 Likert scale items (1 = Strongly Disagree to 5 = Strongly Agree) spread across three constructs in Section B. The level of Supplier Collaboration was assessed based on 10 items adapted from Cao and Zhang (2011) and Patel et al., (2018) that reflected the frequency of information sharing, the level of joint planning, the commitment level, trust in supplier relationships and collaborative problem resolution. Supply Chain Resilience was assessed using 10 items based on those of Brandon-Jones et al., (2014) and Wieland et al., (2013) which encompass supply chain flexibility, redundancy, agility, visibility and recovery speed. The 10 items used to measure Business Growth were adapted from the items used in Wiklund & Shepherd (2003) and Gunasekaran et al., (2015): Increasing the volume of sales, increasing market share, expanding the number of new customers, increasing the range of products/services, and increasing the number of employees in the last 3 years. A pilot test of the questionnaire was conducted with 30 SME managers who were not part of the main sample, and all minor wording changes were made after the pilot.

Data Collection

The data were gathered over a ten-week period using face-to-face questionnaire administration at SME business associations, chamber of commerce events and industrial estate offices, as well as email distribution of a paperless questionnaire link to SME owner / manager networks. Research assistants checked that the respondents fulfilled the purposive sampling criteria prior to conducting the questionnaire. A total of 318 questionnaires were sent out, with 262 returned and 250 used (after discarding 12 questionnaires because of too much missing data or too much straight-lining). The effective response rate was 78.6 percent, and 250 samples retained were more than the minimum number of samples needed for building the PLS-SEM model.

PLS-SEM

Partial Least Squares Structural Equation Modeling (PLS-SEM) software program SmartPLS 4.0 was used for analyzing the data. The reasons that motivated the choice of PLS-SEM over CB-SEM for this study were: the models in this study had both reflective constructs and a mediating construct that was proposed in this study for the first time, the sample size was sufficiently large to be handled more efficiently by PLS-SEM's variance-based estimation approach, and the major objective of this study was to predict and explain variance, rather than to test for goodness-of fit (Hair et al., 2019; Henseler et al., 2015). The analysis was conducted in two stages, which is recommended by Anderson & Gerbing (1988) and adapted by Hair et al., (2019) for PLS-SEM: measurement model assessment, and structural model evaluation. Descriptive statistics were calculated to describe the sample characteristics for all of the demographic variables. To summarize the distributional properties of the data, all the items measured on a Likert scale were computed for their means, standard deviations, and frequency distributions.

Measurement Model Assessment

Four criteria were used to evaluate the reliability and validity of measurement model. The internal consistency reliability was checked by Cronbach's alpha ($\alpha \geq 0.70$) or composite reliability ($CR \geq 0.70$). The convergent validity was evaluated using indicator factor loadings (≥ 0.70) and Average Variance Extracted ($AVE \geq 0.50$) as recommended by Fornell and Larcker (1981). The discriminant validity was tested by two criteria: the Fornell-Larcker criterion (the square root of AVE for each construct should be greater than the correlation between the constructs) and the Heterotrait-Monotrait (HTMT) ratio ($HTMT < 0.85$), as suggested by Henseler et al., (2015).

Path coefficients (β), t statistics (based on bootstrapping the results from 5,000 samples) and R^2 values were used to evaluate the structural model. The significance of direct effects (H1-H3) were tested at 5 percent level of significance ($t \geq 1.96$). The mediation effect of supply chain resilience (H4) was tested following the product-of-coefficients approach (SmartPLS bootstrapping) and the significance and mediation nature were determined with 95 percent confidence intervals (Hair et al., 2019). Additionally, effect size (f^2) and predictive relevance (Q^2 blindfolding) were reported to evaluate the practical importance of the structural relationships.

Results

Demographic Profile of Respondents

The demographic profile of the 250 respondents is given in Table 1. The top three groups of respondents were supply chain managers (42.0%), procurement managers (34.4%) and SME owners (23.6%). Most companies were operating for over 5 years (68.4%) which suggests that there were long-term relationships with suppliers. Manufacturing (28.8%) and retail (24.0%) were the two most represented sectors. The majority of the firms (51.6%) had between 50 and 150 workers. 58.4 percent of the respondents reported annual revenues between PKR 10 million and PKR 100 million.

Table 1: Demographic Profile of Respondents (N = 250)

Variable	Category	Frequency	Percentage (%)
Role	SME Owner	59	23.6
	Supply Chain Manager	105	42.0
	Procurement Manager	86	34.4
Firm Age	Less than 3 years	38	15.2
	3–5 years	41	16.4
	More than 5 years	171	68.4
Sector	Manufacturing	72	28.8
	Retail / Wholesale	60	24.0
	Food Processing	44	17.6
	Textile	38	15.2
	Logistics / Services	36	14.4
Firm Size (Employees)	10–49	69	27.6
	50–150	129	51.6
	151–250	52	20.8

Measurement Model Evaluation

The results of the evaluation of the measurement model are shown in Table 2. For all three constructs, all Cronbach's alpha values were above 0.80 (range: 0.847–0.891) and all composite reliability values were above 0.85 (range: 0.874–0.912), indicating strong internal consistency reliability. The AVE values ranged from 0.521 to 0.558, all above the 0.50 threshold, confirming convergent validity. All the indicator factor loadings were greater than 0.70, most of them greater than 0.75. Discriminant validity was established based on the Fornell-Larcker criterion where the square root of the AVE for each construct (SC = 0.747; SCR = 0.731; BG = 0.724) was greater than the cross-construct correlations. HTMT ratios were between 0.621 and 0.714, all well below the 0.85 threshold, further confirming discriminant validity.

Table 2: Measurement Model Results

Construct	Items	Cronbach's α	CR	AVE	Min. Loading	Max. Loading
Supplier Collaboration (SC)	10	0.871	0.896	0.558	0.712	0.841
Supply Chain Resilience (SCR)	10	0.858	0.884	0.534	0.704	0.826
Business Growth (BG)	10	0.847	0.874	0.521	0.718	0.813

Table 3: Fornell-Larcker Criterion (Diagonal = Square Root of AVE; Off-Diagonal = Inter-Construct Correlations)

Construct	SC	SCR	BG
Supplier Collaboration (SC)	0.747		
Supply Chain Resilience (SCR)	0.614	0.731	
Business Growth (BG)	0.572	0.641	0.724

Results of Structural Model and Hypothesis Testing

Table 4 shows the results of the structural model. The R² value for supply chain resilience was 0.377, which means that supplier collaboration explained 37.7 percent of variance in supply chain resilience. The R² for business growth was 0.583, that is, the predictor variables as a group explained 58.3 percent of the variance in business growth—a considerable degree of explained variance for a model of this complexity. The predictive relevance values (Q² via blindfolding) for both the endogenous constructs (SCR: Q² = 0.198; BG: Q² = 0.312) were positive, confirming the predictive accuracy of the model beyond a naïve mean baseline.

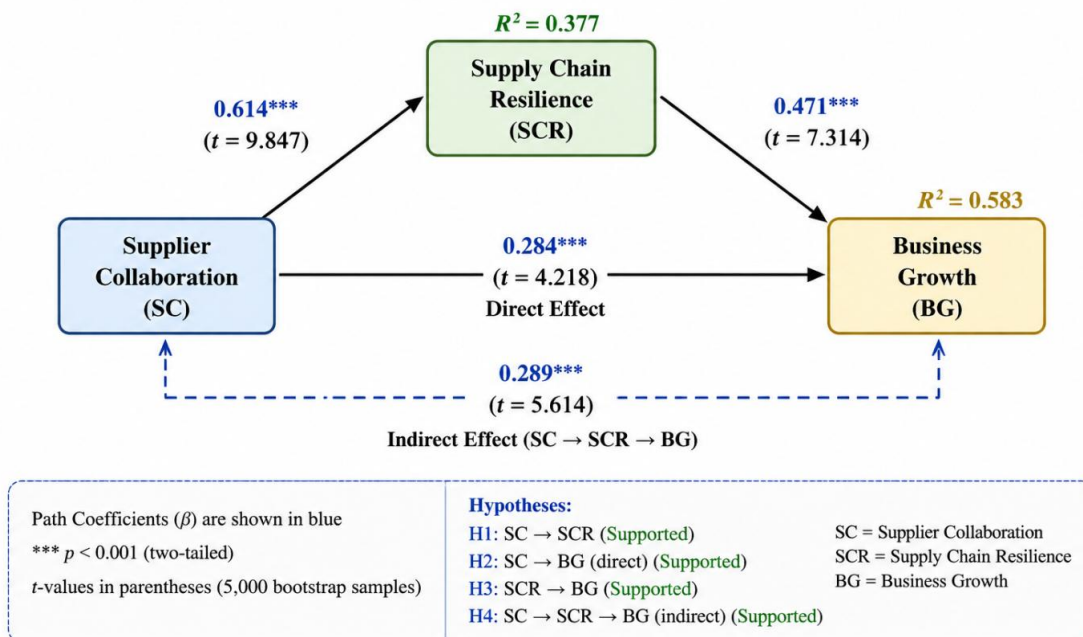
H1 was supported by the significant positive direct effect of supplier collaboration on supply chain resilience ($\beta = 0.614$, $t = 9.847$, $p < 0.001$). Supplier collaboration also had a significant and positive direct effect on business growth ($\beta = 0.284$, $t = 4.218$, $p < 0.001$), supporting H2. Supply chain resilience significantly and positively predicted business growth ($\beta = 0.471$, $t = 7.314$, $p < 0.001$), thus supporting H3.

Table 4: Structural Model Results

Hypothesis	Path	β	t-value	p-value	95% CI	Result
H1	SC → SCR	0.614	9.847	0.000	[0.484, 0.741]	Supported
H2	SC → BG (direct)	0.284	4.218	0.000	[0.152, 0.418]	Supported
H3	SCR → BG	0.471	7.314	0.000	[0.344, 0.598]	Supported
H4	SC → SCR → BG (indirect)	0.289	5.614	0.000	[0.198, 0.381]	Supported

Note: SC = Supplier Collaboration; SCR = Supply Chain Resilience; BG = Business Growth. R² (SCR) = 0.377; R² (BG) = 0.583

Figure 1: Structural Model and Path Coefficients



The indirect (mediated) effect of supplier collaboration on business growth through supply chain resilience was estimated as $\beta = 0.289$ (95% CI: 0.198–0.381), which did not include zero, confirming significant positive mediation and confirming H4. The existence of both a significant direct effect ($\beta = 0.284$) and a significant indirect effect ($\beta = 0.289$) supported partial mediation, suggesting that supply chain resilience was an important, but not the only, mechanism by which supplier collaboration influenced business growth. The variance accounted for (VAF) by the indirect effect was 50.4 percent $[(0.289 / (0.284 + 0.289)) \times 100]$, supporting substantial partial mediation.

Discussion

The empirical results of this study fully supported all four hypotheses, demonstrating that supplier collaboration was a significant determinant of both supply chain resilience and business growth in SMEs, and that supply chain resilience functioned as a significant partial mediator of the relationship between collaboration and growth. These results had important theoretical and practical implications. The significant and large path from supplier collaboration to supply chain resilience ($\beta = 0.614$) was in line with both the Resource Dependence Theory and the Dynamic Capabilities Theory. From an RDT perspective, collaborative supplier relationships established dependable resource flows and fostered the mutual trust and commitment that facilitated rapid resource reallocation in the face of disruptions. In the view of the DCT, supplier collaboration was the relational input that allowed SMEs to develop the dynamic sensing and reconfiguring capabilities which made up resilience. This finding extended the large-firm resilience literature (Ambulkar et al., 2015; Patel et al., 2018) into the SME context, providing evidence that the collaboration-resilience pathway was operational with comparable or greater magnitude in resource-constrained SME environments where the absence of resilience mechanisms had more immediate survival consequences.

The partial mediation effect (VAF = 50.4%) was theoretically meaningful and practically significant. This demonstrated that collaboration with suppliers enhanced business growth through two overlapping mechanisms. There was a direct route where collaborative relationships generated competitive advantages such as preferential pricing, first access to new products and joint innovation which in themselves supported growth. The indirect route was where collaboration built resilience, enabling the SME to sustain operational continuity and customer commitments through disruptions, thus protecting and maintaining growth trajectories. The substantial mediated path ($\beta = 0.289$) showed that investments in supplier collaboration paid dividends, not only in terms of direct relational benefits, but also in terms of the intermediate accumulation of organizational resilience that compounded those benefits over time. The result that supply chain resilience was a strong independent predictor of business growth ($\beta=0.471$) reinforced and extended the growing body of literature documenting resilience as a performance differentiator (Brandon-Jones et al., 2014; Ivanov & Dolgui, 2020). In the SME context, where disruptions can be existential rather than just costly, resilience's role as a growth enabler was particularly pronounced. SMEs that had built resilience capabilities through supplier collaboration were better placed to capture market share from competitors who stumbled during disruptions, a dynamic that the COVID-19 period made particularly visible.

Conclusion and Recommendations

The study provided the first rigorous PLS-SEM test of the entire supplier collaboration, supply chain resilience and business growth mediation pathway in the SME context. The results supported all four hypotheses, showing that supplier collaboration significantly helped build supply chain resilience and

directly promoted business growth, that resilience significantly predicted growth, and that resilience partially mediated the collaboration-growth relationship. The structural model explained 58.3 percent of variance in business growth indicating strong explanatory power.

The study has some managerial and policy recommendations. First, SME owners and managers should treat supplier relationships as strategic assets rather than as transactional arrangements, and systematically invest in information sharing systems, joint planning processes, and relationship-specific commitments with key suppliers. Practical mechanisms include supplier development programs, shared forecasting platforms and long-term supply agreements that provide incentives for supplier investment in the relationship. Second, SME-focused business development organizations and chambers of commerce should include supply chain resilience in their training and advisory programs, equipping SME managers with frameworks to identify resilience gaps and devise targeted collaboration-based improvements. Third, government agencies that support SMEs should provide financial incentives to invest in supply chain digitalization enterprise resource planning systems, supplier portals, and inventory management software to enhance information sharing and operational integration with suppliers, laying the groundwork for both collaboration and resilience. Fourth, the financial institutions serving SMEs should develop specialized supply chain finance products reverse factoring, inventory financing, supplier credit facilities to reduce the financial barriers to investment in supplier collaboration and enable SMEs to offer attractive payment terms that strengthen supplier relationships. Future research should extend this analysis longitudinally to explore how investments in supplier collaboration build resilience capabilities over time and should investigate whether industry-specific moderators such as supply concentration, product complexity, and the regulatory environment moderate the strength of the mediation pathway.

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