International Journal of Entrepreneurial Behavior & Research

Resilience in rural supply chains: the impact of information sharing on responsiveness

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Received 1 March 2025
Revised 23 May 2025
18 July 2025
Accepted 28 August 2025

Abstract

Purpose – This study examines how small rural purchasing firms in Ghana build supply chain resilience by developing responsiveness across logistics, operations, and supplier networks. It focuses on the role of differentiated information-sharing practices in enabling these firms to adapt to structural constraints and supply chain disruptions.

Design/methodology/approach – Survey data from 287 small rural businesses in Ghana are analysed using Partial Least Squares Structural Equation Modelling and Importance-Performance Matrix Analysis to identify key drivers of responsiveness and their impact on resilience.

Findings – Effective information sharing significantly enhances supply chain resilience in small rural purchasing firms by improving the responsiveness of logistics processes, operational systems, and supplier networks.

Practical implications – The study highlights the need for friction-differentiated policies and an ecosystemic approach to strengthening rural supply chain resilience. It advocates for anticipatory resilience mechanisms, relational governance, and digital infrastructure to support small rural businesses and regional economic sustainability. Moving beyond transaction cost-centric strategies, it emphasises the dynamic interactions between logistics, operations, and supplier networks as critical to resilience and growth.

Originality/value – Unlike research centred on urban or global supply chains, this study addresses rural-specific challenges and proposes a framework for sustainable economic growth in Ghana, contributing to both academic discourse and policy development.

Keywords Supply chain resilience, Information sharing, Rural purchasing firms, Logistics process responsiveness, Operations system responsiveness, Supplier network responsiveness

Paper type Research article

Introduction

Small rural enterprises are widely seen as central in fostering inclusive economic development in emerging economies (Greenberg *et al.*, 2018). They generate employment, diversify

Funding: No funding was received for this study.
Conflict of interest: The authors have no conflict of interest to declare.

International Journal of Entrepreneurial Behavior & Research
Emerald Publishing Limited
e-ISSN: 1758-6534
p-ISSN: 1355-2554
DOI 10.1108/IJEBR-03-2025-0250

incomes, and strengthen community resilience, especially in agriculture-based regions with limited formal sector reach (Fiamohe *et al.*, 2024). Scholars highlight their role in local value creation and sustaining livelihoods amid economic volatility and institutional uncertainty (Apostolopoulos *et al.*, 2024). Within supply chain literature, rural firms are progressively recognised as stabilisers in turbulent contexts, offering adaptive capacity and relational depth despite logistical and infrastructural constraints (Essuman *et al.*, 2024). Yet, they face persistent challenges such as limited access to finance, poor infrastructure, fragmented networks, and weak ties to formal supply chains (Deakins *et al.*, 2016), which hinder their ability to respond to disruptions (Liu *et al.*, 2022). As interest in supply chain resilience increases (Chowdhury *et al.*, 2019; Kazancoglu *et al.*, 2022), the literature has yet to fully explain how small rural firms engage in responsive action when conventional institutional mechanisms are inaccessible or insufficient.

While prior research has documented the structural and institutional constraints facing rural enterprises (Fiamohe *et al.*, 2024), theoretical insight into how these firms engage with uncertainty remains limited. Most studies focus on what rural enterprises lack, such as infrastructure, scale, and institutional access, rather than how they operate within these constraints (Sandhu *et al.*, 2024). This deficit perspective tends to position them as peripheral rather than strategic, overlooking the micro-level practices that underpin resilience (Apostolopoulos *et al.*, 2024). Resilience is also often framed at the system or policy level (Campbell, 2021), with limited attention to how it is enacted through everyday decisions and relationships at the firm level. This conceptual gap is particularly evident in the case of non-land-based rural enterprises such as processors, service providers, and off-farm businesses, whose adaptive responses may differ from those of land-based firms (Barlow and Lostak, 2023). Although operating in structurally disadvantaged environments, many of these enterprises exhibit agility, local embeddedness, and innovation in response to disruptions (Kazancoglu *et al.*, 2022). What remains unclear is how they develop responsiveness capabilities under resource constraints, and which forms of responsiveness are most critical to strengthening supply chain resilience. Accordingly, we ask: How do small rural enterprises develop supply chain responsiveness in resource-constrained environments, and what forms of responsiveness are most critical to enhancing their resilience?

Against this backdrop, rural purchasing firms that source goods for resale or processing emerge as key actors in strengthening supply chain resilience (Poblete and Bengtson, 2020). Embedded in their communities, these firms leverage location-specific advantages such as proximity to producers, established supplier relationships, and tailored services (Cholez *et al.*, 2020). Their responsiveness, defined as the ability to adjust behaviours, practices, and operations in the face of environmental volatility, enables them to adapt to disruptions, market shifts, and competitive pressures (Richey *et al.*, 2022). This adaptability is especially important in rural contexts characterised by resource constraints and fragmented infrastructure. While supply chain responsiveness has been widely studied in urban and global settings (Partanen *et al.*, 2020; Roh *et al.*, 2014), its role in rural economies remains under-theorised. Although research points to the value of partnerships in fostering responsiveness through information sharing and collaboration (Asamoah *et al.*, 2021), rural firms often operate outside formal arrangements, instead relying on informal networks and local ties to navigate technological and market changes (Cholez *et al.*, 2020).

Ghana offers a compelling context for exploring supply chain responsiveness under constraints. With over one million small rural enterprises supporting employment and income in land-based sectors (Ghana Statistical Services, 2022), the rural economy is central to national development. However, persistent challenges in infrastructure, market access, and institutional coordination undermine the resilience and supply chain integration of these firms (Agyemang *et al.*, 2022). Policy initiatives such as Planting for Food and Jobs and One District One Factory aim to promote rural industrialisation through subsidies and digital platforms, yet evidence indicates these programmes have mainly benefited larger firms, leaving smaller ones marginalised (Pauw, 2022). This intersection of structural exclusion and entrepreneurial activity makes Ghana's rural purchasing firms well-suited suited for examining how responsiveness develops in the absence of formal institutional support.

This study draws on the contingency perspective of the resource-based view (RBV), which argues that the strategic value of a firm's capabilities depends on their alignment with the conditions in which the firm operates (Chowdhury *et al.*, 2019). While responsiveness and information sharing are widely recognised as vital to resilience (Kazancoglu *et al.*, 2022; Kim and Chai, 2017), prior research often treats these capabilities as universally effective, overlooking how they function under structural constraints. As a result, we know little about how firms in disadvantaged environments, such as rural supply chains, activate and configure these capabilities. The contingency perspective helps address this gap by emphasising contextual fit between capabilities and environmental conditions, including resource scarcity, weak infrastructure, and informal coordination (Cheng and Lu, 2017). Applying this lens to small rural purchasing firms allows us to examine how responsiveness is constructed and mobilised in supply chains with limited institutional support and locally embedded adaptive capacity.

This study offers three distinct contributions to the literature on rural economies (Scartozzi *et al.*, 2024). First, it challenges the assumption that improved information flows automatically strengthen resilience. Our findings show that resilience arises not from general capability expansion, but from aligning capabilities with specific frictions in logistics, operations, and supplier relations. This suggests that strategies focused solely on reducing transaction costs are inadequate in rural contexts (Sandhu *et al.*, 2024). Instead, friction-specific interventions, supported by layered digital infrastructures, are needed. Embedding real options thinking into policy and practice ensures capability investments remain adaptive to uncertainty (Krystallis *et al.*, 2020).

Second, the study shows that resilience is shaped not by isolated firm-level actions, but by cross-domain responsiveness. This supports the contingency view that capabilities derive value through internal coherence and external fit. Information sharing is most effective when embedded in trust-based supplier relationships and supported by responsiveness across logistics and operations. Ecosystem actors should adopt a network-to-ecosystem view that fosters integrated coordination (Rae and Blenker, 2024). As a socio-organisational capability, information sharing depends on relational governance. Relationship audits and trust-based metrics (Zaheer and Venkatraman, 1995) can help shift coordination from transactional exchanges to embedded social norms that underpin resilience (Thai *et al.*, 2020).

Third, the emphasis on expedited orders and on-time delivery in our importance-performance analysis suggests that firms anticipate, rather than merely react to, disruptions (Essuman *et al.*, 2024). This extends the contingency perspective by showing that responsiveness capabilities are most valuable when aligned with expected environmental volatility. Policies should therefore support the development of anticipatory alignment capabilities that synchronise supply chain functions through emerging information flows (Edeh *et al.*, 2024). Rural resilience observatories using predictive analytics can help firms prepare for risks such as climate shocks or infrastructure failure (Braunerhjelm, 2022). Targeted resilience insurance schemes can also incentivise investment in future-ready capabilities, including dual sourcing, automated warehousing, and supplier diversification (Verreynne *et al.*, 2023).

The paper proceeds as follows. First, we review the theoretical background and develop hypotheses. Next, we detail the quantitative methodology. We then present and discuss the results, emphasising theoretical and managerial implications. Finally, the paper concludes with directions for future research.

Theoretical framework and hypothesis development

Organisations in rural communities face competition not only from local actors but also from supply chains with superior resources, economies of scale, and infrastructure (Cholez *et al.*, 2020; Liu *et al.*, 2022). While the RBV suggests rural firms may compete through distinctive capabilities such as strong community ties and local market knowledge (Fernandes *et al.*, 2025; Cheng and Lu, 2017), it remains unclear whether these assets can be effectively leveraged in fragmented and under-resourced supply networks. Although presumed valuable, we lack a systematic understanding of when and how these context-specific resources translate into resilience, especially in environments marked by institutional voids, infrastructural gaps, and volatile demand.

According to the RBV, competitive advantage arises from a firm's distinctive resources and capabilities, including strong community relationships and local market knowledge (Cheng and Lu, 2017). These assets, when effectively leveraged through information sharing, may enhance supply chain responsiveness to build resilience. Building on the contingency perspective of RBV, this study emphasises that organisational resilience relies on a firm's capacity to align strategies with distinct internal and external conditions (Cheng and Lu, 2017). For rural firms, this adaptability is critical given the unique challenges of rural markets, including limited infrastructure access, resource constraints, and fluctuating demand patterns (Fiamohe *et al.*, 2024). Rather than adopting standardised urban or global strategies (Kim and Chai, 2017), rural firms must develop tailored approaches that leverage their community-based networks and localised insights to anticipate and respond to disruptions (Liu *et al.*, 2022).

The contingency perspective further stresses that rural purchasing firms, which act as intermediaries in local supply chains, rely on operational agility to address shifting market demands and supply chain challenges (Chowdhury *et al.*, 2019; Cholez *et al.*, 2020). Their success relies on the degree to which responsive strategies—such as optimising logistics processes and refining operational systems—effectively align with rural conditions characterised by resource scarcity and unpredictable market fluctuations (Barlow and Lostak, 2023). Firms that nurture these responsiveness capabilities may be better positioned to withstand shocks, recover swiftly, and remain economically viable contributors to rural communities.

Furthermore, information sharing is pivotal for supporting responsive strategies by facilitating coordination across supply chains, enabling timely decisions and efficient resource allocation (Kim and Chai, 2017; Greenberg *et al.*, 2018). The value of real-time data exchange becomes particularly pronounced in complex, volatile environments where rural firms operate (Cheng, 2011). In rural contexts, where formal partnerships and institutional support may be limited, informal networks and local knowledge-sharing systems are essential (Deakins *et al.*, 2016). These informal relationships provide rural firms with the flexibility and agility needed to adapt to disruptions, thereby enhancing their resilience and ability to sustain operations (Kazancoglu *et al.*, 2022). By focussing on the fit between information sharing and domain-specific capabilities, we aim to extend the contingency perspective of the RBV to environments where formal institutional support is limited, and the strategic value of capabilities is shaped by environmental misalignment. Figure 1 provides a visual representation of the proposed conceptual framework.

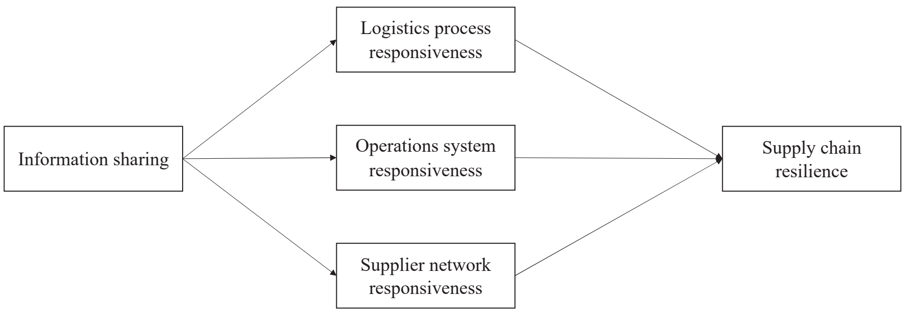

Figure 1. Conceptual framework. Source(s): Authors' own work

Hypothesis development

Information sharing, logistics process responsiveness and supply chain resilience

Information sharing is critical for enhancing supply chain resilience, particularly in rural settings where transparency and collaboration help offset limited infrastructure and institutional support (González-Mon *et al.*, 2024). By exchanging data on inventory, demand patterns, and anticipated disruptions, rural firms improve their ability to anticipate shocks, identify risks, and adjust sourcing, production, and distribution strategies (Campbell, 2021; Barlow and Lostak, 2023). Informed decision-making is essential for maintaining continuity and competitiveness in rural supply chains (Essuman *et al.*, 2024). However, the presence of information alone does not guarantee resilience. Firms must be able to act on it in ways that shape real-time operations.

Logistics process responsiveness fulfils this function by enabling firms to adjust transport routes, delivery schedules, and inventory allocation in response to changing conditions (Asamoah *et al.*, 2021). It allows them to convert informational signals into operational adjustments that preserve supply chain performance under stress (Acquah *et al.*, 2024). More specifically, shared information such as delivery delays, stock imbalances, or road conditions can be translated into real-time changes in transport routing, delivery sequencing, and local warehousing strategies. This mechanism ensures that informational inputs trigger tangible reconfigurations of physical flows, rather than remaining abstract or unacted upon. This is especially vital in rural environments, where long distances, poor roads, and limited storage increase logistical complexity. Even timely information is ineffective without the capacity to reconfigure logistics (Cheng, 2011).

Responsive logistics systems help rural firms reduce delivery times, optimise distribution under variable conditions, and lower costs, thereby enhancing supply chain reliability (Barlow and Lostak, 2023). These systems are not merely complementary to information sharing; they are essential for transforming it into adaptive capacity. Without them, shared information may be delayed, diluted, or lost (González-Mon *et al.*, 2024). Logistics responsiveness also supports the development of contingency strategies that enable firms to act proactively (Poblete and Bengtson, 2020). By sharing data on routes, storage, and supplier flexibility, firms can coordinate responses ahead of disruption (Cholez *et al.*, 2020). This ability to translate information into coordinated action is central to resilience.

In rural areas where formal institutions are often weak or absent, information flow among suppliers, purchasing firms, and downstream partners becomes a key coordination mechanism (Fiamohe *et al.*, 2024). Logistics responsiveness ensures that this coordination translates into action, keeping goods and services moving even under adverse conditions (Sharma *et al.*, 2020). This dynamic capability supports operational continuity, reduces uncertainty, and strengthens rural supply chain resilience (Partanen *et al.*, 2020). We therefore expect logistics process responsiveness to explain how information sharing contributes to resilience, particularly by enabling timely and effective responses to disruption.

H1. logistics process responsiveness mediates the relationship between information sharing and supply chain resilience.

Information sharing, operations system responsiveness and supply chain resilience

In rural supply chains, effectively understanding and integrating critical operational details—such as order patterns, delivery timelines, and quality expectations—is essential for achieving efficiency and managing both costs and lead times (Barlow and Lostak, 2023). However, due to limited technological resources, rural businesses often rely on localised knowledge and pragmatic solutions rather than advanced analytics (Liu *et al.*, 2022). While practical, this reliance may limit the scalability and adaptability of supply chain processes in responding to evolving community preferences and requirements (Braunerhjelm, 2022). Furthermore, sharing detailed information on specific community needs can complicate operations if local systems lack the flexibility to manage additional complexities (Kim and Chai, 2017). Such constraints are particularly pronounced in rural supply chains, where limited resources frequently restrict the integration of specialised processes into the wider operational framework (Greenberg *et al*., 2018). Thus, enhancing the flexibility and adaptability of local operational systems through improved information sharing is crucial. This approach allows organisations to better utilise shared data, ultimately strengthening operational efficiency (Kazancoglu *et al*., 2022).

Operations system responsiveness, defined as firms' ability to adapt processes and resources to changing operational demands, is crucial for competitiveness (Richey *et al*., 2022). In rural contexts, where supply chains face heightened vulnerability to disruptions, such responsiveness is vital for efficiency and resilience (Fiamohe *et al*., 2024). This form of responsiveness emerges when shared information enables real-time coordination of workflows, reallocation of labour or inputs, and reprioritisation of operational tasks (Greenberg *et al*., 2018). These mechanisms allow firms to translate informational inputs into practical adjustments to production schedules and internal resource use. We posit that responsive operations systems reduce inventory mismatches and downtime, thus securing timely delivery and quality service despite limited resources (Asamoah *et al*., 2021). Consequently, rural firms can compete effectively on quality and reliability rather than solely on cost, lowering excess inventory expenses and enabling local suppliers to synchronise their production and delivery schedules with fluctuating requirements for smoother goods flow (Roh *et al*., 2014).

Information sharing among key stakeholders is essential for improved coordination and decision-making in rural supply chains (Greenberg *et al*., 2018). For example, cooperatives providing real-time crop yield data allow distributors to optimise their operations, ensuring timely market delivery, reducing waste, and enhancing profitability (Cholez *et al*., 2020). Even with limited infrastructure, basic technologies such as mobile communication and internet access enable farmers to obtain crucial updates like weather forecasts and market prices, guiding their planting and harvesting decisions (Essuman *et al*., 2024). Such exchanges of vital information facilitate optimal resource utilisation and rapid adaptation to varying conditions, including demand fluctuations and unexpected weather events (Campbell, 2021). Ultimately, effective information sharing strengthens local supply chains, enhancing the resilience and competitiveness of rural businesses in challenging environments.

When rural stakeholders, such as farmers, suppliers, and transporters have access to real-time information, they can swiftly activate contingency plans and reallocate resources to tackle emerging challenges (González-Mon *et al*., 2024). For instance, a rural cooperative with an agile operations team can adapt production schedules and prioritise essential deliveries during periods of disruption, ensuring timely market access (Liu *et al*., 2022). Such flexibility is especially vital in rural contexts, where minimising operational downtime is crucial for preserving livelihoods and sustaining overall community economic stability. By facilitating efficient responses to shifting conditions, enhanced supply chain agility strengthens continuity and resilience against unexpected disruptions (Kazancoglu *et al*., 2022).

H2. operations system responsiveness mediates the relationship between information sharing and supply chain resilience.

Information sharing, supplier network responsiveness, supply chain resilience

In rural supply chains characterised by stakeholder interdependence—such as among farmers, cooperatives, and purchasing firms—prompt and precise information sharing facilitates adjustments to external shocks like demand fluctuations or unforeseen weather events (Cheng, 2011). For example, a sudden rise in demand for local produce can motivate distributors to collaborate with farmers on revised harvesting schedules, ensuring timely market supply. However, while information sharing is essential for flexibility, it does not by itself secure the collective agility required for addressing systemic disruptions effectively (Greenberg *et al.*, 2018). Genuine adaptability emerges from coordinated, interdependent partner actions driven by shared data and synchronised decision-making. Such coordination is particularly critical in rural contexts, where community collaboration often dictates the resilience and recovery capability of local supply chains (González-Mon *et al.*, 2024).

Supplier network responsiveness refers to the ability of interconnected stakeholders to adapt effectively to changing demand and market conditions (Acquah *et al.*, 2024). Within these networks, effective information sharing is essential for enhancing responsiveness, as it facilitates collaborative decision-making and operational alignment (Partanen *et al.*, 2020). Specifically, shared information allows stakeholders to coordinate production schedules, synchronise procurement, and jointly manage transport and storage constraints. Stakeholders with access to timely and accurate data can collectively plan production schedules, optimise inventory control, and mobilise resources promptly to manage disruptions (Cheng, 2011). For instance, during peak harvests or extreme weather events, coordinated communication allows stakeholders to reroute transportation, realign resources, and ease bottlenecks (Liu *et al.*, 2022). Such collective actions bolster the network's ability to innovate and implement best practices, thus strengthening its responsiveness and resilience against rural challenges (Sharma *et al.*, 2020).

Moreover, information sharing fosters transparency, trust, and collaboration among rural supply chain stakeholders, which underpin collective resilience (Huo *et al.*, 2014). Such transparency facilitates resource pooling, coordinated actions, and unified responses to disruptions, ensuring the uninterrupted supply of critical goods and services to both local and wider markets (Partanen *et al.*, 2020). For instance, coordinated information flows enhance food security during crises through efficient distribution planning and reduced wastage (Cheng, 2011). This proactive approach mitigates disruption impacts while strengthening relationships among network partners, thereby enhancing mutual trust and cooperation (Thai *et al.*, 2020). Ultimately, strategic use of information within these networks bolsters adaptability and robustness, improving their ability to navigate challenges and reinforcing overall resilience.

H3. supplier network responsiveness mediates the relationship between information sharing and supply chain resilience.

Methods

Research setting

This study examines responsiveness as a mediator between information sharing and supply chain resilience, focussing on small purchasing firms within Ghana's rural cashew industry (Agyemang *et al.*, 2022). Our research specifically investigates the Jaman and Wenchi Municipalities in the Bono Region (see Figure 2). The Bono regions, encompassing Bono-East and Brong Ahafo, are central to Ghanaian cashew production, accounting for approximately 90% of national cashew exports (Tridge, 2023). These rural communities play a crucial role in the cashew supply chain, where responsiveness is essential for adapting to the challenges and opportunities unique to rural agricultural markets.

Ghana occupies a significant position in the global in-shell cashew market, accounting for over 12.5% of exports and generating annual revenues exceeding US$340.6 million (Ghana Export Promotion Authority, 2022). Approximately 85% of Ghana's cashew production originates from small-scale farmers in rural areas. These farmers primarily serve niche international markets, with over 90% of their harvest exported (Tridge, 2023). Although a small fraction undergoes local processing, most of the cashew crop is destined for export, underscoring the vital function of rural purchasing firms. Acting as intermediaries, these firms connect farmers to exporters and processors, thereby maintaining supply chain continuity within Ghana's cashew industry.

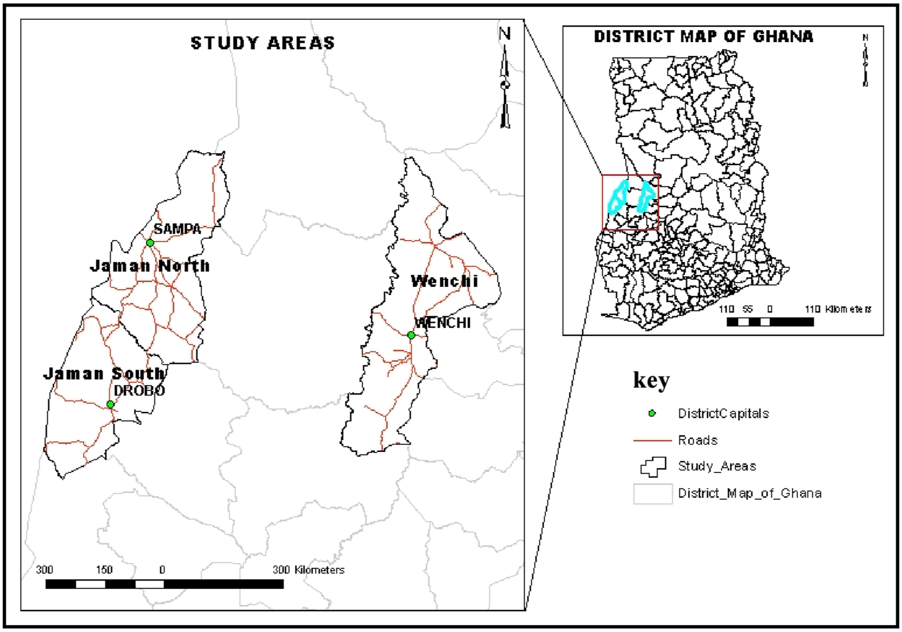

Figure 2. Map of the study area. Source(s): Authors' own work, produced with ArcGIS map (2020)

Sampling and data collection

Following Dillman (2011)'s tailored design method, we conducted an extensive literature review to construct an initial survey, which was pre-tested by three researchers and ten rural purchasing firms. Based on their feedback, we refined the survey, adjusting specific items for clarity and relevance. Our sampling frame targeted small purchasing firms registered with the Cashew Industry Association of Ghana (CIAG), located within rural farming communities in the Jaman and Wenchi Municipalities of the Bono Region. This frame was compiled from the CIAG database, detailing registered firms' names, locations, and contact information. The database categorises small purchasing firms as those employing 30 or fewer people.

This study used a cross-sectional survey design. A simple random sampling technique was applied to a regional database of registered agribusinesses in the cashew sector, with a target sample of 600 firms. Firms were initially contacted by phone to confirm eligibility based on two criteria: at least five years of operation and storage capacity exceeding 200 bags of cashews. These criteria ensured participants had relevant supply chain experience and infrastructure. Storage capacity served as a proxy for a firm's ability to manage inventory and respond to disruptions. Some phone numbers were inactive or outdated. In total, 518 firms were reached, and 407 met the inclusion criteria. To improve response rates in the rural context, we approached local businesses directly and obtained permission to administer surveys in person.

The survey, accompanied by a cover letter, was sent to managers or owners of these firms, with a follow-up after three weeks. We received 315 responses but excluded 28 due to substantial missing data on key constructs, resulting in 287 usable responses. Of these respondents, 218 were male (75.96%) and 69 female (24.04%), with an average age of 42.34 years. All respondents had some level of formal education: 26 (9.06%) completed up to high school, 115 (40.07%) held Higher National Diplomas, 95 (33.10%) had undergraduate degrees, 7 (2.44%) possessed postgraduate certificates, and 44 (15.33%) held master's degrees.

We assessed non-response bias by dividing the sample into early ($n = 129$) and late respondents ($n = 158$), based on response dates. A t-test revealed no statistically significant differences between these groups regarding information sharing, resilience, or responsiveness, indicating that non-response bias did not impact our results.

Measures

All survey instrument measures were adapted from validated scales in the literature, with modifications made to ensure contextual relevance for rural supply chains. As shown in Table 1, all constructs were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Supply chain resilience. Supply chain resilience ($\alpha = 0.759$) was measured using four items adapted from Cheng and Lu (2017) and Chowdhury *et al*. (2019). The items capture the extent to which firms can maintain continuity and adapt effectively in the face of disruptions. This construct reflects agile and responsive behaviours that are especially critical in rural environments, where limited infrastructure and resources increase exposure to operational risk (Campbell, 2021). Respondents assessed their firm's resilience over the past five years relative to major competitors.

Information sharing. Information sharing ($\alpha = 0.870$) was measured using five items adapted from Huo *et al*. (2014), assessing the degree of information exchange with supply chain partners regarding inventory, production, transportation, sales, demand forecasts, and performance metrics. In rural supply chains, where physical distance and logistical

Table 1. Measurement of constructs including validity and reliability

Construct and items	Factor loading
Supply chain resilience (Cronbach's $\alpha = 0.759$, CR = 0.823, AVE = 0.546)	
Our firm's supply chain	
. . . is well prepared for unexpected events	0.749
. . . is able to adequately respond to unexpected disruptions by quickly restoring operations	0.705
. . . has the desired level of connectedness among its members during disruption	0.733
. . . has the ability to maintain control over structure and function during a disruption	0.768
Logistics process responsiveness (Cronbach's $\alpha = 0.732$, CR = 0.736, AVE = 0.652)	
. . . adjust warehouse capacity to address demand changes	0.859
. . . vary transportation carriers to address demand changes	0.804
. . . accommodate special or non-routine customer requests	0.757
Operations system responsiveness (Cronbach's $\alpha = 0.906$, CR = 0.903, AVE = 0.727)	
. . . changes in product volume demanded by customers	0.808
. . . changes in product mix demanded by customers	0.847
. . . expedite emergency customer orders	0.880
. . . reconfigures equipment to address demand changes	0.866
. . . processes to address demand changes	0.860
Supplier network responsiveness (Cronbach's $\alpha = 0.921$, CR = 0.926, AVE = 0.808)	
. . . major suppliers consistently accommodate our requests	0.905
. . . major suppliers promptly vary capacity to address our changing needs	0.904
. . . major suppliers have outstanding on-time delivery record with us	0.892
. . . major suppliers effectively expedite our emergency orders	0.893
Information sharing (Cronbach's $\alpha = 0.870$, CR = 0.877, AVE = 0.658)	
. . . inventory data are visible to all partners in the supply chain	0.760
. . . production and delivery data are shared across the supply chain	0.826
. . . actual sale data are visible to all partners in the supply chain	0.868
. . . demanding forecasts are shared across the supply chain	0.808
. . . performance metrics are shared across the supply chain	0.791

Source(s): Authors' own work

fragmentation can impair coordination, information sharing plays a central role in facilitating timely decision-making and reducing disruption-related risks (Greenberg *et al.*, 2018).

Logistics process responsiveness. This construct ($\alpha = 0.732$) was assessed using three items adapted from Asamoah *et al.* (2021) and Richey *et al.* (2022), capturing the ability to adjust logistics processes quickly in response to fluctuations in customer demand, disruptions, or operational constraints. Flexibility, efficiency, and speed were emphasised, reflecting critical logistics capabilities for small rural firms operating in spatially dispersed and resource-limited environments (Sharma *et al.*, 2020).

Operations system responsiveness. Operations system responsiveness ($\alpha = 0.906$) was measured using five items from Asamoah *et al.* (2021), which evaluate a firm's ability to modify internal systems in response to shifting market demands, operational disruptions, and changing customer requirements. This construct is particularly salient for rural firms, which must frequently reconfigure workflows and allocate scarce resources efficiently under constrained conditions (Acquah *et al.*, 2024).

Supplier network responsiveness. This construct ($\alpha = 0.921$) was measured using four items adapted from Roh *et al.* (2014), assessing how effectively the supplier network responds to demand shifts, supply interruptions, and external uncertainties. Given the limited supplier options available to rural firms, supplier responsiveness represents a key capability for maintaining supply continuity and mitigating vulnerability to upstream uncertainties (Partanen *et al.*, 2020).

Analysis and results

We employed partial least squares structural equation modelling (PLS-SEM) to assess our measurement model and test the proposed hypotheses. Our aim was to construct a multiple mediation framework examining how responsiveness mediates the link between information sharing and supply chain resilience. PLS-SEM was selected due to its variance-based nature, effectively managing complex relationships without creating factor ambiguity in multiple mediation analyses (Hair *et al.*, 2014). Moreover, PLS-SEM emphasises predictive accuracy for endogenous constructs, offering enhanced prediction capabilities and statistical power (Liang *et al.*, 2007). It also accommodates small to medium-sized samples and complex model structures, thereby improving our framework's explanatory strength (Hair *et al.*, 2022).

Measurement model

Table 1 displays factor loadings greater than 0.702 for all items with the minimum values of Cronbach's Alpha = 0.732 and composite reliability = 0.736, indicating acceptable construct reliability (Hair *et al.*, 2022). Additionally, all constructs have average variance extracted (AVE) values that exceed the 0.5 threshold (minimum AVE = 0.546), indicating convergent validity. Discriminant validity was assessed using both the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio of correlations (Hair *et al.*, 2014). According to the Fornell-Larcker criterion, the square root of the AVE of each construct must be higher than the construct's highest correlation with any other construct, as shown in Table 2. The maximum HTMT value of 0.711 (Table 3) is below the conservative rejection threshold of 0.85, which further supports the discriminant validity.

Controlling for common method bias testing

To control for common method bias (CMB), we employed two approaches. First, following Podsakoff *et al.* (2012), we conducted a pilot study to enhance survey item clarity. The survey was systematically developed using established measures from existing literature for key constructs. To further minimise bias, questions concerning predictors, mediators, and the dependent variable were mixed and placed in varied positions throughout the survey. Second, consistent with prior research (Kock, 2017), we performed a full collinearity assessment by

Table 2. Fornell-Larcker criterion for discriminant validity

	Variable	1	2	3	4	5
1	Supply chain resilience	*0.739*				
2	Logistics process responsiveness	0.298	*0.807*			
3	Operations system responsiveness	0.499	0.219	*0.853*		
4	Supplier network responsiveness	0.675	0.296	0.379	*0.899*	
5	Information sharing	0.565	0.323	0.445	0.365	*0.811*

Note(s): Italic diagonal elements are the square root of Average Variance Extracted (AVE)
Source(s): Authors' own work

Table 3. Heterotrait-monotrait (HTMT) values for discriminant validity

	Variable	1	2	3	4	5
1	Supply chain resilience					
2	Logistics process responsiveness	0.361				
3	Operations system responsiveness	0.597	0.269			
4	Supplier network responsiveness	0.637	0.359	0.414		
5	Information sharing	0.711	0.397	0.500	0.404	

Source(s): Authors' own work

estimating five alternative models. As shown in Table 4, all inner variance inflation factor (VIF) values were below the threshold of 3.3 (maximum inner VIF = 2.183), suggesting that CMB is not a concern.

Analytical model

The significance of path coefficients in the PLS-SEM inner model was assessed using the 5,000 sub-sample bootstrapping method (Hair *et al.*, 2014). As shown in Table 5, the R^2 values for supply chain performance ($R^2 = 0.530$, $p < 0.001$), logistics process responsiveness ($R^2 = 0.104$, $p < 0.001$), operations system responsiveness ($R^2 = 0.198$, $p < 0.001$), and supplier network responsiveness ($R^2 = 0.133$, $p < 0.001$) all exceeded the recommended threshold of 0.10 (Hair *et al.*, 2014).

We evaluated the model's out-of-sample predictive accuracy using the cross-validated predictive ability test (CVPAT), employing k-fold cross-validation to mitigate overfitting and underfitting risks in PLS-SEM (Liengaard *et al.*, 2021). We compared the average loss values of PLS-SEM predictions against those from naive indicator averages (IA) and a linear model (LM). Differences in average loss values at or below zero indicate superior predictive

Table 4. Inner variance inflation factor (VIF) values for full collinearity test

	Variable	1	2	3	4	5
1	Supply chain resilience		2.183	1.793	1.605	1.556
2	Logistics process responsiveness	1.161		1.164	1.146	1.124
3	Operations system responsiveness	1.338	1.429		1.391	1.374
4	Supplier network responsiveness	1.280	1.59	1.411		1.410
5	Information sharing	1.380	1.565	1.583	1.556	

Source(s): Authors' own work

Table 5. Structural equation modelling results

Endogenous construct	R^2
Supply chain resilience	0.530***
Logistics process responsiveness	0.104***
Operations system responsiveness	0.198***
Supplier network responsiveness	0.133***

Structural path	Coefficients	SD	CI 95% LCI	UCI	f^2
LPR → SCR	0.075**	0.029	0.020	0.135	0.011
OSR → SCR	0.274***	0.039	0.201	0.350	0.135
SNR → SCR	0.549***	0.035	0.480	0.615	0.520
IS → SCR	0.347***	0.028	0.294	0.404	0.179
IS → LPR	0.323***	0.029	0.267	0.380	0.116
IS → OSR	0.445***	0.037	0.373	0.518	0.248
IS → SNR	0.365***	0.035	0.296	0.434	0.154
Indirect effects					
IS → LPR → SCR	0.024*	0.010	0.006	0.047	
IS → OSR → SCR	0.122**	0.024	0.080	0.173	
IS → SNR → SCR	0.201**	0.021	0.160	0.242	

Note(s): *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$; two-tailed test. SD: Standard deviation, CI: Confidence interval, LCI: Lower confidence interval, UCI: Upper confidence interval, SCR: Supply chain resilience, LPR: Logistics process responsiveness, OSR: Operations system responsiveness, SNR: Supplier network responsiveness, IS: Information sharing

Source(s): Authors' own work

performance of the PLS-SEM model. As reported in Table 6, the PLS-SEM predictions outperform both the naive IA and the more conservative LM prediction benchmarks.

H1 proposes that logistics process responsiveness partially mediates the relationship between information sharing and supply chain resilience. As shown in Table 5, we found significant and positive coefficients for the association between information sharing and logistics process responsiveness ($\beta = 0.323$, $p < 0.001$, $f^2 = 0.116$), and between logistics process responsiveness and supply chain resilience ($\beta = 0.075$, $p < 0.01$, $f^2 = 0.011$). The indirect effect of information sharing on supply chain resilience through logistics process responsiveness was also significant ($\beta = 0.024$, $p < 0.05$), with a 95% confidence interval (CI)

Table 6. Results of out-of-sample predictive relevance (CVPAT)

	CVPAT PLS-SEM vs IA	CVPAT PLS-SEM vs LM
Variable	Average loss difference	Average loss difference
Supply chain resilience	−0.259***	0.052†
Logistics process responsiveness	−0.112***	0.014**
Operations system responsiveness	−0.121***	−0.005**
Supplier network responsiveness	−0.114***	−0.006*
Information sharing	−0.152***	0.013*
Overall	−0.259***	0.052*

Note(s): †$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Source(s): Authors' own work

not including zero (LCI = 0.006, UCI = 0.047). When logistics process responsiveness is controlled, the direct relationship between information sharing and supply chain resilience is significant (β = 0.347, p < 0.001). Logistics process responsiveness partially mediates information sharing and supply chain resilience. Thus, H1 is supported.

H2 predicts the partial mediating effects of operations system responsiveness on the relationship between information sharing and supply chain resilience. The results in Table 5 show a positive and significant relationship between information sharing and operations system responsiveness (β = 0.445, p < 0.001, f^2 = 0.248), and between operations system responsiveness and supply chain resilience (β = 0.274, p < 0.001, f^2 = 0.135). The indirect effect of information sharing on supply chain resilience through operations system responsiveness was also significant (β = 0.122, p < 0.001), with a 95% CI not including zero (LCI = 0.080, UCI = 0.173). When operations system responsiveness is controlled, the direct relationship between information sharing and supply chain resilience is significant (β = 0.347, p < 0.001). Operations system responsiveness partially mediates information sharing and supply chain resilience. Thus, H2 is supported.

H3 predicts the partial mediating effects of supplier network responsiveness on the relationship between information sharing and supply chain resilience. The results in Table 5 show a positive and significant relationship between information sharing and supplier network responsiveness (β = 0.365, p < 0.001, f^2 = 0.154), and between supplier network responsiveness and supply chain resilience (β = 0.549, p < 0.001, f^2 = 0.520). The indirect effect of information sharing on supply chain resilience through operations system responsiveness was also significant (β = 0.201, p < 0.001), with a 95% CI not including zero (LCI = 0.160, UCI = 0.242). When supplier network responsiveness is controlled, the direct relationship between information sharing and supply chain resilience is significant (β = 0.347, p < 0.001). Supplier network responsiveness partially mediates information sharing and supply chain resilience. Thus, H3 is supported.

Post-hoc analysis – Importance-Performance Matrix Analysis (IPMA)

We conducted an Importance-Performance Map Analysis (IPMA) as a post-hoc assessment to pinpoint critical areas for enhancing responsiveness in small purchasing firms. Our aim was to identify responsiveness actions considered important by these firms and those that delivered superior performance outcomes. IPMA involves two dimensions: "importance" and "performance" (Ringle and Sarstedt, 2016). First, it calculates the unstandardised total effect ("importance") of a predictor construct (e.g. logistics process responsiveness) on a target endogenous construct (e.g. supply chain resilience). Second, it establishes "performance" values by averaging and rescaling latent construct data. Our analysis specifically examined the "importance" and "performance" of logistics process responsiveness, operations system responsiveness, and supplier network responsiveness in predicting supply chain resilience. Before implementing IPMA, two conditions must be satisfied: (a) all indicators must share the same orientation (either metric or quasi-metric with consistent coding direction), and (b) outer weights must not be negative. Table 7 (unstandardised and rescaled outer weights) confirms these conditions were fulfilled.

Figure 3 indicates that operations system responsiveness achieved the highest performance score (91.892) relative to other responsiveness dimensions. However, rural purchasing firms identified supplier network responsiveness as most critical to their supply chain resilience, with the highest importance score (0.549). Furthermore, analysis of individual latent variables in Table 8 reveals that within logistics process responsiveness, warehouse capacity (LSP1 = 0.034) ranked highest in importance, whereas adjustments in transportation (LPR2 = 90.319) demonstrated the greatest performance contribution to resilience. Notably, all latent variables associated with operations process responsiveness exhibited similar scores for both importance (ranging from 0.065 to 0.063) and performance (from 90.224 to 93.235). Within supplier network responsiveness, suppliers' accommodation (SR1 = 0.162) and

Table 7. Unstandardised and rescaled outer weights

	Unstandardised outer weights				Rescaled outer weights			
	SCP	LPR	OSR	SNR	SCP	LPR	OSR	SNR
LPR1		0.444				0.323		
LPR2		0.369				0.362		
LPR3		0.426				0.315		
OSR1			0.236				0.211	
OSR2			0.229				0.194	
OSR3			0.236				0.195	
OSR4			0.237				0.187	
OSR5			0.235				0.213	
SCP1	0.305				0.235			
SCP2	0.213				0.125			
SCP3	0.267				0.180			
SCP4	0.555				0.460			
SNR1				0.295				0.257
SNR2				0.304				0.269
SNR4				0.263				0.241
SNR5				0.251				0.233

Note(s): SCP: Supply chain performance, LPR: Logistics process responsiveness, OSR: Operations system responsiveness, SNR: Supplier network responsiveness

Source(s): Authors' own work

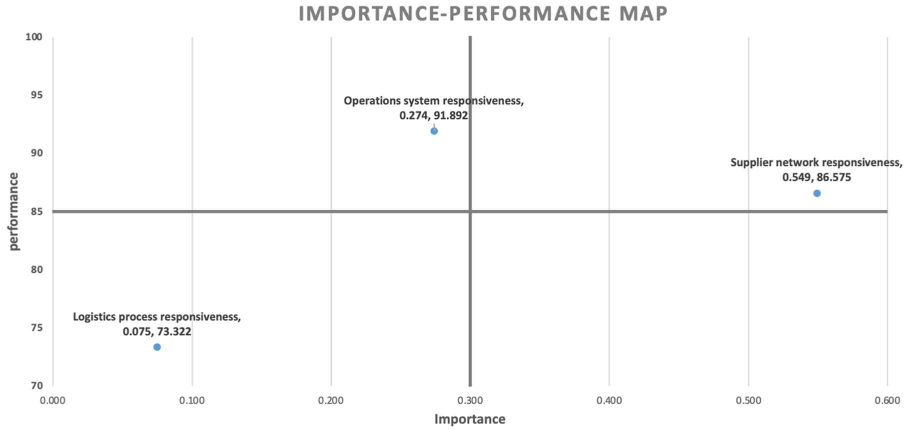

Figure 3. IPMA at the construct level for responsiveness. Source(s): Authors' own work

promptness (SR2 = 0.167) were rated highest in importance, whereas on-time delivery (SR3 = 88.165) and expedited emergency orders (SR4 = 88.193) had the greatest performance impact on resilience.

Discussion

This study investigates how responsiveness in logistics processes, operational systems, and supplier networks explains the relationship between information sharing and supply chain resilience in rural enterprises. Our results suggest that logistics process responsiveness plays a foundational role by enabling firms to act on shared information through adjustments to transport routes, storage use, and delivery timing (Poblete and Bengtson, 2020). In rural areas

Table 8. IPMA at the indicator level for responsiveness

Construct	Indicator code	Importance	Performance
Logistics process responsiveness	LPR1	0.034	80.403
	LPR2	0.028	90.319
	LPR3	0.032	46.504
Operations system responsiveness	OSR1	0.065	93.235
	OSR2	0.063	92.213
	OSR3	0.065	91.303
	OSR4	0.065	90.224
	OSR5	0.064	92.269
Supplier network responsiveness	SNR1	0.162	85.994
	SNR2	0.167	84.300
	SNR4	0.145	88.165
	SNR5	0.138	88.193

Source(s): Authors' own work

with unreliable infrastructure, this capability allows firms to reconfigure physical flows in real time, helping them maintain continuity during disruptions (Liu *et al.*, 2022). Our findings also show that operations system responsiveness is critical for internal adaptability, particularly through mechanisms that translate shared information into task-level coordination, resource reallocation, and scheduling adjustments under constrained conditions. Firms that adjust production schedules, coordinate tasks, and reallocate resources based on information sharing maintain higher performance under stress (Asamoah *et al.*, 2021). This demonstrates how internal flexibility supports resilience, particularly where external institutional support is limited or absent. Moreover, our results highlight the importance of supplier network responsiveness. Firms that actively coordinate with suppliers, adjust delivery plans, and explore alternative sourcing options show greater capacity to sustain operations, illustrating how information-sharing mechanisms trigger relational alignment and synchronised responsiveness across actors (Sharma *et al.*, 2020). This highlights the role of relational governance and external coordination in environments with fragmented formal systems.

Compared to urban supply chains that rely on strong infrastructure, formal governance, and advanced technology (e.g. Partanen *et al.*, 2020; Roh *et al.*, 2014), our findings suggest rural supply chains depend on informal institutions and trust-based relational governance to overcome resource and institutional constraints. This reliance on localized adaptive practices is not a fallback but a key source of resilience suited to fragmented and resource-limited environments. Coordination among rural suppliers, characterized by flexibility, mutual adjustment, and relational alignment, differs markedly from the more formalized responsiveness in urban settings (Kim and Chai, 2017). These differences show rural supply chain resilience stems from unique capability configurations shaped by local conditions, requiring distinct policy and managerial approaches focused on social capital, relational governance, and context-specific information sharing.

The performance-importance analysis further reveals how firms perceive and prioritise different forms of responsiveness. While operations system responsiveness demonstrated the highest performance levels, supplier network responsiveness was rated as most important. This indicates that while internal adjustments are effectively implemented, external supplier coordination is viewed as more critical to long-term resilience. At the indicator level, our results show that warehouse capacity was considered the most important aspect of logistics responsiveness, whereas transportation adjustments contributed most to actual performance. In operations, indicators showed consistently high scores in both importance and performance, reflecting the central role of internal adaptability. For supplier responsiveness, firms placed the greatest importance on supplier accommodation and promptness, while performance was strongest for on-time delivery and emergency order fulfilment.

Theoretical implications

Our findings suggest that supply chain resilience is not merely the product of static infrastructural investments, but a context-dependent capability shaped by the alignment of logistics, operations, and supplier networks with specific environmental demands. This supports the contingency perspective of the resource-based view, which emphasises that capability value depends on alignment with external conditions. At the same time, the role of relational norms and local embeddedness highlights the importance of informal institutions in enabling coordination where formal governance is limited. Viewed through the lens of institutional theory, such informal mechanisms compensate for institutional voids, reinforcing the contextual nature of resilience. Resilience thus emerges not from possessing capabilities alone, but from their ability to address domain-specific frictions. Accordingly, emphasis should shift from infrastructure-centric approaches to strategies that develop context-specific capabilities and support adaptive responses to local challenges.

While information sharing can enhance resilience, we identify multi-level frictions across logistics, operations, and supplier networks. Traditional policy often treats improved information flows as a way to reduce transaction costs (Sandhu *et al.*, 2024), yet our findings show that the value of information depends on its alignment with specific operational challenges. For instance, asymmetries in supplier data require different responses than internal scheduling delays (Thai *et al.*, 2020). This highlights the need for friction-specific capability configurations rather than standardised solutions. Layered digital infrastructures function as capability enablers within the RBV, facilitating real-time coordination and the selective activation of firm resources. When guided by real options thinking, these infrastructures support the strategic deployment of capabilities under uncertainty, enhancing adaptability in volatile environments (Krystallis *et al.*, 2020).

Our results also highlight the central role of supplier network responsiveness in enhancing resilience. In rural settings with limited formal coordination, relational capabilities gain strategic value. Regional suppliers function not as passive intermediaries but as active agents of adaptive capacity (Acquah *et al.*, 2024). Their responsiveness substitutes for formal governance by enabling flexible coordination through local knowledge and informal ties (Verreynne *et al.*, 2023). Their responsiveness enables flexible coordination grounded in local knowledge and informal relational structures, often operating in place of formal governance mechanisms. Strengthening embedded forms of local coordination and co-constructed operational planning can enhance this adaptive role within supply networks (Kim and Chai, 2017).

Further, the indirect effects of information sharing through operational systems and supplier networks suggest that resilience stems from cross-domain responsiveness rather than isolated routines (David and Terstriep, 2025). This supports the contingency view that capabilities must align both externally and internally (Cheng and Lu, 2017). When logistics, operations, and suppliers interact dynamically, they form an integrated capability system more effective than any single domain alone. Specifically, a network-to-ecosystem approach, using mechanisms like digital sandboxes to enable firms and partners to test and calibrate capability combinations can enhance the resilience of these firms (Ochinanwata *et al.*, 2023).

Our findings also show that information sharing is most effective when embedded in relational norms, not limited to technical exchange. This aligns with the contingency logic that socio-organisational capabilities derive value from informal coordination (Edeh *et al.*, 2024). Trust-building mechanisms such as relationship audits or investments in relational governance enhance the contextual effectiveness of information sharing by embedding exchange within stable and cooperative structures that support sustained coordination (Zaheer and Venkatraman, 1995; Thai *et al.*, 2020).

Finally, our importance-performance analysis suggests that responsiveness must be anticipatory as well as reactive. Although expedited orders and on-time delivery are often viewed as outputs, their prominence in our data indicates they function as forward-looking indicators of resilience (Essuman *et al.*, 2024). This reinforces the view that capability value depends on alignment with emerging disruption patterns. From an RBV perspective, resilience observatories that use predictive analytics enhance firms' ability to anticipate and manage external uncertainties such as climate events or infrastructure failures (Braunerhjelm, 2022). When paired with complementary mechanisms like resilience insurance, these observatories encourage investment in capabilities such as dual sourcing, automated warehousing and supplier diversification that reinforce a firm's strategic resource base under conditions of uncertainty.

Managerial implications

In rural supply networks, fostering close relationships is crucial for building trust, which facilitates the open information exchange essential for resilience. These relationships serve as strategic differentiators, enabling firms to outperform competitors through strengthened collaboration within high-trust environments (Thai *et al.*, 2020). Managers should employ a holistic information-sharing approach, leveraging real-time visibility systems to coordinate logistics, operations, and supplier networks effectively (Huo *et al.*, 2014; Greenberg *et al.*, 2018). Critically, such systems must align with the distinct operational rhythms and limitations inherent in rural contexts to maximise their efficacy as resources that bolster supply chain resilience, operational efficiency, and sustained competitive advantage.

Given the resource constraints typical of rural areas, managers need to incorporate risk management tools into ongoing improvement initiatives (Deakins *et al.*, 2016). Regular audits, performance evaluations, and feedback loops enhance adaptive capabilities, empowering firms to anticipate and manage disruptions effectively (Campbell, 2021). Emphasising practical, cost-effective enhancements allows firms to optimise limited resources, thereby ensuring operational stability—a vital consideration in local economies where resilience closely correlates with resource optimisation (Edeh *et al.*, 2024).

Moreover, managers can simultaneously improve efficiency and foster community goodwill through sustainable logistics investments. Implementing environmentally friendly transportation and green storage practices reduces costs, enhances efficiency, and bolsters a firm's image as a responsible community stakeholder. Such initiatives demonstrate commitment to local values and sustainability, distinguishing firms as leaders adept at balancing operational resilience and environmental stewardship (Kazancoglu *et al.*, 2022).

Limitations and suggestions for future studies

This study provides valuable insights into responsive supply chains in rural contexts, yet several limitations offer avenues for future research. First, our examination at the firm-level restricts understanding of responsiveness at the broader industry level. Investigating responsiveness across entire rural sectors could highlight wider systemic effects on rural economies, including employment creation, community resilience, and sector-specific challenges. Such industry-wide analyses could help policymakers devise targeted interventions, including infrastructure investments in agricultural supply chains or contingency planning for vulnerable critical industries (Essuman *et al.*, 2024). Longitudinal research tracking the evolution of responsiveness over time would enhance understanding of rural firms' adaptations to market dynamics, competitive pressures, and environmental changes. In particular, future research could explore the temporal dynamics of responsiveness capabilities and the interdependencies between logistics, operations, and supplier responsiveness as they co-develop in response to recurring disruptions. This would offer deeper insight into how these capabilities interact and sustain resilience in resource-constrained environments. These findings could guide policies promoting adaptive capacity through targeted training and financial support programmes (Fiamohe *et al.*, 2024).

Moreover, while responsiveness is conceptualised here as including adaptability, flexibility, agility, and improvisation (Richey *et al.*, 2022), these dimensions were not individually assessed. Future studies could explore each aspect separately to identify critical components for rural firms facing resource constraints. Such insights could help policymakers design specific initiatives, like subsidies for agile production methods or digital tools facilitating real-time adaptability. Additionally, future research should examine how rural firms incorporate sustainability and green initiatives into their supply chain responsiveness (Kazancoglu *et al.*, 2022). Given growing policy attention towards rural sustainability, understanding how firms balance environmental objectives with competitiveness could inform incentives for adopting eco-friendly supply chain practices. In addition, future research could examine how informal institutions evolve in response to governance gaps and how these influence the long-term development of supply chain capabilities in rural contexts.

Finally, while we emphasise the importance of information sharing for supply chain responsiveness, two additional areas warrant exploration. Firstly, examining governance structures promoting trust and collaboration within rural supply chains could provide actionable insights into formal and informal mechanisms (e.g. contracts, cooperatives, shared leadership) supporting information sharing, thus helping policymakers strengthen local partnerships (Thai *et al.*, 2020). Also, studying power dynamics within rural supply chains could clarify how stakeholder asymmetries among small farmers, cooperatives, and large distributors impact information-sharing practices. This research could suggest strategies to empower smaller stakeholders, ensuring equitable data access and participation in decision-making processes (Verreynne *et al.*, 2023).

Conclusion

This research reconceptualises rural supply chain resilience as a situated institutional process, emerging not from structural provisions alone but from the continuous refinement of capabilities within constrained environments. By tracing how small rural purchasing firms navigate differentiated frictions across logistics, operations, and supplier networks, the study challenges prevailing assumptions that frame resilience as a static, resource-dependent condition. It positions responsiveness as a socially embedded capability, enacted through iterative coordination, informal governance, and context-specific experimentation. This reframing calls for a fundamental reconsideration of how resilience is theorised in peripheral economies. Rather than asking how firms overcome constraints, the more generative question becomes how constraints are used to configure novel forms of coordination and learning. Advancing this agenda will require moving beyond input–output logics toward frameworks that centre on capability formation, mutual adjustment, and the relational construction of supply chain systems under persistent uncertainty.

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