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WHEN DO SUPPLY CHAIN CAPABILITIES ENHANCE RESILIENCE? THE MODERATING ROLE OF ENVIRONMENTAL DYNAMISM IN EMERGING MARKET SUPPLY CHAINS

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A B S T R A C T

This study examines how environmental dynamism influences the effectiveness of supply chain capabilities in enhancing organizational resilience. Drawing on contingency theory and the dynamic capability's view, it investigates the moderating role of environmental dynamism in the relationship between supply chain visibility, agility, coordination, flexibility, and resilience. Data were collected through a cross-sectional survey of non-alcoholic beverage manufacturing firms in Kenya, yielding 278 usable responses. Hierarchical moderated regression and the PROCESS macro were used to test interaction effects. The findings reveal that environmental dynamism significantly moderates the capability–resilience relationship. Agility ($\beta = 0.356$, $p < .001$) and flexibility ($\beta = 0.278$, $p < .001$) exhibit stronger positive effects on resilience under highly dynamic conditions. Conversely, visibility ($\beta = -0.214$, $p < .001$) and coordination ($\beta = -0.142$, $p = .008$) become less effective as environmental dynamism increases. These results demonstrate that supply chain capabilities are not universally beneficial but vary in effectiveness depending on environmental conditions. The study extends contingency theory within supply chain resilience research by highlighting the context-dependent value of different capabilities. The findings also provide practical guidance for managers seeking to strengthen resilience by prioritizing adaptive capabilities in turbulent environments.

1. INTRODUCTION

Global supply chains are increasingly characterized by heightened levels of uncertainty, volatility, and disruption. In recent years, firms have faced a growing number of shocks arising from geopolitical instability, climate-related events, pandemics, fluctuating demand patterns, and regulatory shifts (Taheri Hosseinkhani, 2025). These disruptions have exposed inherent structural vulnerabilities within supply chains, thereby intensifying the need for organizations to cultivate resilience as a strategic capability for survival and continuity (Boonlua et al., 2023). Supply chain resilience, broadly defined as the ability of a system to anticipate, absorb, adapt to, and recover from disruptions, has emerged as a critical determinant of firm survival and sustained competitive advantage (Pu et al., 2023).

The urgency of resilience is particularly pronounced in emerging economies characterized by infrastructural constraints, limited technological integration, institutional instability, and volatile market environments, requiring firms to adopt strategic

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adaptation mechanisms to navigate turbulence and sustain performance (Oke & Moradeyo, 2026; Malik & Terzidis, 2025). In contexts such as Kenya's manufacturing sector, particularly within the non-alcoholic beverage industry, firms operate under conditions of supply uncertainty, fluctuating input costs, and regulatory unpredictability, thereby necessitating the development of supply chain resilience and technological innovation (Mogaka, 2023; Opoku et al., 2025). These challenges further necessitate the development of robust supply chain capabilities that enhance responsiveness and ensure continuity of operations under turbulent conditions (Kaneberg et al., 2025).

A dominant stream of research has identified supply chain capabilities such as visibility, agility, coordination, and flexibility as key enablers of resilience (Patrucco et al., 2025). Visibility enables firms to access and share real-time information across supply chain networks; agility facilitates rapid response to changes in demand or supply conditions; coordination ensures alignment among supply chain partners; and flexibility allows firms to adjust sourcing, production, and distribution processes (Baah et al., 2022). Collectively, these capabilities enhance supply chain resilience by improving information flow, responsiveness, and adaptability, particularly when enabled by digital transformation (Li et al., 2025; Baah et al., 2022).

However, despite the growing recognition of these capabilities, the existing literature reflects an implicit but problematic assumption. A dominant stream of research tends to conceptualize supply chain capabilities as inherently beneficial, with their effects on resilience treated as stable and consistently positive across contexts (Alfaqiyah et al., 2025). Emerging evidence, however, suggests that these relationships may be contingent on environmental uncertainty and mediated through resilience mechanisms (Wang et al., 2025). This dominant perspective, largely rooted in the dynamic capabilities view, emphasizes capability accumulation while often underemphasizing environmental contingencies (Wamba et al., 2020). Consequently, the possibility that the effectiveness of these capabilities varies across environmental conditions remains insufficiently examined.

Emerging evidence further suggests that this assumption may be overly simplistic. Recent studies indicate that the effectiveness of organizational capabilities varies significantly depending on the level of environmental uncertainty, volatility, and complexity (Saeed et al., 2022). In highly dynamic environments, capabilities that enhance efficiency and control under stable conditions may generate unintended rigidity, delays, or information overload, thereby undermining responsiveness (Jifri et al., 2023). For example, while visibility enhances decision-making through improved information availability, excessive or rapidly changing information may reduce decision speed under turbulent conditions. Similarly, coordination mechanisms that rely on structured processes may become less effective when rapid and decentralized responses are required.

This contradiction highlights a fundamental tension in the literature. On one hand, supply chain capabilities are portrayed as drivers of resilience; on the other, their effectiveness may be constrained or altered under conditions of environmental turbulence and interdependence, underscoring the context-dependent nature of these relationships (Kalubanga & Gudergan, 2022). Consequently, there is limited understanding of when and under what conditions specific supply chain capabilities enhance resilience.

Environmental dynamism provides a critical lens through which this tension can be understood. Defined as the rate, unpredictability, and complexity of changes in a firm's external environment, environmental dynamism introduces a contingency that may fundamentally alter the capability performance relationship (Kim et al., 2025). Under conditions of high environmental dynamism, firms must respond rapidly to shifting conditions while making decisions based on incomplete and evolving information, necessitating adaptive and exploratory capabilities (Srikanth & Ungureanu, 2025). In such contexts, adaptive capabilities such as agility and flexibility become increasingly valuable, as they enable rapid reconfiguration of resources and processes. Conversely, structured capabilities such as visibility and coordination, which rely on stable information flows and synchronized decision-making, may face limitations in highly volatile environments.

Despite its theoretical importance, the moderating role of environmental dynamism in shaping the relationship between supply chain capabilities and resilience remains relatively underexplored, with emerging evidence pointing to both enabling and constraining effects (Faruquee et al., 2024). Although recent studies highlight the role of environmental dynamism in shaping supply chain responsiveness, empirical investigations remain limited, particularly in emerging market contexts characterized by heightened volatility (Fianko et al., 2025). As a result, existing research provides an incomplete understanding of the context-dependent nature of supply chain capabilities.

To address this gap, the present study examines the moderating effect of environmental dynamism on the relationship between supply chain capabilities specifically visibility, agility, coordination, and flexibility and supply chain resilience in non-alcoholic beverage manufacturing firms in Kenya. By integrating the dynamic capabilities view with contingency theory, the study advances a context-sensitive understanding of supply chain resilience, emphasizing that the value of capabilities is contingent upon environmental conditions rather than universally fixed.

This study contributes to the literature in several important ways. It extends contingency theory by demonstrating that the effectiveness of supply chain capabilities varies with environmental dynamism. It further challenges the assumption within the dynamic capabilities literature that capabilities are universally beneficial by providing evidence of their context-dependent and potentially contradictory effects. It also

offers empirical insights from an under-researched emerging economy context, thereby enhancing the external validity and practical relevance of supply chain resilience research.

2. LITERATURE REVIEW

2.1 Theoretical Foundation

Understanding how firms build resilience in increasingly turbulent environments requires a theoretical lens that not only captures the role of internal capabilities but also explains how their effectiveness varies across external conditions. This study integrates the dynamic capability's view (DCV) with contingency theory to develop a context-sensitive explanation of how supply chain capabilities influence resilience under varying levels of environmental dynamism. While contingency theory emphasizes the alignment between organizational characteristics and environmental conditions (Luthans & Stewart, 1977), recent empirical evidence underscores that the effectiveness of supply chain capabilities is inherently context-dependent, particularly under conditions of environmental uncertainty (Rehman & Jajja, 2023).

The dynamic capability's view posits that firms achieve sustained performance by developing the capacity to sense opportunities and threats, seize them through appropriate responses, and reconfigure resources to adapt to changing environments (Teece, 2007; Ferreira et al., 2020). Within supply chain contexts, capabilities such as visibility, agility, coordination, and flexibility serve as critical mechanisms through which firms process information, anticipate disruptions, and reconfigure operations to maintain continuity (Dey, 2023). Rather than merely representing operational attributes, these capabilities function as information-processing and response-enabling mechanisms that allow firms to interpret environmental signals and enact timely strategic and operational adjustments.

Drawing on Information Processing Theory, organizations can be conceptualized as systems designed to process information in order to reduce uncertainty and support decision-making (Galbraith, 1974; Galbraith, 2021; Simon & March 2015**)**. Under this perspective, supply chain capabilities enhance a firm's ability to acquire, interpret, and act upon information generated within complex and evolving environments**.** As environmental uncertainty intensifies, the volume, velocity, and ambiguity of information increase, thereby elevating the need for advanced information-processing capacity (Galbraith, 1974; Galbraith, 2021; March & Simon, 1958). Recent evidence further suggests that organizations increasingly rely on digital and ambidextrous capabilities to enhance information processing and accelerate decision-making in complex supply chain environments (Majeed et al., 2025). Consequently, capabilities such as agility and flexibility become critical, as they enable rapid interpretation of signals and timely reconfiguration of operations under conditions of heightened uncertainty and time pressure.

However, despite its explanatory strength, the DCV has been criticized for implicitly assuming that capabilities are inherently beneficial and universally applicable across contexts, with limited attention to their conceptual boundaries and context-specific effectiveness (Kurtmollaiev, 2020). This limitation is particularly important in turbulent environments where the same capability may produce divergent outcomes depending on the nature and intensity of environmental change. By overlooking contextual contingencies, the DCV provides limited guidance on when and under what conditions specific capabilities enhance performance outcomes such as resilience.

Contingency theory addresses this limitation by emphasizing that organizational effectiveness depends on the alignment between internal capabilities and external environmental conditions (Luthans & Stewart, 1977). Rather than assuming universal best practices, the theory posits that different environmental contexts require different organizational responses. Recent research reinforces this perspective by demonstrating that firms adopt alternative, context-dependent pathways to resilience in response to external shocks and geopolitical disruptions (Balicevac Al Ismail et al., 2026). From this viewpoint, environmental dynamism defined in terms of the rate, unpredictability, and complexity of environmental change (Dess & Beard, 1984; Miller, 1987; Kim et al., 2025; AlMulhim, 2023), represents a critical contingency that shapes how capabilities translate into performance outcomes.

Importantly, integrating contingency theory with information-processing logic provides a deeper explanation of capability effectiveness. Dynamic environments increase uncertainty and information-processing requirements, thereby favoring adaptive capabilities that enable decentralized decision-making, rapid response, and continuous reconfiguration **(**Wamba et al., 2020; Saeed et al., 2022; Galbraith, 1974). In contrast, stable environments reduce uncertainty and associated information-processing demands, enabling organizations to rely on formalized structures, predictable information flows, and coordinated decision-making mechanisms (Galbraith, 1974; Galbraith, 2021). This distinction highlights that the value of capabilities is not inherent but contingent upon their alignment with environmental information-processing requirements.

Integrating these perspectives, this study argues that supply chain capabilities do not exert uniform effects on resilience; rather, their effectiveness is contingent upon environmental dynamism. This perspective further reveals a critical theoretical tension: capabilities that enhance efficiency and control under stable conditions may generate rigidity, information overload, or coordination delays under high dynamism, thereby undermining responsiveness (Jifri et al., 2023; Kurtmollaiev, 2020**).** Drawing on this logic, the study adopts a contingency-based and information-processing perspective to explain how different types of capabilities

contribute to resilience under varying environmental conditions.

2.2 Environmental Dynamism as a Moderator

Environmental dynamism, commonly characterized by the rate, unpredictability, and complexity of change, increases uncertainty and disrupts stable patterns of demand and supply, thereby intensifying the information-processing requirements faced by firms and conditionally reshaping the effectiveness of supply chain capabilities (Dess & Beard, 1984). Under conditions of high dynamism, firms encounter unpredictable disruptions, fluctuating demand patterns, and evolving competitive pressures, necessitating decentralized decision-making and adaptive response mechanisms (Adana et al., 2024). In such contexts, capabilities that enhance responsiveness, flexibility, and real-time coordination become critical for maintaining resilience.

Drawing on Information Processing Theory**,** environmental dynamism can be conceptualized as a driver of information-processing demand. As the rate and unpredictability of environmental change increase, firms are required to process larger volumes of more complex and time-sensitive information (March & Simon, 1958)**.** This fundamentally alters the conditions under which supply chain capabilities operate, transforming both their functional roles and performance implications as firms are compelled to reconfigure and digitally enable these capabilities in response to increase information-processing demands (Galbraith, 1974; Galbraith, 2021; Ning & Yao, 2023).

In contrast, stable environments are characterized by lower uncertainty and more predictable patterns of change, reducing the need for continuous adaptation. Under such conditions, firms can rely on formalized structures, standardized processes, and coordinated decision-making mechanisms that emphasize efficiency and consistency (Galbraith, 1974; Galbraith, 2021). This reflects a shift in information-processing requirements, where the emphasis moves from managing ambiguity and rapid change to optimizing efficiency, accuracy, and control.

Importantly, environmental dynamism does not merely influence the strength of relationships between capabilities and resilience; it fundamentally alters the underlying mechanisms through which these capabilities operate, such that the same capabilities may yield both beneficial and adverse outcomes depending on contextual conditions and governance structures (Faruquee et al., 2024). This reflects the non-linear and context-dependent nature of capability effectiveness, where increasing environmental complexity may simultaneously enhance and constrain performance outcomes. Under high dynamism, firms must interpret incomplete, rapidly evolving information and respond under time pressure, thereby increasing the value of capabilities that enable rapid sensing, decision-making, and reconfiguration. In contrast, under low dynamism, the need for rapid response diminishes, and the value of capabilities shifts toward those that enhance coordination, efficiency, and reliability.

This differentiation aligns with the distinction between explorative and exploitative capabilities, where explorative (adaptive) capabilities enhance performance in turbulent environments, whereas exploitative (structured) capabilities are more effective in stable and predictable contexts (Heidenreich et al., 2026). Moreover, systemic disruptions further reinforce this dynamic by altering the relative contribution of competing capabilities, making some more critical while reducing the effectiveness of others (Jifri et al., 2023).

A critical implication of this perspective is the emergence of capability trade-offs under varying environmental conditions. Under high environmental dynamism, adaptive capabilities such as agility and flexibility enhance resilience by enabling rapid response and continuous reconfiguration. However, structured capabilities such as visibility and coordination may become less effective due to information obsolescence, coordination delays, and process rigidity. For instance, while visibility improves access to information, rapidly changing conditions may render this information obsolete before it can be acted upon, thereby reducing its utility. Similarly, coordination mechanisms that require alignment among multiple actors may introduce delays that hinder responsiveness in fast-changing environments.

Conversely, in stable environments, structured capabilities become more valuable as they support efficiency, consistency, and cost optimization. In such contexts, the reliance on standardized processes and coordinated decision-making reduces variability and enhances operational control, thereby contributing positively to resilience. However, the deployment of highly adaptive capabilities in these environments may lead to inefficiencies, unnecessary complexity, and increased operational costs, thereby reducing their relative effectiveness.

This duality highlights a fundamental theoretical tension: the same capability may enhance resilience under certain environmental conditions while constraining it under others. Consequently, environmental dynamism is expected to moderate the relationship between supply chain capabilities and resilience by influencing both the direction and magnitude of their effects.

Accordingly, environmental dynamism is expected to moderate the relationship between supply chain capabilities and resilience by influencing the extent to which specific capabilities contribute to performance outcomes. Under high dynamism, adaptive capabilities such as agility and flexibility are likely to exert stronger positive effects on resilience, while structured capabilities such as coordination and visibility may experience diminishing or even negative effects. Conversely, under low dynamism, structured capabilities may enhance efficiency and stability, thereby contributing more significantly to resilience. This moderation perspective provides a theoretically grounded explanation for the variability and

contradictions observed in prior empirical findings regarding the capability resilience relationship**.** This perspective moves beyond linear assumptions by demonstrating that capability effectiveness is contingent, dynamic, and potentially contradictory under varying environmental conditions.

2.3 Hypotheses Development

Building on the theoretical integration of the dynamic capability's view, contingency theory, and information-processing theory, this study develops hypotheses to explain how supply chain capabilities influence resilience under varying levels of environmental dynamism. From a contingency-based perspective, the effectiveness of these capabilities is not uniform but depends on their alignment with environmental uncertainty and information-processing requirements (Grüner, 2024). From an information-processing perspective, supply chain capabilities function as mechanisms that enable firms to acquire, interpret, and respond to information within complex supply chain networks (Galbraith, 1974; March & Simon, 1958). These capabilities enhance a firm's ability to reduce uncertainty, improve decision quality, and support coordinated responses to disruptions. However, these capabilities differ in their functional roles, with some emphasizing structured coordination and control, while others promote adaptability and responsiveness (Kurtmollaiev, 2020). Consequently, their contributions to supply chain resilience are expected to vary across environmental conditions.

2.3.1 Supply Chain Capabilities and Resilience

Supply chain visibility enhances resilience by improving access to information and enabling firms to detect disruptions early, thereby supporting anticipatory decision-making (Baah et al., 2022). Through increased transparency and information availability, visibility allows firms to interpret environmental signals and coordinate proactive responses across supply chain networks (Galbraith, 1974; March & Simon, 1958). This enhanced situational awareness strengthens a firm's ability to anticipate, absorb, and respond to disruptions, thereby improving resilience outcomes.

Supply chain coordination contributes to resilience by aligning activities and decisions among supply chain partners, thereby improving efficiency, and reducing redundancies (Sudusinghe & Seuring, 2022). Coordination structures reduce uncertainty by standardizing information flows, decision protocols, and interaction routines, enabling synchronized responses across the supply chain (Galbraith, 1974; van den Berg et al., 2020). This alignment enhances operational stability and ensures consistent responses to disruptions, thereby supporting resilience.

In contrast, agility and flexibility represent adaptive capabilities that enable firms to respond rapidly to changes in demand and supply conditions. Agility enhances resilience by reducing decision latency and facilitating real-time operational adjustments (Akhtar et al., 2022), while flexibility enables firms to reconfigure resources, processes, and operational structures in response to disruptions (Piprani et al., 2022; Yu et al., 2021). These capabilities allow firms to absorb shocks, adapt to evolving conditions, and maintain continuity of operations.

Collectively, these capabilities enhance supply chain resilience by enabling firms to anticipate disruptions, absorb shocks, and reconfigure operations in response to environmental changes. However, the effectiveness of these capabilities is contingent upon the environmental context in which they operate. Therefore, the following hypotheses are proposed:

H1: Supply chain visibility has a significant positive effect on supply chain resilience.
H2: Supply chain agility has a significant positive effect on supply chain resilience.
H3: Supply chain coordination has a significant positive effect on supply chain resilience.
H4: Supply chain flexibility has a significant positive effect on supply chain resilience.

2.3.2 Environmental Dynamism as a Moderating Factor

Environmental dynamism, characterized by the rate, unpredictability, and complexity of environmental change, introduces varying levels of uncertainty and information-processing demands that influence organizational decision-making (Dess & Beard, 1984; Miller, 1987). Under such conditions, firms are required to make decisions under time pressure and information ambiguity **(**Phillips-Wren & Adya, 2020**),** thereby increasing the need for capabilities that support rapid interpretation and response.

Under high environmental dynamism, adaptive capabilities such as agility and flexibility become increasingly valuable. These capabilities enable firms to respond quickly to changing conditions, continuously reconfigure operations, and align responses with evolving environmental demands. By facilitating rapid decision-making and operational adjustment, agility and flexibility enhance a firm's ability to maintain resilience in the face of uncertainty.

Conversely, structured capabilities such as visibility and coordination may experience diminishing effectiveness under high environmental dynamism. Rapid environmental changes can render information quickly obsolete, reducing the usefulness of visibility for decision-making. Additionally, coordination mechanisms that rely on alignment among multiple actors may introduce delays, as synchronization across interdependent activities can conflict with the urgency of real-time response **(**Hilbolling et al., 2022**).** In such contexts, structured processes may become rigid, limiting a firm's ability to respond swiftly to disruptions (Jifri et al., 2023).

However, under relatively stable conditions, where uncertainty is lower and information flows are more predictable, visibility and coordination enhance

efficiency, predictability, and control, thereby supporting resilience outcomes (Laguir et al., 2022). This reflects a fundamental contingency-based trade-off, where capabilities that enhance stability under low uncertainty may constrain responsiveness under high uncertainty.

Therefore, environmental dynamism is expected to differentially moderate the relationship between supply chain capabilities and resilience, strengthening the effects of adaptive capabilities while weakening the effects of structured capabilities. Therefore, the following hypotheses are proposed:

H5a: Environmental dynamism negatively moderates the relationship between supply chain visibility and supply chain resilience.

H5b: Environmental dynamism positively moderates the relationship between supply chain agility and supply chain resilience.

H5c: Environmental dynamism negatively moderates the relationship between supply chain coordination and supply chain resilience.

H5d: Environmental dynamism positively moderates the relationship between supply chain flexibility and supply chain resilience.

3. METHODOLOGY

This study adopted a positivist philosophy and a cross-sectional explanatory research design to examine the moderating role of environmental dynamism on the relationship between supply chain capabilities and supply chain resilience among non-alcoholic beverage manufacturing firms in Kenya. The study targeted supply chain professionals involved in procurement, logistics, inventory management, production, warehousing, operations, and supply chain coordination because such respondents possess adequate operational and strategic knowledge regarding supply chain practices within manufacturing firms (Bougie & Sekaran, 2025).

Primary data were collected using structured questionnaires developed from established scales in the supply chain resilience and capability literature. All items were measured using five-point Likert scales. A stratified and purposive sampling approach was employed to ensure representation across multinational, large domestic, medium domestic, and small domestic beverage manufacturing firms. Of the 300 questionnaires distributed, 278 were returned. After data screening and removal of incomplete responses and multivariate outliers, 269 usable questionnaires were retained for analysis, resulting in a final usable response rate of 89.7%.

Missing data were treated using mean substitution procedures, while multivariate outliers were assessed using the Mahalanobis Distance (D^2) technique following recommendations by Tabachnick and Fidell (2019) and Hair et al. (2025). Internal consistency reliability was assessed using Cronbach's Alpha coefficients, with all constructs exceeding the recommended threshold of 0.70. Supply chain capabilities were operationalized through four dimensions: visibility, agility, coordination, and flexibility. Environmental dynamism was conceptualized in terms of the rate, unpredictability, and complexity of environmental change (Dess & Beard, 1984; Miller, 1987; Kim et al., 2025), while supply chain resilience captured the ability of firms to anticipate, absorb, adapt to, and recover from disruptions while maintaining operational continuity (Ivanov & Dolgui, 2021; Pu et al., 2023).

Exploratory Factor Analysis (EFA) using Principal Component Analysis with Varimax rotation and Confirmatory Factor Analysis (CFA) were conducted to assess construct validity and dimensionality. Kaiser-Meyer-Olkin (KMO) values exceeded the recommended threshold of 0.70, while Bartlett's Test of Sphericity was statistically significant ($p < 0.05$), confirming the suitability of the data for factor analysis (Akbulut & Çapik, 2022). Items with low or problematic cross-factor loadings were excluded to improve construct validity (Hair et al., 2019). Convergent validity was assessed using factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR), while discriminant validity was examined through inter-construct correlations and cross-loading assessment. Potential common method bias was minimized through procedural and statistical remedies, including factor analytic procedures and collinearity diagnostics (Podsakoff et al., 2012; Fuller et al., 2016; Hair et al., 2022).

Data analysis was conducted using IBM SPSS Statistics and AMOS. Descriptive statistics and Pearson correlation analysis were initially performed to examine variable distributions and associations among constructs. Hypotheses were tested using hierarchical moderated regression analysis and the PROCESS macro (Hayes, 2017). Interaction terms were generated using mean-centered variables to minimize multicollinearity effects and assess the moderating role of environmental dynamism on the relationship between supply chain capabilities and supply chain resilience, consistent with contingency-based and information-processing perspectives (Galbraith, 1974; Galbraith, 2021; Wamba et al., 2020; Saeed et al., 2022).

4. MEASUREMENT MODEL ASSESSMENT AND CORRELATION ANALYSIS

Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) supported the dimensionality, reliability, and validity of the study constructs. Kaiser-Meyer-Olkin (KMO) values exceeded the recommended threshold of 0.70, while Bartlett's Test of Sphericity was statistically significant ($p < .001$), confirming the suitability of the data for factor analysis (Hair et al., 2025; Watkins, 2021). All retained measurement items achieved factor loadings above the recommended threshold of 0.50, while Composite Reliability (CR) values exceeded 0.70 and Average Variance Extracted (AVE) values surpassed 0.50, confirming satisfactory

internal consistency reliability and convergent validity (Hair et al., 2025). Discriminant validity was also established as inter-construct correlations remained below critical thresholds and no problematic cross-loadings were observed.

Table 1. Descriptive Statistics, Reliability, Validity, and Correlation Matrix

Variable	Mean	SD	α	CR	AVE	1	2	3	4	5	VIF
SCV	3.87	0.71	0.841	0.872	0.631	1					2.14
SCA	4.01	0.66	0.863	0.891	0.672	0.542**	1				2.36
SCC	3.94	0.69	0.852	0.884	0.648	0.498**	0.613**	1			2.41
SCF	4.12	0.63	0.879	0.904	0.701	0.467**	0.655**	0.582**	1		2.57
SCR	4.08	0.61	0.887	0.913	0.724	0.421**	0.702**	0.594**	0.748**	1	—

Notes: SCV = Supply Chain Visibility; SCA = Supply Chain Agility; SCC = Supply Chain Coordination; SCF = Supply Chain Flexibility; SCR = Supply Chain Resilience; α = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted; SD = Standard Deviation; VIF = Variance Inflation Factor. Correlation is significant at $p < .01$.

Table 1 presents the descriptive statistics, reliability coefficients, validity indicators, and correlation matrix for the study variables. The results indicate significant positive associations among supply chain visibility, agility, coordination, flexibility, and supply chain resilience. Supply chain agility and flexibility exhibited relatively stronger correlations with resilience, suggesting the importance of adaptive capabilities in enhancing organizational responsiveness under dynamic operating conditions. The variance inflation factor (VIF) values were below the recommended threshold, indicating the absence of severe multicollinearity concerns among the predictor variables.

5. HYPOTHESIS TESTING AND MODERATING EFFECTS

Hierarchical moderated regression analysis and the PROCESS macro were employed to test the hypothesized direct and moderating relationships between supply chain capabilities, environmental dynamism, and supply chain resilience.

The findings revealed that supply chain visibility, agility, coordination, and flexibility had positive and statistically significant effects on supply chain resilience, thereby supporting H1, H2, H3, and H4 respectively.

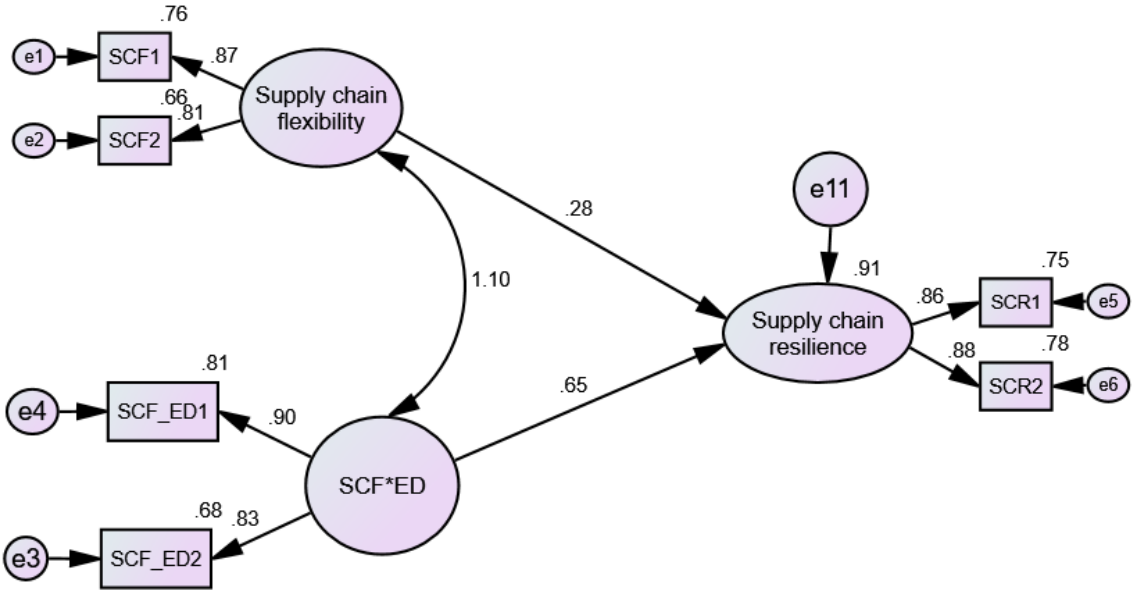

Figure 1. Moderation influence

The results suggest that firms possessing stronger information visibility, adaptive responsiveness, collaborative coordination, and operational flexibility are better positioned to anticipate, absorb, and recover from supply chain disruptions.

The moderation analysis further demonstrated that environmental dynamism significantly influenced the relationship between supply chain capabilities and resilience. Specifically, the interaction effects for supply chain agility and flexibility were positive and statistically significant, indicating that adaptive and reconfigurable

capabilities become increasingly valuable under highly dynamic and uncertain operating environments. In contrast, the interaction effects for supply chain visibility and coordination were negative but statistically significant, suggesting that highly structured and information-intensive capabilities may become less effective under conditions characterized by rapid environmental change, unpredictability, and volatility.

Among the examined capabilities, supply chain flexibility demonstrated the strongest positive moderating interaction effect with environmental dynamism on supply chain resilience. The moderation model achieved acceptable goodness-of-fit indices (CMIN/df = 1.666, CFI = 0.981, TLI = 0.977, RMSEA = 0.056), confirming the adequacy of the proposed moderation model for hypothesis testing (Byrne, 2021; Hair et al., 2025). The findings indicate that firms possessing higher levels of supply chain flexibility derive greater resilience benefits under turbulent and uncertain operating conditions because flexibility enables rapid reconfiguration of sourcing, logistics, production, and distribution processes in response to disruptions and environmental changes.

Figure 1 illustrates the moderating effect of environmental dynamism on the relationship between supply chain flexibility and supply chain resilience. The results demonstrate that the interaction effect between supply chain flexibility and environmental dynamism had a stronger positive influence on resilience than the direct effect of flexibility alone, thereby reinforcing the argument that adaptive and reconfigurable supply chain capabilities become increasingly critical under volatile operating conditions. These findings support contingency theory and the Dynamic Capabilities View by demonstrating that the effectiveness of organizational capabilities depends on environmental conditions and the firm's ability to rapidly adapt to external disruptions and uncertainty.

6. DISCUSSION

The findings of this study demonstrate that supply chain capabilities significantly influence organizational resilience, although their effectiveness varies depending on environmental conditions. Consistent with the Dynamic Capabilities View (DCV), the study establishes that firms possessing stronger operational and adaptive capabilities are better positioned to anticipate disruptions, absorb shocks, and sustain continuity under uncertain operating environments. Specifically, supply chain visibility, agility, coordination, and flexibility exhibited significant positive direct effects on resilience, thereby confirming the strategic importance of information accessibility, responsiveness, collaborative alignment, and operational adaptability in enhancing resilience capabilities within manufacturing supply chains. These findings reinforce prior studies which argue that supply chain capabilities improve resilience by enhancing information processing, responsiveness, and operational continuity under disruption-prone conditions (Baah et al., 2022; Pu et al., 2023; Patrucco et al., 2025).

The findings further reveal that environmental dynamism plays a critical contingency role in shaping the effectiveness of supply chain capabilities. In particular, the positive moderating effects observed for supply chain agility and flexibility suggest that adaptive and reconfigurable capabilities become increasingly valuable under conditions characterized by rapid environmental change, uncertainty, and volatility. These findings support contingency theory by demonstrating that organizational effectiveness depends on the alignment between internal capabilities and external environmental conditions (Luthans & Stewart, 1977). Under highly dynamic operating environments, firms are required to respond rapidly to changing customer demands, supply disruptions, regulatory shifts, and fluctuating market conditions. Consequently, capabilities that facilitate rapid decision-making, decentralized responsiveness, and operational reconfiguration become essential for sustaining resilience.

The significant positive moderating effect of supply chain flexibility is particularly important because it highlights the strategic value of reconfiguration-oriented capabilities within turbulent supply chain environments. Firms possessing higher levels of flexibility demonstrated stronger resilience outcomes under conditions of elevated environmental dynamism because flexibility enables rapid adjustment of sourcing arrangements, logistics operations, production schedules, and distribution systems in response to disruptions. These findings are consistent with studies emphasizing that organizational flexibility enhances resilience by enabling firms to rapidly adapt operations under uncertainty and environmental turbulence (Piprani et al., 2022; Saeed et al., 2022). The findings further reinforce the Dynamic Capabilities View by demonstrating that resilience increasingly depends on a firm's ability to continuously reconfigure resources and operational processes in response to environmental changes.

Similarly, the positive moderating effect observed for supply chain agility suggests that responsiveness-oriented capabilities become more critical as environmental uncertainty intensifies. Under highly dynamic conditions, firms operating with agile supply chain structures are better able to interpret environmental signals, accelerate decision-making, and respond rapidly to disruptions before they escalate into operational crises. These findings align with prior studies arguing that agility enhances supply chain responsiveness and organizational adaptation under volatile conditions (Akhtar et al., 2022; Wamba et al., 2020). The findings also support Information Processing Theory by demonstrating that agility enhances organizational capacity to process evolving information and enact timely operational responses under conditions of uncertainty and complexity (Galbraith, 1974; Galbraith, 2021).

In contrast, the negative moderating effects observed for supply chain visibility and coordination suggest that

structured and information-intensive capabilities may become less effective under highly turbulent operating conditions. Although visibility and coordination generally improve operational efficiency, information sharing, and alignment under relatively stable environments, their effectiveness appears to diminish as environmental dynamism increases. One possible explanation is that highly dynamic environments generate rapidly changing and complex information flows that may overwhelm decision-making systems, reduce information relevance, and create delays in coordinated responses. Similarly, coordination mechanisms that depend on synchronized decision-making and formalized interaction routines may reduce organizational responsiveness when rapid decentralized decisions are required. These findings support arguments suggesting that capabilities emphasizing control, standardization, and centralized coordination may generate rigidity under highly uncertain conditions (Jifri et al., 2023; Kurtmollaiev, 2020).

The findings therefore challenge the dominant assumption within portions of the supply chain resilience literature that organizational capabilities are universally beneficial regardless of environmental context. Instead, the study demonstrates that capability effectiveness is contingent, context-dependent, and potentially contradictory under varying environmental conditions. While structured capabilities such as visibility and coordination may enhance resilience under relatively predictable environments, adaptive capabilities such as agility and flexibility become increasingly important under turbulent conditions. This finding extends contingency theory by demonstrating that environmental dynamism not only influences organizational outcomes directly but also fundamentally alters the functional value of different supply chain capabilities.

From an emerging market perspective, the findings are particularly important because firms operating within developing economies frequently encounter infrastructural limitations, regulatory uncertainty, fluctuating supply conditions, technological constraints, and market volatility. In such environments, resilience depends less on rigid operational structures and more on adaptive capabilities that support rapid response and operational improvisation. Consequently, managers operating in highly volatile supply chain environments should prioritize investments in flexibility and agility while ensuring that visibility and coordination systems remain sufficiently adaptive and responsive to rapidly changing conditions. The findings therefore provide important managerial insights for manufacturing firms seeking to strengthen resilience under increasingly uncertain and disruption-prone environments.

7. THEORETICAL IMPLICATIONS

This study extends the supply chain resilience and organizational capability literature by demonstrating that the resilience value of supply chain capabilities varies across environmental conditions. While prior studies frequently conceptualize supply chain capabilities as universally beneficial, the findings reveal that the effectiveness of specific capabilities depends on the degree of environmental dynamism confronting firms. Adaptive capabilities such as agility and flexibility exhibited stronger resilience-enhancing effects under turbulent operating conditions, reinforcing the argument that dynamic capabilities derive strategic value from their ability to facilitate rapid reconfiguration and organizational adaptation under uncertainty.

The findings advance contingency theory by empirically demonstrating that environmental dynamism functions as an important contextual mechanism shaping the relationship between supply chain capabilities and resilience outcomes. The results suggest that organizational capabilities cannot be evaluated independently of the environments within which they operate because environmental uncertainty fundamentally alters the effectiveness of operational and strategic capabilities. Some capabilities strengthened resilience under volatile conditions, while others became less effective or potentially restrictive during turbulence.

The findings also enrich Information Processing Theory by highlighting the differential effectiveness of information-intensive capabilities across varying environmental conditions. Although visibility and coordination generally support information sharing and operational integration, their effectiveness weakened within highly turbulent environments, suggesting that excessive reliance on structured information-processing systems may reduce responsiveness under rapidly changing conditions. The results therefore deepen theoretical understanding regarding the relationship between information-processing capabilities, adaptability, and resilience within disruption-prone supply chain environments.

The study additionally enriches the emerging market supply chain literature by providing empirical evidence from non-alcoholic beverage manufacturing firms in Kenya, a context characterized by infrastructural constraints, market volatility, and environmental uncertainty. Existing resilience literature remains heavily concentrated within developed economies, limiting contextual understanding of how supply chain capabilities function under developing-country conditions. The findings therefore broaden resilience scholarship by demonstrating the context-dependent nature of supply chain capability effectiveness within emerging and uncertainty-intensive markets.

8. MANAGERIAL IMPLICATIONS

The findings provide important managerial implications for manufacturing firms operating within volatile and uncertain supply chain environments. Managers should prioritize investments in adaptive supply chain capabilities such as agility and flexibility because these capabilities become increasingly valuable under

turbulent operating conditions. Firms possessing flexible sourcing arrangements, responsive logistics systems, and adaptable production processes are better positioned to respond rapidly to disruptions and maintain operational continuity during periods of uncertainty.

Managers should also recognize that structured capabilities such as visibility and coordination may not always generate superior resilience outcomes within highly dynamic environments. Although visibility and coordination remain important for operational integration and efficiency, excessive dependence on centralized coordination structures and rigid information-processing systems may reduce responsiveness when rapid decentralized decisions are required. Managers should therefore ensure that coordination and information-sharing mechanisms remain sufficiently flexible to accommodate changing operational conditions.

The findings further indicate that resilience strategies should be aligned with the environmental conditions confronting firms. Under relatively stable environments, structured coordination and information visibility systems may adequately support operational continuity. Under highly volatile and disruption-prone conditions, firms should emphasize decentralized responsiveness, rapid decision-making, and operational adaptability. Managers should therefore avoid adopting uniform resilience strategies across all environmental contexts and instead develop contingency-oriented capability configurations aligned with prevailing environmental conditions.

For firms operating within emerging economies such as Kenya, the findings underscore the importance of building adaptive resilience mechanisms capable of responding to infrastructural instability, regulatory uncertainty, supply disruptions, and market volatility. Managers should therefore strengthen organizational learning, supply chain responsiveness, and operational flexibility to improve resilience under increasingly uncertain business environments.

9. CONCLUSION

This study examined the moderating role of environmental dynamism on the relationship between supply chain capabilities and supply chain resilience among non-alcoholic beverage manufacturing firms in Kenya. The findings established that supply chain visibility, agility, coordination, and flexibility significantly influence organizational resilience, although their effectiveness varies across environmental conditions. Adaptive capabilities such as agility and flexibility demonstrated stronger resilience-enhancing effects under turbulent operating conditions, while the effectiveness of structured capabilities such as visibility and coordination weakened under highly dynamic environments. The findings underscore the importance of aligning organizational capabilities with prevailing environmental conditions. Firms operating within volatile and uncertainty-intensive environments require supply chain structures that support rapid responsiveness, operational adaptability, and continuous reconfiguration of resources and processes. Consequently, resilience should not be viewed as a static organizational outcome but rather as a dynamic capability shaped by environmental conditions and the firm's ability to adapt to disruptions.

The study also reinforces the importance of environmental dynamism as a critical contextual mechanism influencing capability effectiveness within supply chain systems. The findings demonstrate that organizational capabilities do not generate uniform resilience outcomes across all operating environments, thereby highlighting the contingent and context-dependent nature of supply chain resilience. These insights are particularly important for firms operating within emerging economies characterized by infrastructural instability, market volatility, and supply uncertainty.

Overall, the study provides important theoretical and managerial insights regarding the role of adaptive supply chain capabilities in strengthening organizational resilience under increasingly uncertain and disruption-prone environments.

10. LIMITATIONS AND FUTURE RESEARCH

Several limitations should be acknowledged when interpreting the findings of this study. The study adopted a cross-sectional research design, which limits the ability to establish causal relationships and examine capability-resilience dynamics over time. Future studies may adopt longitudinal approaches to examine how supply chain capabilities evolve and influence resilience under changing environmental conditions.

The study also focused on non-alcoholic beverage manufacturing firms operating within Kenya. Although this context provided important insights into resilience within emerging markets, the findings may not be fully generalizable to other industries or geographical contexts. Future studies may therefore examine the proposed relationships across multiple sectors and countries to improve contextual comparability and external validity.

The study further examined environmental dynamism as the primary moderating variable. Other contextual factors such as technological turbulence, institutional pressures, supply chain complexity, and organizational culture may also influence the relationship between supply chain capabilities and resilience. Future research may therefore incorporate additional moderating and mediating mechanisms to provide a more comprehensive understanding of resilience capability configurations.

Finally, the study focused primarily on organizational-level capabilities and resilience outcomes. Future research may extend the analysis by examining inter-organizational resilience mechanisms, digital resilience capabilities, sustainability-oriented resilience practices,

and ecosystem-level resilience strategies within increasingly interconnected supply chain networks.

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