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Orchestrating transformative resilience in resource-constrained environments: A supply chain perspective

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# Orchestrating transformative resilience in resource-constrained environments: A supply chain perspective

## Abstract

**Purpose** – Resource-constrained environments both spur and hinder transformative resilience, yet little is known about how some firms navigate such environments to achieve transformative resilience. This study proposes and examines the presence of supply chain managers and supply chain entrepreneurial orientation as resource-orchestration enablers of transformative resilience in resource-constrained environments.

**Design/methodology/approach** – The study hypothesizes that the presence of supply chain managers and supply chain entrepreneurial orientation, individually and through their interdependent relationship, drive transformative resilience. The study's hypotheses are tested on survey data from 397 firms in a resource-constrained environment (Ghana). The findings are validated with second-wave survey data on transformative resilience from 205 of these firms, collected a year later. A series of regression-based multivariate analyses is used to analyze the data.

**Findings** – The results indicate that, unlike the presence of supply chain managers, a strong supply chain entrepreneurial orientation accounts for high levels of transformative resilience. The contribution of supply chain manager presence to transformative resilience is mediated by supply chain entrepreneurial orientation.

**Originality/value** – This study presents resource orchestration theory as a promising lens for conceptualizing transformative resilience and analyzing its building blocks from a supply chain perspective. It further addresses gaps in the empirical understanding of transformative resilience in terms of its measurement and antecedents.

**Keywords:** Supply chain resilience, transformation, supply chain managers, strategic orientation, entrepreneurship, Africa

**Paper type:** Research article

## 1. Introduction

Firms operating in resource-constrained environments are more vulnerable to chronic disruptions that often cascade into sustained structural and operational failures in their supply chains (SCs) (Msowoya and Luiz, 2026; Oke and Nair, 2023; Razak et al., 2024). These environments are most prevalent in developing countries and Africa (Essuman et al., 2026; Ibrahim et al., 2026) and are characterized by limited access to critical resources, such as raw and semi-processed materials, intermediary services, finance, technology, infrastructure, and institutional support (Busch and Barkema, 2021; Oke and Nair, 2023). Using multi-country cases and constraint-based thinking, Oke and Nair (2023) illustrate how such environments, by inducing SC disruptions, can stimulate firms to transform their operations and SCs through innovative responses. This insight reinforces a long-standing literature that contends that hostile environments and scarcity can spur innovative responses (Acar et al., 2019; Khoury and Prasad, 2016). However, this literature also recognizes that resource-constrained environments can inhibit such responses (Essuman et al., 2026), particularly *transformative resilience*, which is resource-intensive and often disrupts existing organizational structures and routines (Chirico et al., 2024; Oke and Nair, 2023). As a result, in resource-constrained environments, firms may not prioritize transformative resilience; instead, they may pursue responses focused on resource conservation and temporal stability during disruptions (Dankyira et al., 2024).

These competing views on firm behavior regarding transformative resilience in resource-constrained environments raise an underexplored question: *why do some firms, but not others, demonstrate transformative resilience in resource-constrained environments?* We contribute to addressing this question by building on the strategy and entrepreneurship literature that underscores the strategic value of resource mobilization, coordination, creation, and deployment in resource-constrained environments (Adegbile et al., 2024; Busch and Barkema, 2021; Msowoya and Luiz, 2026). These actions, constituting resource orchestration (RO) (Sirmon et al., 2011), can allow firms to overcome resource constraints while pursuing novel changes in their operations and SCs (Chirico et al., 2024; Oke and Nair, 2023). This literature is particularly relevant to understanding the sources of heterogeneity in transformative resilience because such resilience depends on firms' capacity to mobilize or create new internal and external SC resources, and to deploy them to shift operations and SCs

into new domains after disruptions (Mirzabeiki and Aitken, 2023). Accordingly, we present an SC-focused RO perspective to address our research question.

RO theory views managers as resource orchestrators who facilitate changes in firms' resource portfolio and configuration in disruptive environments (Sirmon et al., 2007). By conceptualizing transformative resilience as novel changes in operations and SC resources during disruptions, we argue that SC managers can contribute to this resilience due to their central role in managing internal and external SC resources (Hendricks et al., 2015; Roh et al., 2016), particularly during disruptions (Paraskevas et al., 2023; Sihvonen and Kauppi, 2025). These managers inherently possess the SC-specific experiences, knowledge, and skills (Nikookar and Yanadori, 2022; Roh et al., 2016) needed to mobilize, coordinate, and deploy intra-firm and external SC resources (Roh et al., 2016; Sihvonen and Kauppi, 2025).

Notwithstanding this contention, the presence of SC managers in firms (hereafter, SC manager presence) is itself a scarce resource, particularly in resource-constrained environments (Essuman et al., 2026). Strategy and entrepreneurship literature argues that entrepreneurial orientation can compensate for resource deficiency (Andersén, 2021). It provides the vision and motivation needed to mobilize, create, coordinate, and deploy resources in pursuit of new market opportunities (Chirico et al., 2011; Schweiger et al., 2019). Extending this logic to SC contexts, we follow Hult et al. (2007) in proposing SC entrepreneurial orientation as a driver of transformative resilience and also as an intervening mechanism through which SC manager presence enhances transformative resilience. SC entrepreneurial orientation refers to the extent to which a firm works with key SC members to engage in risk-taking initiatives, pursue innovation, and proactively seek new market opportunities (Hult et al., 2007). We propose that SC entrepreneurial orientation enables the orchestration of internal and external SC resources (Appiah et al., 2025; Chirico et al., 2024), providing a pathway through which SC managers direct their resource management actions toward improving transformative resilience.

This study offers many contributions, three of which are highlighted here. First, it addresses the limited empirical knowledge on transformative resilience in operations and SCs (Gold et al., 2026) by empirically operationalizing the construct and analyzing its antecedents. Second, it advances an RO perspective that reconceptualizes transformative resilience as a form of resource structuring and pioneering enabled by SC RO capacities, such as SC manager presence and SC entrepreneurial orientation. The study's theorization allows us to move beyond Scholten et al.'s (2025) view and related questions about whether transformative resilience is necessary in all contexts or constitutes a last-resort form of

resilience, to explain why transformative resilience varies across firms operating in contexts that can both encourage and constrain such resilience (Oke and Nair, 2023). Finally, the study contributes to debates on whether SC managers matter (Sihvonen and Kauppi, 2025; Suurmond et al., 2025) by showing that their contribution to transformative resilience depends on the mechanisms through which they perform their RO roles.

We use the subsequent section to discuss key literature and then develop the study's theoretical foundation and hypotheses. Following that, we describe the study's methodology and data. The data analysis and results are presented afterward. After this, we discuss the study's theoretical contributions and implications, as well as practical implications and limitations. We conclude the paper with key reflections on the study's insights.

## **2. Literature Review, Theoretical Background, and Hypothesis Development**

This section first discusses pertinent literature on the study's concepts. Next, it presents the theoretical foundation of the study, and then the development of hypotheses.

### **2.1. Literature Review**

#### *2.1.1. Transformative resilience*

Extant literature suggests that, when SC disruptions occur, firms may exhibit resilience properties reflecting either *preservation* of existing structures and functions (e.g., absorption and recovery) or *changes* in structures and functions (e.g., adaptation and transformation) (Gold et al., 2026; Holgado et al., 2024; Scholten et al., 2025). The former is often associated with temporal stability or the engineering view of resilience, whereas the latter reflects the change-oriented or socioecological view of resilience (Ruel et al., 2026; Wieland et al., 2023). This study focuses on the transformation dimension of resilience (transformative resilience, for short) (Mirzabeiki and Aitken, 2023).

Scholarly views on transformative resilience and adaptive resilience overlap, although an emerging view regards the former as involving (radical) changes that position the firm in new domains of operations, and the latter as involving (minor) changes that occur to keep the firm in existing domains of operations (Gold et al., 2026; Scholten et al., 2025; Wieland et al., 2023). This study defines transformative resilience as the extent to which firms change their operations and SC resource portfolios and configurations in novel ways during SC disruptions (Scholten et al., 2025; Wieland et al., 2023). As expanded on in Section 2.2, the operations and SC resources that may undergo such changes include, but are not limited to,

products, technologies, processes, supply networks, and customer networks (Gold et al., 2026; Scholten et al., 2025).

Despite its distinctiveness from other resilience dimensions (Scholten et al., 2025; Wieland and Durach, 2021), transformative resilience lacks focused theoretical and empirical assessment (Gold et al., 2026). Much of the empirical literature focuses on resilience indicators associated with preservation or combines preservation- and change-oriented resilience indicators into aggregate firm or SC resilience scales, as reflected in studies that rely on widely used resilience scales (see Nikookar et al., 2025). Existing literature on transformative resilience is largely conceptual, although recent qualitative research has begun to explore its nature, antecedents, and contexts (Mirzabeiki and Aitken, 2023; Scholten et al., 2025). Research addressing these limitations is timely given the pronounced emphasis on transformative responses in operations and SCs lately (Roehrich et al., 2026; Wieland et al., 2023).

Extant literature largely focuses on major disruptive events such as pandemics, trade wars, geopolitical tensions, and climate change to illustrate the importance of transformative resilience (Roehrich et al., 2025; Wieland et al., 2023). However, although these episodic disruptions provide suitable contexts for studying transformative resilience, they are not the only conditions that may necessitate it. Chronic disruptions emerging from resource-constrained environments also spur transformative resilience responses as they can cascade into sustained adverse impacts and render existing operations and SCs no longer cost-effective (Msowoya and Luiz, 2026; Oke and Nair, 2023).

We contend that a resource-constrained environment particularly provides a compelling context for studying transformative resilience, as it allows us to address questions not about the desirability or importance of such resilience (Scholten et al., 2025), but about what firms require to orchestrate it (Roehrich et al., 2025). Our focus on a resource-constrained environment also allows us to expand on assumptions that underpin prior resilience research in such contexts. This body of research generally assumes that when faced with disruptions, firms or decision-makers in resource-constrained environments tend to focus on conserving resources (Dankyira et al., 2024) and where improvisation and orchestration actions are enacted, they are directed toward achieving operational continuity (Msowoya and Luiz, 2026). The present research advances an alternative view, grounded in RO theory, regarding the sources of heterogeneity in firms' transformative resilience in resource-constrained environments.

### *2.1.2. Supply chain manager presence*

Practically all firms have SCs and may not need dedicated SC managers to perform the SC management function. However, the emergence of the SC management field and, accordingly, the appointment of managers to dedicated SC positions have given rise to a research stream that seeks to explain the added value such dedicated managers offer firms (Hendricks et al., 2015; Roh et al., 2016). Accordingly, prior studies address this question by using binary scales that capture whether a firm has individuals occupying SC-related managerial or executive positions (e.g., Kroes et al., 2022; Paraskevas et al., 2023; Sihvonen and Kauppi, 2025; Wagner and Kemmerling, 2014). The rationale and measurement traditions underpinning this research stream guide the present study. Accordingly, we define and measure SC manager presence as whether firms have individuals in dedicated managerial positions responsible for managing their SCs.

Prior studies have assessed the unique contributions of SC managers by focusing on various organizational outcomes, such as financial performance (Roh et al., 2016; Wagner and Kemmerling, 2014), operational and financial performance during disruptions (Sihvonen and Kauppi, 2025), stock market reactions (Hendricks et al., 2015), and product recall propensity (Paraskevas et al., 2023). However, such studies hardly account for the relevant intervening mechanisms underlying what SC managers do or through which they exert particular effects (Sihvonen and Kauppi, 2025). In addition, these studies largely focus on resource-abundant environments, such as publicly listed firms in advanced economies, and are primarily guided by upper-echelons thinking, reflecting the executive positions SC managers often hold in such contexts. This research extends this literature by focusing on transformative resilience and by examining both the direct and indirect roles of SC managers in shaping this outcome in resource-constrained environments.

### *2.1.3. Supply chain entrepreneurial orientation*

The SC entrepreneurial orientation concept is situated in the strategic orientation literature (Schweiger et al., 2019). Strategic orientation is a multidimensional construct that represents firms' overall posture toward specific issues within their environment (e.g., opportunities and threats) and how they manage them to gain strategic advantage (Gatignon and Xuereb, 1997; Voss and Voss, 2000). Strategic orientation, thus, exists in different forms depending on the nature of the issues involved and how firms respond to them. Examples include entrepreneurial orientation and market orientation, which reflect strategic postures toward entrepreneurial and marketing issues, respectively (Schweiger et al., 2019). SC management

research has extended these ideas to propose orientations that align more closely with SC thinking and contexts, such as SC orientation (Min et al., 2007) and SC disruption orientation (Bode et al., 2011). Our work follows Hult et al.'s (2002; 2007) extension of entrepreneurial orientation to the SC context.

Hult et al. (2002) conceptualize SC entrepreneurial orientation as a specific form of SC cultural competitiveness, whereby shared values and beliefs between a firm and its SC members are directed toward activities that create market value for the SC. SC entrepreneurial orientation refers to “the chain members’ values associated with the pursuit of new market opportunities and the renewal of existing areas of supply chain activities” (Hult et al., 2007, p. 1038). In terms of manifestation, however, SC entrepreneurial orientation reflects the degree to which a firm works with key SC members to engage in risk-taking initiatives, pursue innovation, and proactively seek new market opportunities (Hult et al., 2007). Although prior research on the value of this orientation has focused on operational performance outcomes (Hult et al., 2002; 2007), we develop and test the proposition that it is equally valuable for transformative resilience, especially in resource-constrained environments.

## ***2.2. Theoretical foundation***

RO theory addresses questions about (1) the sources of superior firm performance, (2) the nature of resource management, (3) the role of managers in this regard, and (4) how managers and/or resource management explain performance variance among firms (D’Oria et al., 2021; Sirmon et al., 2011). This research focuses on questions (2) and (3) concerning the theory. As illustrated in Figure 1, it conceptualizes transformative resilience as the structuring and pioneering of operations and SC resources under disruptive conditions and proposes that this resilience is enabled by SC managers and SC entrepreneurial orientation.

According to RO theory, managers drive strategic change in dynamic and disruptive environments by engaging in three broad resource management actions: structuring, bundling, and leveraging (Sirmon et al., 2007; Sirmon et al., 2011). They engage in resource structuring by building a resource portfolio through acquisition, accumulation, and divestment; in resource bundling by integrating and aligning resources to stabilize operations, enhance existing capabilities, and develop new ones; and in resource leveraging by mobilizing and deploying these capabilities to achieve operational and strategic outcomes (Sirmon et al., 2011). At the firm level, these RO actions are enacted by multiple managers, whose individual contributions and effectiveness may vary across top and middle/functional

managers (Sirmon et al., 2011). This work examines whether and how SC managers, who typically do not hold top management positions but are responsible for functional-area RO roles (Suurmond et al., 2025), explain variations in transformative resilience.

Firms' operations and SCs consist of a portfolio and configuration of internal and external organizational resources and capabilities that are managed to create and deliver market value (Ralston et al., 2023). Among other RO actions, firms acquire, configure, and/or deploy factor-market resources (e.g., suppliers, supply networks, and materials), product-market resources (e.g., products, customers, and customer networks), and internal organizational resources and capabilities (e.g., operational routines and technologies) to pursue operational and strategic objectives (Craighead et al., 2020; Ralston et al., 2023). The RO perspective holds that firms adjust these RO actions in response to changes in their environment (Sirmon et al., 2007). When firms encounter SC disruptions, they have options to either *preserve* or *change* the structure, form, and configuration of their existing operations and SC resources (Scholten et al., 2025). Transformative resilience, which follows the latter option, takes the form of resource structuring and pioneering (Sirmon et al., 2007), as it involves novel changes in the portfolio and configuration of operations and SC resources. Specifically, it entails *replacing or divesting* existing operations and SC resources and *acquiring* and *creating* new ones in response to SC disruptions (Craighead et al., 2020; Mirzabeiki and Aitken, 2023; Scholten et al., 2025).

Scholars emphasize the need to contextualize RO theory, which was originally developed with limited consideration for variations in organizational context (D'Oria et al., 2021; Wales et al., 2013). Recent developments recognize that contextual factors, such as firms' life cycle stage (Sirmon et al., 2011) and size (Chirico et al., 2024; Wales et al., 2013), present different resource needs and capacity to effectively undertake RO. The present study seeks to extend this line of thinking by considering the role of SC managers in resource-constrained environments. This study argues that although such environments make RO particularly important during SC disruptions, they simultaneously encourage resource conservation (Dankyira et al., 2024). Thus, explaining why transformative resilience differs across firms in such environments requires accounting for variations in firm-specific RO capacity that not only motivate transformative resilience but also enable it. We propose SC manager presence and SC entrepreneurial orientation as such RO capacities. The arguments underlying this position are developed in the subsequent sections.

--- Insert Figure 1 about here ---

## **2.3. Hypotheses**

### *2.3.1. The role of SC manager presence*

As a form of strategic change, transformative resilience has a long-term focus (Gold et al., 2026; Wieland and Durach, 2021), disrupts existing operations and SC routines (Oke and Nair, 2023), and may require substantial resource investment (Chirico et al., 2024). In resource-constrained environments, these strategic change issues may discourage firms from pursuing transformative resilience during SC disruptions (Dankyira et al., 2024). The study contends that SC managers, by virtue of the internal and external SC RO roles associated with their positions, can help firms overcome resource constraints to achieve transformative resilience.

Top managers tend to exercise greater control over strategic change issues, such as transformative resilience, but they may lack the understanding and competencies needed to manage SCs and may be occupied with other strategic issues. Without dedicated SC managers, SC-related challenges and solutions may receive limited attention and resource commitment from top managers (Paraskevas et al., 2023), especially in a resource-constrained environment. By representing and overseeing firms' SC functions (Nikookar and Yanadori, 2022), SC managers are positioned to initiate strategic actions and participate in strategic decisions related to SC design and operations (Paraskevas et al., 2023; Sihvonen and Kauppi, 2025). Such strategy development opportunities available to SC managers can enable them to shape their firms' operations and SC-related RO decisions (Sirmon et al., 2011), which become particularly critical during disruptions when stakes are high (Sihvonen and Kauppi, 2025).

The experience and knowledge of SC managers can extend to SC disruption management (Nikookar and Yanadori, 2022). Thus, they are better positioned to guide necessary redesigns of SCs while also advising other functional areas (e.g., operations and marketing) that need to undertake the transformative responses required to address such disruptions (Paraskevas et al., 2023; Nikookar and Yanadori, 2022). Similarly, SC managers may become key contact points for advising top managers on resilience responses. When disruptions require transformative responses, SC managers can champion such efforts and secure resources from top management to support these initiatives (Körber and Cotta, 2021; Kroes et al., 2022).

In their role as middle managers in strategy processes (Chadwick et al., 2015; Sirmon et al., 2011), SC managers are also responsible for implementing new SC strategies (Kroes et

al., 2022; Paraskevas et al., 2023). In doing so, SC managers are expected to mobilize and coordinate critical resources (e.g., knowledge, ideas, and expertise) across functional units (Körber and Cotta, 2021; Sihvonen and Kauppi, 2025). Such cross-functional resource mobilization and coordination roles are essential for driving transformative resilience, which often requires efforts from multiple functional areas. Relatedly, SC managers are involved in mobilizing, integrating, and deploying external resources (e.g., information and innovative ideas) from suppliers and customers (Sihvonen and Kauppi, 2025; Suurmond et al., 2025). These boundary-spanning RO roles of SC managers can help firms in resource-constrained environments overcome their internal resource limitations to achieve transformative resilience (Chirico et al., 2024; Paraskevas et al., 2023). Therefore, we hypothesize that:

*H1. SC manager presence positively affects transformative resilience in a resource-constrained environment.*

### *2.3.2. The role of supply chain entrepreneurial orientation*

We contend that SC entrepreneurial orientation underlies the creation, mobilization, coordination, and deployment (investment) of internal and external SC resources, which are critical for firms in resource-constrained environments to engage in strategic change and pursue new opportunities. Thus, it is expected to function not only as a driver of transformative resilience but also as a pathway through which SC manager presence contributes to transformative resilience in such contexts.

Transformative resilience requires resource investment (Sirmon et al., 2007). As with the intra-firm perspective of entrepreneurial orientation (Andersén, 2021; Sturm et al., 2023), where SC entrepreneurial orientation is strong, a firm, working with its SC members, is likely to prioritize and channel investment into opportunity exploration, creation, and exploitation to create new value (Hult et al., 2007). Thus, although not all firms can recognize value-enhancing opportunities from disruptions, SC entrepreneurial orientation increases firms' chances of spotting such opportunities quickly (Andersén, 2021). Also, even if firms recognize disruption-related opportunities, those lacking a strong SC entrepreneurial orientation may be reluctant to commit resources to exploit such opportunities (Sturm et al., 2023). Accordingly, a strong SC entrepreneurial orientation helps firms in resource-constrained environments overcome the tendency to conserve resources and instead take risks to invest in disruption-related opportunities (Wales et al., 2013). This is particularly likely

because entrepreneurially oriented SCs recognize that interest in, and support for, such investments are shared among SC members (Hult et al., 2007).

Moreover, although external resource acquisition and mobilization are core means through which firms overcome internal resource constraints (Oke and Nair, 2023), SC entrepreneurial orientation offers a more robust mechanism for achieving this. By fostering a shared interest in creating market value among SC members, this orientation encourages partners to share resources, such as ideas, knowledge, experience, and financial support, to rapidly exploit new market opportunities (Hult et al., 2007). In addition, it guides firms in allocating scarce resources toward activities that generate market value (Hult et al., 2007). In sum, SC entrepreneurial orientation provides a platform through which firms can quickly acquire, mobilize, and deploy external resources to drive transformative resilience (Appiah et al., 2025; Chirico et al., 2024). Therefore, we hypothesize that:

*H2. SC entrepreneurial orientation positively affects transformative resilience in a resource-constrained environment.*

RO theory suggests that SC managers perform RO functions, but it says little about whether they are effective in all contexts or the enabling mechanisms through which they successfully undertake such functions (Suurmond et al., 2025). We suggest that although SC manager presence has potential RO value, it may not by itself explain transformative resilience, especially in environments that impose significant constraints on SC managers.

Resource-constrained environments can pose major challenges for SC managers in performing their RO roles effectively. The tendency for firms to conserve resources in such contexts can hinder SC managers' efforts to mobilize resources from top management and across other functional areas to support transformative resilience initiatives. Not only do focal firms in resource-constrained environments experience resource scarcity and conservation tendencies, but their SC members do as well. We propose that SC entrepreneurial orientations serve as an intervening mechanism through which SC managers overcome these internal and external RO constraints to achieve transformative resilience.

SC managers' domain-specific position offers them a unique advantage in shaping top management's prioritization of SC entrepreneurial orientation, as well as the extent to which this orientation is incorporated into the firm's corporate strategy and values (Körber and Cotta, 2021; Kroes et al., 2022). Moreover, even when SC entrepreneurial orientation emerges from contextual necessity or is initiated by top managers, the domain-specific

position enables SC managers to serve as key actors in implementing this orientation into action. This gives them a platform to engage top management, cross-functional managers, and external SC actors to mobilize the resources required to make their SC more competitive. By directing their efforts toward driving SC entrepreneurial orientation, SC managers are likely to be more effective in promoting strategic issues, such as new market and resource opportunities arising from disruptions, within their firms and across their SCs, thereby enabling them to secure the necessary attention to resources and support both internally and from SC members. In so doing, SC entrepreneurial orientation enables SC managers, especially in resource-constrained environments, to access, mobilize, and deploy the resources required for transformative resilience. Therefore, we test this hypothesis:

*H3. SC entrepreneurial orientation positively mediates the relationship between SC manager presence and transformative resilience in a resource-constrained environment.*

### **3. Methodology**

The methods used to test the study's hypotheses seek to strike a balance between methodological conventions in operations and SC management and methodological adaptations that reflect the peculiarities of underexplored empirical settings in the field (Essuman et al., 2026). These settings, common in African and other Global South countries (Essuman et al., 2026; Schilling et al., 2026), are often characterized by the absence of secondary databases for measurement and sampling, challenges in identifying and recruiting key respondents, and the impracticality of conventional survey administration approaches, particularly for the longitudinal survey design implemented in this research. To ensure transparency and share lessons for future research conducted in similar empirical settings, we provide details of the study's methodology in Part I of the Supplementary File.

#### **3.1. Research design**

We conducted two-wave surveys to test our hypotheses. The first survey (Study 1), conducted between October and December 2024, captured cross-sectional data on the independent and dependent variables. To mitigate concerns about temporal order, Study 1 measured SC manager presence and SC entrepreneurial orientation over an earlier time horizon (the past three years) than transformative resilience (the past two years). The second survey (Study 2) was a follow-up study that collected data one year later, between September and October 2025, on transformative resilience from firms that participated in Study 1. Both

studies collected subjective and objective data on transformative resilience, enabling us to assess the validity of this construct's measurement. The two studies further enabled us to assess the robustness of findings on the direct effects of SC manager presence and SC entrepreneurial orientation on transformative resilience. The following sections discuss the study's sample, data collection, and measurement. The potential survey biases and controls are addressed in Section 1.5 of the Supplementary File.

### **3.2. Sample and data collection**

The study's data come from firms operating in Ghana, a resource-constrained environment (Essuman et al., 2026). Although Ghana, like many other African countries, is endowed with certain natural and social resources, it faces substantial deficiencies in several critical resources, including SC infrastructure (e.g., transportation, warehousing, and connectivity technologies), finance, intermediary services, energy resources, and formal institutional support (Ibrahim et al., 2026; Razak et al., 2024). The country also relies heavily on imports for many raw and semi-processed materials while experiencing significant exchange rate volatility. These resource deficiencies create frictions that frequently disrupt SCs (Msowoya and Luiz, 2026; Oke and Nair, 2023; Razak et al., 2024). Beyond irregular shifts in supply and product market conditions and unstable macroeconomic conditions (e.g., inflation and exchange rate fluctuations), firms in Ghana also report raw material shortages, unpredictable power outages, supplier failures, transportation failures, product failures, and operational breakdowns (Dankyira et al., 2024).

There is a lack of secondary data on firms in Ghana that detail SC manager titles, limiting our ability to draw a sample and administer the survey through conventional means. To address this challenge, we employed trained research assistants to conduct in-person visits to both identify a suitable sample and administer the survey. Specifically, a firm in the sample had to: (1) be a registered, autonomous business entity; (2) have operated for more than three years; (3) employ at least five full-time workers; (4) be located in one of Ghana's most industrialized or commercial regions (i.e., the Ashanti Region or Greater Accra Region). Since the survey questionnaire was administered in English, we also required that the firms have at least one key respondent literate in English.

Three initiatives enabled the study to obtain an adequate sample. First, we used multiple sources (e.g., BusinessGhana and GhanaYello) to gather contact and location information for 411 firms that met the sample inclusion criteria; this information facilitated the firm visits. Second, the research assistants visited industrial and commercial zones, where

they could access additional firms. Finally, they used referrals from key respondents to contact other firms. In total, 712 firms were contacted, of which 683 consented to participate in Study 1.

For each participating firm, one key respondent holding a senior management position was identified to provide the data (Nikookar et al., 2025; Sturm et al., 2023). Priority was given to individuals in managerial roles within SC, logistics, purchasing/procurement, or operations. In firms without such designated roles (typically small- and medium-sized firms), top managers (e.g., owner-managers or general managers) were selected as respondents. In all cases, respondents were given sufficient time (14 working days) to complete the questionnaire and were asked to consult relevant units within the firm to obtain any data not readily available.

The data collection for Study 1 took place between October 2024 and December 2024. During this period, follow-up visits were conducted to retrieve the completed questionnaires. A total of 461 completed questionnaires were received. At the time of questionnaire retrieval, key respondents were also asked to complete a brief follow-up survey focused on the study's dependent variable (transformative resilience). This follow-up survey was completed within seven working days, producing 415 completed questionnaires. After removing cases with missing data, the final matched sample comprised 397 firms, representing an overall effective response rate of 55.76%.

Between September and October 2025, we approached the effective sample from Study 1 to obtain data on transformative resilience, and 265 firms consented to participate in the follow-up study. Of these, 213 firms provided data, of which eight were dropped due to missing value issues. The effective sample for Study 2 was therefore 205, representing a matched response rate of 51.64%. The sample profile is shown in Table I.

-- Insert Table I --

### **3.3. Unit of Analysis and Measurement**

The unit of analysis in this study is the firm, and all constructs are operationalized from the focal firm's perspective. Unlike the other constructs, SC entrepreneurial orientation is inherently an SC-level construct, reflecting the extent to which firms engage in entrepreneurially oriented interfirm collaborations (Hult et al., 2007). To address this SC-level issue, we conceptualize SC entrepreneurial orientation as a relational and emergent property of firms' SC that is enacted through interfirm interactions and practices, but

experienced and interpreted by individual firms participating in the SC (Hult et al., 2007). Accordingly, we capture SC entrepreneurial orientation through the focal firm's assessment of these shared practices, namely proactive, innovative, and risk-taking actions (Hult et al., 2002; 2007). This approach is consistent with the view that shared phenomena can be meaningfully reported by actors when they are directly involved in, and have visibility over, the relevant interactions (Kozlowski and Klein, 2000). In this sense, SC entrepreneurial orientation reflects a collectively enacted orientation that is cognitively represented and evaluated at the firm level. Prior research has adopted a similar approach by measuring SC-level or inter-firm relationship constructs, such as SC collaboration, from the focal firm's perspective (e.g., Chirico et al., 2024; Nikookar et al., 2025).

We used a questionnaire to collect data. We followed best practices to generate the measurement items and to design the questionnaire to enhance measurement reliability and validity while reducing common method bias (CMB) (MacKenzie et al., 2011; Podsakoff et al., 2024). For example, the items were generated from key literature, and we ensured they reflected the conceptualizations and definitions of the study's constructs. Also, two independent scholars familiar with the resilience and SC literature reviewed our conceptualizations of the constructs and evaluated the items accordingly. They provided comments that helped us improve our conceptualizations and ensure the items have good face and content validity. Again, we piloted the questionnaires on 34 key informants who were excluded from the main survey. The feedback obtained was used to improve the clarity of items and the scales. The questionnaire items are presented next.

### **3.3.1. Substantive variables**

*Dependent variable: Transformative resilience.* There is a lack of existing items for transformative resilience. We drew on qualitative studies (Mirzabeiki and Aitken, 2023) and conceptual papers featuring illustrative cases (e.g., Wieland et al., 2023) to develop subjective and objective items for transformative resilience. All items were anchored in the SC disruptions the firms had experienced in the past (Section 3.3.2). Study 1 considered a two-year time window to operationalize the items, while Study 2 used a one-year time window. Specifically, for each study, respondents first indicated the SC disruptions their firms had encountered during the period of interest, which then served as the reference for their responses to the transformative resilience items.

For the subjective items, respondents indicated the extent to which the SC disruptions prompted their firms to successfully undertake each of the following actions: (1) introducing

completely new operations technologies and methods; (2) introducing entirely new products/services to the market; (3) identifying and securing new sources of supply; (4) using entirely new processes and methods to source supplies; and (5) using entirely new processes and methods to sell products/services. A five-point scale ranging from “not at all” (1) to “to a larger extent” (5) was used to rate these items.

For the objective items, respondents reported the number of transformative actions their firms successfully undertook in response to the SC disruptions: (1) introduction of new products or services, (2) adoption of new operational technologies or methods, (3) new customer markets penetrated, and (4) sourcing materials from new supply markets or suppliers. The responses produced count data, which were summed to create a variable for transformative resilience. This variable correlated strongly with the averaged subjective items for transformative resilience (Study 1:  $r = 0.643$ ,  $p < 0.001$ ; Study 2:  $r = 0.546$ ,  $p < 0.001$ ). Therefore, we tested our hypotheses using the first set of items and used the second set to conduct a robustness check.

*Independent variable: SC manager presence.* Our measurement of this construct follows both prior work and the theoretical justifications provided in Section 2.1.2. To summarize, we theorize about and sought to empirically measure, if any, the unique RO effect of dedicated SC managers in firms. Accordingly, a binary indicator was used to measure SC manager presence (Kroes et al., 2022; Paraskevas et al., 2023; Sihvonen and Kauppi, 2025). Prior studies have used text analysis to derive such a binary indicator. A key challenge of this measurement approach is the absence of universal descriptors for SC managerial job titles (Wagner and Kemmerling, 2014). Prior work addresses this issue by considering title descriptors that extend beyond “supply chain” to include related descriptors, such as purchasing, procurement, sourcing, and logistics (Kroes et al., 2022; Sihvonen and Kauppi, 2025; Wagner and Kemmerling, 2014).

As these job title descriptors can be numerous and vary across firms (Wagner and Kemmerling, 2014), our measurement approach required respondents to indicate whether their firms had dedicated managers in any of the following roles: leading SC, logistics, purchasing, procurement, or sourcing functions for at least the past three years (Paraskevas et al., 2023; Sihvonen and Kauppi, 2025; Wagner and Kemmerling, 2014). Firms that reported at least one of such job titles received a value of 1; otherwise 0 (Paraskevas et al., 2023; Sihvonen and Kauppi, 2025).

*Mediating variable: SC entrepreneurial orientation.* We adapted four items from Hult et al. (2007) to measure this construct, ensuring that the items are relevant to the study’s

context and behavioral perspective of the construct that underlies our theorization (Covin and Lumpkin, 2011). The respondents used a seven-point scale ranging from “strongly disagree (=1)” to “strongly agree (=7)” to evaluate the items: During the last three years, our company and its key supply chain members (e.g., suppliers, intermediaries, and customers): (1) initiated actions to which other companies in our industry respond; (2) were fast to introduce new methods and processes; (3) had a strong tendency for high-risk initiatives/projects; (4) were bold in our efforts to maximize the chances of exploiting opportunities.

### **3.3.2. Control variables**

To mitigate omitted variable bias, we controlled for five variables (SC disruption, managerial SC education, firm size, firm ownership, and firm sector), measured in Study 1, that could potentially covary with the independent, mediator, or dependent variables (Hill et al., 2021).

*SC disruption.* The items for transformative resilience were based on the SC disruptions firms had encountered. Since SC disruption experience varies among firms, it was essential for us to control for this factor. SC disruptions tend to weaken and threaten the stability and integrity of firms’ operations and SC configurations; firms experiencing greater levels of these events are likely to prioritize transformative resilience. However, the economic losses associated with SC disruptions may also limit their ability to invest in transformative resilience.

Since it is impractical to capture all SC disruptions in a single study, our measurement focused on the extent to which such events interrupted firms’ operations and SC activities, rather than on compiling a list of specific SC disruptions for evaluation. The items covered disruptions in upstream, internal operations, and downstream portions of a firm’s SC. To avoid measurement ambiguity, the survey provided a definition and examples of SC disruption from which the respondents were guided in their evaluation of the items: “Supply chain disruption or “disruption” refers to unexpected events that interrupt the activities and the flow of products/materials, information, and funds in a company’s supply chain. These events are numerous. Examples are sudden closure of major suppliers, shortages in the supply market, transportation failure, technology failure, energy shortages, natural disasters, and human-caused disasters.” Based on this information, the respondents rated these items: During the last two years, (1) our internal operations have suffered several disruptions; (2) disruptions have become very rampant in our supply markets; (3) our transportation networks and activities have faced several disruptions; (4) our sourcing/purchasing activities have encountered numerous disruptions; (5) several unexpected events have disrupted our

customer markets; (6) unexpected events have interrupted our customer order fulfillment activities. Each disruption item was evaluated on a seven-point scale ranging from “strongly disagree (=1)” to “strongly agree (=7).” We treated the items as formative, as SC disruptions are triggered by distinct factors and tend to affect different areas of the firm’s operations and SCs. A collinearity check indicated no redundancy among the items (highest variance inflation factor = 2.158); therefore, the items were summed to represent SC disruption.

*Managerial SC education.* Our theorization assumes SC managers are competent (Nikookar and Yanadori, 2022). Although our measure of SC manager presence includes a minimum threshold of three years of experience, it does not consider SC-related qualifications. To address this issue, we controlled for variability in the extent of SC qualifications among firms’ managers. We used a multiple-response item, asking respondents to indicate all relevant SC qualifications held by their managers. These qualification options include a diploma, bachelor’s degree, master’s degree, PhD, professional, and short courses (e.g., workshops). The total number of qualifications reported was used to measure managerial SC education.

*Firm size and ownership type.* Firm size (measured as the natural logarithm of the number of full-time employees) and ownership type (whether a firm is locally owned or has foreign or joint ownership) represent key sources of resource heterogeneity, with important implications for the study’s theorization. Prior research suggests firm size can predict the overall resilience of a firm (e.g., Nikookar and Yanadori, 2022). As firms grow larger, their scope and scale complexities often increase, potentially limiting strategic decision speed and flexibility. However, compared to small firms, large firms may have critical resources (e.g., financial capital) to support transformative resilience. More importantly, large firms may have greater resource capacity and motivation to recruit SC managers and develop SC human capital. Also, in Ghana, a developing country where SC management is still an emerging function, locally-owned firms may not fully recognize its importance and therefore be less inclined to invest in SC human resources. In contrast, firms with foreign ownership, given their potential broader exposure to contemporary management practices, may make such investments.

*Firm sector.* Literature suggests that variations in sectoral conditions (e.g., opportunities and threats) may influence firms’ resilience (Nikookar and Yanadori, 2022). Also, sectoral differences in operations and SC design (e.g., complexity) can influence both the necessity and speed of transformative resilience during disruptions. Furthermore, the need for SC managers may differ across sectors. For instance, SC management has traditionally

been developed in the manufacturing sector. Nearly 50% of the firms in our sample were from the manufacturing sector. Therefore, we created a dummy variable to control for the potential sector effect (manufacturing = 1; otherwise = 0).

## **4. Data Analysis**

### **4.1. Reliability and validity analysis**

The items for transformative resilience and SC orientation are reflective of their constructs. Accordingly, we used covariance-based confirmatory factor analysis (CFA) and maximum likelihood estimator in Mplus 7.4 to test the reliability and validity of the items (Hair et al., 2019). As shown in Table II, the data from both Study 1 and Study 2 fit the measurement model and support the unidimensionality, internal consistency, and convergent and discriminant validity of the items. All factor loadings are positive and significant at the 1% level. The congeneric reliability and average variance extracted (AVE) are greater than 0.60 and 0.50, respectively, and the AVEs exceed the shared latent variances (Hair et al., 2019).

-- Insert Table II here --

### **4.2. Hypothesis testing**

The descriptive statistics and correlations for the study's variables are given in Table III. We used covariance-based SEM to test its hypotheses. SEM allowed us to concurrently analyze the multiple dependence relationships in our conceptual model using the full set of measurement items for the reflective constructs (Hair et al., 2019). The SEM procedure involved estimating all hypothesized paths together with the control variables simultaneously (Hair et al., 2019). Table IV presents SEM paths, model fit indices, and path estimates and associated statistics. Overall, the SEM model fits the data for both studies.

The results indicate that SC manager presence does not affect transformative resilience (Study 1:  $\beta = -0.073$ ,  $p = 0.421$ ; Study 2:  $\beta = 0.072$ ,  $p = 0.518$ ), and that SC entrepreneurial orientation positively affects transformative resilience (Study 1:  $\beta = 0.501$ ,  $p < 0.001$ ; Study 2:  $\beta = 0.382$ ,  $p < 0.001$ ). These results reject H1, but support H2. The results further show that SC entrepreneurial orientation positively mediates the relationship between SC manager presence and transformative resilience (Study 1: indirect  $\beta = 0.151$ , 95% CI [0.060, 0.258]; Study 2: indirect  $\beta = 0.125$ , 95% CI [0.030, 0.235]). The bootstrap confidence intervals for the mediation effects do not include zero, thereby supporting H3 (Malhotra et al., 2014).

-- Insert Table III and Table IV here --

### 4.3. Robustness checks

We conducted three sets of analyses to assess the robustness of the study's findings. The statistical analyses and results are reported in Part 3 of the Supplementary File (Tables S1, S2, and S2).

First, we assessed the robustness of the SEM results regarding the effects of SC manager presence and entrepreneurial orientation on transformative resilience by using the count-based data for the latter variable. We conducted negative binomial (NB) regression because the count data exhibited overdispersion (Study 1: mean = 4.589; variance = 22.823; Study 2: mean = 3.581, variance = 8.196) (Faruquee et al., 2025). As shown in Table S1, the results indicate that while SC manager presence does not affect transformative resilience (Study 1:  $\beta = 0.047$ ,  $p = 0.725$ ; Study 2:  $\beta = -0.033$ ,  $p = 0.809$ ), SC entrepreneurial orientation positively affects it (Study 1:  $\beta = 0.454$ ,  $p < 0.001$ ; Study 2:  $\beta = 0.308$ ,  $p < 0.001$ ). These results hold if transformative resilience is replaced with its individual count items. Collectively, the NB regression results confirm the SEM results: unlike SC manager presence, SC entrepreneurial orientation affects transformative resilience positively.

Second, the firms from Study 1 that also participated in the second study tend to differ in size from those that did not participate in the second study (Table I). Although the findings across the two studies are comparable, we assessed whether this difference in sample composition influenced the results of Study 1. To do so, we re-conducted the analyses of Study 1 using only the subsample of firms that also participated in Study 2. As reported in Table S2 in the Supplementary File, the findings remained unchanged, suggesting that sample attrition in Study 2 is unlikely to have biased the study's conclusions.

Finally, the arguments for H1 and H3 assume that SC managers hold similar levels of authority and influence within their firms and/or have access to comparable complementary internal organizational resources. These assumptions are implied in prior studies (e.g., Sihvonen and Kauppi, 2025; Wagner and Kemmerling, 2014); however, they are unlikely to always hold. The contexts of small firms for SC managers are quite distinctive. These firms, defined in this study as businesses employing no more than 30 full-time workers (Ghana Statistical Service, 2024), are less likely to appoint SC managers to senior or executive-level positions (e.g., chief SC officer); if dedicated SC managers exist in such firms, they are likely to occupy functional or junior-level positions, where managerial authority and description are low. Moreover, in such firms, SC managers are less likely to have access to complementary

internal organizational resources. These limitations can undermine the effectiveness of the RO roles of SC manager presence in small firms. Accordingly, we excluded the small firms from our sample and reanalyzed the data. However, the findings reported in Table S3 of the Supplementary File do not differ in direction or significance from those of the full sample.

## **5. Discussion**

This study began with the premise that while resource-constrained environments and their associated SC disruptions encourage transformative resilience, they also inhibit the manifestation of such resilience. The underexplored question addressed in this study was, therefore, what explains variations in firms' transformative resilience in such environments. This study elaborated on RO theory and used data from a resource-constrained environment to address this question. The study's implications, contributions, and limitations are presented in this section.

### **5.1. Research contributions and implications**

The study contributes to and has implications for streams of literature on transformative resilience, SC management, entrepreneurship, and RO theory.

We advance research on resilience in the operations and SC management literature and the broader management literature. Although these streams of literature have long recognized transformative resilience as a distinct form of firm- and SC-level resilience (Wieland and Durach, 2021; Wieland et al., 2023), there has been a lack of empirical examination (Gold et al., 2026). We address this limitation in two ways. First, we develop and validate subjective and objective indicators of transformative resilience from an operations and SC standpoint. Second, we shed empirical insights into how SC entrepreneurial orientation drives transformative resilience and also serves as a mechanism through which SC manager presence contributes to this form of resilience.

Existing literature largely theorizes the nature and logic of transformative resilience through the lenses of complex adaptive systems and panarchy theories (e.g., Scholten et al., 2025; Mirzabeiki and Aitken, 2023; Novak et al., 2021; Wieland et al., 2023). Although these theories recognize the role of individual firms in transformative resilience responses (Scholten et al., 2025), their applications primarily focus on firms' interfaces and co-evolution with external environments or broader systems, such as SC networks, industries, and socio-political systems (Mirzabeiki and Aitken, 2023; Wieland and Durach, 2021). We expand on the individual firm view by underscoring how transformative resilience constitutes

a firm-driven strategic change occurring within their broader systems, such as SCs (Scholten et al., 2025). Specifically, from the RO perspective, such a strategic change involves firms' structuring and pioneering their operations and SC resources during disruptions (Craighead et al., 2020; Sirmon et al., 2007).

The RO perspective further allows us to move beyond existing questions about the contexts in which transformative resilience is necessary or unnecessary (see Scholten et al., 2025) to understand the sources of variation in transformative resilience within contexts, such as resource-constrained environments, that both spur and constrain firms' ability to demonstrate such resilience (Oke and Nair, 2023). Although greater levels of SC disruption may necessitate transformative resilience (Scholten et al., 2025), such a condition in itself may not produce greater transformative resilience, as threat-rigidity research suggests (Dankyira et al., 2024). The lack of a significant effect of SC disruption intensity on transformative resilience in this study supports this contention (see Table 1). In particular, in resource-constrained environments, we argue that the desire for transformative resilience is realizable only when firms have the capacity to orchestrate resources. Where such RO capacity is lacking, this desire becomes unattainable and may instead be replaced by the desire to enact responses that conserve existing operations and SC structures and configurations (Dankyira et al., 2024). A key implication of the RO perspective is that pursuing transformative resilience entails strategic choices (Sirmon et al., 2007). We argue that these choices are shaped by variations in firms' capacity for RO (e.g., SC manager presence and SC entrepreneurial orientation), rather than transformative resilience being a default or last resilience response (Scholten et al., 2025), or merely a product of the dynamic nature of the complex systems within which firms interact (Mirzabeiki and Aitken, 2023; Novak et al., 2021).

We contribute to the literature examining whether the presence of SC managers matters (e.g., Paraskevas et al., 2023; Roh et al., 2016; Sihvonen and Kauppi, 2025; Wagner and Kemmerling, 2014). Because the effects of SC manager presence may vary across organizational outcomes, we focus on the underexamined outcome of transformative resilience to advance understanding in this area. The study's findings suggest that the presence of SC managers itself does not make much of a difference in transformative resilience. Instead, its contribution to transformative resilience is enabled through SC entrepreneurial orientation. This insight underscores the need for research to account for what SC managers do and the mechanisms through which they function (Suurmond et al., 2025). It

also suggests the need for future research to revisit questions addressed in earlier studies using direct-effect analyses.

The study's analysis of SC entrepreneurial orientation advances the strategic entrepreneurship perspective on SCs (Hult et al., 2007; Ketchen and Craighead, 2020). Prior operations and SC research recognize entrepreneurial orientation as crucial for SC resilience (in general), but their theoretical analyses are limited to an intra-firm view on entrepreneurial orientation (e.g., Sturm et al., 2023). We extend this view by explaining how SC entrepreneurial orientation offers both intra-firm and boundary-spanning RO capacity for transformative resilience, and how SC managers facilitate this orientation. These theoretical propositions are supported by the study's data. The study thus advances the limited insights into the SC perspective on entrepreneurial orientation, particularly regarding its antecedents and outcomes (Ketchen and Craighead, 2020; Hult et al., 2007). It also enriches the emerging perspective on the RO roles of boundary-spanning SC practices, such as supplier collaborations (Chirico et al., 2024) and SC co-value creation (Appiah et al., 2025).

In their study of refugee SCs in Malawi, Msowoya and Luiz (2026) use the concept of spatial orchestration to advance an orchestration lens for understanding how SC actors in resource-constrained environments can demonstrate operational continuity through the coordination and reconfiguration of geographical territories. However, this orchestration lens leaves more to be learned about situations where RO aims to foster novel forms of change. In extending the orchestration lens along these lines, this study elaborates on RO theory in terms of its constructs and relationship specification, as well as the depth (managerial level) of its application (see Sirmon et al., 2011). Building on Sirmon et al.'s (2007) idea that RO involves changing existing resource portfolios in response to dynamic environments, we introduce transformative resilience as an important construct for understanding resource structuring and pioneering during SC disruptions. While Craighead et al. (2020) envisage the utility of RO theory for understanding change-oriented resilience, we develop this idea more fully, distinguishing the RO manifestations that constitute transformative resilience (e.g., changes in technologies, products, and supply and customer network resources) from the RO foundations that may enable them. The RO foundations, including SC managers and entrepreneurial orientation, permit lower-order resource management actions such as intra-firm and external resource search, acquisition or creation, mobilization, and coordination, offering firms the potential to demonstrate higher-order RO outcomes (e.g., transformative resilience) in disruptive situations.

Traditionally, RO theory has been organized around managers and their inherent resource management roles (D'Oria et al., 2021; Sirmon et al., 2011). Although subsequent developments recognize strategic orientations as mechanisms that enable RO actions (Andersén, 2021; Chirico et al., 2011; Schweiger et al., 2019), these streams of thinking have largely developed separately. We address this shortcoming by unpacking the interdependence between managers and strategic orientations, and how this link helps shed light on how managers become effective in undertaking the RO roles. Accounting for such a link is particularly instructive when explaining variations in firm-level RO outcomes in contexts where managers are not part of the upper-echelon coalition (Sirmon et al., 2011). In such situations, this study theorizes that strategic orientation can serve as a pathway through which middle- and functional-level managers sell strategic issues, gain attention, and mobilize and coordinate resources. This contention is particularly relevant for strategic orientations (e.g., SC strategic orientations) that middle- and functional-level managers (e.g., SC managers) can shape. These managers, we argue, are more likely to direct their efforts through such strategic orientations toward successful RO. Along these lines, this research advances the underdeveloped RO theory from the perspective of middle- and functional-level managers (Sirmon et al., 2011).

## **5.2. Practical implications**

A major implication of the study's findings for firms operating in resource-constrained environments, such as Ghana, is that SC entrepreneurial orientation is not only more instrumental for attaining transformative resilience than the mere presence of SC managers, but is also more accessible, particularly for firms lacking the capacity to create dedicated SC managerial positions. A critical starting point for embracing SC entrepreneurial orientation is to elevate SC management from being viewed primarily as an operational or functional activity to recognizing it as a strategic means of exploring and exploiting market and economic opportunities together with SC partners.

Although firms can self-nurture SC entrepreneurial orientation, those in resource-constrained environments can benefit from support from business stakeholders. For example, trade associations, government agencies, and development agencies can facilitate the development of such orientation through training programs, collaborative learning initiatives, and knowledge-sharing platforms, such as business incubators. Also, management schools can help harness SC entrepreneurial orientation in industry by ensuring that their SC

education programs incorporate strategic entrepreneurship perspectives and practices that equip managers to overcome resource-scarcity challenges and pursue market opportunities.

The findings further indicate that top managers should go beyond appointing SC managers and embrace strategic orientations that enable these managers to effectively orchestrate resources. Because such orientations reflect the firm's strategic posture, they require recognition and support from top management. When implementing these orientations within SCs, SC managers can be empowered to champion them by aligning their firms' interests and strategic priorities with those of their SC partners to drive particular strategic courses of action, such as transformative resilience.

### **5.3. Limitations and avenues for future research**

Four limitations are worth highlighting in this study. First, we conceptualized transformative resilience as a resilience demonstration (outcome), rather than as the processes through which it occurs. This conceptualization approach allowed us to separate its measurement indicators from questions concerning its causes or the processes through which it emerges (Scholten et al., 2025). The RO perspective advanced in this work addresses such questions. However, the quantitative nature of this study did not allow us to gain insights into the manner in which firms pursue transformative resilience, for example, whether through gradual or fast-paced approaches (Scholten et al., 2025). Although possessing relevant RO capacity may accelerate the attainment of transformative resilience, it is also possible that firms lacking such capacity may still attain it over the long run. Accordingly, beyond using qualitative research to explore heterogeneity in firms' approach to pursuing transformative resilience, future quantitative research could examine whether RO capacity shortens the time between the enactment and demonstration of transformative resilience.

Second, the study's binary measurement of SC manager presence is consistent with its theorization and follows prior studies (e.g., Kroes et al., 2022; Paraskevas et al., 2023; Sihvonen and Kauppi, 2025), but this measurement approach does not capture important nuances, such as variations in managerial attributes within the SC manager category. We controlled for variation in managerial SC education and conducted further analyses to isolate cases in which SC managers were more likely to hold senior positions and have access to greater internal resources. The overall conclusion regarding whether SC manager presence has direct effects on SC entrepreneurial orientation or transformative resilience did not change. That said, we found that although SC manager presence directly affects SC entrepreneurial orientation (but not transformative resilience), it explains a small variance in

this outcome across analyses involving varying sample characteristics. This limited explanatory power of SC manager presence suggests that relevant boundary conditions may be missing. Future research could gain further insight into such boundary conditions by operationalizing SC manager presence in ways that capture variations in managerial attributes (e.g., hierarchy and discretion), or by modelling these attributes as contingency factors.

Third, we recognize that other important antecedents of transformative resilience may exist, even within resource-constrained environments, that this study did not consider. Although transformative resilience is distinct from other resilience dimensions, this distinction also raises questions about whether and how resilience antecedents identified in prior studies affect transformative resilience. There are even opportunities for future work to explore the antecedent roles of other relevant strategic orientations, such as SC learning orientation and disruption orientation.

Finally, although the study is set in a resource-constrained environment, its data are drawn from only one such context. Therefore, although our theorization has broad general relevance, the findings have limited generalizability. We encourage future research to examine firm and country contexts that either share similarities with or differ from the current study's setting. Investigating such contexts would help assess whether our findings apply more broadly or are contingent on the contextual factors used to interpret them.

## **6. Conclusion**

Inspired by the contradictory firm behaviors regarding transformative resilience in resource-constrained environments, this study advanced an SC-focused RO theoretical view on why such differences occur. This view contended that transformative resilience depends on the orchestration of internal and external SC resources, enabled through SC manager presence and SC entrepreneurial orientation. A key conclusion from the study's findings is that, although SC entrepreneurial orientation directly drives transformative resilience outcomes, it also functions as an intervening mechanism through which SC manager presence contributes to transformative resilience. The study has explained how these theoretical and empirical insights advance the limited understanding of transformative resilience and its antecedents in operations and SC management research, while also contributing to the literature on SC managers, the entrepreneurship–SC management interface, and RO theory. We hope the study's insights and limitations encourage and provide useful direction for future research on these topics.

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Table I. Sample and respondent profile

| Variable                                            |                                               | Study 1 |        | Study 2 |        |
|-----------------------------------------------------|-----------------------------------------------|---------|--------|---------|--------|
|                                                     |                                               | Count   | %      | Count   | %      |
| Firm sector                                         | Manufacturers                                 | 195     | 49.1   | 109     | 53.2   |
|                                                     | Distributors and logistics firms              | 150     | 37.8   | 69      | 33.7   |
|                                                     | Exporter                                      | 12      | 3.0    | 6       | 2.9    |
|                                                     | Extraction, mining, and drilling firms        | 13      | 3.3    | 6       | 2.9    |
|                                                     | Other firms (e.g., building and construction) | 27      | 6.8    | 15      | 7.3    |
| Firm ownership                                      | Locally owned firms                           | 245     | 61.7   | 126     | 61.5   |
|                                                     | Foreign-owned firms                           | 104     | 26.2   | 52      | 25.4   |
|                                                     | Joint-owned firms                             | 48      | 12.1   | 27      | 13.2   |
| Respondent's position                               | Chief executive officer                       | 50      | 12.6   | 19      | 9.3    |
|                                                     | Owner-manager                                 | 47      | 11.9   | 27      | 13.2   |
|                                                     | Managing director                             | 14      | 3.5    | 20      | 9.8    |
|                                                     | General manager                               | 45      | 11.3   | 24      | 11.7   |
|                                                     | SC/logistics manager                          | 85      | 21.4   | 30      | 14.6   |
|                                                     | Operations/production manager                 | 103     | 25.9   | 40      | 19.5   |
|                                                     | Purchasing/procurement manager                | 53      | 13.4   | 45      | 22.0   |
|                                                     |                                               | Mean    | SD     | Mean    | SD     |
| Firm size (number of full-time employees)           |                                               | 71.88   | 152.99 | 106.58  | 205.82 |
| Firm age (number of years in business)              |                                               | 17.68   | 11.58  | 18.51   | 12.68  |
| Respondent's experience in current position (years) |                                               | 6.64    | 4.39   | 6.18    | 3.62   |

Source: Authors' own work

Table II. Confirmatory factor analysis results

| Construct                                       | Item  | Study 1              |       |       | Study 2              |       |       |
|-------------------------------------------------|-------|----------------------|-------|-------|----------------------|-------|-------|
|                                                 |       | Loading <sup>a</sup> | CR    | AVE   | Loading <sup>a</sup> | CR    | AVE   |
| Transformative resilience                       | TR1   | 0.761                | 0.880 | 0.593 | 0.793                | 0.855 | 0.537 |
|                                                 | TR2   | 0.767                |       |       | 0.707                |       |       |
|                                                 | TR3   | 0.787                |       |       | 0.661                |       |       |
|                                                 | TR4   | 0.823                |       |       | 0.689                |       |       |
|                                                 | TR5   | 0.700                |       |       | 0.812                |       |       |
| SC entrepreneurial orientation                  | SCEO1 | 0.645                | 0.896 | 0.541 | 0.605                | 0.851 | 0.598 |
|                                                 | SCEO2 | 0.805                |       |       | 0.790                |       |       |
|                                                 | SCEO3 | 0.798                |       |       | 0.781                |       |       |
|                                                 | SCEO4 | 0.864                |       |       | 0.858                |       |       |
| <i>Model fit indices:</i>                       |       |                      |       |       |                      |       |       |
| Chi-square ( $\chi^2$ )                         |       | 56.383               |       |       | 28.279               |       |       |
| Degree of freedom (DF)                          |       | 26                   |       |       | 26                   |       |       |
| Normed $\chi^2$                                 |       | 2.169                |       |       | 1.088                |       |       |
| Comparative fit index (CFI)                     |       | 0.984                |       |       | 0.997                |       |       |
| Tucker-Lewis index (TLI)                        |       | 0.977                |       |       | 0.996                |       |       |
| Root mean square error of approximation (RMSEA) |       | 0.054                |       |       | 0.021                |       |       |
| Standardized root mean square residual (SRMR)   |       | 0.031                |       |       | 0.036                |       |       |
| p-value                                         |       | 0.001                |       |       | 0.345                |       |       |

Note: <sup>a</sup> = Standardized factor loading; CR = congeneric reliability; AVE = average variance extracted.

Source: Authors' own work

Table III. Correlations and descriptive statistics

| Variable                                  | 1       | 2       | 3       | 4       | 5        | 6        | 7       | 8      | 9       | Mean   | SD    |
|-------------------------------------------|---------|---------|---------|---------|----------|----------|---------|--------|---------|--------|-------|
| 1. SC manager presence                    |         | 0.182** | 0.104*  | 0.088   | 0.601**  | -0.145** | 0.371** | 0.002  | 0.235** | 0.416  | 0.493 |
| 2. SC entrepreneurial orientation         | 0.256** |         | 0.557** | 0.496** | 0.095    | -0.032   | 0.192** | -0.046 | 0.049   | 3.551  | 1.301 |
| 3. Transformative resilience (subjective) | 0.154*  | 0.456** |         | 0.643** | 0.065    | -0.025   | 0.215** | -0.039 | 0.010   | 1.888  | 0.851 |
| 4. Transformative resilience (objective)  | 0.089   | 0.455** | 0.456** |         | 0.016    | 0.003    | 0.182** | -0.062 | -0.019  | 4.589  | 4.777 |
| 5. Firm size                              | 0.600** | 0.198** | 0.088   | 0.002   |          | -0.230** | 0.314** | -0.039 | 0.273** | 3.618  | 1.024 |
| 6. Local firms                            | -0.158* | 0.001   | 0.008   | 0.017   | -0.187** |          | -0.035  | 0.082  | -0.076  | 0.617  | 0.487 |
| 7. Managerial SC education                | 0.360** | 0.200** | 0.148*  | 0.103   | 0.307**  | -0.020   |         | -0.030 | 0.058   | 0.970  | 1.083 |
| 8. SC disruption intensity                | 0.037   | -0.135  | -0.057  | -0.110  | 0.037    | -0.045   | -0.007  |        | -0.011  | 23.987 | 6.670 |
| 9. Manufacturing firms                    | 0.284** | 0.070   | 0.041   | -0.032  | 0.358**  | -0.141*  | 0.034   | 0.031  |         | 0.490  | 0.501 |
| Mean                                      | 0.546   | 3.574   | 1.961   | 3.439   | 3.922    | 0.615    | 1.112   | 23.629 | 0.532   |        |       |
| SD                                        | 0.499   | 1.253   | 0.636   | 2.750   | 1.139    | 0.488    | 1.077   | 6.758  | 0.500   |        |       |

Notes: Correlations above and below the principal diagonal are for Study 1 (N = 397) and Study 2 (N = 205), respectively.  $p < 0.05$  (2-tailed);  $p < 0.01$  (2-tailed).

Source: Authors' own work

Table IV. Structural equation modeling results

| Variables and relationships                                 | Study 1 (N = 397) |       |        |                | Study 2 (N = 205) |       |        |                |
|-------------------------------------------------------------|-------------------|-------|--------|----------------|-------------------|-------|--------|----------------|
|                                                             | $\beta$           | SE    | p      | 95% CI         | $\beta$           | SE    | p      | 95% CI         |
| <i>Hypothesized paths:</i>                                  |                   |       |        |                |                   |       |        |                |
| SC manager presence → Transformative resilience             | -0.073            | 0.090 | 0.421  |                | 0.072             | 0.112 | 0.518  |                |
| SC manager presence → SC entrepreneurial orientation (SCEO) | 0.301             | 0.130 | 0.021  |                | 0.327             | 0.161 | 0.042  |                |
| SC entrepreneurial orientation → Transformative resilience  | 0.501             | 0.055 | <0.001 |                | 0.382             | 0.070 | <0.001 |                |
| SC manager presence → SCEO → Transformative resilience      | 0.151             |       |        | [0.060, 0.258] | 0.125             |       |        | [0.030, 0.235] |
| <i>Control paths:</i>                                       |                   |       |        |                |                   |       |        |                |
| Firm size → SC entrepreneurial orientation                  | -0.045            | 0.062 | 0.475  |                | 0.044             | 0.070 | 0.528  |                |
| Local firms → SC entrepreneurial orientation                | -0.009            | 0.105 | 0.928  |                | 0.076             | 0.128 | 0.555  |                |
| Managerial SC education → SC entrepreneurial orientation    | 0.127             | 0.050 | 0.011  |                | 0.085             | 0.062 | 0.170  |                |
| SC disruption intensity → SC entrepreneurial orientation    | -0.007            | 0.007 | 0.370  |                | -0.019            | 0.009 | 0.035  |                |
| Manufacturing firms → SC entrepreneurial orientation        | 0.020             | 0.102 | 0.846  |                | -0.023            | 0.131 | 0.860  |                |
| Firm size → Transformative resilience                       | -0.003            | 0.043 | 0.946  |                | -0.037            | 0.049 | 0.443  |                |
| Local firms → Transformative resilience                     | -0.020            | 0.072 | 0.787  |                | 0.018             | 0.089 | 0.837  |                |
| Managerial SC education → Transformative resilience         | 0.097             | 0.035 | 0.005  |                | 0.033             | 0.043 | 0.449  |                |
| SC disruption intensity → Transformative resilience         | -0.001            | 0.005 | 0.919  |                | 0.001             | 0.006 | 0.850  |                |
| Manufacturing firms → Transformative resilience             | -0.024            | 0.071 | 0.741  |                | 0.033             | 0.092 | 0.719  |                |
| <i>Model fit indices:</i>                                   |                   |       |        |                |                   |       |        |                |
| $\chi^2$                                                    | 120.424           |       |        |                | 91.777            |       |        |                |
| DF                                                          | 68                |       |        |                | 68                |       |        |                |
| Normed $\chi^2$                                             | 1.771             |       |        |                | 1.350             |       |        |                |
| CFI                                                         | 0.972             |       |        |                | 0.971             |       |        |                |
| TLI                                                         | 0.963             |       |        |                | 0.962             |       |        |                |
| RMSEA                                                       | 0.044             |       |        |                | 0.041             |       |        |                |
| SRMR                                                        | 0.029             |       |        |                | 0.041             |       |        |                |
| p-value                                                     | <0.001            |       |        |                | 0.029             |       |        |                |
| R <sup>2</sup> for SC entrepreneurial orientation           | 0.056             |       |        |                | 0.104             |       |        |                |
| R <sup>2</sup> for transformative SC resilience             | 0.411             |       |        |                | 0.281             |       |        |                |

Notes:  $\beta$  is an unstandardized estimate; SE is standardized error; p is p-value (2-tailed); CI is a bootstrap confidence interval (bootstrap samples = 5,000).

Source: Authors' own work

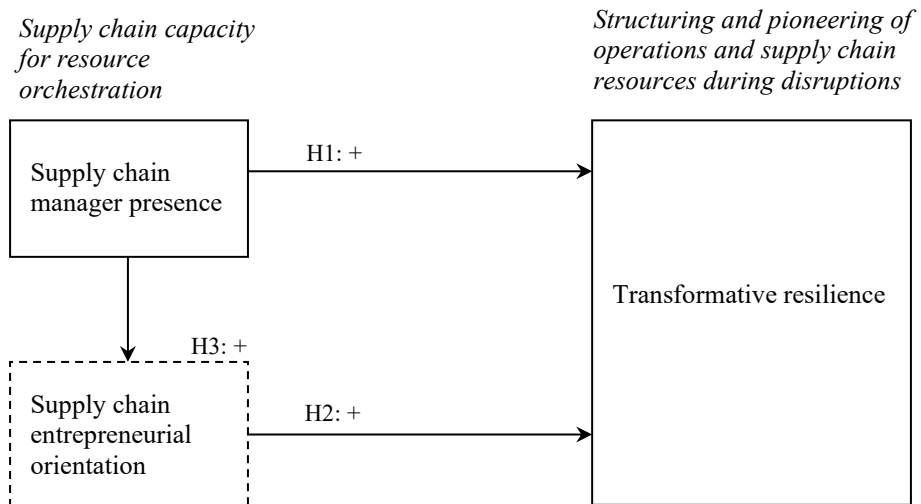


Figure 1. Theoretical model  
Source: Authors' own work

## Orchestrating transformative resilience in resource-constrained environments: A supply chain perspective

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### **INTRODUCTION**

This document has two parts. Part I provides expanded methodological information, and Part III presents the results of the robustness analyses.

### **PART I: RESEARCH METHODOLOGY: ADDITIONAL INFORMATION**

#### **1.1 Overview**

The data used in this paper comes from a funded research project that collected data on supply chain human capital, resilience, and related constructs concerning entrepreneurship, technology, organizational attention, and performance outcomes, among others. The project's methodology was informed by general survey research conventions (e.g., Flynn et al., 2018; Hulland et al., 2018; Kull et al., 2018), guidance on the use of cross-sectional versus longitudinal survey designs (Rindfleisch et al., 2008), and the incorporation of timing in measurement (Aguinis and Bakker, 2021), as well as contextualized methodological traditions in Ghana and other African countries (e.g., Adomako et al., 2021; Dankyira et al., 2024). The proposed methodology and data collection instruments were reviewed by management scholars with expertise across operations, supply chain, and strategic entrepreneurship research to ensure that they conformed to best survey practices, where necessary, and fit for the study setting. Additional expert feedback for Study 2 was received after the researchers reported on the preliminary findings from Study 1. Before collecting data, the project obtained ethics approval from the host institution of the research center that funded the study.

In the sections that follow, we expand on the methodology reported in the paper. We organize our discussion around key respondent recruitment and sampling firms, data and measurement, data collection, and survey biases and controls.

#### **1.2 Recruiting key respondents and sampling firms**

The research project focused on firm-level and supply chain-specific constructs, as well as constructs associated with other functional areas, such as human resource management and finance/accounting (e.g., human capital, technology, financial performance, and market

performance). Ideally, therefore, the study would have relied on multiple key respondents from each firm (Flynn et al., 2018). However, the project was designed to address practical constraints. Some of the sampled firms, especially small and medium-sized firms, did not have all the relevant functional managers or specialists required for a multi-respondent design (Kull et al., 2018). Also, even if firms had such ideal domain-specific respondents, we were unsure if they could be accessed. Using a multi-respondent design would have resulted in the exclusion of many potential firms, particularly small and medium-sized firms (Kull et al., 2018), which are the predominant firm types in the study's setting, a developing country in Africa (Essuman et al., 2026). In essence, we sought to strike a balance between selecting appropriate respondents and obtaining sufficiently large samples across the two studies with adequate demographic variability to test the research hypotheses.

Accordingly, we followed general survey guidance by identifying suitable single key respondents based on firm characteristics (Flynn et al., 2018; Kull et al., 2018). A distinctive feature of our approach was that we identified an array of alternative key respondents who could be approached within each firm if a particular respondent type was unavailable. This approach introduced redundancy into our key respondent recruitment process. For example, for small firms, we targeted top-level managers, such as owner-managers, CEOs, general managers, or managing directors. For medium-sized or large firms, we relied on similar experienced managers when dedicated supply chain or operations management positions were absent. In addition, we asked respondents to consult relevant organizational units or available organizational records when they did not readily possess the information requested in the questionnaire. Because we could not verify whether respondents undertook these additional steps, we incorporated alternative indicators for constructs, where necessary, to assess response consistency. For example, some constructs, such as transformative resilience, were measured using different but related indicators to enable consistency checks across responses. Our assumption was that respondents with accurate knowledge of their firm and its supply chain would provide reasonably consistent responses across these different measurement indicators.

We also required respondents to have held their managerial positions for at least three years at the time of data collection. This requirement was introduced because some constructs were measured with a three-year reference period, making familiarity with the firm's activities

over that timeframe important. The average key respondents across the two studies had held their managerial position for about six years.

Given the complexity of the key respondent requirements, coupled with English literacy considerations and the absence of prior secondary information about potential respondents, the study relied on firm-to-firm visits and preliminary screening procedures to identify suitable respondents (Dankyira et al., 2024). Specifically, in Study 1, the enumerators approached firms using a checklist of key respondent criteria and first enquired whether the firm had a manager matching any of the desired respondent profiles. Where a key respondent was available, the enumerators then confirmed whether the firm met the study's inclusion criteria, such as having operated for at least three years and having a minimum of five workers. Once these criteria were satisfied, the enumerators explained the study's purpose and potential practical value and then sought the respondent's consent to participate. Consenting respondents subsequently received the questionnaire.

To facilitate questionnaire retrieval and enable follow-up participation in Study 2, the enumerators asked respondents whether they were willing to share their contact details. To preserve anonymity, such contact information was retained only in the fieldworkers' personal records and was not collected through the questionnaire itself. Where respondents did not provide contact information, the enumerators recorded location information of the firms.

The fieldwork records from Study 1 facilitated the data collection for Study 2. The data collection methods and procedures used in Study 1 were replicated in Study 2. Although the effective response rate for Study 1 (55.76%,  $N = 397$ ) was comparable to that of Study 2 (51.64%,  $N = 205$ ), we consider the Study 2 data collection process less successful because some contacts had already been established with the participating firms and/or key respondents during Study 1.

A major challenge we faced was the unavailability of the original key respondents in firms that participated in Study 1, as well as the unavailability or unwillingness of alternative key respondents to provide data. These challenges were more pronounced among small firms. In contrast, key respondents in medium- and large-sized firms, mostly operations, purchasing/procurement, and supply chain managers, were more often present at their workplaces, making data collection easier in these firms. Due to budget constraints, no additional visits were made after two unsuccessful attempts to reach respondents. Overall,

these challenges help explain why the average firm size in Study 2 was larger than that in Study 1. The implications of this sample composition pattern across Study 1 and Study 2 are examined in paragraph three of Section 4.3 of the paper.

### **1.3 Data and measurement**

#### ***1.3.1 Data type and sourcing***

Our review of extant literature suggested that some prior studies had used secondary sources to obtain objective data on firm resilience to major disruptive events (e.g., COVID-19) (Jiang et al., 2023; Liu et al., 2023). However, such data were unavailable in Ghana and many other African countries, contexts where the project funder was interested. Moreover, we could not obtain secondary data on supply chain managers and entrepreneurial orientation. Prior survey-based research from similar contexts suggests that researchers can directly request objective data from key respondents (e.g., Adomako et al., 2021). In implementing this approach, we sought to address debates regarding whether subjective and objective data are comparable and can substitute for one another by collecting both types of data on our outcome variables, where necessary. This allowed us not only to examine issues about consistency between subjective and objective data but also to test our hypotheses using both forms of data.

#### ***1.3.2 Timing***

Our hypotheses imply causal relationships, and because temporal lag in measurement is essential for testing such relationships, we incorporated timing into our operationalization of the constructs (Aguinis and Bakker, 2021). This represents an important methodological improvement over prior supply chain and firm resilience studies that rely on survey data but rarely account for measurement timing. In this study, we needed to address questions regarding the time periods over which supply chain disruptions and resilience responses occurred, as well as the time periods over which supply chain manager presence and entrepreneurial orientation were assessed.

We addressed these timing issues in two ways. First, in Study 1, we anchored the indicators to time horizons that temporally separated the outcome variables from their predictors (Essuman et al., 2023). For example, transformative resilience was measured using a more recent time horizon (a two-year window) than its hypothesized predictors (a three-year window), to account for the fact that the predictors must precede the manifestation of the

dependent variable (Essuman et al., 2023). Second, we conducted a follow-up survey one year later (Study 2), asking respondents about supply chain disruptions experienced during that period and the extent to which firms demonstrated transformative resilience in response to those disruptions.

#### **1.4 Data collection: Enumerators and fieldwork procedures**

Sociocultural factors (e.g., power distance culture and uncertainty avoidance) and an underdeveloped data collection infrastructure (e.g., poor address systems and unstable internet connectivity) render conventional survey administration methods, such as postal and internet surveys, less suitable for operations and supply chain management research in Ghana and many other African countries (Osei and Ofori, 2025). Consequently, survey research targeting managers in such contexts typically relies on in-person, paper-and-pen questionnaires administered by trained enumerators (Adomako et al., 2021; Dankyira et al., 2024; Osei and Ofori, 2025). We adopted these strategies in both Study 1 and Study 2.

We recruited a team of five enumerators (research assistants) to collect the data. All were graduates with prior experience in survey administration. Two training sessions were organized for the enumerators. The first took place before the pilot study, while the second, which focused on reflections and additional guidance, was conducted after the pilot study. Both training sessions covered the questionnaire content, particularly to help enumerators provide immediate clarification when needed, and the survey administration procedures, including approaching firms and potential key respondents, establishing rapport, gaining interest and consent, and maintaining records of questionnaire distribution and collection. In addition, the enumerators were provided with written fieldwork guidelines. Among other things, the guidelines specified the firms and respondents the study was interested in, how to approach them, and how to maintain records.

The enumerators were assigned to different commercial and industrial zones. They initially approached firms based on a list of potential firms generated from online firm databases (e.g., BusinessGhana and GhanaYello) and subsequently expanded their visits through referrals to increase the sample size.

Several steps were taken to ensure that the enumerators visited the target firms and engaged the preferred key respondents. First, one member of the project team based in Ghana supervised the fieldwork activities. Second, enumerators were required to complete a form

documenting the addresses of the firms visited and, where possible, the contact details of the key respondents. This served both as a deterrence measure and as a basis for random follow-ups. Finally, a different team of research assistants was assigned to enter the questionnaire data into the database. This arrangement enabled us to inspect completed questionnaires and follow up with enumerators to address any observed concerns, such as incomplete responses or unusual response patterns.

## **1.5 Survey Biases and Controls**

### ***1.5.1 Nonresponse bias***

The study aimed to test theoretically-grounded hypotheses rather than pursue broad generalization, in which case nonresponse bias or a lack of sample representation may be a concern (Hulland et al., 2018). As is typical of the study's context, the sample comprised mainly small and medium-sized firms (Ghana Statistical Service, 2024). While nonresponse bias itself does not confound study's findings (Faruquee et al., 2025; Hulland et al., 2018), our effective response rates and sample size (Study 1: response rate = 55.76%, N = 397; Study 2: response rate = 51.64%, N = 205) were large enough for testing both the measurement and structural models in the study (Hair et al., 2019). Besides, they compare favorably with those reported in prior survey-based resilience studies (e.g., Faruquee et al., 2025; Sturm et al., 2023) and survey studies from related empirical contexts (e.g., Appiah et al., 2025; Dankyira et al., 2024). That said, as findings from hypothesis-testing research are limited to its sample, Section 5.3 of the paper cautions against broad generalization of this study's findings.

### ***1.5.2 Common method bias***

We drew insights from Podsakoff et al. (2024) to implement procedural remedies to reduce common method bias. The major remedy involved collecting data on the dependent variable separately from the independent and mediating variables, at different points in time (Podsakoff et al., 2024). Additional remedies included enhancing item clarity and placing the items for the independent and mediating variables far apart within the questionnaire. We also included a cover letter on official letterhead to enhance the study's credibility. The cover letter explained the study's relevance to industry, defined key terms (e.g., supply chain and supply chain disruption), provided guidelines for completing the questionnaire, assured respondents of anonymity and confidentiality, and assured the respondents that the study had

received ethical clearance. Furthermore, we relied on knowledgeable and experienced respondents to obtain data.

### **1.5.2 Endogeneity**

The study's hypothesized relationships may be susceptible to endogeneity, which occurs when an independent variable correlates with the error term of a dependent variable (Lu et al., 2018). Endogeneity can arise from multiple sources and is inherently unobservable, implying no empirical analysis can fully eliminate it (Hill et al., 2021). Consequently, our research sought to anticipate potential sources of endogeneity and implemented controls to lessen their impact (Hill et al., 2021; Lu et al., 2018).

First, model misspecification can cause endogeneity, and addressing this concern requires researchers to ensure their models are informed by sound theory (Lu et al., 2018). The study's theoretical model follows the logic of resource-based theories (Nikookar and Yanadori, 2022), especially RO theory (D'Oria et al., 2021). However, in the case of RO theory, failure to capture the intervening mechanisms that explain managerial actions can result in model misspecification and omitted variable endogeneity (Hill et al., 2021). We addressed this concern by theorizing and empirically capturing SC entrepreneurial orientation as a mediator of the relationship between SC manager presence and transformative resilience. By using structural equation modeling (SEM), we were able to simultaneously estimate whether the independent variable (i.e., SC manager presence) has a direct effect after accounting for the mediation path (D'Oria et al., 2021).

Second, the tendency of transformative resilience to predict SC manager presence and/or SC entrepreneurial orientation can cause simultaneity endogeneity (Hill et al., 2021). For example, less transformative resilient firms may engage in problemistic search, motivated to explore and invest in initiatives (e.g., SC managers or SC entrepreneurial orientation) that enhance their transformative resilience. However, because levels of transformative resilience are contingent upon a multiplicity of internal and external organizational factors (e.g., Mirzabeiki and Aitken, 2023; Shen et al., 2023; Wieland et al., 2023), there is little reason to believe that firms will necessarily limit their search for solutions to SC managers or SC entrepreneurial orientation. More importantly, as advanced in this article, the direction of causal relationships specified in the study's model follows the RO theory's predictions (D'Oria et al., 2021). Moreover, in Study 1, we incorporated a logical time horizon into the

measurement of variables to reduce ambiguity about their temporal ordering. Also, in Study 2, we introduced a 1-year time lag in the measurement of the dependent variable.

Third, as discussed in Sections 3.3 and 4.1 of the paper, we used procedural remedies to address measurement error endogeneity (Hill et al., 2021). Besides using CFA to validate the reflective items, our hypothesis-testing used SEM to control for measurement errors (Hill et al., 2021). Additionally, the study used an alternative data type for the dependent variable, obtaining consistent findings (Tables 4 and 5).

Finally, we used a control variable approach to mitigate omitted variable endogeneity (Hill et al., 2021; Lu et al., 2018). As argued in Section 3.3.2, we anticipated and controlled for firm size as a major source of omitted variable bias when examining the effects of SC manager presence.

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## PART II: ROBUSTNESS CHECK RESULTS

Table S1. Negative binomial regression results

| Study 1 (N = 397)              |                           |       |        |              |       |        |                          |       |        |                      |       |        |                              |       |        |  |
|--------------------------------|---------------------------|-------|--------|--------------|-------|--------|--------------------------|-------|--------|----------------------|-------|--------|------------------------------|-------|--------|--|
| Independent variables:         | Dependent variables       |       |        |              |       |        |                          |       |        |                      |       |        |                              |       |        |  |
|                                | Transformative resilience |       |        | New products |       |        | New technologies/methods |       |        | New customer markets |       |        | New suppliers/supply markets |       |        |  |
|                                | (total count)             |       |        |              |       |        |                          |       |        |                      |       |        |                              |       |        |  |
|                                | β                         | SE    | p      | β            | SE    | p      | β                        | SE    | p      | β                    | SE    | p      | β                            | SE    | p      |  |
| SC manager presence            | 0.047                     | 0.133 | 0.725  | -0.080       | 0.172 | 0.643  | 0.098                    | 0.172 | 0.568  | 0.081                | 0.229 | 0.723  | 0.086                        | 0.162 | 0.596  |  |
| SC entrepreneurial orientation | 0.454                     | 0.044 | <0.001 | 0.505        | 0.060 | <0.001 | 0.415                    | 0.051 | <0.001 | 0.518                | 0.061 | <0.001 | 0.321                        | 0.053 | <0.001 |  |
| Firm size                      | -0.060                    | 0.069 | 0.384  | 0.085        | 0.088 | 0.336  | -0.042                   | 0.095 | 0.660  | -0.201               | 0.106 | 0.059  | -0.086                       | 0.092 | 0.345  |  |
| Local firms                    | -0.058                    | 0.106 | 0.584  | 0.055        | 0.150 | 0.713  | 0.154                    | 0.142 | 0.278  | -0.167               | 0.176 | 0.341  | -0.131                       | 0.130 | 0.312  |  |
| Managerial SC education        | 0.090                     | 0.052 | 0.084  | 0.133        | 0.069 | 0.054  | 0.082                    | 0.057 | 0.153  | 0.091                | 0.080 | 0.255  | 0.057                        | 0.067 | 0.396  |  |
| SC disruption intensity        | -0.010                    | 0.007 | 0.167  | -0.014       | 0.010 | 0.143  | -0.010                   | 0.009 | 0.275  | -0.016               | 0.012 | 0.176  | 0.000                        | 0.009 | 0.955  |  |
| Manufacturing firms            | -0.022                    | 0.106 | 0.833  | -0.279       | 0.147 | 0.058  | 0.082                    | 0.137 | 0.550  | 0.156                | 0.175 | 0.371  | -0.054                       | 0.130 | 0.677  |  |
| Model fit indices:             |                           |       |        |              |       |        |                          |       |        |                      |       |        |                              |       |        |  |
| Wald χ²                        | 129.77                    |       |        | 89.16        |       |        | 77.58                    |       |        | 85.97                |       |        | 47.11                        |       |        |  |
| Pseudo R²                      | 0.041                     |       |        | 0.065        |       |        | 0.062                    |       |        | 0.054                |       |        | 0.030                        |       |        |  |
| p-value                        | <0.001                    |       |        | <0.001       |       |        | <0.001                   |       |        | <0.001               |       |        | <0.001                       |       |        |  |

| Study 2 (N = 205)              |                           |       |        |              |       |        |                          |       |       |                      |       |        |                              |       |        |  |
|--------------------------------|---------------------------|-------|--------|--------------|-------|--------|--------------------------|-------|-------|----------------------|-------|--------|------------------------------|-------|--------|--|
| Independent variables:         | Dependent variables       |       |        |              |       |        |                          |       |       |                      |       |        |                              |       |        |  |
|                                | Transformative resilience |       |        | New products |       |        | New technologies/methods |       |       | New customer markets |       |        | New suppliers/supply markets |       |        |  |
|                                | (total count)             |       |        |              |       |        |                          |       |       |                      |       |        |                              |       |        |  |
|                                | β                         | SE    | p      | β            | SE    | p      | β                        | SE    | p     | β                    | SE    | p      | β                            | SE    | p      |  |
| SC manager presence            | -0.033                    | 0.136 | 0.809  | -0.216       | 0.182 | 0.235  | 0.026                    | 0.172 | 0.879 | -0.166               | 0.200 | 0.405  | 0.215                        | 0.168 | 0.200  |  |
| SC entrepreneurial orientation | 0.308                     | 0.048 | <0.001 | 0.407        | 0.062 | <0.001 | 0.182                    | 0.063 | 0.004 | 0.291                | 0.067 | <0.001 | 0.309                        | 0.055 | <0.001 |  |
| Firm size                      | -0.057                    | 0.066 | 0.393  | -0.019       | 0.079 | 0.813  | 0.037                    | 0.076 | 0.629 | -0.136               | 0.111 | 0.220  | -0.125                       | 0.097 | 0.196  |  |
| Local firms                    | -0.060                    | 0.111 | 0.587  | 0.006        | 0.162 | 0.968  | 0.151                    | 0.139 | 0.278 | -0.048               | 0.179 | 0.787  | -0.207                       | 0.132 | 0.117  |  |
| Managerial SC education        | 0.032                     | 0.055 | 0.556  | 0.112        | 0.058 | 0.053  | 0.035                    | 0.061 | 0.562 | 0.025                | 0.089 | 0.776  | -0.038                       | 0.075 | 0.615  |  |
| SC disruption intensity        | -0.007                    | 0.008 | 0.346  | -0.015       | 0.012 | 0.201  | 0.011                    | 0.009 | 0.234 | -0.014               | 0.012 | 0.252  | -0.009                       | 0.010 | 0.326  |  |
| Manufacturing firms            | -0.022                    | 0.114 | 0.846  | -0.103       | 0.156 | 0.511  | 0.033                    | 0.137 | 0.812 | -0.026               | 0.195 | 0.895  | -0.068                       | 0.149 | 0.647  |  |
| Model fit indices:             |                           |       |        |              |       |        |                          |       |       |                      |       |        |                              |       |        |  |
| Wald χ²                        | 51.54                     |       |        | 59.33        |       |        | 24.32                    |       |       | 27.32                |       |        | 43.36                        |       |        |  |
| Pseudo R²                      | 0.050                     |       |        | 0.093        |       |        | 0.027                    |       |       | 0.050                |       |        | 0.064                        |       |        |  |
| p-value                        | <0.001                    |       |        | <0.001       |       |        | 0.001                    |       |       | <0.001               |       |        | <0.001                       |       |        |  |

Notes:  $\beta$  is an unstandardized estimate; SE is standardized error; p is p-value (2-tailed); Estimated using negative binomial regression in StataNow.

Source: Authors' own work

Table S2. Regression results for Study 1 firms that participated in Study 2 (N = 205).

| <i>Direct effects</i>                                  | SC entrepreneurial orientation <sup>a</sup> |       |       | Transformative resilience (subjective) <sup>a</sup> |                     |        | Transformative resilience (objective) <sup>b</sup> |       |        |
|--------------------------------------------------------|---------------------------------------------|-------|-------|-----------------------------------------------------|---------------------|--------|----------------------------------------------------|-------|--------|
|                                                        | $\beta$                                     | SE    | p     | $\beta$                                             | SE                  | p      | $\beta$                                            | SE    | p      |
| SC manager presence                                    | 0.477                                       | 0.219 | 0.031 | 0.017                                               | 0.137               | 0.900  | 0.127                                              | 0.182 | 0.483  |
| SC entrepreneurial orientation (SCEO)                  |                                             |       |       | 0.376                                               | 0.044               | <0.001 | 0.478                                              | 0.068 | <0.001 |
| Firm size                                              | 0.068                                       | 0.097 | 0.485 | -0.022                                              | 0.060               | 0.712  | -0.091                                             | 0.093 | 0.330  |
| Local firms                                            | 0.098                                       | 0.177 | 0.579 | 0.012                                               | 0.110               | 0.917  | -0.021                                             | 0.148 | 0.889  |
| Managerial SC education                                | 0.131                                       | 0.085 | 0.126 | 0.079                                               | 0.053               | 0.136  | 0.056                                              | 0.061 | 0.354  |
| SC disruption intensity                                | -0.026                                      | 0.013 | 0.037 | -0.006                                              | 0.008               | 0.442  | -0.014                                             | 0.011 | 0.209  |
| Manufacturing firms                                    | -0.001                                      | 0.183 | 0.994 | -0.010                                              | 0.113               | 0.928  | -0.023                                             | 0.145 | 0.873  |
| <i>Model fit indices</i>                               |                                             |       |       |                                                     |                     |        |                                                    |       |        |
| R <sup>2</sup>                                         | 0.103                                       |       |       | 0.317                                               |                     |        |                                                    |       |        |
| F of R <sup>2</sup>                                    | 3.770                                       |       |       | 13.067                                              |                     |        |                                                    |       |        |
| Wald $\chi^2$                                          |                                             |       |       |                                                     |                     |        | 69.65                                              |       |        |
| Pseudo R <sup>2</sup>                                  |                                             |       |       |                                                     |                     |        | 0.044                                              |       |        |
| p-value                                                |                                             |       |       | <0.001                                              |                     |        | <0.001                                             |       |        |
| <i>Indirect effect<sup>a</sup></i>                     |                                             |       |       | $\beta$                                             | 95% CI <sup>c</sup> |        |                                                    |       |        |
| SC manager presence → SCEO → Transformative resilience |                                             |       |       | 0.179                                               | [0.017, 0.330]      |        |                                                    |       |        |

Notes:  $\beta$  is an unstandardized estimate; SE is standardized error; p is p-value (2-tailed); <sup>a</sup>Estimated using PROCESS Model 4 in SPSS; <sup>b</sup>Estimated using negative binomial regression in StataNow; <sup>c</sup>Number of bootstrap samples = 5,000.

Source: Authors' own work

Table S3. Regression results for medium and large firms only

| Variables and relationships                                             | Study 1 (N = 232)                 |       |        |                | Study 2 (N = 149)                |       |        |                |
|-------------------------------------------------------------------------|-----------------------------------|-------|--------|----------------|----------------------------------|-------|--------|----------------|
|                                                                         | $\beta$                           | SE    | p      | 95% CI         | $\beta$                          | SE    | p      | 95% CI         |
| <i>Hypothesized paths:</i>                                              |                                   |       |        |                |                                  |       |        |                |
| SC manager presence → Transformative resilience <sup>a</sup>            | -0.035                            | 0.112 | 0.757  |                | 0.210                            | 0.115 | 0.071  |                |
| SC manager presence → SC entrepreneurial orientation (SCEO)             | 0.457                             | 0.185 | 0.014  |                | 0.550                            | 0.247 | 0.027  |                |
| SC entrepreneurial orientation → Transformative resilience <sup>a</sup> | 0.383                             | 0.040 | <0.001 |                | 0.197                            | 0.039 | <0.001 |                |
| SC manager presence → SCEO → Transformative resilience <sup>a</sup>     | 0.175                             |       |        | [0.041, 0.309] | 0.108                            |       |        | [0.014, 0.207] |
| <i>Control paths:</i>                                                   |                                   |       |        |                |                                  |       |        |                |
| Firm size → SC entrepreneurial orientation                              | 0.092                             | 0.109 | 0.402  |                | 0.096                            | 0.123 | 0.439  |                |
| Local firms → SC entrepreneurial orientation                            | -0.053                            | 0.155 | 0.735  |                | 0.232                            | 0.200 | 0.247  |                |
| Managerial SC education → SC entrepreneurial orientation                | 0.132                             | 0.082 | 0.110  |                | 0.154                            | 0.102 | 0.132  |                |
| SC disruption intensity → SC entrepreneurial orientation                | -0.021                            | 0.012 | 0.096  |                | -0.024                           | 0.015 | 0.127  |                |
| Manufacturing firms → SC entrepreneurial orientation                    | -0.035                            | 0.162 | 0.829  |                | 0.023                            | 0.210 | 0.913  |                |
| Firm size → Transformative resilience                                   | 0.098                             | 0.065 | 0.134  |                | 0.020                            | 0.057 | 0.723  |                |
| Local firms → Transformative resilience                                 | -0.013                            | 0.092 | 0.885  |                | 0.024                            | 0.092 | 0.793  |                |
| Managerial SC education → Transformative resilience                     | 0.026                             | 0.049 | 0.596  |                | -0.044                           | 0.047 | 0.348  |                |
| SC disruption intensity → Transformative resilience                     | 0.006                             | 0.007 | 0.420  |                | 0.012                            | 0.007 | 0.109  |                |
| Manufacturing firms → Transformative resilience                         | -0.076                            | 0.096 | 0.428  |                | -0.135                           | 0.097 | 0.163  |                |
| <i>Model fit indices:</i>                                               |                                   |       |        |                |                                  |       |        |                |
| R <sup>2</sup> for SC entrepreneurial orientation                       | 0.079 ( $F = 3.206, p < 0.005$ )  |       |        |                | 0.099 ( $F = 2.602, p < 0.021$ ) |       |        |                |
| R <sup>2</sup> for transformative resilience                            | 0.328 ( $F = 15.582, p < 0.001$ ) |       |        |                | 0.218 ( $F = 5.604, p < 0.001$ ) |       |        |                |

Notes: Transformative resilience is based on the subjective scale;  $\beta$  is an unstandardized estimate; SE is standardized error; p is p-value (2-tailed); <sup>a</sup>Estimated using PROCESS Model in SPSS with bootstrap samples of 5,000.

Source: Authors' own work