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Original Research

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The Mediating Role of Supply Chain Disruption Between Supply Chain Resilience Practice and Competitive Advantage of Manufacturing Companies

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Abstract

The global expansion of supply chain (SC) networks improves the overall performance of the SC and increases an organization's susceptibility to disruptions within the chain. This study examines the mediating role of supply chain disruption (SCD) between supply chain resilience practice (SCRP) and competitive advantage (CA) of manufacturing companies in Ethiopia. We employed descriptive and explanatory research designs and analyzed the data collected from 347 participants using SEM methods. The findings show that SCRP significantly affects SCD and CA. Moreover, SCRP significantly influences CA, mediated by SCD. Building and maintaining SC resilience reduces disruptions and enhances competitiveness in the ever-changing business landscape. Therefore, manufacturing firms are suggested to minimize disruptions further and obtain a better CA using SC resilience measures.

Keywords: *supply chain disruption, supply chain resilience, competitive advantage, manufacturing companies*
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Introduction

Managing the supply chain has become one of the most vital subjects of management study, and organizational leaders are more interested in mitigating disruptions in the supply chain (Varzandeh et al., 2016). The performance of a worldwide supply chain expands supply chain networks and enhances organization experience to supply chain disruption (SCD; Bode & Wagner, 2015). The vulnerability of SCDs

worldwide has emerged as an escalating concern in the last few years (Langat & Karanja, 2021). In late 2019, the appearance of coronavirus disease 2019 (COVID-19) in Wuhan, China, which spread worldwide, was a cause of SCDs worldwide. SCDs are events that negatively impact normal supply chain operations and, as a result, create some degree of disarray in the chain (George & Mallery, 2003). Unforeseen occurrences can interfere with the steady flow of supplies and resources through the supply chain, putting participating companies at risk for financial and operational issues (Craighead et al., 2007).

To be able to handle disruptions in the future, SCD-oriented companies keep an eye on the environment and learn from past mistakes. Effectively developing and managing resources provides the link between understanding the disrupted environment and preparation to be successful in the face of disruptions (Ambulkar et al., 2015). Companies can handle the possibility of SCDs and regain their previous operational level or improve their current status by establishing supply chain resilience (Bugvi & Mughal, 2022; Wieland & Wallenburg, 2012). Supply chain resilience has evolved into a crucial dynamic capability for the growth of businesses in nebulous circumstances in which environmental uncertainty is only going to grow, and disruptive occurrences could have an abruptly detrimental impact on firms (Ali et al., 2017).

Managing SCDs is becoming an increasingly important practice in the contemporary business landscape to enhance competitiveness (Baah et al., 2022). Similarly, Duclos et al. (2003) stated that modern supply chains are required to promptly, proficiently, and effectively meet client demand in order to establish a competitive edge by increasing quality, lowering costs, reducing time to market, ensuring delivery dependability (keeping delivery promises), and maintaining product innovation (Li et al., 2006). By implementing preemptive measures, optimizing supply chain systems, and establishing swift recovery capabilities, organizations can enhance their competitive advantage (CA) sustainability (Akbar & Isfianadewi, 2023; Pu et al., 2023). Similarly, organizational leaders who respond to SCDs efficiently and quickly can gain an additional benefit over their rivals (Varzandeh et al., 2016). An earlier study also confirms that firms with better supply chain resilience practices (SCRPs) are primarily focused on addressing common challenges encountered in daily life as well as those arising from a crisis (Gualandris & Kalchschmidt, 2015).

A contrasting viewpoint in the literature on the relationship between SCRPs, SCD, and CA centers on the extent to which resilience strategies can completely reduce disruptions and improve competitiveness. Some scholars argue that SCRPs directly contribute to a company's competitive edge by ensuring business continuity, cutting lead times, and enhancing customer satisfaction. Firms that actively engage in resilience strategies have a better chance of sustaining operational effectiveness despite interruptions, providing them with a long-term competitive edge (Christopher & Peck, 2004). Supply chain resilience should be seen as a strategic competence that reduces risk exposure and promotes long-term profitability (Jüttner & Maklan, 2011). This perspective indicates that resilience is dominant in shaping competitive positioning, independent of disruptions.

On the other hand, other academics argue that if disruptions happen often and to a high degree, resilience strategies alone will not be enough to maintain a competitive edge. Relying too much on resilience strategies may hurt competitive edge by raising operating costs and decreasing efficiency (Ponomarov & Holcomb, 2009). Furthermore, SCDs serve a critical mediating function, which means that resilience initiatives only result in a CA if they successfully reduce or neutralize disruptions (Ambulkar et al., 2015). This viewpoint shows that the effectiveness of SCRPs varies depending on the type and magnitude of disruptions, and they do not always immediately improve competitiveness. As a result, some scholars support resilience as a direct route to CA, while others emphasize the moderating or mediating function of shocks, contending that resilience is not a prerequisite for long-term competitiveness.

In Ethiopia, which was the backdrop for our study, the bottled water manufacturing industry is becoming very competitive, and SCRP and CA are critical for a company's success. However, Ethiopian bottled water companies' operations are facing disruptions due to various factors. At the time of our study, about 20 bottlers had stopped production. Operational producers are also working under their capacity. This is due to shortages and sharp increases in the price of raw materials and excise tax charged on bottled water, severe currency, and price vibrations (Capital, 2022). Our study addressed three research questions: (1) What is the effect of SCRP on SCD? (2) How does SCD mediate between SCRP and CA? and (3) What is the effect of SCRP on CA?

This study pioneers the exploration of the mediating role of SCD between SCRP and CA, specifically within Ethiopia's water bottling manufacturing industry. While previous research has focused on the general challenges encountered by the industry, this study uniquely examines the interplay between SCRP, SCD, and CA. By addressing the specific disruptions caused by shortages, price increases, and foreign exchange issues, this research provides novel insights and strategic recommendations to enhance the resilience and competitiveness of medium- and large-scale bottled water manufacturers in Ethiopia.

Literature Review

Historical Perspective

The study on the mediating role of SCD between SCRPs supply chain resilience practices and CA in manufacturing companies in Ethiopia is framed within the evolving landscape of managing supply chains. Historically, managing supply chains in the mid-20th century was primarily focused on optimizing logistics and operational efficiency through methodologies such as economic order quantity and material requirements planning (Chopra, 2018). During this period, the primary goal was to minimize costs and maximize productivity, with little emphasis on risk management or resilience.

The late 20th century saw significant changes due to globalization, which increased the complexity and vulnerability of supply chains. Techniques like just-in-time manufacturing, which enhanced efficiency by minimizing inventory costs, also exposed supply chains to more significant risks from disruptions (Christopher, 2000). Events such as the terrorist attacks of 9/11 and the 2002 West Coast port lockout highlighted these vulnerabilities and underscored the need for resilient supply chain strategies (Tang, 2006). This era marked the beginning of a shift toward understanding the benefit of resilience in supply chains to survive and speedily recover from unexpected interruptions.

The strategic need of supply chain resilience in the 21st century has been further highlighted by significant international shocks, such as the COVID-19 pandemic and the Tohoku earthquake in 2011. These events have demonstrated that robust resilience practices, including supplier diversification, investment in flexible manufacturing, and enhanced collaboration, are critical for maintaining a CA (Chowdhury & Quaddus, 2017; Ivanov & Dolgui, 2020). Contemporary research, such as our study, explores the dynamic interplay between resilience practices, SCD, and competitive outcomes. It shows that effective resilience strategies can mitigate the negative impacts of disruptions, thereby serving as a vital element of a company's competitive strategy in a volatile global environment (Ali et al., 2017; Pettit et al., 2013).

Theoretical Review

Supply Chain Resilience Practice

SCRP refers to the strategies, processes, and actions organizations undertake to ensure the continuity, adaptability, and toughness of their supply chains in the face of disruptions, uncertainties, and risks (Ali et al.,

2017; Fiksel et al., 2014). It involves proactive measures to anticipate, mitigate, react to, and recover from various disturbances that can affect the supply chain network's flow of goods, data, and finances (Juan et al., 2022; Tukamuhabwa et al., 2015).

SCRPs are essential for companies to ensure the continuity and stability of their supply chains in the occurrence of various disturbances (Brandon-Jones et al., 2014; Matas et al., 2024). To effectively manage disruptions, organizations must identify and assess potential risks and vulnerabilities within their supply chains (Christopher & Peck, 2004). Further, it is mandatory to continuously monitor, evaluate, and refine supply chain resilience strategies based on lessons learned from past disruptions, changing market dynamics, and emerging threats (Pettit & Beresford, 2009). Thus, through successful SCRP, organizations can enhance their resilience and effectively navigate disruptions to maintain business continuity and CA.

Supply Chain Disruption

According to Bode and Wagner (2015), the performance of worldwide supply chains, which expands the networks of supply chains, enhances firm exposure to disturbances. SCDs are sudden and unforeseen disruptions that interrupt the regular movement of goods and resources within the supply chain (Marley et al., 2014). As a result, businesses in the supply chain face risks to their operations and finances (Craighead et al., 2007). They arise when there is an unforeseen interruption in the flow of completed and partially completed goods within a supply chain (Revilla & Saenz, 2017).

SCDs have augmented in frequency and intensity, leading to more substantial consequences (George & Mallery, 2003). They involve supplier reliability, geopolitical instability, natural disasters, and demand fluctuations (Christopher & Peck, 2004; Ivanov & Dolgui, 2021). Businesses focused on SCD keep an eye on the environment and draw lessons from past disruptions to manage future ones (Ambulkar et al., 2015). Hence, understanding the diverse nature of SCDs and their potential impact is crucial for organizations to develop effective risk management strategies and build resilience within their supply chains.

Competitive Advantage

CA is the ability of a firm to obtain higher profits than rivals involved in the same industry (Porter, 1985). A firm possesses a CA over its competitors when its profitability surpasses the rival companies' average profitability and rate of profit growth competing for the same clients (Hill & Jones, 2008). CA serves as a point of contact for original marketplaces in comparison to the business's main competitors. It also facilitates the association between design and product growth and enhances the firm's reputation in comparison to its primary rivals (Vargas et al., 2018).

Maury's study (2018) discussed how CA represents the economic value created by exploiting the resources and capabilities of a firm. Firms gain a CA by responding to changing customer demands in diverse markets quickly and at the right time (Güner et al., 2018). Contemporary supply chains are anticipated to promptly, proficiently, and successfully meet customer demand (Duclos et al., 2003). Therefore, by leveraging sources of CA and continuously innovating and adapting to changing market conditions, companies can reinforce their market position, drive growth, and enjoy long-term success in competitive markets.

Research Hypothesis

Supply Chain Resilience Practice and Supply Chain Disruption

SCRPs involve identifying and assessing possible risks and vulnerabilities inside the supply chain. By understanding potential disruptions, organizations can implement proactive measures to mitigate their impact (Chowdhury & Quaddus, 2017; Ponomarov & Holcomb, 2009). Companies embracing continuous

improvement and learning are better equipped to anticipate, adapt, and recover from disruptions effectively (Pettit & Beresford, 2009; Yang et al., 2017). Hence, by adopting proactive measures and investing in building resilience strategies, organizations can reduce the effect of disruptions and maintain operational continuity in dynamic and unpredictable environments. Given these views, we proposed the following hypothesis:

H1a: SCRP significantly influences SCD (see Table 3).

Supply Chain Resilience Practice and Competitive Advantage

SCRPs have become increasingly crucial for organizations seeking CA in today's volatile and uncertain business setting. Resilient supply chains prioritize risk management and mitigation strategies to identify, evaluate, and address possible disruptions (Abeysekara et al., 2019; Sheffi, 2015). SCRP is an ongoing process that requires continuous improvement and learning. Learning from past experiences, conducting post-event evaluations, and implementing lessons learned can reinforce companies' resilience competencies and gain a CA (Pettit et al., 2013). In light of the preceding opinion, this study proposed the following hypothesis:

H1b: SCRP significantly affects CA (see Table 3).

Supply Chain Disruption and Competitive Advantage

SCDs can profoundly affect CA, challenging organizations to adapt and innovate in response to unexpected events. Organizations with complex, interconnected supply networks are particularly susceptible to disruptions, disrupting production, delaying deliveries, and impacting customer satisfaction (Sheffi, 2015). SCDs can erode CA by leading to delays in product availability, poor quality control, and increased costs. Customers may seek alternative suppliers or switch to competitors offering more reliable products and services, resulting in a loss of market share and revenue (Tang, 2006). Severe SCDs can damage an organization's reputation and brand image. Negative publicity surrounding supply chain failures, such as product recalls, ethical lapses, or labor violations, can undermine consumer trust and loyalty, tarnishing the company's brand and competitive positioning (Revilla & Saenz, 2017). Considering these views, we proposed the following hypothesis:

H2a: SCD significantly influences CA (see Table 3).

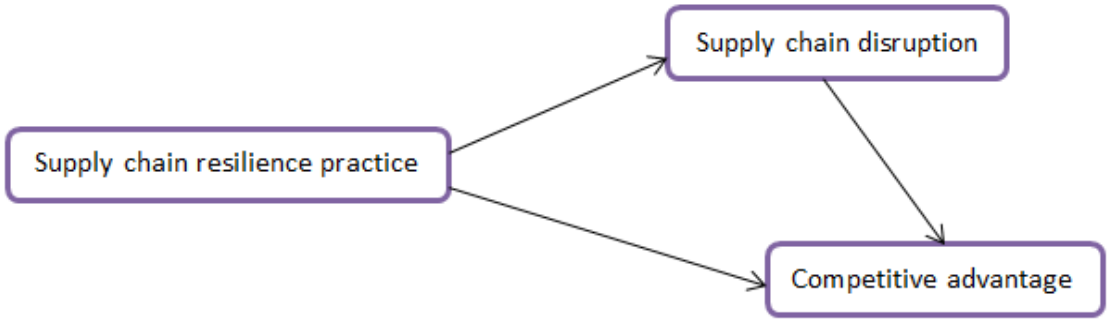
Mediating Effect on Supply Chain Disruption

As supply chains become increasingly complex and interconnected, understanding the mechanisms through which resilience practices contribute to CA in the occurrence of disturbances remains a critical area for academic inquiry and managerial practice. A study conducted by Pu et al. (2023) discussed the mediating effect of operational vulnerabilities between supply chain resilience and sustainable CA. When disruptions occur, resilient organizations are better equipped to mitigate the impact of disruptions, recover quickly, and maintain their competitive position (Christopher & Peck, 2004; Ivanov & Dolgui, 2021; Pettit et al., 2013). Based on these opinions, this study proposed the following hypothesis:

H2b: SCD significantly mediates SCRP and CA (see Table 3).

This study used the conceptual framework shown in Figure 1. The framework indicates that SCRP directly affects SCD and CA. The effect is portrayed by straight arrows going into SCD and CA from SCRP. The standardized regression coefficient quantifies the magnitude of this effect. SCRP also has an indirect effect on CA. The effect implies that SCD acts as a dependent variable on SCRP and as the independent variable for CA. Further, SCD serves as a mediating factor in the connection between SCRP and CA.

Figure 1. *The Path Analysis Model*



Source: Adapted from Dittfeld et al. (2022) and Pu et al. (2023).

Research Methodology

Research Design

This study adopted descriptive and explanatory research designs. We also used a quantitative research approach (Zikmund et al., 2009). We used descriptive design to describe the characteristics of the participants and the explanatory study design to determine the causal association between SCRP, SCD, and CA. We employed the quantitative research approach to present study objectives using empirical assessments that involve numerical measurement and analysis (Walliman, 2010).

Sampling Methods

This study focused on medium- and large-scale bottled water manufacturing companies in Ethiopia. Based on the Ethiopian Classification of Enterprise, firms with total assets between 1,500,001 to 20,000,000 Ethiopian birr (ETB) and total employees between 30 to 100 are considered medium-scale companies. Companies with total assets greater than 20,000,000 ETB and more than 100 employees are considered large-scale organizations. We used these criteria to identify 72 medium- and large-scale companies.

Among 72 bottled water manufacturing companies operating during the study, we purposively selected 10 based on their high production capacity and highly consumable products. This study used the sample size formula (Yamane, 1967), in which n is the sample size, N is the total population, and e is the degree of precision, as shown below:

$$n = \frac{N}{1+N(e)^2}, n = \frac{3{,}125}{1+3{,}125(0.05)^2} \approx 355$$

Therefore, a sample size of 355 (see Table 1) employees was determined using stratified (number of companies) simple random sampling techniques. The participants were grouped based on the selected companies. From 355 questionnaires distributed to the respondents, 347 (97.75%) were correctly filled out and returned.

Table 1. *Proportionality of the Sample Size*

S/N	Bottled Water Companies	Population Size	Proportional Sample Size
1	Gold Water	564	(564*355)/3,125=64
2	One Water	601	(601*355)/3,125=68
3	Top Water	340	(340*352)/3,125=39
4	Fham Water	259	(259*355)/3,125=29
5	Daily Water	234	(234*355)/3,125=27
6	Arki Water	196	(196*355)/3,125=22
7	Cheers Water	157	(157*355)/3,125=18
8	Boss Water	126	(126*355)/3,125=14
9	Blu Water	151	(151*355)/3,125=17
10	Africa Water	497	(497*355)/3,125=57
Total		**3,125**	**355**

Ethical Approval

This study was approved by the Board of Postgraduate Studies and Research in the Faculty of Business Studies of Punjabi University, Patiala, India (2442/Research) on March 29, 2023. We obtained written informed consent before collecting data from participants. The questionnaires were made anonymous, and participants had the freedom to opt out of the participation at any point if they felt uncomfortable.

Data Collection Methods

This study employed structured questionnaires (Walliman, 2010) to collect primary data from company employees regarding SCRP, SCD, and CA. The items were initially developed in English and subsequently translated into the local language. The survey responses were organized in an ordinal fashion utilizing a 5-point rating system, in which a score of 1 indicated significant disagreement and a score of 5 indicated strong agreement. These scales are valuable tools in social science and attitude research endeavors (Croasmun & Ostrom, 2011). For initiation purposes, the researchers presented how the study results would benefit the participants' companies, which helped convince them to participate. The researchers also scheduled data collection after confirming the participants' convenient time.

Data Analysis Methods

To analyze the data, the researchers employed inferential and descriptive statistics. With the use of version 23 of the Statistical Package for Social Sciences (SPSS), the obtained data were coded, inputted, and examined. Standard deviation, mean, frequency, percentage, and other descriptive statistics were used. Inferential statistics such as confirmatory factor analysis (CFA), structural equation modeling (SEM) path analysis, and person correlation analysis were used with the help of Amos software version 23. Reliability and validity of the scale were also tested using Cronbach's alpha and CFA, respectively.

Operational Definitions

SCRP consists of five items, while SCD and CA cover six and seven items, respectively. The operational definitions of the variables include 18 statements, with each item being measured using a five-level scale (see Table 2).

Table 2. *Variables' Operational Items*

Constructs	Items	Sources
Supply chain resilience practice		(Jüttner & Maklan, 2011; Wieland & Wallenburg, 2012)
SCRP1	We systematically identify the sources for supply chain disruptions.	
SCRP2	We assess the risks of our manufacturing company.	
SCRP3	We assess the risks of important suppliers and customers.	
SCRP4	We assign persons responsible for the management of the risks.	
SCRP5	We continuously monitor the changes that might promote the disruptions.	
Supply chain disruption		(Peck, 2005; Pettit et al., 2010, 2013)
SCD1	We depend on supplies that experience severe currency or price variations.	
SCD2	Our facilities or markets are frequently exposed to severe natural disasters.	
SCD3	We regularly face unforeseen technology failures in our operations.	
SCD4	Our products are regularly stolen or destroyed.	
SCD5	Our production capacity is limited.	
SCD6	Raw materials for our products are scarce or in high demand.	
Competitive advantage		(Chen, 2019; Lakhal, 2009; Li et al., 2006)
CA1	We are able to compete based on quality.	
CA2	We offer products that are highly reliable.	
CA3	We offer products that are very durable.	
CA4	We are able to offer prices as low or lower than our competitors.	
CA5	We offer competitive prices.	
CA6	We respond well to customer demand for new product features.	
CA7	We have fast product development.	

Note: SCRP = supply chain resilience practice; SCD = supply chain disruption; CA = competitive advantage.

Hypothesis Testing

This study tested three hypotheses. Accordingly, the study's findings supported three hypotheses (H1a, H1b, and H2b), whereas the study's result did not support one hypothesis (H2a; see Table 3).

Table 3. *Summary of Hypothesis Test Results*

Hypotheses	Contents	Results
H1a	SCRPs significantly affect SCD	Supported
H1b	SCRPs significantly affect CA	Supported
H2a	SCDs significantly affect CA	Not supported
H2b	SCDs significantly mediate between SCRP and CA	Supported

Note: SCRP = supply chain resilience practice; SCD = supply chain disruption; CA = competitive advantage.

Results

Respondents' Characteristics

Table 4 shows that 82 (23.6%) respondents were female and 265 (76.4%) were male. This result indicates the majority of Ethiopian bottled water manufacturing companies' employees were male. The majority of participants (74.4%) held a bachelor's degree, with master's degree holders (11.2%) and diploma holders (10.1%) following closely behind. This finding depicts that the majority of the respondents were at least first-degree qualified. More respondents (70%) were from the natural science stream, while 30% of them were from the social science stream. This study's respondents were mainly managerial position holders (55.9%), with the remainder (44.1%) in the nonmanagerial ranks. With a standard deviation of 6.705 and a mean age of 29.59, the individuals demonstrated productive age. The participants' experience was, on average, 4.77 years with a standard deviation of 4.859, which infers that no employees had zero experience.

Table 4. *Summary of Respondents' Characteristics*

Categorical variables	Sub-variables	Freq.	%	Valid %	Cumulative %
Gender	Female	82	23.6	23.6	23.6
	Male	265	76.4	76.4	100.0
	Total	**347**	**100.0**	**100.0**	
Qualification	Certificate	15	4.3	4.3	4.3
	Diploma graduate	35	10.1	10.1	14.4
	Bachelor's degree	258	74.4	74.4	88.8
	Master's degree	39	11.2	11.2	100.0
	Total	**347**	**100.0**	**100.0**	
Field of study	Social science	104	30.0	30.0	30.0
	Natural science	243	70.0	70.0	100.0
	Total	**347**	**100.0**	**100.0**	
Position	Managerial position	194	55.9	55.9	55.9
	Non-managerial position	153	44.1	44.1	100.0
	Total	**347**	**100.0**	**100.0**	

Continuous variables	N	Min.	Max.	Mean	Std. deviation
Age	347	23	60	29.59	6.705
Experience	347	1	33	4.77	4.859

Reliability Analysis

The internal consistency of the instruments for SCRP, SCD, and CA was measured using Cronbach's alpha as follows: $\alpha \geq .9$ is excellent, $.8 \leq \alpha \leq .89$ is good, $.7 \leq \alpha \leq .79$ is acceptable, $.6 \leq \alpha \leq .69$ is questionable, $.5 \leq \alpha \leq .59$ is poor, and $\alpha \leq .5$ is unacceptable (George & Mallery, 2003). Cronbach's alpha values for each scale and their subscales were computed (see Table 5). All variables were found in the range of very good and acceptable reliability coefficient levels ranging from $\alpha = .784$ to $\alpha = .854$. The results demonstrate that the measures used in the study were reliable and consistent. Researchers can have confidence that the variables accurately captured the constructs of interest and that the data collected are dependable for further analysis.

Table 5. *Summary of Scale Reliability Analysis*

Constructs	CR	AVE	Cronbach's alpha
SCD	.838	.511	.809
CA	.795	.505	.784
SCRP	.863	.515	.854

Note: CR = composite reliability; AVE = average variance extracted; SCD = supply chain disruption; CA = competitive advantage; SCRP = supply chain resilience practice.

The composite reliability (CR) values are all in line with the average variance extracted (AVE; > .700), and the AVE values are more significant than .500, indicating acceptable internal consistency of the scale (Hu & Bentler, 1999). These results imply a high level of reliability in the measurement indicators. This enhances the credibility and validity of the structural model used in the analysis.

Validity Analysis

Based on data from 347 valid, completed questionnaires, we analyzed the validity of the scales using CFA with the help of Amos version 23 software for the constructs' scales. Therefore, the indices were found to fit the data better (see Table 6), in which χ^2/df = Chi-square divided by degrees of freedom, GFI = goodness of fit index, AGFI = adjusted goodness of fit index, NFI = normed fit index, TLI = tucker-lewis index, CFI = comparative fit index, DF = degree of freedom, and RMSEA = root mean square error of approximation (Hu & Bentler, 1999). The result demonstrates that the specified theoretical structure of relationships among observed variables is in line with the actual data collected. The finding of better model fit strengthens the overall credibility and validity of the dimension instruments used in the study. It provides confidence that the constructs are accurately operationalized and measured, enhancing the robustness of subsequent analyses and findings (Mohajan, 2017).

Table 6. *Summary of Scale Validity Analysis*

Variables	χ^2/df	GFI	AGFI	NFI	TLI	CFI	RMSEA
SCRP scale fit	2.632	.992	.961	.991	.982	.995	.064
SCD scale fit	2.936	.957	.918	.938	.935	.958	.069

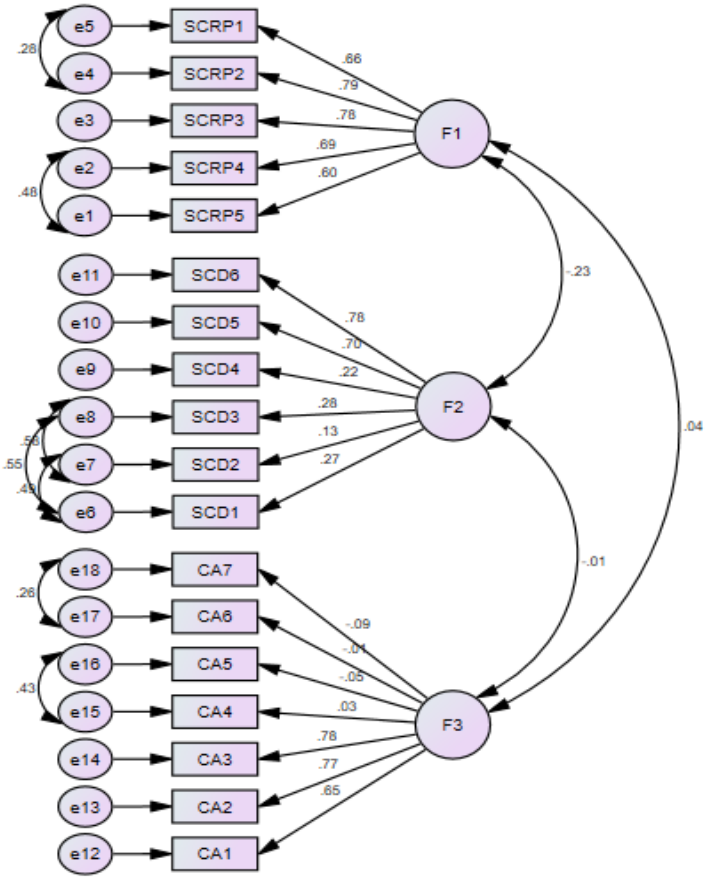
CA scale fit	2.704	.958	.927	.908	.912	.939	.065

Note: GFI= goodness of fit index; AGFI = adjusted goodness of fit index; NFI = normed fit index; TLI = tucker-lewis index; CFI = comparative fix index; RMSEA = root mean square error of approximation; SCRP = supply chain resilience practice; SCD = supply chain disruption; CA = competitive advantage.

Confirmatory Factor Analysis of SCRP, SCD, and CA

CFA was conducted to estimate the covariate between SCRP, SCD, and CA constructs on 18 items (see Figure 2). The fit indices results of SCRP, SCD, and CA scale are indicated as follows: CMIN = 224.594, *df* = 125, χ2/*df* = 1.797, GFI = .942, AGFI = .920, CFI = .950, NFI = .900, RMSEA = .045, and *p* = .000 (Hu & Bentler, 1999). The result shows that the specified relationships among latent constructs, observed variables, and covariates are consistent with the data. The model is adequate in explaining the patterns of relationships observed in the data.

Figure 2. *Confirmatory Factor Analysis*



Person Correlation Analysis

The descriptive statistics and correlation analysis results of each variable were obtained using SPSS software Version 23 (see Table 7). The results show that SCRP is significantly and negatively (β = -.107) related to SCD. The negative relationship displays that organizations with higher levels of SCRPs tend to experience lower

levels of SCDs. SCRP is also significantly and positively (β = .104) related to CA, which shows organizations with higher levels of SCRPs tend to experience better CA. However, SCD is negatively but not significantly (β = -.031) associated with CA. Although the relationship may not be statistically significant in this particular sample, mitigating disruptions can still be crucial for maintaining competitiveness in the marketplace. These results portray that the correlation between the variables was logical and consistent with the available concepts and theories.

Table 7. *Correlation of SCRP, SCD, and CA*

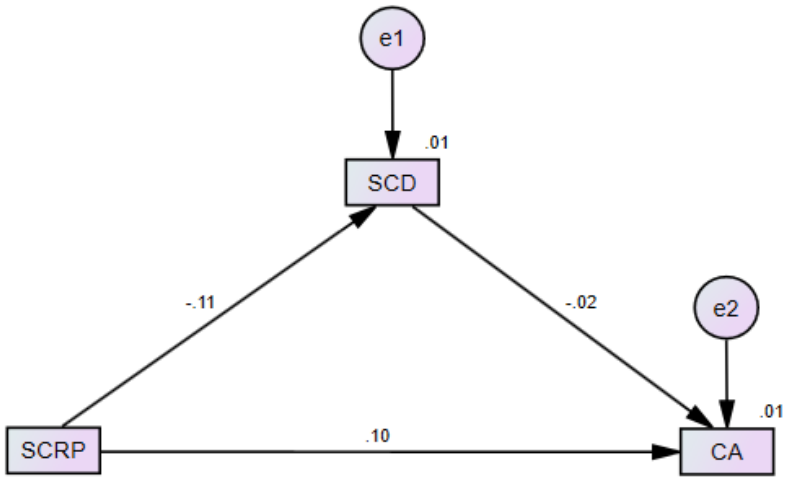
Variables	*M*	*SD*	SCRP	SCD	CA
SCRP	3.556	.849	1.000	-.107*	.104*
SCD	2.044	.725		1.000	-.031
CA	3.760	.482			1.000

Note: *Correlation is significant at .05 (2-tailed). SCRP = supply chain resilience practice; SCD = supply chain disruption; CA = competitive advantage.

Structural Equation Modeling Path Analysis

Before having the constructs' mean for final path analysis, the SEM path analysis results were obtained as follows: $\chi 2 = 28.567$, $df = 11$, $p = .003$, $\chi 2 / df = 2.597$, GFI = .979, AGFI = .948, CFI = .981, NFI = .970, and RMSEA = .063 (Hu & Bentler, 1999). This result indicated that the specified relationships among variables were consistent with the observed data. Based on the mean value of the constructs, the path model is finally presented (see Figure 3). The model infers that SCRP directly, significantly, and negatively (β = -.107) affected SCD with $R^2 = .23$. The direct effect of SCRP on SCD was -.107 with a 95% confidence interval (CI) of -.209, -.015, excluding 0 (see Table 8). This study corroborates previous research by demonstrating that SCRPs significantly reduce negative outcomes in the supply chain. Specifically, the researchers found that a unit change in SCRP decreases SCD by .107 units. In other words, the higher levels of SCRP are associated with lower levels of SCD.

Figure 3. *Final SEM Path Model*



SCRP construct is also directly, significantly, and positively (β = .101) affects CA with $R^2 = .21$. The direct effect of SCRP on CA was .101, with a 95% CI of .017/.190, excluding 0 (see Table 8). This study demonstrates that

SCRP significantly enhances CA, with a unit change in SCRP resulting in a .101 increase in CA. It also means that the higher levels of SCRP are related with higher levels of CA. The influence of SCD on CA was -.020, with a 95% CI of -.116/.074, excluding 0 (see Table 8). This study indicated that there was a negative association between SCD and CA. This association was not statistically significant. This implied that changes in SCD are not reliably associated with changes in CA in the study sample.

Table 8. *Summary of Effect Analysis*

Variables		Effects		CI		*p*-value
Independent	**Dependent**	**Direct**	**Indirect**	**95% CI**	**95% CI**	
SCRP	SCD	-.107	-	-.209	-.015	.026*
SCRP	CA	.101	-	.017	.190	.019*
SCRP	CA	.101	.002	.017	.190	.019*
SCD	CA	-.020	-	-.116	.074	.697

Note: *Correlation is significant at .05 (2-tailed). CI = confidence interval; SCRP = supply chain resilience practice; SCD = supply chain disruption; CA = competitive advantage.

Table 8 displays the results of the bootstrapping test, which examines the mediating influence of SCD between SCRP and CA. SCRP indirectly, significantly, and positively (β = .002) affected CA through SCD with R^2 = .17. This result was based on the final model (see Figure 3). The researchers determined that SCD mediates the link between SCRP and CA by .002, with a 95% CI of .017/.190, eliminating 0. In other words, each unit increase in companies' SCRP would increase the companies' CA by .002 units through its indirect effect on SCD. The findings indicate a substantial mediating effect of SCD between CA and SCRP. This further means that higher levels of SCRP are related with higher levels of CA, mediated by SCD.

Discussion

Supply Chain Resilience Practice Effect on Supply Chain Disruption

The result of this study showed a negative and significant relationship between SCRP and SCD. The result agreed with the report of Pu et al. (2023), which indicated that robust SCRPs significantly reduce operational vulnerabilities. While there is a difference in the magnitude of the effect, both studies highlight the critical role of effective SCRP in increasing supply chain stability and reducing disruptions or vulnerabilities. Moreover, the findings indicated that companies that invest in and implement SCRP tend to experience lower levels of SCD. The results also highlighted the importance of resilience-building efforts in managing and reducing disruptions within the supply chain (Chowdhury & Quaddus, 2017).

Effect of Supply Chain Disruption on Competitive Advantage

A negative relationship was found between CA and SCD. This negative trend was consistent with the study of Pu et al. (2023), which reported a negative association between operational vulnerabilities and the sustainable CA in manufacturing companies. Although our findings did not reach statistical significance, they did suggest a similar underlying trend in which supply chain issues could potentially erode CA. The negative influence of SCD on CA aligned with the intuitive understanding that disturbances in the supply chain can hinder a firm's ability to contest effectively in the market. These disruptions may lead to delays, increased costs, reduced customer satisfaction, and loss of market share, all of which can diminish CA (Ivanov & Dolgui, 2021).

Effect of Supply Chain Resilience Practice on Competitive Advantage

SCRP had a positive and significant effect on CA. This finding aligned with the research of Rezaei et al. (2022), which reported a positive relationship between supply chain resilience and CA in manufacturing firms. Both studies emphasized the importance of robust SCRP in strengthening a company's competitive edge. The companies that implement effective SCRP are more likely to gain a CA compared to those that do not. A positive relationship between SCRP and CA indicated the importance of building and maintaining resilient supply chains to enhance competitiveness in today's dynamic business setting. Companies can, therefore, enhance their competitive position by focusing on building resilience in their supply chains (Pettit et al., 2013).

Mediating Effect on Supply Chain Disruption

Our results showed that SCRP had a positive and significant influence on CA through SCD. Similarly, a study conducted by Musa and Pujawan (2017) showed that higher levels of SCRP in manufacturing companies can significantly lead to increased CA. This indicates that even minor improvements in SCRP can lead to slight enhancements in CA by reducing disruptions in the supply chain (Yang et al., 2017).

Limitations and Future Studies

It is crucial to know the limits of this research, even if it contributed to the current body of knowledge, especially in the areas of CA, SCD, and SCRP. This study only focused on bottled water manufacturing companies in Ethiopia. Expanding the sample size and including a variety of industries and geographical regions would improve the findings' generalizability.

Future research endeavors may also broaden their purview to encompass SCRP publications that are published in languages other than English. Furthermore, by focusing only on quantitative data, this study may have missed qualitative information that could have expanded on our knowledge of the phenomenon. The integration of qualitative data to supplement and enhance the quantitative findings may prove advantageous for future study activities.

Theoretical and Managerial Implications

This study has theoretical and managerial implications. Theoretically, by combining recent research and finding gaps for further investigation, this study offers academic scholars a useful resource. It facilitates the advancement of knowledge in the area of SCRP and CA by assisting in setting research objectives and priorities.

Practically, based on the research findings, policymakers are encouraged to prioritize the promotion and support of SCRPs as a crucial strategy for businesses to mitigate disruptions and enhance operational stability. To achieve this, policies could include providing financial incentives, such as tax breaks or grants, to companies that invest in SCRP. Additionally, developing standardized guidelines and best practices for supply chain risk management across various industries would ensure a more consistent and effective approach to reducing disruptions.

Moreover, the study showed that while the direct association between SCD and CA is not statistically significant, the indirect effect through SCRP is substantial. This underscores the importance of managing disruptions to maintain a competitive edge. Therefore, policies should also encourage collaboration and information sharing among businesses to bolster overall supply chain resilience. We believe that policy

makers can have a significant influence by supporting technological advancements and encouraging supply chain diversification.

Conclusion

In recent years, the vulnerability of SCD worldwide has become a rising concern. Thus, managing SCDs is becoming an increasingly vital practice. This research used both descriptive and explanatory research designs to look at the role of SCD in the association between CA and SCRPs. The researchers collected data from 347 employees using structured questionnaires and primarily analyzed the data using Pearson correlation, factor analysis, and path analysis. This study confirmed the validity and reliability of the constructs measuring SCRP, SCD, and CA. The high average variance and average variance values, along with the excellent model fit, underscore the robustness of the measurement model. Future research can use these findings to reliably explore the dynamics of managing supply chains and CA in various contexts.

This study underscored the significant effect of SCRP on mitigating disruptions and enhancing operational stability. By aligning with and extending previous research, the researchers affirmed that SCRP is not just beneficial but essential for companies aiming to thrive in an increasingly volatile global market. While this study did not discover a statistically substantial association between SCD and CA, it aligned with existing research and an intuitive business understanding that disruptions are detrimental to maintaining a competitive edge.

In line with the previous investigation, this study emphasized that companies can strengthen their market position by investing in and implementing robust SCRP. This study also demonstrated that SCRP significantly affects CA indirectly through the reduction of SCDs. The substantial mediating effect of SCD highlights the critical role of managing disruptions in achieving a robust competitive position. This study, therefore, contends that manufacturing companies should minimize disruptions further and obtain a better competitive edge using resilience measures.

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