A Pilot Study on the Role of Ethical Leadership in Fostering Innovation and Resilience in Supply Chain Organizations

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Abstract. This paper aims to evaluate the impact of ethical leadership on innovation and resilience in supply chain organizations during a crisis. It explores the dynamics through which ethical leaders may influence organizational ethical culture and organizational flexibility to lead supply chain organizations through innovation and develop resilience during turbulent and uncertain conditions. The paper employs 20 senior managerial-level respondents selected at random and collects data from them via an online quantitative survey. The study adopts a positivist research approach and applies established measurement scales to assess ethical leadership, organizational culture, organizational flexibility, innovation, and organizational resilience. The findings indicate that ethical leaders play an essential role in developing an ethical organizational culture and in fostering innovation that may indirectly impact resilience. The results further suggest that while ethical leadership has a significant direct influence on supply chain innovation, its direct effect on organizational resilience appears more limited and is likely mediated by other organizational factors. This pilot study contributes to the growing literature on leadership in crisis management by highlighting the importance of ethical leadership as a driver of innovation in supply chains. The research also identifies important directions for future large-scale studies aimed at better understanding the complex relationships between leadership, innovation, and resilience in supply chain contexts

Keywords: Ethical Leadership, Organizational Culture, Organizational Resilience, Organizational Flexibility, Supply Chain Innovation.

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1. Introduction

1.1 Background and Research Context

Consumer-Packaged Goods (CPG) companies substantially rely on consistency in production and distribution and are vulnerable to natural and economic crises. The interlinked nature of global trade leads to disruptions in global supply chains, shortages of raw materials, workforce limitations, and extreme demand fluctuations during crises, and these impacts traverse geographical boundaries. CPG companies faced with such disruptions need to learn to adapt and innovate their processes (Gereffi, 2020). This research examines the role of ethical leadership in enabling CPG companies to respond effectively to supply chain disruptions.

While several studies exist that have explored the role of leadership in crisis management (Bundy *et al*., 2017), the role of ethical leadership in navigating supply chain challenges has been rarely studied. Ethical leadership is linked with creating an environment of trust and transparency (Brown & Treviño, 2006) and developing a culture that supports resilience (Wang & Feng, 2023). However, its direct impact on innovation and crisis communications has not been thoroughly studied (Yukl *et al*., 2013). For example, there are studies linking ethical leadership to nurturing organizational culture (Engelke & Swegan, 2024) by facilitating organizational learning culture (Rodriguez-Sanchez *et al*., 2021), ethical culture (Saleem *et al.*, 2020), ethical reporting, system thinking (Metwally *et al.*, 2019), and ethical climate (Kleynhans *et al.*, 2021). Ethical leadership also influences organizational flexibility and is indirectly linked with innovation through ethical organizational culture (Ilyas *et al*., 2020; Van der Wal & Demircioglu, 2020; Vu, 2020). As such, ethical leaders likely influence organizational resilience strategies through their impact on culture, organizational flexibility, and human capital.

Nevertheless, there are gaps in the literature regarding the understanding of the impact of ethical leadership on innovation, particularly in the context of supply chain management during crises. This points to a significant gap in knowledge, as understanding the impact of ethical leadership on supply chain resilience may enable preparedness for businesses to prepare for any future crises. This study, therefore, aims to explore the mechanisms through which ethical leadership influences both innovation and resilience in the supply chain context. The research investigates how leadership values can translate into creating adaptive and innovative organizational behaviors, particularly under conditions of stress.

The current study aims to study and explore the impact of ethical leadership by finding answers to the following questions:

Research Questions

(1) To what extent does ethical leadership drive innovation to mitigate supply chain challenges during a crisis?

(2) To what extent does ethical leadership impact organizational resilience during a crisis?

2. Literature Review and Conceptual Framework

2.1 Ethical Leadership (EL), Organizational Flexibility (OF), and Organizational Culture (OC)

Ethical leadership comprises a transparent leadership style that indulges in responsible decision-making (Bachmann, 2017). A predominant characteristic of ethical leaders is that they have a moral compass that guides them during ethical dilemmas and moral challenges, thus making them potent influencers in creating an ethical climate in the organization (Hillmann & Guenther, 2021), which has been linked with organizational resilience (Ullah *et al.*, 2021). This ethical climate enables a strong organizational culture based on shared norms and values that shape organizations' activities. As ethical leaders are morally guided, they create a sphere of influence with their personal actions and interpersonal relationships (Brown *et al*., 2005). By their actions and directions, ethical leaders can encourage effective and transparent decision-making among their followers (Avey *et al.*, 2011; Bedi *et al.*, 2016; Ullah *et al.*, 2021). Ethical leaders are also found to influence corporate governance and overcome challenges associated with ethical dilemmas (Bachmann, 2017; Bhatti *et al.*, 2020; Walumbwa *et al.*, 2011). These characteristics of ethical leaders justify the inclusion of ethical leadership for evaluating innovation and resilience in supply chain organizations facing crises.

Given the influential role of ethical leadership in fostering resilience (Sastrawaha et al., 2024), it is essential to consider the role played by organizational adaptability or flexibility in tandem with ethical leaders' sustained performance during turbulent times. Organizational flexibility is the ability to adapt rapidly to changes in the environment by altering or reconfiguring resources, processes, or structures. Flexible organizations can change their strategies and reallocate resources to create competitive advantages even during turbulent times (Awais *et al.*, 2023; Ni *et al.*, 2020). Supply chain organizations depend on flexibility for their continuity and sustainability due to their exposure to rapidly evolving consumer demands and high interdependence on global markets (Ramos *et a*l., 2023; Shukor *et al*., 2021). Flexible organizations are found to have flatter structures and emphasize employee empowerment and decentralized decision-making (Bal & Izak, 2021). Such organizations can innovate and stay resilient during disruptions, and as such, organizational flexibility forms a crucial factor in the current study.

While flexibility is linked to organizational ability to pivot during disruptions, there is a need to study the broader context of organizational culture that enables the development of adaptive behaviors. Organizational culture comprises collective beliefs, values, norms, and practices (Azeem *et al*., 2021) and impacts employees' perceptions, attitudes, and actions. Organizational culture influences employees' ethical behavior, innovation, and ability to adapt (Naveed *et al*., 2022) and forms a foundation for decision making (Akpa *et al*., 2021). Organizational culture also plays a crucial role during a crisis, where it supports values like risk-taking, adapting, and ethics to stay resilient (Azeem *et al*., 2021). An open and empowering organizational culture is likely to impact employees' innovation and engagement and lead to creative solutions during disruptions (Siswadi *et al*., 2023). The current study, therefore, explores the impact of ethical leadership in shaping a culture that is conducive to organizational innovation and resilience.

2.2 Innovation (I) and Organizational Resilience (OR)

Innovation is the process of developing creative solutions or practices to enhance organizational performance or competitiveness (Hund *et al*., 2021). Supply chain organizations rely on innovations to obtain operational efficiencies and become more responsive and sustainable to the changes in their dynamic environment (Kivimaa *et al*., 2021). Innovative organizations are vested in developing novel solutions to adapt to changing external and internal realities (Azeem *et al*., 2021). Several studies have linked innovation to organizational resilience, especially during a crisis, as innovative organizations can rapidly develop creative solutions and adapt (West & Richter, 2024). Organizational cultures that encourage innovation through flexible decision making and empowerment have also been linked to better performance, not only during immediate crises, but also in the longer term (Naveed *et al*., 2022). Innovation is, therefore, selected as a variable affecting organizational resilience in this study.

While innovation is found to link to organizational resilience, it is crucial to further examine resilience itself as a core organizational capability in dynamic environments.

Resilience, or their capacity to adapt and recover, and go beyond surviving to thrive, is important for long-term sustainability for supply chain organizations that operate in dynamic environments (Osei *et al*., 2023; Wang & Feng, 2023). However, resilience as a variable has been largely studied from the perspective of economic or financial resilience, while the more focused manifestation of resilience may be observed in terms of organizational capabilities like human capital, flexibility, or culture (Duchek, 2020; Rodriguez-Sanchez *et al.*, 2021).

2.3 Impact of Ethical Leadership on Organizational Resilience, Organizational Flexibility, Organizational Culture and Innovation

Ethical Leadership and Organizational Resilience

Several studies have linked servant leadership to organizational resilience (Ahmad *et al*., 2021; Batool *et al*., 2022; Wiroko, 2021) or linked authentic leadership to organizational resilience (Bilgetürk & Baykal, 2021; Kleynhan *et al*., 2021; Mao *et al*., 2021). Studies linking ethical leadership to organizational resilience are rare, though the literature acknowledges their independent significance (Cheng *et al.*, 2022; Vakilzadeh & Haase, 2021). Nevertheless, there is a considerable indication of a relationship between the two constructs through their links to organizational culture, human capital, or innovation (Gichuhi, 2021; Rodriguez-Sanchez *et al*., 2021; Suriyankietkaew *et al*., 2022; Vera *et al*., 2020).

Also, there is almost no research that links ethical leadership with innovation or directly with organizational resilience. Ethical leadership is known to affect sustainability or the ability to balance economic, social, and environmental responsibilities for long-term viability (Bhatti *et al*., 2020; Dey *et al*., 2022; Ilyas *et al*., 2020; Saha *et al*., 2020; Saleem *et al*., 2020), it has not been researched in terms of its more direct impacts on resilience, particularly in the context of increasingly complex and uncertain market environments for supply chain organizations. As existing studies suggest ethical leadership's indirect effects on resilience, this research proposes that ethical leadership contributes to resilience by first shaping the organizational culture and fostering flexibility that enables innovation. As such, the following research hypothesis is developed:

H1: Ethical Leadership Impacts Organizational Resilience in Supply Chain Organizations

To further investigate this pathway, the next section explores how ethical leadership may influence organizational flexibility, which is found to be a key enabler of innovation and adaptability in previous studies (Awais *et al.*, 2023; Ni *et al.*, 2020).

Ethical Leadership and Organizational Flexibility

There is recognition in literature that leadership impacts organizational flexibility (Eliot, 2020; Gichuhi, 2020; Lombardi *et al*., 2021), and ethical leadership improves capabilities and adaptability (Ayoko, 2021), which leads to innovation (Vu, 2020). Previous studies suggest a causal relationship that ethical leaders shape organizational flexibility through their values and norms that encourage decentralized decision-making, openness to change, and employee empowerment (Mehmood & Lawa, 2025). By their guidance, ethical leaders improve the organization's capabilities to reconfigure resources and adapt (Liu & Zhao, 2019). Ethical leadership, by encouraging values of trust, distributed decision-making, and openness, may become a catalyst for flexibility that can lead to innovation and adaptability during crises.

Also, studies during the pandemic have found that ethical leaders strengthen organizational flexibility through employee empowerment and encouragement for innovation during disruptions (Li *et al*., 2022; Wen *et al*., 2021).

As previous literature supports this causal relationship, the current study proposes ethical leadership as a relevant predictor of organizational flexibility. The current study, therefore, develops the following hypothesis:

H2: Ethical Leadership Positively Impacts Organizational Flexibility

The next section examines how ethical leadership may shape organizational culture, which is another fundamental factor reported in literature as contributing to resilience (Akpa *et al*., 2021; Naveed *et al*., 2022).

Ethical Leadership and Organizational Culture

Next, ethical leadership develops an ethical organizational culture that fosters resilience through building trust and commitment (Kanokorn *et al*., 2023; Sharif & Scandura, 2014) and adaptability (Engelke & Swegan, 2024; Katz, 2018). Furthermore, ethical leadership and organizational culture have been studied together as factors in creating an ethical environment that leads to organizational resilience and sustainability (Engelke & Swegan, 2024; Al Halbusi et al., 2021; Al Halbusi *et a*l., 2022; Hillmann, 2021; Hillmann and Guenther, 2021).

While studies have found similar outcomes of ethical leadership, in the form of positive and ethical organizational climate and good corporate governance, there is a lack of focused studies on the specific benefits of ethical leaders, particularly in the context of supply chain organizations. More specific contributions of ethical leadership may be linked to their impact on organizational culture or employee behavior (Metwally *et al*., 2019; Sarwar *et al*., 2020), but such studies are rare.

The current study, therefore, hypothesizes,

H3: Ethical Leadership Positively Impacts Organizational Culture

Ethical Leadership and Innovation

Several studies have linked ethical leadership as a driver of innovation, particularly during turbulent and ethically complex times. By displaying normatively appropriate conduct through personal actions and interpersonal relationships, ethical leaders can foster conditions that facilitate innovative behaviour (Liu *et al.,* 2023)**.** Ethical leaders

provide a sense of psychological safety that is linked with innovation and work engagement (Jin *et al.,* 2022; Liu *et al.,* 2023). Studies have also reported that ethical leaders not just create a psychological empowerment, they are also able to provide job clarity and person-job fit, that leads to better employee engagement and innovative behavior (Abuzaid *et al.,* 2024). By enabling an alignment of values between the employees and organization, ethical leaders are able to provide role clarity and incentive for employee inputs and creativity, thus enabling a culture of innovation. Ethical leaders are therefore able to create a climate of innovation by generating a trust-based empowering culture (Masianoga & Chakauya, 2023). These findings underscore the importance of ethical leadership as an enabler of innovation, and hence, the following hypothesis is developed.

H4: Ethical Leadership Positively Impacts Innovation

2.4. Innovation and Organizational Flexibility, Organizational Culture, and Organizational Resilience

Innovation and Organizational Flexibility

Organizational flexibility is linked with organizational recovery and improved performance in supply chains (Frederico, 2021; Ivanov, 2024; Nikookar *et al*., 2024)**.** Organizational flexibility is often studied as a precursor for innovation and as an important link between innovation and organizational performance (Awais *et al*., 2023). Several scholars have studied organizational resilience during COVID-19 and reported that organizational flexibility enabled innovation and led to sustainable organizational performance during the disruptions (Dubey *et al*., 2019; Siagian *et al*., 2021). Similarly, innovation has been found to play a mediating role in the relationship between organizational flexibility and organizational competitiveness (Awais *et al*., 2023; Ni *et al*., 2020). There is, therefore, substantial indication in the literature that organizational flexibility impacts innovation, which leads to the following hypothesis:

H5a: Organizational Flexibility Positively Impacts Innovation.

There is also some support in literature that organizational flexibility may be strengthening the effects of ethical leadership on innovation. For example, Yang and Liu (2022) found that strategic flexibility moderated the effect of ethical leadership on green innovation behaviors through green organizational identity. Thus, organizational flexibility may ensure that ethical leaders are more successful at inspiring innovation. Similarly, Liu and Zhao (2019) found that organizational flexibility improved the positive impact of ethical leadership on organizational identity and boosted innovative behavior. As such, the following hypothesis is suggested:

H5b: Organizational Flexibility Moderates the relationship between Ethical Leadership and Innovation.

Next, the role of organizational culture is also found essential in shaping an environment that supports and sustains innovative behaviors.

Innovation and Organizational Culture

Ethical leaders, by fostering an open and value-based culture that nurtures psychological safety (Aboramadan & Kundi, 2023), empower individuals and teams to take risks without fear of failure, which leads to innovation. Recent research further confirms that organizational cultures that provide psychological safety enable employees to be creative and innovative during crises (Yaqoob *et al*., 2024). A strong

ethical culture based on values is likely to lead to resilience, and flexibility enables the organization to respond in innovative ways during crises (Evans & Behrami, 2020). This is reflected in the following hypothesis:

H6a: Organizational Culture Positively Impacts Innovation

Additionally, there's growing empirical support showing that organizational culture moderates the relationship between ethical leadership and innovation. For example, Jin *et. al* (2022) found that ethical leadership enhances innovative behavior by encouraging employees' ideas, and this is moderated by psychological safety. Thus a culture that enables safe idea-sharing positively impacts ethical leaders' ability to encourage innovation. Additionally, other studies have found that person-organization fit positively moderates the effect of ethical leadership on innovation. While not directly addressing organizational culture, the study suggests that value alignment and culture consistency may act as a moderator in this relationship. As such, the following hypothesis is developed:

H6b: Organizational Culture Moderates the relationship between Ethical Leadership and Innovation

Additionally, it is essential to explore how innovation contributes directly to enhancing organizational resilience.

Innovation and Organizational Resilience

Also, innovation is linked with organizational resilience (Do *et al*., 2022; Dovbischuk, 2022; Gallab & Di Nardo, 2023), particularly innovation-oriented capabilities like the ability to effectively train employees, to facilitate cross-functional collaboration and develop inter-firm relationships, and the capability to distribute new knowledge (Dovbischuk, 2022).

Several studies have linked innovation and adaptive capacity with organizational resilience (Do *et al*., 2022; Dovbischuk, 2022; Gallab & Di Nardo, 2023; Liang & Li, 2023; Rocchetta, 2024; Sabahi *et al.*, 2020; Schröder, 2022). Particularly, innovation-oriented capabilities like the ability to effectively train employees, to facilitate cross-functional collaboration and develop inter-firm relationships, and the capability to distribute new knowledge (Dovbischuk, 2022) impact organizational resilience. The current research, too, develops the hypothesis:

H7a: Innovation leads to Organizational Resilience.

Innovation as a Moderator Between Ethical Leadership and Organizational Resilience

Ethical leadership's impact on organizational reliance may be contingent on other organizational factors as discussed above, in the form of organizational flexibility and organizational culture (Engelke & Swegan, 2024). However, there is also sone research that suggests that innovation may be a factor in the relationship between ethical leadership and organizational resilience. Innovation serves as key organizational competency that may enhance ethical leadership's effectiveness in fostering resilience (Teece *et al*., 2016). There is evidence from conceptual models in leadership and crisis management literature suggesting that innovation enables leadership to adopt resilient practices (O'Neill & Salas, 2025; Gallab & Di Nardo, 2023). Thus, it is plausible that organizations high in innovative capacity are likely to have an enhanced impact of ethical leadership on organizational resilience. Hence, the following hypothesis is developed.

H7b: Innovation moderates the relationship between ethical leadership and organizational resilience.
Figure 2 demonstrates the conceptual framework underpinning this research.

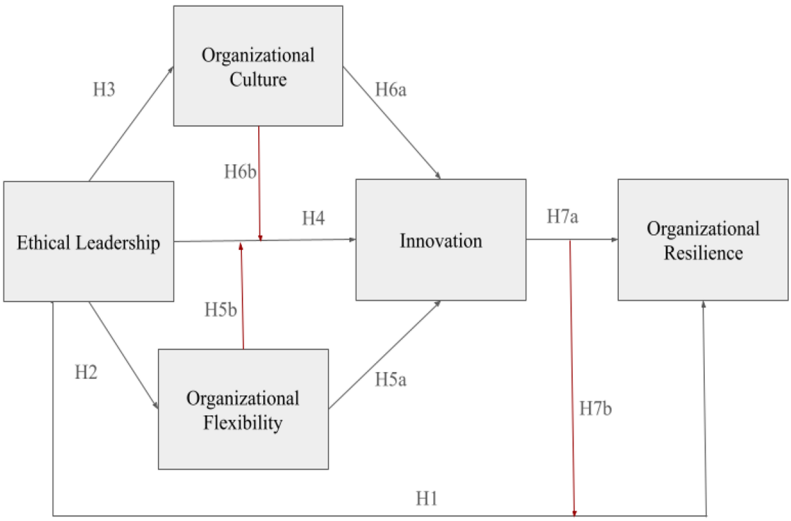

Figure 2: Conceptual Framework
Source: Author

This conceptual framework depicts the causal relationships between ethical leadership and organizational resilience. Ethical leadership influences both organizational culture and organizational flexibility, which create conducive conditions for organizational innovation. Innovation impacts organizational capabilities to develop novel solutions to adapt and thrive during the crisis, thus leading to organizational resilience.

3. Methodology

3.1 Research Design

This study employs a positivist approach and quantitative methodology (Darby *et al.*, 2019) to assess the impact of ethical leadership on innovation and organizational resilience. The positivist approach enables collecting data in an objective and context-independent manner (Park *et al.*, 2020). It is suited for the current study, which aims to evaluate the relationships between research variables that are well-researched in previous studies and which can be measured using standardized and validated scales.

3.2 Sampling and Participant Selection

This study targets supply chain professionals and business consultants within the Consumer Packaged Goods (CPG) industry in Europe, ensuring a diverse and informed participant pool. As this is a pilot study, it does not aim to draw particular conclusions, but to gather information that can determine the feasibility of the research and help in refining the research instrument.

For a pilot study, a sample size of 12 is acceptable (Julious, 2005); this study uses a sample of 20 to ensure that data analysis can be conducted with accurate results. The current study includes 20 participants, thus exceeding the threshold sample size for pilot studies. As the current study is exploratory in nature, it considers the minimum thumb rule of 10 respondents per predictor (Hair *et al*., 2011; Sarstedt *et al.*, 2023). Given that the current study has 3 predictors for innovation and two for organizational resilience, a full-scale study ideally requires a larger sample. However, for the purpose of this pilot study, a sample of 20 is found to be more suitable, though the resultant findings need to be treated as exploratory and interpreted with caution due to the lower statistical power of the sample size.

Participants include supply chain managers and business leaders, procurement officers, logistics professionals, and business consultants/advisors who have actively contributed to crisis management, innovation, and leadership strategies during supply chain disruptions. Eligibility criteria require a minimum of three years of experience in either an in-house SCM role within a CPG company or a consulting/advisory role working with CPG clients. Recruitment is conducted via targeted outreach through Social platforms for industry groups, supply chains, referrals, and consulting networks.

3.3 Measurement Scales and Constructs

Ethical Leadership is measured using the Ethical Leadership Questionnaire (ELQ) (Brown *et al.*, 2005). Logistics-related innovation activity scale by Wong & Ngai, 2022) is used for assessing innovation in supply chains, and organizational culture is measured using Treviño *et al.* (1998). Organizational Flexibility is assessed by Sethi and Sethi (1990) and Upton (1994), while the Supply Chain Resilience Scale (SCRES) by Brandon-Jones *et al*. (2014) is used for measuring Organizational Resilience in the supply chain. (See Appendix A).

3.4 Data Collection

Data collection is done using an online survey of supply chain managers and executives within the European CPG industry. The survey will assess participants' perceptions of ethical leadership within their organizations, how it influenced innovation during the pandemic, and its impact on organizational resilience.

3.5 Data Analysis

Due to the small sample size, key analyses were conducted using a combination of IBM SPSS (for reliability, correlation analysis, normality tests, and ordinary least squares regression) and SmartPLS (for select measurement model assessments like outer loadings). PLS-SEM outputs such as AVE and HTMT could not be fully

generated due to a small sample size (Sarker *et al*., 2024). The data analysis included demographic profiling of the respondents, followed by descriptive statistics for the data. Next, reliability was tested using Cronbach's alpha, validity was established using an item-level correlation matrix (SPSS) and outer loadings (Smart Pls), which resulted in reducing 4 items. This was also followed by a normality test that established the data to be normally distributed and hence amenable to analysis using parametric methods. A Preliminary Bivariate Correlation Analysis was done to explore the strength and direction of linear relationships between key constructs. It helped in identifying potential associations and multicollinearity before hypothesis testing (Baharum *et al*., 2023). Finally, regression analysis is used to test the hypothesis and provide answers to the research questions. Given the pilot sample size, moderation analyses are reported as exploratory and intended to inform hypothesis refinement and power planning for a larger follow-up study.

3.6 Ethical Considerations

Informed consent is obtained from the respondents before they take the survey, and all information required for them regarding the purpose of the study, their right to privacy and confidentiality, and their right to leave the survey at any given point (before the data analysis process begins, which is 1 month from the date of submission of the survey response). Further, responses are kept anonymous, and any demographic information is kept private and not shared with any third party or revealed during the analysis. The survey is online, which ensures that the respondents can take it from any location of their choice and comfort without any security concerns.

4. Results

4.1 Demographic Profile

The respondents predominantly belonged to the European region (19 out of 20) , with only one respondent from Latin America. This may imply that the findings are more applicable in the context of Europe. Most participants belonged to a consultancy or advisor firn (10), followed by logistics/3PL providers (5), manufacturing (3), retailers (2). It is seen that the largest number of respondents were from food and beverages (8), followed by household goods (5), consumer electronics (2), and 1 participant each from personal care, mobiles, tech, healthcare and heavy machinery. Thus, the respondents belonged to different sectors related to supply chains, and as such, the findings are representative of supply chains from across diverse sectors and regions. The sample, therefore, contained a representative mix of respondents from different industries and sectors as such, the findings are expected to have broad applicability across industries. The following Table 1 captures the details of the respondents: The findings show that the majority of respondents (50%) belonged to small-sized companies (with employees under 500), and 30% belonged to large companies with over 5000 employees. The remaining 20% were from mid-sized companies with employees between 500 and 5000. Thus, the sample can be slightly biased toward small companies, though there is substantial representation of large and mid-sized firms as well.

Table 1: Respondents Demographic

Firm Type	Small	Medium	Large	**Total**
Consultancy/Advisory Firm	6	3	2	**11**
Logistics/3PL Provider	2	1	1	**4**
Manufacturing	1	0	2	**3**
Retailer	1	0	1	**2**
Total	**10**	**4**	**6**	**20**

Also, the respondents were mostly mid-to-senior level executives with experience between 6 and 10 years (20%) and between 11-15 years (35%). Additionally, 20% of respondents have over 16 years of experience, while 25% have between 3 and 5 years. This distribution reflects a well-balanced sample in terms of career tenure, capturing perspectives from various stages of professional development. As such, the findings may be considered broadly representative of organizational decision-makers across different levels of experience.

4.3 Descriptive Statistics

Table 2: Descriptive Statistics

	Mean	**Standard Deviation**	**Skewness**	**Kurtosis**
EL	3.73	0.56	-0.42	-0.91
OC	3.39	0.50	-0.12	-0.18
OF	3.60	0.55	-0.28	-0.21
SCI	3.64	0.36	-0.35	-0.62
OR	3.44	0.54	-0.88	0.66

The descriptive analysis of the composite scores for each variable was developed to assess the data distribution among the 20 participants. Table 2 shows that Ethical Leadership (EL) has an average score of 3.73 (on the five-point scale), which suggests that there was a moderate consensus among respondents regarding their perceptions of

ethical leadership within their organizations. EL also showed a standard deviation (SD) of 0.56, which shows low variability in responses. The negative skewness (-0.42) indicates that more participants tended to agree with the ethical leadership statements than disagree with them. A kurtosis of -0.91 indicates a flatter than a typical normal distribution.

Organizational Culture (OC) showed an average score of 3.39 and a standard deviation of 0.50. These findings indicate that the responses did not vary much and appeared to cluster around agreement with the statements. The skewness value (-0.12), which is close to zero, indicates a balanced distribution of responses around the mean. The kurtosis (-0.18) further shows a normal bell curve distribution. Together, these findings indicate that the participants' views on OC were generally similar and moderately positive.

Organizational Flexibility (OF) had an average of 3.60 with an SD of 0.55. There is a slight negative skewness (-0.28) that indicates that the respondents tended to lean toward positive ratings of the statements. The kurtosis (-0.21) implies a relatively normal distribution without flatness or peaks. Overall, these findings suggest that participants generally agreed that their organizations are moderately flexible.

Supply Chain Innovation (SCI) exhibited an average score of 3.64 and a low SD (0.36), which indicates strong consensus among respondents. The negative skewness (-0.35) is indicative of a slight lean towards more favorable perceptions of SCI, and a kurtosis of -0.61 suggests a slightly flatter distribution and no extreme highs or lows.

Organizational Resilience (OR) with an average score of 3.44, an SD of 0.54, showed a noticeable negative skewness (-0.88), which shows that participants tended to agree that their organization was resilient. A positive kurtosis (0.65) suggests a slightly peaked distribution, which indicates that some respondents used extreme ratings.

Overall, all 5 variables had average scores between 3.4 to 3.7, which indicates that almost all respondents rated their organizations positively, within the “Neutral” to “Agree” range. The modest SDs further confirm that the respondents tended to have less variability in their responses. The skewness and kurtosis values were used to confirm that the respondents tended to lean towards more positive views, and there were no extreme outliers.

4.3 Reliability and Validity

4.3.1 Reliability

Table 3: Cronbach’s Alpha Test

Construct	Cronbach's Alpha
Ethical Leadership (EL)	0.863
Organizational Culture (OC)	0.772
Organizational Flexibility (OF)	0.513

Supply Chain Innovation (SCI)	0.642
Organizational Resilience (OR)	0.707

Cronbach's alpha was used to test the reliability and internal consistency of the constructs. A Cronbach's alpha (α) >0.7 is considered reflective of internal consistency. Table 3 above, α = 0.86 for shows ethical leadership, suggesting strong internal consistency among its ten items. Organizational culture (α = 0.77) and organizational resilience (α = 0.71) also showed good reliability. However, SCI exhibited a lower alpha of 0.64, and organizational flexibility, too, showed lower internal consistency with an alpha of 0.51. Thus, it is suggested that some caution be applied in interpreting these values. Nevertheless, since this is a small data set, these results still provide valuable preliminary insights and highlight areas for refinement in future, larger-scale research.

4.3.2 Validity

Content validity is established by ensuring that all variables and constructs are rooted in literature and adapted from standard and validated scales (Rusticus, 2024). Construct validity is ideally measured using Exploratory factor analysis (EFA) and Confirmatory Factor Analysis (CFA); however, the small sample size restricted conducting these tests, as both require a sample size > 100 (Sjøberg & Bergersen, 2022). Instead, convergent and discriminant validity, which are key aspects of construct validity (Cheung *et al*., 2024; Rasoolimanesh, 2022), were examined by analyzing item-level correlation matrices (Table Appendix B) and outer loadings (Appendix C).

The correlation matrix (Appendix B) shows that ethical leadership (EL1–EL10) items generally have moderate positive correlations among themselves. For example, EL1 correlates with EL7 at 0.57 and with EL8 at 0.48. This suggests good convergent validity within EL. Similarly, organizational culture (OC1–OC8) items also show moderate positive correlations within themselves, though in some pairs, it is lower. For example, OC1-OC3, OC1-OC4, and OC1-OC4 correlate at r=0.59 each, but OC1-OC2 is r=0.37. However, the items cluster together as required. For organizational flexibility (OF1–OF3), the correlations within the group are positive but lower. For example, OF1-OF2, r=0.26, and for OF1-OF3, r=0.29 (this was also seen with the owner's Cronbach's alpha in Table 3 above, where α = 0.51 for organization flexibility).

Supply chain innovation (SCI1–SCI10) items show moderate internal correlations, suggesting convergent validity (for example, SCI1-SCI, r=0.43). Organizational resilience (OR1–OR4) items showed mixed internal correlations, with some items correlating highly (OR2 and OR3, r = 0.75), and others, like OR1-OR2 (r = –0.21), exhibiting a negative relationship. This variation suggests that certain items may reflect different facets of resilience, and with minor refinement in item wording or structure, the scale can be strengthened for future use.

Across the constructs, most correlations between items are low (r<0.33), which supports discriminant validity. However, there are some higher correlations across constructs (like EL4 and OR3 at 0.60), which may suggest some overlapping. Although some overlap is observed across a few items, the overall pattern of strong within-

construct and low between-construct correlations supports both convergent and discriminant validity. The findings, therefore, offer evidence for the structural soundness of the measurement model in this pilot study.

Outer loadings indicate how well each observed item reflects its underlying construct, and values above 0.70 suggest strong item reliability. Some items showed a negative factor loading, or close to zero. These items were removed from the model, and the test was conducted again.

The findings in Appendix C, show that EL and OC constructs are relatively strong, but OF, SCI, and OR suffer from weak or non-significant indicators like OC6, SCI3, OF1, and OR4, which were removed from the final analysis. Additional tests like, Average Variance Extracted (AVE), Fornell-Larcker Criterion, or HTMT (Heterotrait-Monotrait), were not calculated due to the small sample size.

4.4 Test of Normality

The Shapiro-Wilk tests (Rasoolimanesh, 2022) were conducted separately for each composite variable to assess normality of the distribution. Table 4 presents the results.

Table 4: Test of Normality

	W-Statistic	p-value
EL_mean	0.912	0.068
OC_mean	0.976	0.864
OF_mean	0.931	0.161
SCI_mean	0.962	0.576
OR_mean	0.909	0.060

All composite scores had p-values above the common significance threshold of 0.05, with ethical leadership (p=0.068), organizational culture (p=0.864), organizational flexibility (p=0.161), Supply chain innovation (p=0.576), and organizational resilience (p=0.060). This shows that distributions of the composite variables can be considered as approximately normal, and hence parametric statistical methods such as Pearson correlations and linear regressions can be used for hypothesis testing.

4.5 Preliminary Bivariate Correlation Analysis

This was done to explore the strength and direction of relationships between pairs of variables. It helps identify potential associations before conducting more complex hypothesis testing or structural modeling. See Table 5.

Table 5: Bivariate Correlation Analysis

Hypothesis	Pearson r	p-value
H1: EL → OR	0.231	0.326
H2: EL → OF	0.102	0.668
H3: EL → OC	0.573	0.008
H4: EL → SCI	0.566	0.009
H5a: OF → SCI	0.366	0.113
H6a: OC → SCI	0.349	0.132
H7a: SCI → OR	0.269	0.252

The Pearson correlation coefficient between EL and OR was found to be 0.231, with a p-value of 0.326 ($p>0.05$). While this suggests a weak positive relationship, the relationship is not significant as p is greater than 0.05. This finding suggests that the respondents do not significantly perceive EL to be associated with OR.

The findings in Table 5 show that EL and OF have r = 0.102 and a p-value of 0.68, suggesting a weak positive but non-significant relationship; and OF and SCI have an r = 0.36 and a p-value of 0.11, which suggests a moderate positive but not significant relationship ($p>0.05$). The correlation between EL and OC was 0.57, with a p-value of 0.009, which indicates a statistically significant moderate-to-strong positive correlation. Nevertheless, it can be seen that there is a tendency among the respondents to associate OC with SCI ($r=0.349$), but a p-value of 0.132 ($p>0.05$) indicates a statistically insignificant relationship.

With $r =0.269$, a p-value of 0.25, the findings reflect a weak positive but not significant relationship between SCI and OR. This suggests that higher perceptions of innovation in the supply chain may be somewhat associated with higher levels of organizational resilience, but the evidence in the current sample is limited to support the contention. Also, ethical leadership and innovation had $r=0.566$ and p-value = 0.009, which indicates a significant positive and moderate to strong relationship.

4.6 Hypothesis Testing

Hypotheses were tested using Ordinary Least Squares (OLS) linear regression (conducted in SPSS) and produced path coefficients (β), t-values, p-values, R^2, and effect sizes (f^2) aligned with the hypothesized model structure. It needs to be noted that owing to the small sample size, the findings may be reflective of limitations of the sample rather than of statistically significant results, and hence need to be treated as exploratory in nature.

4.6.1 EL and OR, OF, OF and SCI in Supply Chain Organizations

EL and OR

The first research hypothesis explored the relationship between EL and OR. The findings are presented in Table 6.

Table 6: EL as a Predictor of OR

Path	β	t-value	p-value	R Squared	f^2
EL → OR	0.220	1.215	0.230	0.054	0.057

With a coefficient (β) of 0.22 (which suggests a positive impact of EL on OR), the model explains approximately 5.4% (R^2=0.054) of the variance in OR due to EL. Despite the positive coefficient, the relatively low R^2 value and low f^2 = 0.057 suggest that ethical leadership alone may account for only a small portion of the variation in organizational resilience in the perceptions of the respondents. Also, p-value =0.233 and t=1.215 (p>0.05; t<1.96), the results are not statistically significant. As such, the HI, *Ethical Leadership Impacts Organizational Resilience in Supply Chain Organizations,* was rejected.

EL and OF

The second research hypothesis explored the relationship between ethical leadership and organizational flexibility (Table 7 below).

Table 7: EL as a Predictor of OF

Path	β	t-value	p-value	R Squared	f^2
EL → OF	0.099	0.422	0.678	0.010	0.010

It was found that there is a weak relationship between the two variables (Table 7). With β = 0.099 and a very low R^2 of 0.01 and f^2 of 0.010 (low effect), it is indicated that EL accounts for only 1% of the variance in OF. Also, the p-value =0.678 and t=0.422 (p>0.05; t<1.96), the results are not statistically significant. These results highlight that, within this small pilot sample, EL does not have a notable direct impact on OF; *as such, H2: Ethical Leadership Positively Impacts Organizational Flexibility, is rejected.*

EL and OC

Hypothesis 3 focused on the impact of EL on OC, and the results are presented in Table 8 below.

Table 8: EL as a predictor of OC

Path	β	t-value	p-value	R Squared	f^2
EL → OC	0.504	2.608	0.018	0.328	0.488

The analysis for H4 revealed a β of 0.50, an R^2 of 0.33, and an f^2 of 0.448 (large effect) (Table 8). These findings show that EL accounts for 33% variation in OC, which suggests EL to be a significant factor impacting OC. The p-value of 0.018 and t-value of 2.608 ($p<0.05$; $t>1.96$) show that the relationship is significant. As such, hypothesis H3, *Ethical Leadership Positively Impacts Organizational Culture,* is accepted.

EL and SCI

Table 9 presents the analysis to test the relationship strength between EL and SCI.

Table 9: EL as a Predictor of SCI

Path	β	t-value	p-value	R Squared	f^2
EL → SCI	0.366	2.276	0.030	0.320	0.471

The analysis showed a regression coefficient (β) of 0.37, an f^2 of 0.471 (large effect), and an R^2 of 0.32. These findings indicate that EL can predict 32% of the variance in SCI. With this notably large effect size and statistically significant results (p-value = 0.03; t-value =2.276), it can be presumed that EL impacts SCI considerably. As such, *H4, Ethical Leadership Positively Impacts Innovation,* is accepted.

4.6.2 SCI and OF, OC and OR in Supply Chain Organizations

SCI and OF

Hypothesis 5a evaluated the relationship between OF and SCI, and the results are presented in Table 10 below.

Table 10: OF as a Predictor of SCI

Path	β	t-value	p-value	R Squared	f^2
OF → SCI	0.244	1.669	0.112	0.134	0.155

Results showed a β of 0.24 but $p = 0.112$ and $t = 1.669$ ($p>0.05$; $t<1.96$), which suggests a positive but non-significant relationship (Table 10). Further, the R^2 value of 0.13 suggests that OF can explain approximately 13% of the variance in SCI and $f^2 = 0.155$ (medium effect), which hints that OF may be an important factor for SCI. However, the relationship was not found to be statistically significant in this small sample. Hence, H5a, *Organizational Flexibility Positively Impacts Innovation*, is rejected.

SCI and OC

Hypothesis 6a predicted that organizational culture impacted supply chain innovations, and the relationship was tested (Table 11).

Table 11: OC as Predictor of SCI

Path	β	t-value	p-value	R Squared	f^2
OC → SCI	0.257	1.581	0.131	0.122	0.139

Table 11 shows β =0.257, f^2 of 0.139 (large effect), with an R^2 value of 0.12. These findings indicate that 12% of the variance in SCI can be explained by OC. While the result is not statistically significant (p-value = 0.131; t-value =1.581), the moderate effect size suggests a potentially meaningful relationship that could be explored in larger studies. Nevertheless, in the current study, H6a, *Organizational Culture Positively Impacts Innovation,* is rejected.

SCI and OR

Hypothesis 7a explored the relationship between SCI and OR (Table 12).

Table 12: SCI as a Predictor of OR

Path	β	t-value	p-value	R Squared	f^2
SCI → OR	0.396	1.857	0.072	0.072	0.078

Table 12 shows a β of 0.40, f^2 of 0.078 (small effect), and an R^2 value of 0.07, which underscores that SCI explains only 7% of the variance in OR. The effect size suggests a positive relationship, but it's not significant (p-value = 0.07; t-value =1.857) and needs confirmation with a larger sample. As such, *H7a, Innovation leads to Organizational Resilience,* is rejected.

4.7. Moderating Relationships

The research also studied the moderating impact of OC and OF on the relationship between EL and SCI, and of SCI on the relationship between EL and OR. These findings are discussed next.

Given the pilot sample size (N=20), the moderation results are interpreted as exploratory patterns rather than definitive evidence.

OF as a Moderator in the Relationship between EL and SCI

Table 13 shows the results of the testing OF as a moderator in the relationship between EL and SCI.

Table 13: OF, EL, and SCI

Path	β	t-value	p-value
EL → SCI	1.053	0.958	0.352
OF → SCI	0.947	0.825	0.422

EL × OF → SCI	-0.1983873245	-0.6481059796	0.5261086748
R^2			0.431

The model explains 43.1% of the variance in SCI (R^2=0.43). EL (β=1.053) and OF (β=0.947) showed strong positive main effects on SCI, which suggests that they independently contribute to perceptions of innovation. The interaction term (EL × OF) had a negative coefficient (β=–0.198), which can be translated to mean that higher levels of OF may slightly weaken the direct positive impact of EL on SCI. However, none of the predictors had significance as seen from the high p-values and low t-values in Table 13. As such, a moderating effect of OF is noted, but in a negative direction. In any case, the Hypothesis, H5b*, Organizational Flexibility Moderates the Relationship between Ethical Leadership and Innovation,* is rejected.

OC as a Moderator in the Relationship between EL and SCI

The moderation analysis examined whether OC moderates the relationship between EL and SCI (Table 14)

Table 14: OC, EL, and SCI

Path	β	t-value	p-value
const	3.415	1.234	0.235
EL_mean	0.131	0.177	0.862
OC_mean	-0.381	-0.455	0.656
EL_OC_interaction	0.081	0.372	0.715
R-squared			0.335

Table 14 shows that the model explained approximately 33.5% of the variance in SCI perceptions (R^2=0.335), but the effect was not statistically significant (t = 0.372, p = 0.715). The main effect of both EL (β = 0.131, p = 0.862) and OC (β= – 0.381, p = 0.656) was not significant, suggesting that, independently, these variables were not strong positive predictors of Supply Chain Innovation in this small pilot sample. Also, the interaction term (EL × OC) is positive but not significant (β=0.081, p =0.715), which suggests that perceptions of high levels of OC strengthen the relationship between EL and SCI. As such, H6b*, Organizational Culture Moderates the Relationship between Ethical Leadership and Innovation,* is rejected.

SC1 as a Moderator in the Relationship between EL and OR

The research also explored the impact of SCI on the relationship between EL and OR, and the findings are presented in Table 15.

Table 15: OF, EL, and SCI

Path	β	t-value	p-value
EL → OR	–3.84	–1.26	0.225
SCI → OR	–3.76	–1.20	0.249
EL × SCI → OR	1.110	1.30	0.211
R^2			0.169

The model accounted for about 16.9% of the variance in OR ($R^2 = 0.169$). Both EL ($\beta = –3.84$) and SCI ($\beta = –3.76$) had strong negative main effects in this small pilot sample, which were not significant ($p = 0.225$, $t = -1.26$; and $p = 0.249$, $t = 1.20$). The interaction term (EL × SCI) had a positive coefficient ($\beta=1.11$), which means that higher levels of SCI may enhance the positive impact of EL on OR. However, this interaction effect was not statistically significant ($t = 1.30$, $p = 0.211$), falling below the threshold for significance. These findings need to be considered as exploratory owing to the small sample size and the unusual negative main effects. Nevertheless, the hypothesis, *H7b, Innovation moderates the relationship between Ethical Leadership and Organizational Resilience,* is rejected.

5. Discussion

Despite previous studies showing a positive link between EL and OR, through building a culture of trust and an ethical climate (Ullah *et al.*, 2021; Wang & Feng, 2023), the current study did not find a statistically significant relationship between EL and OR (HI is rejected). The findings suggest that EL alone may not directly account for perceived resilience, and is likely to have an indirect influence on resilience through innovation, culture, or flexibility.

Also, though EL is found to impact OF through encouraging adaptability and decentralized decision making (Ayoko, 2021; Vu, 2020), this link was not proven in the current study (H2 is rejected). The findings can be attributed to the possibility of additional factors involved in the situation, or may also be reflective of the small sample size limitation. However, EL was found to positively impact OC (H4 is accepted), and the finding is backed by literature that shows ethical leaders influence cultural norms and shared values (Sharif & Scandura, 2014; Engelke & Swegan, 2024).

OF and SCI links are well-established in previous studies (Awais *et al*., 2023), and strong OC fosters innovation (Aboramadan & Kundi, 2023; Yaqoob *et al*., 2024), but the current study disproved both Hypotheses 3 and 5. These outcomes may be affected by the small sample size, suggesting potential for these relationships to emerge more clearly in a larger dataset.

SCI is reported in literature to affect OR (Do *et al*., 2022; Gallab & Di Nardo, 2023), but H6 was rejected due to the results not being statistically supported in this study. This could indicate the possibility of a more complex dynamic between these constructs or the limitation of the small sample used for the pilot study.

However, the research finds that EL positively impacts SCI (H7), which affirms prior research linking EL with innovation by encouraging trust, transparency, and risk-taking (Vu, 2020; Ilyas *et al*., 2020). This finding highlights EL as a significant factor in fostering innovation, especially during crises, which supports the main research question regarding EL's role in mitigating supply chain challenges.

Hypothesis 5b and Hypothesis 6b examined whether OF and OC, respectively, impact the effect of EL on SCI, and the results showed a positive but non-significant effect, thus rejecting both hypotheses. This is contradictory to earlier findings emphasizing the role of OC in shaping innovation (Naveed *et al*., 2022; Siswadi *et al*., 2023) and in empowering leadership to influence innovation. Nevertheless, the specific moderating role of culture in the EL–SCI relationship is relatively underexplored in empirical studies, with most scholars viewing OC as an outcome of EL rather than as a variable that modifies leadership's impact.

Similarly, previous studies have highlighted OF as an enabler of innovation during disruptions (Awais *et al*., 2023; Dubey *et al.*, 2019; Nikookar *et al*., 2024), but its specific moderating role for EL-SCI is not explored. Additionally, there may be other moderators or mediators involved in the situation that are not accounted for in this pilot study. Next, Hypothesis 7b examined SCI's moderating effect on the relationship between EL and OR, but was rejected. This finding, too, diverges from previous research that positions innovation as a catalyst for resilience (Do *et a*l., 2022; Dovbischuk, 2022; Gallab & Di Nardo, 2023).

However, innovation has not been found to indirectly impact resilience through EL. The relationship between EL, innovation, and resilience may involve mediated pathways or additional contextual factors not included in this study.

It needs to be noted that the lack of statistically significant moderation effects in this study could be the result of a small sample size (N = 20). Small samples tend to lower statistical power and increase chances for Type II errors, or where real effects go undetected due to a lack of sensitivity in the test (Mascha & Vetter, 2018). Moderation analysis is best done using larger samples as interaction terms often produce small effect sizes and can suffer from variability (Serdar *et al*., 2021). The high p-values, as such, may reflect the limitations of the sample rather than the absence of significance. As seen in Tables 19 and 21, the positive interaction coefficients in two of the models (H8: $\beta = 0.163$; and H10: $\beta = -0.198$), and the high R^2 values (ranging from 17% to 43%), it is likely that meaningful patterns may exist. The results, therefore, provide theoretical support for the moderating role of OC, OF, and SSI, and indicate that future research with a larger sample size can be done for further validation of these relationships.

6. Conclusion

The results found that EL has a direct impact on both SCI and OC. As such, the first research question, *To what extent does ethical leadership drive innovation to mitigate*

supply chain challenges during a crisis?, is answered. The research has demonstrated that EL has a moderate and significant impact on driving innovation in supply chain organizations. Also, EL led to OC, which also showed a moderate and not significant relationship with SCI. Moderation analysis also showed that both OC and OF had insignificant impacts on the relationship between EL and SCI. Nevertheless, EL had a direct and significant impact on innovation.

The second research question, *To what extent does ethical leadership impact organizational resilience during a crisis?,* was answered in the negative in this research. EL was only weakly and insignificantly linked with OR; thus, a direct impact of EL and OR was not established. However, EL impacted SCI, which was found to have some weak positive impact on Resilience. Also, a weak, insignificant impact of SCI as a moderator between EL and OR was found. These findings indicate that EL may not directly predict OR, but it has an indirect impact through fostering innovation in crises.

7. Practical Implications for the CPG Industry

This research provides actionable insights for managers and decision-makers in the Consumer-Packaged Goods (CPG) sector operating in volatile environments. As ethical leadership is positively linked with innovation, but not with resilience, leaders in CPG firms need to complement ethical leadership values with additional innovation-enabling practices. Also, the study had theorized organizational culture and flexibility as important enablers of innovation, but did not find statistical support. This implies that CPG firms may need to reassess these factors. For example, firms may need to invest in developing adaptive cultures and teams that are focused on innovation. Also, the lack of moderating pathways to resilience implies that leaders should focus more on direct innovation pathways and not rely solely on contextual organizational traits during crises.

8. Theoretical Contributions

This research adds to the literature on ethical leadership by empirically examining its role in impacting innovation and resilience in supply chain disruptions in the CPG sector, which has been largely unexplored till now. It also extends the understanding by testing moderating relationships involving organizational culture, flexibility, and innovation, which, too, has not been studied much in previous studies. The findings show that ethical leadership measurably impacts innovation, but not resilience, which is likely to be mediated by other factors and dynamics. It also provides a novel view on traditional enablers of innovation like flexibility and culture, and suggests that they may not be independently contributing to innovation, unless held together by leadership. These findings invite further exploration into the dynamics of these variables by future researchers.

9. Limitations and Future Recommendations

A limitation of the study is the small sample size (N=20) that limits its generalizability and also its statistical power. It provides exploratory insights, but the findings need to be interpreted with caution and need to be further validated by larger samples. Additionally, the study relied on the self-report method, which may introduce common method bias. Also, the study is cross-sectional, which may limit understanding of the causal relationship.

Building on this pilot (N=20), the next stage will scale the study to a larger, stratified sample of supply chain professionals across multiple CPG-related sectors and organization types (e.g., consultancy/advisory, logistics/3PL, manufacturing, retail) and across company size bands. This will allow (i) more robust hypothesis testing with improved statistical power, (ii) confirmatory measurement validation (e.g., CFA/SEM and discriminant validity tests), and (iii) a more credible examination of interaction effects (moderation), which typically require larger samples.

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