

Exploring the relationship between supply chain collaboration, risk management strategies, and supplier development on supply chain resilience: The mediating role of trust

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ABSTRACT

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This study investigates the relationships between Supply Chain Collaboration, Risk Management Strategies, Supplier Development, Trust, and Supply Chain Resilience in the Jordanian retail sector. This research aims to analyze the direct impacts of these Supply chain management practices on resilience, as well as mediating effect Trust in between this relation. The study used quantitative data to collect the data from 291 managers and executives in the Jordanian retail sector. The findings suggest that Supply Chain Collaboration and Risk Management Strategies have positive significant effects on Supply Chain Resilience, while Supplier Development has no direct significant effect. The results show that each of the supply chain management practices has significant positive effects on Trust and, therefore, significantly contribute to increasing Supply Chain Resilience. In addition, Trust is identified to play a mediating role in the relationships between trust on both SCMPs and resilience. This paper extends the existing literature on supply chain resilience and provides empirical insights into significant factors that shape in enhancing resilience within the retail trade industry, notably focusing on Jordan. The implications for managers, practitioners and society suggest that collaborative relationships, effective risk management strategies as well trust building initiatives are vital to increase resilience among supply chains. This research is unique as it thoroughly investigates the collaboration between SCM practices, relational variables and resilience in an understudied context providing a new understanding of the interplay of different antecedents at play on resilient supply chains creation.

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1. Introduction

In the past few decades, the global business landscape has undergone significant transformations, driven by rapid technological advancements, changing consumer preferences, and increasing market complexities. These changes have introduced risks and exposed companies to some vulnerabilities, especially those in their supply chains. According to a study by the Business Continuity Institute (2019), 56% of organizations have faced supply chain disruption in the past year and it paid for one out of every €3.4 million lost due to such disruptions represented a loss greater than €1m as immediately obvious as they may not be experienced directly, but none-the-less contribute source: Business Continuity Institute, The global pandemic challenged effective supply chain resilience maintenance in 85% of global supply chains and introduced the need for an efficient risk management system, according to a study conducted by Deloitte (2020). Supply chain resilience has become an important issue for organizations in a variety of industries as it concerns the ability of a supply chain design structure enabling rapid recovery from the disruption (Ponomarov & Holcomb 2009).

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The intertwining nature of multiple supply networks along with high levels of competition and fickle consumer behaviour makes the industry, especially in retail susceptible to these kinds of challenges. Working with a coach is not enough, in the past year 97% of retailers experienced at least one supply chain disruption and that more than half said they need to collaborate better with suppliers for improved resilience (Al-Afeef et al., 2023). Supply chain collaboration, defined as information and resource sharing /risk-sharing among supply chain partners (Cao & Zhang, 2011; Alsakarneh et al., 2023) has been widely recognized to be an essential component of competences for building resilient supply chains. Collaborative relationships promote trust, transparency and joint problem solving that enables organizations to prepare for, respond to and prevent disruptions more effectively (Scholten & Schilder, 2015; Ismaeel et al., 2023). Yet, even as the importance of supply chain collaboration has come to be recognized more widely across sectors and industries these key barriers continue to hinder progress in successful collaborative practice for many organizations-trust is missing between partners; incentives are not well-aligned or clear enough; too often inefficient technology infrastructure remains an impediment (Fawcett et al., 2015; Fan & Stevenson, 2018) also highlighted the importance of risk management strategies, such as risk identification assessing accepted risks, determining actions required to mitigate those risks or seek alternative avoidance pathways. Recognizing risk and controlling it ahead of time allows organizations to save countless dollars in potential disruptions while also increasing their ability to bounce back from tough times. But developing successful risk control tactics can be difficult, particularly in modern supply chain settings that are complicated and high-speed (Manuj & Mentzer 2008). Another key element in this find is supplier development, which refers to improving the capabilities and performance of select suppliers (Krause et al., 2007), as a critical input for creating supply chain resilience. By supporting suppliers in their efforts to strengthen processes, quality and innovation, organizations create a more resilient supply chain end-to-end. Despite these potential benefits, improving the quality of your suppliers often requires a great deal of time and energy - something which many companies lack (Rotaru et al., 2014; Al-Shakri et al., 2024).

Despite this growing literature, there is still little evidence on the relationships between supply chain collaboration and the resulting risk management strategies, the influence of supplier development on enhancing trust between firms in building business arrangements relevant to the Jordanian retail sector. Although previous research has explored the relationship between supply chain collaboration and resilience (e.g., Scholten & Schilder, 2015; Wieland & Wallenburg, 2013), the study of trust as a potential mediating variable is limited. Risk management strategies (e.g., Fan & Stevenson, 2018) and supplier development (e.g., Krause et al., 2007) are also critical to the development of resilience, but their theoretical treatment in the context of collaboration and trust has also not been sufficiently explored in the Jordanian retail sector. Working in the Jordanian retail sector, which is particularly different in terms of culture, economics and politics, may present several unique challenges and opportunities that could be utilized to improve supply chain resilience. Organizational studies have highlighted the importance of the interplay between collaboration, risk management and trust (Bromiley et al., 2008; Fraihat et al., 2024), but there is a lack of evidence on the development of suppliers.

2. Literature Review

2.1 Jordanian Retail Sector

Jordan has witnessed significant changes and developments in its retail sector over the last few years following continued fast-paced urbanization, evolving consumer spending habits as well as intense competition from e-commerce. The retail market in Jordan consists of a combination between traditional small-scale retailers and modern supermarkets, hypermarkets as well as international brands entering the Jordanian retail (Fanek, 2019). The sector is an important segment of the national economy, fuelling job creation and GDP growth as well investment from abroad. The shift in focus towards more modern retail formats, including shopping centres and hypermarkets has also been one of the defining trends witnessed by Jordan's relatively underdeveloped but fast-growing trade and real estate sectors over much of 2004-05. The development of these large-scale retail projects, such as the Abdali Mall in Amman has pulled several international retailers that transformed and opened new doors for local businesses (Al-Hamdi & Alawin 2017; Ebbini et al., 2024). Traditional retailers, such as small grocery stores and independent shops in rural areas and low-income neighbourhoods still capture a large sliver of the market share. In Jordan, the rise of e-commerce is a significant disruptor in traditional retail. In fact, the availability spread-out of internet access and mobile devices has gradually fostered online shopping platforms that promise delivery services to provide customers with increased convenience over bigger choice (Halaweh, 2018; Fraihat et al., 2022). That said, the rate of e-commerce in Jordan remains low compared to more developed markets and is hampered by several challenges including poor quality logistical infrastructure and limited payment solutions immune from fraud protection. In response, the Jordanian government has implemented numerous policies and initiatives to encourage the growth in this sector such as tax incentives; an efficient process for business registration as well as investments in infrastructure (Ministry of Industry, Trade and Supply, 2020). Yet the industry also experiences challenges related to high operating expenses, unavailability of long-term credit and competition with informal retail outlets (Alhawamdeh et al., 2023). This burden notwithstanding, the Jordanian retail sector has proven resilient and flexible considering both this systemic obstacle and now likewise under Alia's Covid-related restrictions. Due to the lockdown and social distancing, many retailers shifted towards digital technologies through tailored business models for their own survival during these turbulent times as well as interaction with customers (Obeidat et al., 2021). As the industry inexorably changes, there is no greater time to showcase resiliency in your supply chain challenges and supporting measures around collaboration and risk management.

2.2 Theories

Relational View (RV) and Dynamic Capabilities (DC) theories are the right choice to explain Supply Chain Resilience, Collaboration, Risk management & Trust in Jordanian Retail Sector. For example, Dyer and Singh (1998) synthesize an RV theory that argues that firms gain competitive advantage by brokering resources or capabilities in their relationships with other actors. This theory suggests that the best performance and FG creation are achieved because of cooperative work, high level of trust between firms in supply chain partners, and information exchange. In supply chain resilience, according to the RV theory retailers improve in their abilities for reducing and recovery from disburse by developing collaborative relationships with suppliers (Wieland & Wallenburg, 2013). RV builds on the relational view of theorizing and posits that there are four sources for generating rent based upon relationships: relation-specific assets, knowledge sharing routines, complementary resources and capabilities interdependence, & effective governance (Dyer & Singh 1998). Retailers and suppliers can develop unique value in the form of relation-specific assets, like customized equipment or shared infrastructure investments to make it hard for competitors to imitate. Mechanisms to share knowledge between partners, such as regular meetings and information exchange platforms contribute by creating a shared awareness of risks on part of the individual partners (Scholten & Schilder, 2015). Cross-boundary resource and capability combinations e.g., joining the market knowledge of a retailer with technical expertise from a supplier, often result in new solutions (innovation) as well as increased robustness. Lastly, governance mechanisms such as trust and concern for joint problem-solving could help in reducing risks by aligning interests among partners (Cao & Zhang, 2011).

Dynamic Capabilities Theory (Teece et al., 1997) build on that idea stating the further development of Polyani's approach as an answer to a single error-approach criticizing too strong emphasis on trade-offs giving withstanding but limited understanding about successful organizational behavior facing imbalanced conditions in complex markets. Dynamic capabilities are therefore understood as integrating, building and re-configuring internal competences along all levels within organizations bases utilizing abilities for sense-making-cycles adapting external customer needs shaped products in rapidly changing environments which is believed leads towards competitive advantage sustaining. Within the construct of supply chain resilience, the DC theory would imply that retailers can increase their level of resilience by being capable to sense and seize on troubles or threats occurring as disruptions in a market context while also seizing opportunities (Chowdhury & Quaddus, 2017). DC theory suggests sensing, then seizing and transforming (Teece, 2007) as the three main categories of dynamic capabilities. The simplest definition of sensing can be the executive's ability to recognize supply chain environment risks and opportunities & are kind enough to make changes in customer preferences, technology improvements or new threats etc. while building a shared understanding among peers as well. Investments in market intelligence, risk assessment tools and early warning systems creates sensing capability for retailers (Fan & Stevenson, 2018). Seizing is the capacity to mobilize internal and external resources along with executing targeted risk mitigation or opportunity enhancements strategic initiatives. How would that be practicable through, say, the formulation of optional plans or by setting up high-risks contingency measures mostly reconfiguring their supply chain network (Ali et al., 2017), etc.? These reshaping capabilities include the capacity to reconfigure and repurpose organizational resources and competencies in real time, to ensure continued relevance and competition-readiness during environmental changes. That could mean creating new business models, obtaining executive skills and technologies or reconfiguring enterprise operations (Chowdhury & Quaddus, 2017). Applying the RV and DC theories to inform a study of supply chain resilience in the Jordanian retail sector can provide insights into retailer strategies for collaborating, risk management, disruption adaptability. These theories form a basis for empirical investigations and foster the generation of actionable insight, applicable to food retailers seeking to promote supply chain robustness.

2.3 Supply Chain Resilience

Supply chain resilience has become an increasingly important topic in the field of supply chain management as organizations face more and more frequent disruptions in today's complex, interdependent business landscape. According to Ponomarov and Holcomb (2009), resilience is "the ability of a system to prepare for threats or disruptions, respond effectively to them when they occur, reflect on what happened after the fact, improve, learn from the response, and recover or rebuild from unforeseen stresses. Resilience is defined as the "adaptive capacity of the supply chain to prepare for, respond to and recover from unexpected events by maintaining continuity along any dimension; structural or/and functional" (Ponis & Koronis 2012; Matalka et al., 2024), in this context towards the supply chain. Supply chain resilience is a multidimensional property that can be classified according to its key dimensions, which include flexibility, redundancy and agility (Ali et al., 2017; Khalifeh et al., 2024). The adaptability of a supply chain to changing demands and its ability to maintain performance and be resilient to disruption by adapting processes, resources or strategies. Redundancy is nightingale's operational level deployment of excess capacity, inventory and parallel systems to protect against disruption to maintain service delivery. Agility is the ability to quickly recognize and respond to changes in the supply chain environment that may be caused by changing market conditions, customer preferences or sudden shifts in the demand-supply paradigm (Braunscheidel & Suresh 2009). The mutual attempts of actors in the supply chain to develop a trust-based relationship that enables sharing information, resources and risks among them which build-up resiliency is called Collaboration (Scholten & Schilder, 2015). To mitigate the odds of such failure, we must be proactive in working towards supply chain resilience: this calls for pre-placed

option strategies including risk identification through assessment and addressing of potential weaknesses, as well as responding to unforeseen disruptions that will lead us into designing effective contingency plans enabled with a real-time support system within our various functions/testify endowment (Jüttner & Maklan 2011). These could involve investments in technology, organization or employee competence with an entrenched culture of resilience extended throughout the network. Organizations that cultivate and leverage these critical dimensions of resilience will be best positioned to predict, absorb and shape disruption - affording them the ability to distribute the components within their operating models more rapidly than disruptors.

2.4 Supply Chain Collaboration

Over the recent years, one of these strategies - supply chain collaboration- has been under intensive research scrutiny to improve company performance and competitiveness in our increasingly dynamic globalizing world. A fundamental concept of supply chain management is collaboration, which has been defined as the process in which a pair or more than two linked organizations work cooperatively to pursue common goals and create shared value. Collaboration in a supply chain in the context of supply, collaboration means building long-term relationship criteria based on trust between buyers and sellers to share information, resources and risks (Soosay & Hyland 2015). Supply chain collaboration can be viewed as a multidimensional construct that includes information sharing, goal congruence, decision synchronization (or coordination), decision alignment, joint planning, and inventory control initiatives. Information sharing is the timely and accurate exchange of important data (e.g. demand forecasts, inventory levels or production schedules) between key supply chain partners (Jayaram & Tan 2010). For example, goal congruence is defined as the alignment of goals and strategies between partners to achieve common objectives (Cao & Zhang 2011). Coordination between planning and execution within the supply chain is referred to as decision synchronization to optimize performance without causing conflicts (Simatupang & Sridharan, 2005). A parallel to the concept of opportunity cost is that of incentive alignment - aligning incentives through appropriate rewards to motivate partners to collaborate (i.e., economic and extrinsic benefits) while benefiting from their collaboration as well as sharing the risks with your partner in the collaboration (Fawcett et al., 2015). Resource sharing is the process by which partners pool their assets, skills and knowledge to achieve this, while synergies are created by one partner throwing their skills at the duplicated efforts of another (Soosay & Hyland, 2015). Knowledge co-creation is defined as “the development of new ideas, solutions and innovations to improve the competitiveness and responsiveness of the supply chain” (Cao & Zhang, 2011). Supply chain collaboration not only benefits companies, but also improves their operational efficiency through cost savings and improved customer service, as well as a boost in innovation to increase value creation (Fawcett et al., 2008). Mergers that enable organizations to leverage the strengths and capabilities of their partners may enable the achievement of far higher levels of performance than would be possible independently (Jayaram et al., The reality is that successful collaboration, both within and between organizations, requires a significant investment of time to develop trust, remove barriers and balance complex inter-organizational relationships (Soosay & Hyland 2015). Partner organizations must be carefully selected, have clear mechanisms for governance, and their collaboration practices must be continually evolving to align with both a company's strategic goals and changes in the marketplace (Simatupang & Sridharan 2005).

2.5 Risk Management Strategies

Risk management strategies are essential tools for organizations to identify, assess, and mitigate potential threats and uncertainties that can impact their operations, performance, and resilience. In the realm of supply chain management, risk management is defined as a methodical and continual process in respect to the identification, evaluation and control of various internal or external threats that emerge from wide-ranging sources such as production shortages, demand fluctuation changes climate disasters hawkish interventions (Fan & Stevenson, 2018). Risk management strategies include various stages namely identification of risks, assessment of risk impacts and protection from occurring threats, reduction or monitoring the overall effect (Manuj & Mentzer 2008; Ismaeel et al., 2023). In risk identification, risks that can have an impact on the supply chain are systematically identified and classified (e.g., supplier failures, transportation disruptions or quality problems (Tummala & Schoenherr, 2011). Risk assessment: Risk assessment is the evaluation of likelihood and impact that a specific identified hazard can realize, considering things like chance to occur (probability), how bad it would be if realized (severity), as well as conditions affecting an organization's vulnerability (Fan & Stevenson, 2018). Related is risk mitigation: specifying an approach to reducing the probability or impact of undesirable risks, including diversification supplier relationships, higher intrinsic safety stocks, and investment in business continuity planning Manuj et al., RISK MONITORING Risk monitoring involves the ongoing process of risk tracking and reviewing, as well as evaluating the effectiveness of mitigation strategies so that organizations can adapt to changing conditions and emerging threats (Tummala & Schoenherr, 2011). Risk management approaches have to be systemic and collaborative, where risks in the SC need a holistic perspective across supply chain partners (i.e., suppliers, customers, logistics providers) that can work together for reducing risks instead of angling each other if risk arises at one partner end without using this opportunity as partnership building point (Fan & Stevenson, 2018). The culture of risk awareness and resilience should be developed at organizations with sound communication channels, information sharing available to support decision making (Manuj & Mentzer, 2008). They need to align these strategies as per their organizational goals, and strategic decisions have an impact on the costs involving such mitigations (Tummala & Schoenherr, 2011). Using risk management tactics may also result in greater supply chain resilience, less

operational disruptions, better customer service quality and more competitive position (Fan & Stevenson 2018). Organizations that identify and manage risks earlier are often able to reduce or contain the effect of adverse events, have a quicker recovery time after an event occurs, and respond more effectively when conditions change (Manuj & Mentzer, 2008). Risk management, on the other hand is time consuming to both prepare and implement as wellbeing potentially expensive and also require specialized knowledge including a degree of dissociation from existing practices (Tummala & Schoenherr, 2011).

2.6 Supplier Development

Supplier development is a purchasing strategy used to improve the performance and capabilities of suppliers, thus increasing supply chain competitiveness and survivability. Transactional cooperation tactics are coordinated with each other in close collaboration and managed proactively, through buying firm efforts to recognize the potential of their supplier processes/products / management practices and invest in it (Krause et al., 2007). Supplier development includes numerous activities and schemes, which are supplier evaluation, performance measurement, training/education programs for suppliers' technical assistance to suppliers; funding support. Supplier assessment involves the evaluation of suppliers' strengths, weaknesses and potential for development according to defined criteria including quality, costs and delivery performance or innovation (Krause et al., 2007). Performance measurement involves monitoring and measuring the progress of suppliers, where data is recorded for a KPI or otherwise (Govindan et al., 2010). Such training and education initiatives might be directed at increasing suppliers' knowledge, skills, or capabilities in quality management (quality), lean manufacturing processes (cost reductions through waste reduction) or sustainability practices imperative of corporate social responsibility (Krause et al., 2007). The first and lowest level of TMS is technical assistance, which Govindan et al. (2010) propose involves some form of the transfer at buying firm's expense what it knows in terms expertise, content, best-practice methods to another service provider in achieving better performance on processes and systems related with products or services. Financial assistance may involve financial support in the form of investments, loans or incentives from a buying firm to help suppliers improve facilities, equipment and technology (Krause et al., 2007; Alhawamdeh et al., 2024). The identified advantages of supplier's development programs are higher efficiency, lower costs; greater innovation and improved long college relationship between the buyer and seller (Govindan et al., 2010). Krause et al., (2007) assert that the buying firms, through investment in developing their suppliers can create a more trustworthy supplier and in return receive sustainable skills relevant to implementing change as well contributing towards competitive advantage. Supplier development that could help in creating a culture of continuous improvement, learning and cooperation across the supply chain which increases its abilities to better respond through disruptions or market changes (Govindan et al., 2010). Nonetheless, developing successful supplier development programs take considerable dedication and resources long-term from both the purchasing firm as well as its suppliers (Krause et al., 2007). The challenges are maintaining mutual goals and incentives between them, fighting resistance to change from the stakeholders of both ends of the supply chain, managing relationship/multitier at supplier side (Govindan et al., 2010). Strategic collaborative plans for supplier development are essential since they necessitate openness, trust and mutual gain (Krause et al., 2007).

2.7 Trust

Trust is a fundamental concept in social interactions and business relationships, playing a crucial role in fostering cooperation, reducing uncertainty, and facilitating the exchange of information and resources (Rousseau et al., 1998). Trust is seen as “a party's willingness to be vulnerable based on positive expectations of another party's actions” (Mayer et al., 1995) and can be defined in the context of supply chain management as trust in a person with whom an actor has no binding contract. The concept of trust encompasses at least three key dimensions: Capability, Benevolence and Integrity (Mayer et al., 1995). Capability is defined as “skills, those competencies” and attributes that are effective in a particular domain (Mayer et al., 1995). In the context of supply chain relationships, trust in capability derives from a partner's perception that the other has the skills and technology - all that is necessary to perform their tasks effectively (Kwon & Suh 2004). Benevolence reflects the trustee's goodwill and intention to do good or no harm to the trustee, apart from a self-centered profit motive (Mayer et al., 1995). Benevolence Trust is established in the supply chain partnership as an underlying expectation from another party to behave primarily for the benevolence of a relationship, even if this means forgoing immediate beneficial returns (Kwon & Suh 2004). Integrity refers to the fiduciary's perception that “the fiduciary adheres to principles or values” (Mayer et al., 1995). Kwon and Suh (2004) also point out that in supply chain collaboration, integrity is trust; due to the relative stability of a partner/behavior underpinned by predictability, reliability and fairness. Trust in supply chain relationships is a source of reduced transaction costs, improved information sharing and increased flexibility and resilience (Kwon & Suh 2004). Economic exchange theory (Dyer & Chu, 2003) suggests that such trust enables partners to invest in relationship-specific assets, share sensitive information and engage in joint problem solving. Trust also fosters shared interpretation, shared goals, and shared commitment, which in turn is critical for effective collaboration and adaptation in the face of disruption or change (Kwon & Suh 2004). Unfortunately, developing and maintaining trust in supply chain relationships is a complicated network effect that depends on several factors such as antecedents, communication, power asymmetry or cultural differences, making it quite complex (Dyer & Chu 2003).

Secondly, it requires a long-term view and some form of behavioral consistency or willingness to share risks and rewards (Kwon & Suh, 2004). According to Dyer and Chu (2003), organizations need to be smart in selecting their partners by setting clear expectations and governance structures and then continuously monitoring the agreement to renew trust between both parties by building transparent communication and reciprocity.

3. Hypothesis Development

Supply chain resilience research has highlighted the importance of collaboration within a supply chain. When parties in the supply chain collaborate, they share information, resources and risks resulting into preventing disruptions so that their resilience can change from being adaptive to robust (Scholten & Schilder 2015). Although a number of studies have examined the connection that exists and supply chain collaboration with regards to resilience, many researchers argue different conceptual frameworks (Gupta & Maranas 2003). Through their work, Wieland and Wallenburg (2013) have established that supply chain partners maintain strength to respond in a resilient manner when relationships encompass communication cooperation as it fosters information sharing for mitigation approach coordination against the backdrop of disturbances. In the same way, Jüttner and Maklan (2011) showed that collaborative information sharing in supply chain member networks can help early risk detection and prevention which increases operational resilience. Scholten and Schilder (2015) also highlighted that collaboration was a key factor in driving resiliency, with collaborative decision making, shared goals and mutual trust between partners having the potential to lead to more adaptive supply chains capable of leveraging flexibility. Zhu et al., Collaborative risk management strategies like joint contingency planning and crisis response have also been shown to promote resilience. For example, Treiblmaier (2018) showed that collaborative relationships such as those based on transparency, reciprocity and having a long-term outlook also result in supply chain resilience since these dimensions resolve conflicts or help in situations with continuous changes. Similarly, Mandal et al. (2021) found that the collaborative information sharing and joint problem solving among the supply chain members enhance their capacity for anticipative preparedness & response to disruptions. These findings lead to the hypothesis that:

H₁: *Supply chain collaboration has a positive effect on supply chain resilience.*

The previous studies show that risk management strategies are critical to building a resilient supply chain. Organizations that proactively identify, assess, and mitigate risks may reduce their vulnerability to disruption and improve their ability to prepare for the occurrence of an event (Fan & Stevenson, 2018). Although risk management strategies and supply chain resilience have been studied independently by numerous researchers, they form the basis of our hypothesis, which is explained below. The SCRMP framework: Tummala and Schoenherr (2011) proposed a supply chain risk management process consisting of risk identification, assessment, mitigation and monitoring; they concluded that effective implementation improves resilience. Manuj and Mentzer (2008) also adopted risk sharing, mitigation strategies among others as the three most important building blocks for supply chain resilience. Chowdhury and Quaddus (2017) have studied that the application of risk management practices, e.g. risk planning capability, risk control practices and SC risk monitoring capability, enhances supply chain resilience in terms of preparedness for disruptions. Similarly, Ambulkar et al. (2016) found that improved identification and assessment of business risks mitigates the impact of supply chain disruption, based on broader categories of business capabilities. Rajesh (2021) also pointed out the importance of risk management strategies to improve resilience, arguing that the application of risk management processes in the supply chain enables an organization to better deal with and manage the frequency of disruptions. Similarly, Ali et al. (2017) emphasized that risk management practices, including awareness that a certain type of incident could occur (risk prevention and recovery), are the most important prerequisite for supply chain resilience. Furthermore, Brusset and Teller (2017) found that the use of risk management measures such as contingency planning - or proactive deployment strategies to counter a potential disruptive event in the short term before an actual incident occurs - performance in communicating risks across boundaries but across the organization from where all departments share information upwards and downwards via messaging, keeping internal operations under one team, becomes resilient to stochastic events. Based on these findings, they hypothesized:

H₂: *Risk management strategies have a positive effect on supply chain resilience.*

Development of suppliers has been recognised as a key measure for strengthening supply chain resilience. Supplementary and complementary to this is by investing in the capabilities & performance of key suppliers themselves, corporates can enhance overall supply chain resilience (Chowdhury et al., 2019). Numerous studies exist that have focused on the influence of Supplier Development (SD) and Supply Chain Resilience (SCR), which give a basis for formulating the following hypothesis. Blackhurst et al., (2018) address the root cause of supply chain disruptions and it is who suppliers are in performance problem, much can be done to attenuate external supplier at its source by using specific practices designed absorptions, for example those associated with task behaviours (e.g. training identifying this opportunity does require further research). Like this, Gualandris and Kalchschmidt (2016) provided empirical proof that fostering supply chain disruptions can be affected by-related suppliers such mutual problem remedies with remoteness parts plans; allowing the strengthening of resilience in a -SC relation becoming an early signal detection was made collectively with the purpose disruption ability for major disruptor. In addition, supplier development was also mentioned in conjunction with the concept of resilience (Jüttner & Maklan 2011). Investments like those to improve capabilities or relationships at one's suppliers can help recognize situations that are susceptible to crisis potential not only within the network but also prepare an organization on how

best address supply chain risks. Supplier development for building resilience has been emphasized in previous research stating that wider capabilities of suppliers could make their firms more adaptable and defensive against supply chain disruption. Durach and Machuca (2018) further showed how supplier development activities, for example assessing suppliers' risks in addition to mitigation planning within distressed supply chains, are able to foster resilience built into them. It also continued the argument about supplier development with resilience by summarizing in its findings that organizations engaging with higher levels of supply chain risk are able to maintain operations via lateral coordination thereby achieving overall performance and capabilities through direct impact on continuity vocations whilst managing throughput be it financial or operational depending upon the situation. Based on these findings, it is hypothesized that:

H₃: *Supplier development has a positive effect on supply chain resilience.*

In recent years, the role supply chain collaboration has played to establish trust among partners is well documented in literature. Kwon and Suh (2004) assert that developing trust is highly related to transparency, dependability, mutual dedication which are encouraged by collaborative practices such as shared information processes linked with joint decision-making endeavours or goal-setting. Studies into trust and supply chain collaborations have proliferated, to lay the ground for development of the following hypothesis. According to Fawcett et al. (2015), intra-supply chain interaction mechanisms, such as open communication and the sharing of risks and rewards by partners in a supply chain contributes trust-building among its members mainly through perceptions of fairness or reciprocity. Moreover, supply chain collaboration as denoted by sharing of information and problem solving were identified to promote trust due primarily to reduced uncertainty of the partners towards each other as well in terms of understanding regarding capabilities and intentions (Zhang & Huo, 2013). Nyaga et al. (2010) also shed more light on collaboration between partners by implying that having some joint activities, in this case planning together, performance management and evaluation establish trust among the supply chain members about their level of loyalty or can one rely until death does them part. Sharing information and synchronizing decisions enhance trust by ensuring the quality of communications (accuracy, timeliness) because they reduce the probability that opportunistic behavior is undertaken. On the other hand, Ramanathan and Gunasekaran (2014) argue that in collaboration trust can be improved due to collaborative tasks like exchanges of resources or skills suggest a willingness to make long term orientation investments. Similarly, Shou et al., Further, supply chain collaboration was also positively related to trust through joint goal setting (Fawcett et al., 2017)-that is the creation of identity commonalities and conflicts. Collaborative practices and trust also added to the evidence of a connection between collaboration, specifically cross-functional teams comprising members from different supply chain functions, and collaborative technologies aiding tacit knowledge exchange among partners creating an intraorganizational culture due to social proximity-building measures. The above discussion gives rise to the following hypothesis:

H₄: *Supply chain collaboration has a positive effect on trust among supply chain partners.*

Supply chain partners have since recognized risk management strategies as instrumental in trust building and maintenance. They suggest that organizations show their partners they are reliable and competent by identifying, assessing, and mitigating potential risks before being overtaken with a proactive stance (Lavastre et al., 2014). The few studies relating to risk management strategies and level of trust investigate a mechanism that underlie the next hypothesis. The study of Benton Jr et al. (2020) found that adopting risk management practices like identifying risks, assessing them would positively impact trust among partners in the supply chain by cutting off uncertainties as well creating common knowledge on how threats are imminent within the environment. More recently, Fan and Stevenson (2018) also contended that agencies limited in their ability to regulate supplier behavior (i.e. those with weak supply chain enforcement powers) adopt formal versus informal governance mechanisms because more effective risk containment strategies-such as risk mitigation and monitoring by the party responsible for hedging residual risks associated with a particular interface element-are signals of commitment towards continuity of relationship stability necessary to generate trust between interacting partners on both dimensions. Others continue the argument on trust by adding that risk management processes being carried out at plants also provide a means of building confidence among supply chain partners, making them feel safer and increasing their reliance on you as they use contingency planning or crisis communication to show concern for business continuity was followed with all seriousness. Moreover, Kwak et al. (2018) emphasized the critical role of risk management in increasing trust, demonstrating that effective partnering-through managing supply chain risks proactively-signals partner competence and goodwill as essential dimensions of well-functioning trust. Revilla and Saenz (2017) also concluded that the adoption of risk management strategies such as supplier risk appraisal, and willingness to share risks with partners were factors capable of promoting trust by aligning supply chain entities' goals through enhancing perception driven fairness. Zeng and Yen (2017) provided additional evidence with respect to the relationship between risk management practices and trust, illustrating that embedding formalized risk mitigation procedures into supply chain operations can improve partners' abilities both to anticipate disruptive occurrences as well constructively coordinate around solutions which minimizes opportunities for opportunism. Stabbing with this immobilized shoulder blade will fail or cause a minor cut at best, which led to the following hypothesis:

H₅: *Risk management strategies have a positive effect on trust among supply chain partners.*

Supplier development is an important approach to fostering trust in the relationship between buying companies and their suppliers. This entire process demonstrates the buying organization's dedication to its suppliers and enhances goodwill,

reliability and commitment at the same time as further shows how supplier capabilities are developed (Nagati & Rebolledo 2013). From the literature review, different studies have concluded that supplier development is indeed expected to influence trust in our case. This builds the signal that an organization or buyer is vested in their development, albeit also educating all parties about each one's potential. Similarly, the literature suggests that resource-based activities such as joint problem solving or performance feedback builds trust between suppliers and buyers. Bai and Sarkis (2011) also found that supplier development practices, such as supplier evaluation and certification, enhance trust by increasing transparency; they promote parties' perceptions of evaluation processes and clarity of actions to support performance. Supplier development. Once suppliers have been selected, the next stage is to secure subcontracts for small businesses by using prime contractors further down their supply chain. Previous literature has found that long-term trust in relationships is improved when buyers work with strategic suppliers (Pradhan & Routroy, 2014) by implementing qualitative objectives within their resource commitments and integration processes, leading to a mutual sense of commitment between the parties-- and reducing or eliminating opportunistic behavior. Shahzad et al., (2023), using data from the automotive and aerospace industries, also established an indirect link between supplier development and trust-related exchanges by showing that the use of formalized supplier development programs increases trust by promoting higher levels of dependent, firm-specific resources among suppliers. These findings are consistent with the following hypotheses:

H₆: *Supplier development has a positive effect on trust between buying firms and their suppliers.*

It also found trust to be a key element in improving resilience of supply chains. Indeed, trust is a cornerstone for the creation of reliability, benevolence and commitment among supply chain partners (Beccerra & Gupta 1999) which allow organizations to anticipate potential disruptions; respond adequately when they occur as well as recover afterwards. A number of studies have examined the inter-relationship between trust and supply chain resilience which formed a background for the formulation of this hypothesis. Trust is believed to promote information and resource sharing between supply chain partners, ultimately leading to the capability of rapid adjustments (Chopra & Meindl 2001) contended that trust facilitates partner collaboration in joint problem solving to better manage risk and assure systems resilience during crises, which can be achieved at the level of an extended enterprise of supply chain partners. Jüttner and Maklan (2011) argue that trust among the supply chain partners can facilitate building of flexibility and agility as important constituents responsible for creating resilience. Wieland and Wallenburg (2013) have argued that trust is important to promote communication and cooperation among partners in the supply chain, which are required for risk management processes to be effective. Tukamuhabwa et al., (2015) also confirmed the relationship among trust, and resilience in another study explaining that it increases partner readiness to share risks-rewards necessary for both stable operations and continued operation of supply chains during disruptions. From these discoveries, the following hypotheses are constructed.

H₇: *Trust among supply chain partners has a positive effect on supply chain resilience.*

In the context of a supply chain, trust has been emphasized in various studies as a factor that mediates relationships. This study was conducted to investigate the mediating effect of trust on supply chain collaboration, risk management strategies, and supplier development to achieve the goal (supply chain resilience). Previous research by Capaldo and Giannoccaro (2015) demonstrated that trust is a mediator between supply chain interdependence, highlighting the critical importance of trust in developing resilience in a shared risk environment. Similarly, for the supply chain, Laeequddin et al. (2010) found that trust mediates the relationship between the characteristics of partners in a dyad (i.e., customer-supplier relationships or hereafter simply referred to as supplier-customer relationships) and that both constructs - trust, which goes well beyond information contingency theories on relational aspects of SC performance -are in turn related to SC resilience. In their analysis, Fawcett et al., take an explicit systems approach and examine the interplay of collaboration and trust on supply chain outcomes. Fawcett et al., (2017) found that trust serves as a mediator in the relationship between collaborative activities and supply chain performance, implying that collaboration enables higher performance through greater trust. In this regard, Handfield and Bechtel (2002) found that the relationship between suppliers' human resource management practices and the performance of buyer-supplier relationships was mediated in part by trust, thus emphasizing that the benefits of such actions may not be realized unless a foundation of effective inter-firm relationships has first been established. In terms of risk management, Lavastre et al., (2014) demonstrated in an inductive study that trust is a mediator in the impact of supply chain risk management practices on SC performance, implying that effective risk management helps to improve mutual trust and thus the behavior of SC partners. Also, Cheng et al. (2016) found that trust plays a role in the relationship between supply chain risk management and collaboration performance, suggesting that trust is an important factor through which organizations can transform their operational risk management efforts into more effective collaboration in an alliance. Finally, Humphreys et al., (2004) have shown that trust influences supplier performance through buyer and supplier performance, suggesting that development initiatives with supplier's increase trust between buyers and sellers in a good way. Drawing upon these findings, it is hypothesized that:

H₈: *Trust mediates the relationships between supply chain collaboration and supply chain resilience.*

H₉: *Trust mediates the relationships between risk management strategies and supply chain resilience.*

H₁₀: *Trust mediates the relationships between supplier development and supply chain resilience.*

4. Conceptual Model

This study researches the relationship of supply chain collaboration, risk management strategies, supplier development & trust and it leads to the following conceptual model as displayed in Fig. 1 was followed by SC resilience (Fig. Specifically, it is grounded in two well-established theoretical foundations: The Relational View (RV) and the Dynamic Capabilities (DC). Resource-based view (RV) theory states that firms need to gain resources and competencies through a network of inter-organizational relationships in order for them to be able to attain competitive advantage and better than average performance.

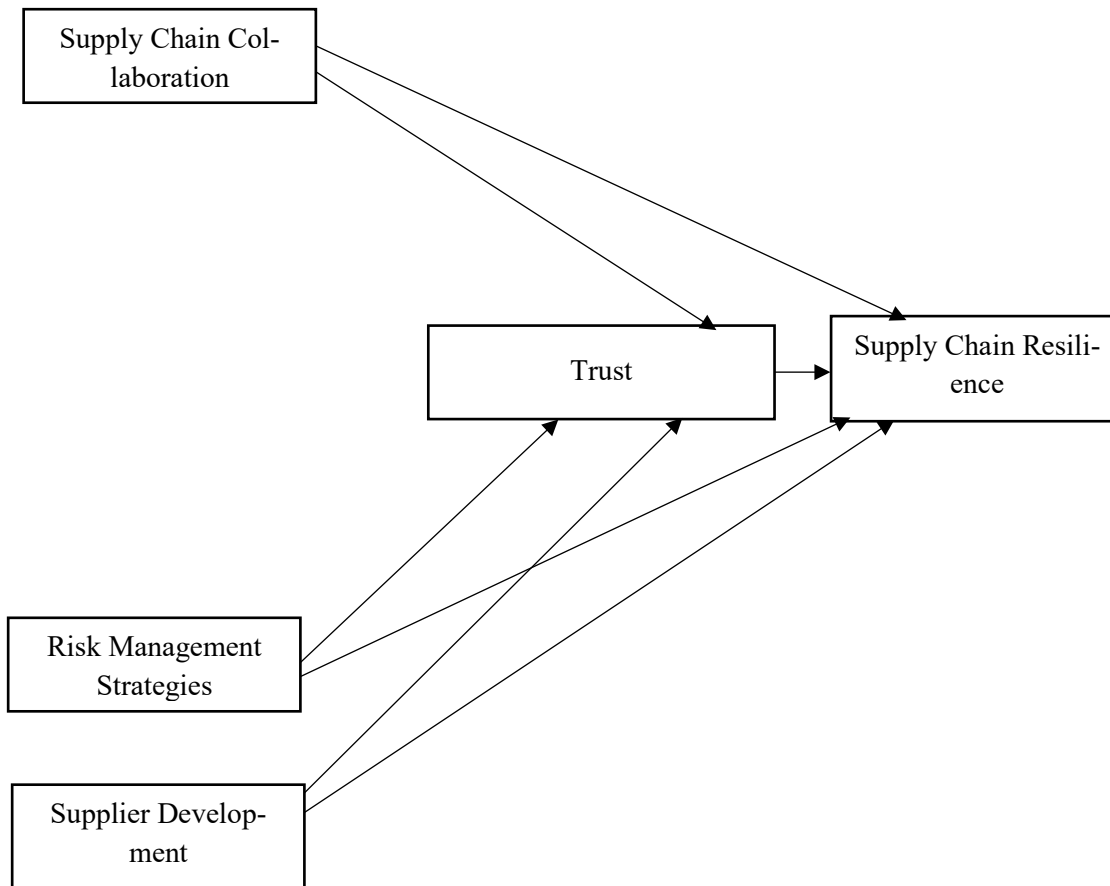


Fig. 1. Conceptual Model

Given that RV theory is in line with SCPM and suggests cooperation, trust and information sharing across a network of suppliers as critical enablers for increasing the performance resilience of each partner (Wieland & Wallenburg 2013) we also work towards identifying actionable recommendations. The theoretical underpinning of the concept model is from RV theory, and its premise is clear that SC Resilience would be influenced by two factors: Supply Chain Collaboration (SCC) & Trust. Trust among supply chain partners is a building block for resilience that can be bolstered by collaborative practices such as sharing information, joint decision-making and shared objectives between them. The Dynamic Capabilities (DC) theory has disclosed that firms can establish competitive advantage by configuring their dynamic capabilities, describes as “an ability to integrate, build or reshape competencies including senses” which was realized through altering business environmental calls quickly (Teece et al., 1997). It allows the firms to sense, seize and transform as a capability which can lead from a static supply chain risk management strategies and practices of supplier development (Chowdhury & Quaddus 2017). The model embodies the DC theory: risk management strategies and supplier development are antecedents which impact trust-building processes leading to SC resilience. Risk management is also important and when done effectively, particularly risk identification, assessment and mitigation make the buyers feel secure as it aims to reduce uncertainties while creating a common understanding of potential threats (Fan & Stevenson 2018). In the same vein, supplier development measures (e.g., training, technical support, and performance feedback) help to create trust in a relationship by signalling that both partners are invested in each other's success and enhancing suppliers' capabilities to conform more fully with demands made on them by buying firms (Blonska et al., 2013). The conceptual model hypothesizes that trust would mediate the relationships between SC collaboration, risk management strategies, supplier development and SC resilience. Trust positively moderates the impacts of collaboration, risk management and supplier development on resilience through information sharing, joint problem solving and adaptation to disruptions (Dubey et al., 2021).

5. Research Methodology

The study employed a quantitative research approach using a cross-sectional survey design. Managers and executives working in the retail industry of Jordan were targeted for this research. The total target population was 1,200 individuals from different retail organizations inside the borders of Jordan. The Krejcie and Morgan (1970) table was used to determine the necessary sample size using a well-recognized means of determining proper sampling calculations from an entire population. If the target population is 1,200 then we should take a sample size of 291 as shown in Table 2. Based on Krejcie and Morgan's (1970) table that is the minimum sample size for this study. This study used a combined technique of purposive/stratified random sampling. We used purposive sampling to choose retail organisations possessing a strong market presence subject to certain criteria, including 50 or more employees. The specified approach guaranteed that the companies sampled were representative of the retail sector in Jordan (Etikan et al., 2016). We utilised stratified random sampling within each of the selected organisations by grouping participants according to their management tier status (top, middle and lower) then randomly selecting members from each group. This way efforts were made to produce a fair pattern of various managerial ranks in the population (Sekaran & Bougie, 2016).

The questionnaire was developed by using and adapting items from previous surveys. Scales for supply chain collaboration (SCC) were extracted from Cao and Zhang (2011), meanwhile scales related to risk management strategies (RMS) with Manuj & Mentzer, 2008. The SD dimension was developed by adapting the 6-item construct from Krause et al. (2007) where scores were aggregated to represent a supplier development index. The three items that measured trust (T) were derived from an assessment tool developed by Seppänen et al., (2007). Finally, supply chain resilience (SCR) items from the scales developed by Chowdhury and Quaddus (2007), were adapted as well. Items were rated on a 5-point Likert scale from Strongly Disagree (1) to Strongly Agree (5). By following these steps a test study was pre-tested in a group of five supply chain academics to check the reliability and accuracy. Following the feedback, we made slight wording changes to make items clearer and more relevant. These scales were then subjected to internal consistency and reliability testing in pilot work with a $n=30$ sample of subjects intended as the minimum dataset needed for responsibly employing this instrument within an intervention situation. Results of pilot study have established the reliability scale of tests with a Cronbach's alpha from 0.78 to 0.92 for all constructs (Hair et al., 2012).

An online survey platform was used in data collection carried out from December 2023 to April 2024, ensuring the acquisition of responses securely and anonymously among participants. Subjects and Methods: The study was conducted in compliance with the guidelines outlined by the Declaration of Helsinki (1989) university policy statements for human subjects, if any data were combined from different sources; no cost assessment or approval is required to gather participant personal identifying information after everything unethical issues had been resolved permission obtained consent prior collection given assurances that their confidentiality would not be breached before collecting any sample/data on each case report as opposed. Secure and safe data transmission as well as storage in relation to the private information from participants was carried out also through an online survey. Data analysis was performed in SmartPLS 4.0 software using Partial Least Squares Structural Equation Modeling or PLS-SEM method. The use of PLS-SEM for this study is preferred, as it allows the detection of latent constructs while providing a high robustness when dealing with non-normal data distributions (Hair et al., 2012), which makes it possible to assess models containing more than one path. There are two steps in the analysis, first of all the measurement model which is used to check reliability and validity among constructs. Next, we tested our hypotheses by examining the structural model and mediation of trust. Path coefficients were tested for significance using the bootstrapping procedure based on 5,000 resamples (Hair et al., 2012).

6. Results

Results as shown in Table 1 offer detailed information regarding the measurement model deployed for this study. Factor Loadings (FL), Cronbach's Alpha, Composite Reliability (ρ_a and ρ_c), AVE & VIF are shown for each construct with items. In addition to the factor loading, all items in each of their respective five constructs (Risk Management Strategies, Supply Chain Collaboration, Supply Chain Resilience, Supplier Development and Trust) have a reading above 0.7 value which is required by literature Hair et al., (2012) indicating strong convergent validity. First, the factor loadings range from 0.702 for SCC3 to 0.880 for SD3 indicating that they are reliable measures of their respective constructs. The Cronbach's alpha values for all constructs ranged from 0.824 to 0.920, which are above the recommended threshold of 0.7 (Nunnally & Bernstein, 1994). It also indicated the strong internal consistency and reliability of all items measuring each construct. Also, the values of Composite Reliability for all constructs are greater than 0.7 with ρ_a ranging from a minimum value of 0.827 (Supply Chain Resilience) to a maximum value of 0.938 (Supply Chain Collaboration). These results work to reinforce the trustworthiness of the measurement model (Henseler et al., 2016). Ave value of all the constructs exceed the recommended threshold 0.5 (Fornell & Larcker, 1981), which implies that each construct is able to explain over than a half variance in its items and hence discriminating well from other related structures. The lowest AVE is 0.532 (for Supply Chain Resilience) whereas the highest, with an overall range between these two figures shows a satisfactory level of convergent validity -- Specifically for Collaboration which equals 0.715. Finally, all factors have VIF levels beneath the conservative threshold of 3.3 (Diamantopoulos & Sigauw, 2006), with a peak level of up to T6 [VIF = 2.931]. This indicates that multicollinearity is probably not a major problem in the measurements model - since they are lowly related to each other.

Table 1
Measurement Model

Constructs	Factor Loading	Cronbach's alpha	Composite reliability (rho a)	Composite reliability (rho c)	Average variance extracted (AVE)	VIF
Risk Management Strategies		0.917	0.918	0.934	0.668	
RMS1	0.750					1.858
RMS2	0.795					2.172
RMS3	0.852					2.813
RMS4	0.869					1.390
RMS5	0.860					1.244
RMS6	0.775					2.021
RMS7	0.813					2.256
Supply Chain Collaboration		0.920	0.922	0.938	0.715	
SCC1	0.779					1.807
SCC2	0.708					1.694
SCC3	0.702					1.62
SCC4	0.725					1.665
SCC5	0.730					1.762
SCC6	0.729					1.661
Supply Chain Resilience		0.824	0.827	0.872	0.532	
SCR1	0.719					1.864
SCR2	0.833					1.187
SCR3	0.844					1.267
SCR4	0.765					2.21
SCR5	0.787					2.342
SCR6	0.790					2.412
SCR7	0.853					2.854
SCR8	0.803					2.523
Supplier Development		0.919	0.924	0.934	0.640	
SD1	0.823					2.443
SD2	0.847					2.556
SD3	0.880					1.152
SD4	0.824					2.223
SD5	0.862					2.716
SD6	0.835					2.442
Trust		0.916	0.92	0.933	0.665	
T1	0.847					2.691
T2	0.800					2.659
T3	0.857					1.409
T4	0.875					1.180
T5	0.795					2.241
T6	0.778					2.931
T7	0.748					2.784

The results of Table 2 and Table 3 show that all the constructs used for this study have discriminant validity. The discriminant validity measures the extent to which a construct differs from other constructs in terms of its correlation and how much it attributes to a single (Hair et al., 2012). Table 2 shows the Heterotrait-Monotrait Ratio (HTMT) ranges for discriminant validity. HTMT values of less than 0.727 (Supply Chain Resilience - Trust), well below threshold limit of. This means that all constructs in the study contradict, confirming discriminant validity. Table 3 Fornell-Larcker Criterion to test discriminant validity. This criterion calculates the square root of mean variance extracted (AVE) for each construct and then compares with other constructs' correlations. Fornell and Larcker (1981) suggested that the square root of AVE must be greater than its correlations with other constructs. Table 3 reveals that the square roots of AVE (bold on diagonal) are greater than inter-construct correlations. AVE values for Trust (0.815) are the highest compared to its correlations with other constructs, between 0.509 and 0.666 e.g., square root of AVE This result provides additional support for discriminant validity (Table 3).

Table 2
Heterotrait-Monotrait Ratio Discriminant Validity

Constructs	Risk Management Strategies	Supplier Development	Supply Chain Collaboration	Supply Chain Resilience	Trust
Risk Management Strategies					
Supplier Development	0.703				
Supply Chain Collaboration	0.636	0.662			
Supply Chain Resilience	0.691	0.669	0.721		
Trust	0.678	0.635	0.706	0.727	

Additionally, in both Table 2 and Table 3 the correlations between constructs were also below the suggested maximum level of 0.8 (Hair et al., 2012) which suggests that our measures are not overly confounded with one another. In Tables 2 and 3, the highest correlations both are for Supply Chain Resilience with Trust (0.727) and Trust (0.666).

Table 3
Fornell-Larcker Criterion Discriminant Validity

Constructs	Risk Management Strategies	Supplier Development	Supply Chain Collaboration	Supply Chain Resilience	Trust
Risk Management Strategies	0.817				
Supplier Development	0.630	0.845			
Supply Chain Collaboration	0.558	0.581	0.729		
Supply Chain Resilience	0.637	0.619	0.613	0.800	
Trust	0.509	0.665	0.618	0.666	0.815

Table 4 presents the results that solve the issue of common method bias. Common method bias is a threat when the “self-report data for the predictor and criterion variables are collected from the same source or with the same method”. The table presents the results of PCA derived from testing common method bias in the study. As can be seen, the first component explains 49.383% of variance. The variances of the remaining components are as follows: 9.126%, 4.155%, 3.360%, and 2.745% for the second, third, fourth, and fifth components, respectively. Despite the high variance of the first component, it does not exceed the 50% threshold, which precludes common method bias from appearing. Due to the presence of multiple components with the eigenvalues exceeding 1, it is possible to claim that the measured variables do not load into a single component and do not show a high bias effect. The results are also evidenced by the rotation sums of squared loadings, which show that the variances are distributed among the five components. Indeed, 28.975% of variance was accounted for by the first component.

Table 4
Common Method Bias

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.790	49.383	49.383	16.790	49.383	49.383	9.852	28.975	28.975
2	3.103	9.126	58.509	3.103	9.126	58.509	5.625	16.543	45.518
3	1.413	4.155	62.664	1.413	4.155	62.664	3.065	9.013	54.532
4	1.142	3.360	66.023	1.142	3.360	66.023	2.846	8.371	62.902
5	.933	2.745	68.768	.933	2.745	68.768	1.994	5.866	68.768

Table 5 presents the findings from structural models evaluating fitness and applicability or predictive relevance. It shows the r-square, Q-square and f-square values for both endogenous constructs: Supply Chain Resilience Trust Table 2 R-square values indicate how much variance in the endogenous construct is theoretically predictable from exogenous constructs (Hair et al., 2012). For Supply Chain Resilience, the R-square value indicates is 0.715 suggesting that exogenous constructs in the model can explain around >71% variance in Supply Chain Resilience as depicted directly from Fig 2. And for Trust, the R-square value is 0.789 as well, which means that it can also be explained by an exogenous construct about 78.9%. The results show that the magnitude of R-square values is substantial (Chin 1998), indicating a strong predictive power in the structural model. The Q-square values evaluate the predictive relevance of a model through blindfolding (Hair et al., 2012). Positive value of Q-square denotes the predictive relevance of the model for endogenous construction. Table 5 clearly indicates that the Q-square values for Supply Chain Resilience (0.450) and Trust (0.517) are greater than zero which ensures the predictive relevancy of both constructs in our model. The f-square values, measured according to Cohen (1988), lastly indicate for each of the exogenous constructs their effect sizes on the endogenous construct. According to the guidelines of Cohen 1988, f-square values indicate a large effect size for Supply Chain Resilience (0.855) and medium one for Trust (0.443).

Table 5
R-Square, Q-Square, and F-Square

Constructs	R-square	Q-square	F-square
Supply Chain Resilience	0.715	0.450	0.855
Trust	0.789	0.517	0.443

The results presented in Table 6 provide a detailed analysis of the structural model, focusing on the hypothesized relationships between the constructs. The table displays the path coefficients (Beta), standard deviations, t-statistics, p-values, and the decision to support or not support each hypothesis. Hypothesis 1 (H1) examined the effect of Supply Chain Collaboration on Supply Chain Resilience. The results show a positive and significant relationship ($\beta = 0.634$, $t = 18.881$, $p < 0.001$), supporting H1. Such results indicate if Supply Chain Collaboration increases by one unit, it positively impacts on the dependent variable Supply Chain Resilience a 0.634 unit higher and under constant control of other factors. This is clear based

upon the high strength of t-statistic and low p-value, there is a very little chance to observe this relationship by accident (Hair et al., 2012). Relationship between Risk Management Strategies and Supply Chain Resilience The results reveal a positive and significant relationship ($\beta = 0.194$, $t = 4.079$, $p < 0.001$), supporting H2. This suggests that a one-unit increase in Risk Management Strategies results in 0.194-unit error chance relative to Supply Chain Resilience, all other factors equal ($p = 0.123$). The effect size is smaller for H2, in comparison to H1, but this relationship is statistically significant and further supports the meaningful nature of Risk Management Strategies on supply chain robustness (Ambulkar et al., 2015).

Hypothesis 3 (H3) examined the effect of Supplier Development on Supply Chain Resilience. The results show a negative and non-significant relationship ($\beta = -0.046$, $t = 0.821$, $p = 0.412$), not supporting H3. This result indicates that Supplier Development has no mediating significant effect on Supply Chain Resilience in the current study. The t-statistic is low and the p-value is high means that this relationship may not be significant and it could have happened by chance (Hair et al., 2017). H4 to H6: Supply Chain Collaboration, Risk Management Strategies and Supplier Development factors affect Trust The results support all three hypotheses and are positive in their significance. Supply Chain Collaboration ($\beta = 0.145$, $t = 5.492$, $p < 0.001$), Risk Management Strategies ($\beta = 0.257$, $t = 5.454$, $p < 0.001$), and Supplier Development ($\beta = 0.567$, $t = 13.843$, $p < 0.001$) all contribute to building Trust among supply chain partners. The strong t-statistics and low p-values indicate the significance of these relationships (Hair et al., 2012).

Hypothesis 7 (H7) examined the effect of Trust on Supply Chain Resilience. The results show a positive and significant relationship ($\beta = 0.157$, $t = 2.818$, $p = 0.005$), supporting H7. In other words, this finding indicates that a one-unit increase in Trust drives an increment of 0.157 units into Supply Chain Resilience. This important relationship underscores the role of Trust in building Supply Chain Resilience (Capaldo and Giannoccaro, 2015). Hypotheses 8 to 10 (H8~ H10) Infrastructure were whether Trust could play the mediating Impact Supply Chain Collaboration, Role of element in determining Risk Management Suppliers Development & Supply Chain Strategies; Hypothesis Resilience. Positive and significant indirect effects were found for the results supporting all three mediation hypotheses. Trust mediates the relationships between Supply Chain Collaboration ($\beta = 0.023$, $t = 2.504$, $p = 0.012$), Risk Management Strategies ($\beta = 0.04$, $t = 2.764$, $p = 0.006$), Supplier Development ($\beta = 0.089$, $t = 2.588$, $p = 0.01$), and Supply Chain Resilience. These findings suggest that Trust plays a crucial role in translating the effects of Supply Chain Collaboration, Risk Management Strategies, and Supplier Development on Supply Chain Resilience (Seppänen et al., 2007).

Table 6
Structural Results

H.	Path Analysis	Beta	Standard	T statistics	P values	Decision
H1	Supply Chain Collaboration → Supply Chain Resilience	0.634	0.034	18.881	0.000	Supported
H2	Risk Management Strategies → Supply Chain Resilience	0.194	0.048	4.079	0.000	Supported
H3	Supplier Development → Supply Chain Resilience	-0.046	0.055	0.821	0.412	Not Supported
H4	Supply Chain Collaboration → Trust	0.145	0.026	5.492	0.000	Supported
H5	Risk Management Strategies → Trust	0.257	0.047	5.454	0.000	Supported
H6	Supplier Development → Trust	0.567	0.041	13.843	0.000	Supported
H7	Trust → Supply Chain Resilience	0.157	0.056	2.818	0.005	Supported
Mediation Using Indirect Effect						
H8	Supply Chain Collaboration → Trust → Supply Chain Resilience	0.023	0.009	2.504	0.012	Supported
H9	Risk Management Strategies → Trust → Supply Chain Resilience	0.04	0.015	2.764	0.006	Supported
H10	Supplier Development → Trust → Supply Chain Resilience	0.089	0.034	2.588	0.01	Supported

7. Discussion

The findings of this study support the positive relation between Supply Chain Collaboration (independent variable) and Supply Chain Resilience (dependent variable), which is Hypothesis H1. According to Scholten and Schilder (2015), sharing of information and decision-making in relation to supply chain operations effectively improves the supply chain's capacity to manage disruptions. In a similar vein, Wieland and Wallenburg (2013) showed that characterised by communicative and cooperative relations between partners of supply chain enhance resilience. This finding is in line with the Relational View (RV) theory by Dyer and Singh (1998) that, it is through close working relationships that firms can harness the resources and capabilities of the partner and in turn, obtain better performance and adaptability. Thus, Supply Chain Collaboration as an enabler establishes a positive climate for the enhancement of resilience capacities as trust, commitment, and knowledge exchange are established.

The relationship proposed between Risk Management Strategies and Supply Chain Resilience as stated in H2 is in tune with the findings of earlier research works. Ambulkar et al. (2015) in their study on risk management in supply chain network and firm competitiveness observed that the SCRM capability of a firm would enhance the competitiveness of its supply chain against disruptions. Similarly, Fan and Stevenson contended that practices of risk identification, assessment, and risk control improve the supply chain's capability in managing disruptions. This development receives support from the Dynamic Capabilities (DC) theory that asserts that firms can create buffer stocks by seeding capabilities that help them to

detect opportunities and act on them while simultaneously altering their strategic plans because of volatility in the environment (Teece et al., 1997). Risk management strategies are therefore one of the essential dynamic capabilities that incorporate the capacity of firms to address possible threats and utilize disruptions (Fan & Stevenson, 2018).

Surprisingly, this finding contradicts some of the prior research as the analysis for the H3 revealed that Supplier Development did not have a significant impact on Supply Chain Resilience. For instance, Chowdhury and Quaddos (2017) pointed out that Supplier Development practices, which includes training and technical support, positively influence supply chain readiness. The present study did not report a direct significant relationship, which implies that the effects of Supplier Development on the aspect of Supply Chain Resilience may not be in a simple direct manner but could be context influenced. The findings of the study may also show that the relationship between Supplier Development and performance is fully moderated through Trust in line with the significant indirect relationship (H10). It also underlines the necessity to take into account the presence of the mediating variables while studying the links between the supply chain management practices and resilience.

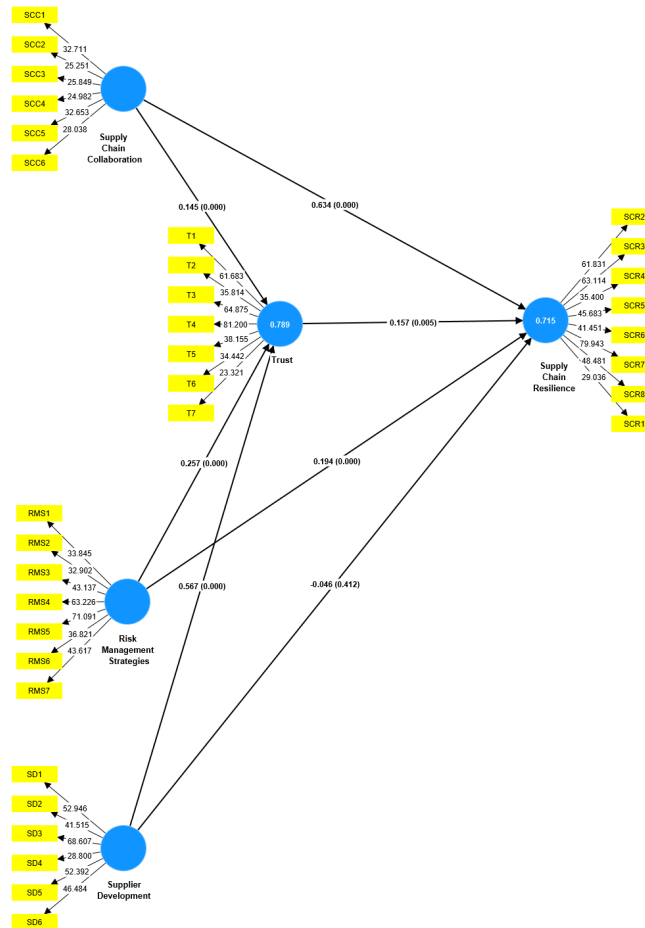


Fig. 2. Graphical Structural Results

The proposed and tested hypothesis H4, H5, and H6 on the positive influence of Supply Chain Collaboration, Risk Management Strategies, and Supplier Development, on Trust are supported by prior literature. According to Fawcett et al., (2012) trust can be built through partnering and other closeness construct activities, which include information sharing and solution-oriented activities. Blonska et al., (2013) showed that essentially Supplier Development activities, for instance training and performance feedback increase the degrees of trust based on endorsement. The RV theory backs these findings; Dyer and Singh (1998) postulated that trust-based, reciprocal, and long-term relationships facilitate the acquisition of resources and capabilities crucial to a firm. The positive impact of Trust on Supply Chain Resilience (H7) is in compliance with the studies done before. For instance, Capaldo and Giannoccaro (2015) demonstrated empirically that trust among supply chain members' increases resilience by enabling more information exchange as well as problem solving and adaptation to disruptions. Similarly, trust enhances the accumulation of social capital and relational competences that help firms to access resources from their partners when dealing with disruptions. The RV theory explains that trust enables firms to benefit from the valuable knowledge and resources produced during interfirm interactions (Dyer & Singh, 1998) by facilitating reciprocal resource exchange and thus improved performance as well resilience. Trust possesses an important mediating role between Supply chain collaboration, Risk management strategies and Supplier development with respect to SC resilience which signifies the vital impact of trust in transforming SCM practices into resilient capabilities (H8, H9 & H10 respectively). This convergence with the literature is notable, as trust has largely been conceptualized as a mediating factor

in previous studies. For example, Dubey et al. (2021) showed that trust, supply chain agility and resilience are mediated in terms of function as an organically structured. The DC perspective informs the role of trust as a mediator, since it argues that dynamic capabilities are determined by firms' relational resources and competencies (Teece et al., 1997). According to Dubey et al., (2019), trust as a relational resource allows creation, assimilation and implementation of dynamic capabilities - e.g., Risk Management Strategies and Supplier Development through knowledge sharing, learning and adaptation. Accordingly, that trust which makes a company more responsive with the benefits of strong supply chain performance partners serves as somewhat like an accelerant in allowing translation to execute focused capabilities.

8. Conclusion of the Study

The purpose of this study was to explore the associations with Supply Chain Collaboration, Risk Management Strategies, Supplier Development and Trust in Jordanian retail sector. The research had several objectives which were to the direct effect on Supply Chain Resilience as supply chain collaboration, risk management strategies and supplier development moreover they affect Trust. The study also looked for the mediating effect of Trust on supply chain management practices and Supply Chain Resilience. Results of the structural model analysis largely supported the hypothesized relationships. Supply Chain Collaboration and Risk Management Strategies had a positive significant relationship with Supply Chain Resilience which is clear that supply resilience should be manifested by collaborative relationships among the companies to fight effectively against potential risks. A significant direct effect of Supplier Development on Supply Chain Resilience was not supported, which indicates that the extent to which Supplier Development affects SC resilient may be influenced by other factors or boundary conditions. Moreover, Supply Chain Collaboration, Risk Management Strategies and Supplier Development provided support for Trust into the implementation of supply chain management practices suggesting that trust can be a valuable ally in promoting good relations Collaborative between partners. Additionally, results showed that trust has a highly positive influence on SC Resilience; this suggests the importance of deploying resilient-centric capabilities across the supply chain to deal with and mitigate such disruptions. The study also highlights that Trust as an underpinning factor plays a mediator role in relation between Supply Chain Collaboration, Risk Management Strategies, Supplier Development and spurs the development of leverage mechanism eventually founder to supply chain resilience. Overall, our findings suggest that practice → capability translation may be contingent on resources and capabilities available through other firms a firm interacts with (supply-chain management), the access of which might itself rely upon trust. The Relational View (RV) theory and the Dynamic Capabilities (DC) theory served as considerable theoretical lenses for contextualizing these relationships. The RV theory emphasizes the role of relational resources (e.g., trust and collaboration) as antecedents to supply chain performance but also prompts an interest in how these could serve resilience objectives. The DC theory suggests that companies can indeed adjust to the environment and build resilience through dynamic capabilities, e.g. buyer-supplier practices related with risk management or supplier development.

9. Research Implication

There are several significant implications for managers, theorists, practitioners and society more widely that can be drawn from the results found in this study. From a manager perspective, the results indicate that retail managers in Jordan should invest more effort into creating collaborative relationships with their suppliers and customers as Supply Chain Collaboration positively influences both Trust and Supply Chain Resilience. Managers need to cultivate trust and information disclosure fill with open communication information sharing as well Joint problem solving within suppliers and other partners. Moreover, the strong influence of Risk Management Strategies on Supply Chain Resilience necessitates efficient risk identification, assessment and mitigation processes. Retail executives need to dedicate resources towards building a strong risk management muscle that can better equip their organizations in not simply predicting and preparing for potential supply chain disruptions but also being equipped functionally organized and prepared. While the direct effect of Supplier Development on Supply Chain Resilience was not strong, managers should consider that investments in supplier development initiatives could increase Trust and therefore enable resilience. Theoretically, this research deepens understanding on the application of Relational View (RV) and Dynamic Capabilities (DC) avenues within a supply chain resilience context. These findings lend robust empirical evidence-based support for the core theoretical tenets of RV Theory, emphasizing that relational constructs such as trust and collaboration are crucial determinants in enhancing supply chain performance and resilience. It also illustrates the theoretical importance of DC theory for synthesizing how firms can develop and deploy dynamic capabilities (e. g., risk management strategies, supplier development) as sources of resilience. Practical and theoretical implications: The importance of Trust as a mediator offers novel insights to our understanding in the role that relational resources play alongside dynamic capabilities in explaining supply chain resilience. For practitioners, findings from this study offer useful insights into what are important supply chain management practices and relational factors that foster the development of resilient supply chains. The results highlight the importance of enrolling both macro and processual management virtues in regards to trust, cooperation among supply chain associates, hazard supervision designs as well as dealer development helpfulness for experts. By focusing on them, practitioners can help their organizations develop the resilience capabilities that will be essential in negotiating an ever more unpredictable and turbulent business climate. The study also holds far reaching social implications by suggesting supply chain resilience is fundamental for uninterrupted provisioning of essential goods and services to the society, especially under crisis or disruption. This research can provide important insight to retail

companies of Jordan and worldwide, for it enhances the awareness in identifying main elements that could help organizations pre-existing supply chains perform more anti-resilient beyond a disruptive world while may contribute greatly mitigating impacts on society at risk. Increased stability, less shortage of essential products and shorter time for hard recovery all contribute to better social welfare as well as economic sustainability through more resilient supply chains.

10. Limitations and Future Studies

Although this study has some significant contributions in the body of knowledge regarding supply chain resilience within Jordanian retail sector; still it has its own limitations. First, data are cross-sectional and do not measure the temporal relationships between variables. Future research should use longitudinal designs to explore the longer-term change process in supply chain management practice, trust and resilience relationships, especially in relation to concrete disruption triggered changes of business environment. In addition, a single industry in one unique geographic context was considered that might reduce applicability of results across sectors or regions. Future studies could replicate the relationships between these variables in different industries and cultural contexts, while also testing their robustness or identifying potential boundary conditions. A second limitation consists in the use of survey data from a single respondent for each organization (thus bringing into play common method bias). Even though statistical controls for common method bias were used in the present research, future researchers might wish to use other sources of data as well or even objective measures to replicate these findings. In addition, the study zeroed in on only a few of supply chain management practices and relational factors; it is possible that other variables might be important to build resilience into your own global supply chains. For the future, research can look into how further actions such as supply chain agility and flexibility, visibility might play a role in resilience along with various relational factors too like power dependency conflict. In conclusion, the non-significant direct effect of Supplier Development on Supply Chain Resilience led to our recommendation that further research is needed to explore what is potentially a more complex association than proposed here. Future work could test for potential moderating and mediating factors that may influence the effects of Supplier Development on resilience, such as interfirm relationships, duration between buyer-supplier interaction periods or steps in supply chain operations, learning mechanisms behind relational adaptation processes during supplier development efforts.

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