Management Information System and Digital Supply Chain Influence on Supply Chain Resilience through Supply Chain Risk Management

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ABSTRACT

This study tested the influence of management information systems and digital supply chain on supply chain resilience through supply chain risk management in Saudi Arabian textile companies. Data was collected from 360 employees of textile companies in Saudi Arabia through a convenient sampling technique. The structural Equation Modeling (SEM) technique was employed using AMOS software. The regression results show that all management information system capabilities and digital supply chains positively and significantly impact supply chain risk management. Supply chain risk monument also positively and significantly impacts supply chain resilience. The indirect mediating effect results also show that supply chain risk management mediated significantly between management information system capability and supply chain resilience. Supply chain risk management is also partially mediated between the digital supply chain and the supply chain resilience of textile companies in Saudi Arabia. Based on the results of the study, it is recommended that Saudi Arabian textile companies should manage their management information system capabilities and invest in digital supply chains to improve supply chain risk management. Additionally, companies should focus on strengthening supply chain risk management practices as a mediator to bolster supply chain resilience.

Keywords: Management information system, Digital supply chain, Supply chain resilience Supply Chain Risk Management.

INTRODUCTION

Management information systems (MIS) is important for organizations to improve their decision-making and achieve global competitive advantage (Azzahra et al., 2023). The organizations face difficulties in their internal and external environment. For this purpose, MIS is an integral component because it helps to integrate both technological tools and human resources to collect, store, analyze, and disseminate information necessary for strategic and operational decision-making (Salem & Yousif, 2023). For instance, Murodilov (2023) enforced that MIS could help to streamline operations, and improve the quality and speed of decision-making. Mulaydinov (2024) also argued that MIS serves as a backbone for improving decision-making which enables managers to make informed choices that align with organizational goals. Beyond improving organizations' efficiency, MIS also played a critical role in growing innovation in the current competitive environment. Collins et al. (2021) further supported this notion that MIS provides organizations with the agility to respond to changing market conditions and create new business models that help to increase supply chain resilience. In

other words, MIS also helps to control better risk management by providing real-time data and analytics, which could help organizations predict, assess, and mitigate potential risks (Wong et al., 2022). In the context of supply chain management, MIS systems are particularly important, as they allow organizations to integrate and manage complex networks of suppliers, manufacturers, and distributors, ensuring smooth operations and minimizing risks (Boyens et al., 2012; Wong et al., 2022). These previous studies emphasized that MIS is an important tool in supply chain management risk management (SCRM).

MIS plays a key role in improving SCRM by providing the most relevant information which helps to provide better decision-making (Boyens et al., 2012). The MIS also helps to the organizations control their inventory which reduces the SCRM. (Gao et al., 2019) further supported that MIS enhances the ability to quickly access and analyze supply chain data to enable organizations to manage SCRM proactively rather than reactively. Besides, MIS helps organizations identify weaknesses in the supply chain by disclosing internal and external risks (Xue et al., 2013). This enables companies to develop risk mitigation strategies to reduce disruption and improve supply chain resilience. Additionally, with advanced analytical tools embedded in the MIS, companies can monitor potential risks before they emerge, reducing their impact on the business (Giannakis & Louis, 2011). These studies emphasized that MIS helps companies to control risk management in their operations. Therefore, this study focused on the impact of MIS on SCR by improving SCRM.

Different studies argued that SCRM improves SCR by enabling organizations to respond to their crises more effectively (El Baz & Ruel, 2021). Other studies, argued that a proper MIS system in the organization improves the SCRM which could lead to improved SCR. This enforces that when the companies have their investment in technology operations to improve their SCRM strategies like identification of risks in early stages which improves the SCR (Xue et al., 2013). Rashid et al. (2024) also enforced that effective risk management improves SCR, which are key component of resilience and establishing long-term mitigation plans (Al-Ayed & Al-Tit, 2023). Furthermore, Qiu et al. (2024) further explained that organizations with strong SCRM policies are better equipped to absorb shocks and recover more quickly from disruptions of supply chain which increases the SCR. Through prioritizing risks, organizations can strengthen the capacity for flexibility and uncertainty, making supply chains stronger and more resilient over time. Thus, based on previous discussion study focused on the impact of MIS on SCR through the improvement of SCRM.

Extant studies have majorly focused on the impact of MIS on the firm performance or other dependent variables while having limited attention to measuring the mediating effects of SCRM (Anozie et al., 2024; El Baz & Ruel, 2021; Qiu et al., 2024; Rashid et al., 2024). The indirect role of SCRM is overlooked in the extant literature. Furthermore, extant studies also have major attention on the direction of SCRM on SCR with limited attention to SCRM as a mediating variable. Furthermore, previous studies also overlooked the impact of digital supply chains on SCR especially with the mediating role of SCRM. To address this gap, this study focused on the impact of MIS and digital supply chain on SCR in one combined model. In other word, previous studies mainly focused on other countries with a limited attention on Saudi Arabia textile companies. In Saudi Arabia, the textile sector plays an important role in the country's economic development, as it is a key driver of employment growth and export growth (Muthuswamy & Sharma, 2023). However, despite its importance, the integration of MIS and digital supply chain into SCRM in the Saudi textile industry has not been thoroughly explored, presenting a research opportunity to provide valuable insights for industry

sustainability and improved competition (Ammer & Pantamee, 2024). To address the previous gaps, this study develops a research concept on the impact of MIS and digital supply chains on SCR through SCRM in a Saudi Arabian textile sector.

The study significance is that this study contributed that how MIS and digital supply chains could enhance SCR through SCRM improvement in the context of the textile sector of Saudi Arabia. Furthermore, this filled the empirical gap through focusing on the Saudi textile industry which has been underrepresented in previous studies, contributing to the development of effective risk mitigation strategies and improving performance in emerging markets. Study practical contributed to the understanding that investment in improved MIS and digital supply chain are necessary to improve SCRM and resilience. Managers are encouraged to help enhance their organization's MIS capabilities to better anticipate and mitigate disruption that will help by enhancing the development involving strong partnerships of the supply chain, which can reduce risks and increase resilience, especially in essential sectors such as textiles. Study contributes to the recognition of the need to prioritize investments in digital infrastructure and MIS capabilities for competitive advantage and long-term sustainability in the supply chain. Supporting these investments will help businesses better manage risks and adapt to future challenges in a dynamic global supply chain.

HYPOTHESIS DEVELOPMENT

The management information system is considered to be critical component from the technology perspective because it helps to organizations in effective decision-making (Azzahra et al., 2023). For this purpose, the social-technical system theory can be effectively applied in the context of MIS to improve supply chain resilience (Wu et al., 2006). The MIS enforces the alignment of the various technical systems within the organization structure to enhance the efficiency in the current dynamic environment (Bostrom & Heinen, 1977). Management information systems has been conceptualized in various contexts in the extant studies but among these, IS planning sophistication, IS development capability, IS operations capability, IS partnership quality, and IS human capital are paramount (Mkongo & Macha, 2022; Ravichandran et al., 2005). These dimensions are further supported by resource-based theory where it is theorizes that the strategic planning, development, and operational capabilities of MIS, along with strong partnerships and skilled human capital, serve as valuable organizational resources (Wu et al., 2006). These core dimensions collectively enhance the organization's ability to leverage MIS for innovation that increases the supply chain resilience through supply chain risk management (SCRM).

Among the MIS capabilities, a sophisticated information system (IS) strategy refers to develop and implement integrated strategies to support business and operational objectives (Haleem, 2016). It involves incorporating planning methods, forecasting tools, and allocation methods into IS development. Effective IS process flexibility is important for SCRM because it enables organizations to anticipate, identify, and mitigate risks through improved planning processes (Winter et al., 2023). A sophisticated IS design approach for risk mitigation, resource efficiency, and contingency planning, all of which are important for supply chain sustainability in the face of turbulence. Yang et al. (2023) further emphasized that organizations with advanced IS management skills have risk mitigation strategies that enhance SCRM. Adenekan et al. (2024) showed that a structured IS system provides better visibility into the supply chain, enabling firms to identify weaknesses before they escalate into major problems. Mizrak (2023) further found that companies that adopt sophisticated IS systems have fewer operational

problems using predictive tools. Mizrak (2023) also found that IS systems increased the speed of decision-making in a crisis and significantly reduced the impact on the supply chain. Dou et al. (2023) emphasized that IS strategy aligns organizational resources with risk management priorities, ensuring effective management of challenges. Abdullahi and Mohamud (2023) further emphasized that a well-designed IS strategy reinforces risk management in the supply chain, and strengthens the organization's ability to manage vulnerable upstream stakes Ahmad and his colleagues. Based on the previous discussion, the following hypothesis is formulated below,

H1: *IS Planning Sophistication significantly improves the SCRM.*

Furthermore, IS development capabilities which shown the organizations ability to design, and develop and strong solutions which meet the objectives of the organizations (Adamides & Karacapilidis, 2020). This consisted of innovations in technology to develop a strong information which is the need of the organizations to increase the performance (Adamides & Karacapilidis, 2020). IS development capabilities are important for supply chain resilience because they enable organizations to design resilient systems. Through the implementation of the innovative IS solutions, companies can increase operational flexibility, reduce response times, and improve overall supply chain speed (Tien, 2021). Chen et al. (2022) further showed that IS development can support supply chain recovery by integrating real-time analytics systems that provide actionable insights. Weili et al. (2022) further found that companies with strong IS development capabilities adopt predictive analytics tools that reduce risk and improve flexibility. Ivanov and Dolgui (2020) found that IS development increases supply chain velocity which enabling the firms to adapt more quickly to changing market conditions. Rashid et al. (2024) also emphasized that IS development could support proactive risk management through providing solutions to emerging challenges. (Odimarha et al., 2024) emphasized that technology strengthens collaboration between supply chain actors and improves flexibility. They also further concluded that IS development can improve supply chain efficiency through the seamless integration of advanced technologies. Based on previous studies, it has been formulated following the research hypothesis.

H2: *IS development capability significantly influences on SCRM.*

IS operations capability shows the capability of the organizations to control, and optimize the IS of the organizations in the business operations (Singh & Modgil, 2024). This consisted of analysis of data in real-time and integration of IS in the business major operations. This is the reason, authors identified that IS operation capability is important for the improvement of SCRM because it increase the culture in the organizations to ensure the continuous monitoring and optimization of the supply chain. It enables companies to identify and respond to risks in real-time, reducing disruption and maintaining efficiency. Islam et al. (2024) highlighted that IS implementation could enhance risk identification by incorporating real-time data analytics into SCRM. They also conducted that active technology streamlines procedures, reducing the probability of problems. Odimarha et al. (2024) also emphasized that the use of IS can improve the flexibility and accuracy of decision-making in terms of risk mitigation. Surucu-Balci et al. (2024) found that organizations with advanced IS management systems manage supplier risks more effectively through a leaner flow of information. Safari et al. (2023) noted that IS implementation can reduce the frequency and impact of supply chains. They further emphasized that the use of IS tools enhances problem-solving by enabling faster and more informed decision-making. IS implementation could help to manage supply chain challenges

effectively and ensure continuity during turbulent times. Therefore, study has following hypothesis below,

H3: *IS operations capability has a significantly influence on SCRM.*

The IS partnership quality consisted of creating a relationship between the enterprises along their technology partners in the implementation of proper IS systems in their operations (Fernando et al., 2022). The better quality in the partnership is characterized by strong trust, shared goals, and the mutual commitment to successfully improve the SCRM. Strong IS partnerships are critical to supply chain resilience as they encourage collaboration, innovation, and knowledge sharing (Kankam et al., 2023). Through leveraging the expertise and resources of technology partners, organizations can build strong systems that allow them to cope with, and then recover from, crises. Al Shanti and Elessa (2022) highlighted that high levels of IS-sharing enable organizations to co-create innovative solutions that effectively address supply chain vulnerabilities. Surucu-Balci et al. (2024) showed that IS participation by partners enhances resilience by aligning partners' objectives with active SCRM. Behl et al. (2022) found that IS partnerships improve response time to crises through coordinated efforts and shared technologies. Yuan and Pan (2023) emphasized that IS partnerships enable firms to develop transformational capabilities by combining advanced technologies and knowledge. Al Shanti and Elessa (2022) showed that strong IS partnerships enable suppliers to identify and improve risk mitigation decisions. Thus, based on the previous discussion, the following hypothesis is formulated below,

H4: *IS partnership quality has a significant impact on SCRM.*

IS human capital refers to the skills, knowledge, and expertise of employees involved in implementing information systems in an organization (Oyewole et al., 2024). This includes both technical and managerial skills. IS human capital is a key enabler for SCRM because experienced professionals are better equipped to use IS tools, identify potential risks, and implement effective risk mitigation strategies Investing in IS human capital can enhance organizations' ability to manage the disruptions in supply chain (Lang et al., 2022). Gunasekaran and Ngai (2004) highlighted that continuous development programs for IS professionals improve organizational preparedness for supply chain disruptions. Adel and Younis (2021) highlighted that experienced IS professionals bridge the gap between risk identification and management. Rashid et al. (2024) found that IS training programs empower employees to confidently manage challenging supply chain challenges. They also argued that organizations that invest in IS human capital improve risk management outcomes. Al-Dosari and Fetais (2023) emphasized that IS training facilitates the integration of advanced tools for SCRM. Zhong et al. (2021) concluded that IS human capital development strengthens supply chain continuity by reducing vulnerability and increasing volatility.

H5: *IS human capital significantly improves the SCRM.*

Companies have their attention increase on the digital supply chain (DSC) to increase their performance. (Ageron et al., 2020) argued that DSC which consists of manufacturing technology, big data analytics, and advanced robotics to ensure transparency, responsiveness, and security Help increase SC reliability. In addition, further study found that DSC increase the assessment of SCRM through improve more proactive strategies related to risks (Rauniyar et al., 2022). In other study, other authors also argued that DSC increase the SCRM through

enabling proper identification and response of disruptions. Advanced analytics and automation also help predict potential risks and optimize decision-making to minimize their impact (Ivanov & Dolgui, 2020). Another empirical study also found that DSC improves SCRM through the detection of risk in early stages. This leads to better risk mitigation and more effective decision-making in managing disruptions (Ivanov, 2024). On the other hand, it was also found that companies with the DSC tool helps to the organizations in proactively identify and manage risks through improving information flow and decision-making speed. The study highlighted that these technologies enhance risk resilience by enabling quick responses to disruptions (Rauniyar et al., 2022). The following hypothesis is formulated below based on the previous discussion,

H6: *Digital supply chain significantly improves the SCRM.*

SCRM strategies are important to reduce disruption in the supply chain resilience (Al-Ayed & Al-Tit, 2023). Better information is needed to deliver RM strategies with improved performance for root canal prevention, response, rehabilitation, or even state development (El Baz & Ruel, 2021). Implementing an RM strategy enables organizations to anticipate risks and use proactive strategies to overcome adverse SC disturbances, avoid, and detect them even before a crisis occurs, and recover from disturbances coming in. Company supply chain diversity, flexibility, quick preparation and enhanced inventory can be a variety of methods (Ageron et al., 2020). These actions will absorb the negative effects of unexpected crises, and enable the organization to prevent negative impacts and achieve success despite the presence of hostile crises (Rashid et al., 2024). According to Rashid et al. (2024), resilient SCs are characterized by increased RM capabilities that support organizational strategic and operational objectives through risk management and negotiation during critical crises. Developing such a plan enhances productivity and can reduce the performance degradation caused by SC disturbances during crises. The study has formulated the following hypothesis based on the previous discussion,

H7: *SCRM significantly improves to SCR.*

Mediating Role of Supply Chain Risk Management

In previous it has been found that MIS capabilities have a direct influence on SCRM. SCRM also has a direct effect on supply chain resilience. These relationships have little attention to indirect effect analysis. Extant literature has argued that MIS played an integral concern in increasing SCRM through data integration and predictive analysis to identify and mitigate potential risks which increases the supply chain operation of the organizations (Creazza et al., 2021). The MIS in the organization increases the organization's capability to monitor supply chain activities. With tools such as decision support systems, data visualization techniques, and risk assessment modules, MIS facilitates better decision-making during turbulence. It also supports collaboration between supply chain partners, ensuring a smooth flow of information and solving problems together (Petratos & Faccia, 2023). Through integrating advanced technologies such as artificial intelligence (AI) and machine learning (ML), MIS can anticipate potential risks and optimize mitigation strategies with downtime reduced workload, increased efficiency, and enhanced supply chain stability (Gao et al., 2019). MIS strengthened supply chain resilience through organizations that enabled organizations to mitigate the risks posed by increased visibility. Real-time dashboards and tracking systems provide end-to-end transparency in the supply chain which helps businesses identify problems such as late

shipments, and risks which increase the supply chain resilience (Yuan & Pan, 2023).

MIS encourages collaboration between supply chain stakeholders by integrating communication and data sharing mechanisms. This integration ensures that all partners are equal in addressing risks, enabling faster and more coordinated responses in times of violence (Wang-Mlynek & Foerstl, 2020). Collaborative tools provided by MIS, such as cloud-based systems and shared dashboards accelerate the delivery process by providing the flexibility to quickly adapt to changing market conditions or business challenges (Li et al., 2022). MIS enables companies to adapt to crises while maintaining operational efficiency by improving speed and decision-making accuracy. Extant studies have been conducted on the mediating effect of SCRM. For instance, Rashid et al. (2024) conducted study with the mediating effect of SCRM and found significant mediating effect of SCRM. They also suggested that further SCRM relationships could also be tested along with other variables. In another study, Waqas et al. (2023) conducted a study where SCRM use as a mediating between the relationship of DSC and supply chain resilience. They found the partial mediating effect of SCRM. They also concluded that further research could be conducted with the mediating effect of SCRM along with other information technology variables. Thus, based on previous research, the following hypotheses are formulated below,

H8: *IS Planning Sophistication significantly improves the SCR through SCRM.*
H9: *IS development capability significantly influences SCR through SCRM.*
H10:*IS operations capability has a significant impact on SCR through SCRM.*
H11:*IS partnership quality has a significant impact on SCR through SCRM.*
H12:*IS human capital significantly improves the SCR through SCRM.*
H13:*Digital supply chain significantly improves the SCR through SCRM.*

RESEARCH METHODS

This study develops a research concept on the impact of management information systems and digital supply chain management on supply chain resilience through supply chain risk management in a Saudi Arabian textile company. This study used a three-step SEM approach (Huo et al., 2020). The first step consisted of the collection of data through a survey questionnaire and conducted a pilot testing. The next step was to assess the model through the confirmatory factor analysis (CFA). The third step consisted of hypothesis testing through the structural model (Al Issa & Abdelsalam, 2021). These analysis were conducted through structural Equation modeling technique (SEM) using AMOS software.

Survey design and instrument

The survey questionnaire was developed using a two-stage approach. The first step was a comprehensive literature review in which factors and variables were identified. The questionnaires were adopted from extant literature where it was already used. The management information capabilities has been measured by five capabilities. Among those Information system planning sophistication measured by 4 questions, information system development capability is measured by 4, information system operations capability measured by five items, information system partnership quality is measured by 5 questions. These items were adopted rom the study of (Ravichandran et al., 2005). In addition, information system human capital was composed of by four items of (Mkongo & Macha, 2022). Digital supply chain measured by 5 indicators (Rashid et al., 2024). Supply chain risk management comprises by four

indicators (Rashid et al., 2024). Lastly, supply chain resilience is composed of four indicators (Rashid et al., 2024). The questionnaire was measured on a point Likert Scale 1 for strongly disagree and 5 for strongly. Firstly, an adopted questionnaire was pre-tested before the distribution of the questionnaire. The questionnaires was distributed among the field experts and academicians which have the knowledge of supply chain operations which is recommended. The questionnaires was distributed among 30 employees for pilot testing. All questionnaires alpha values was greater than 0.70 which shown the reliability of the construct.(Cheah et al., 2018). The study variables are predicted in Figure 1 below.

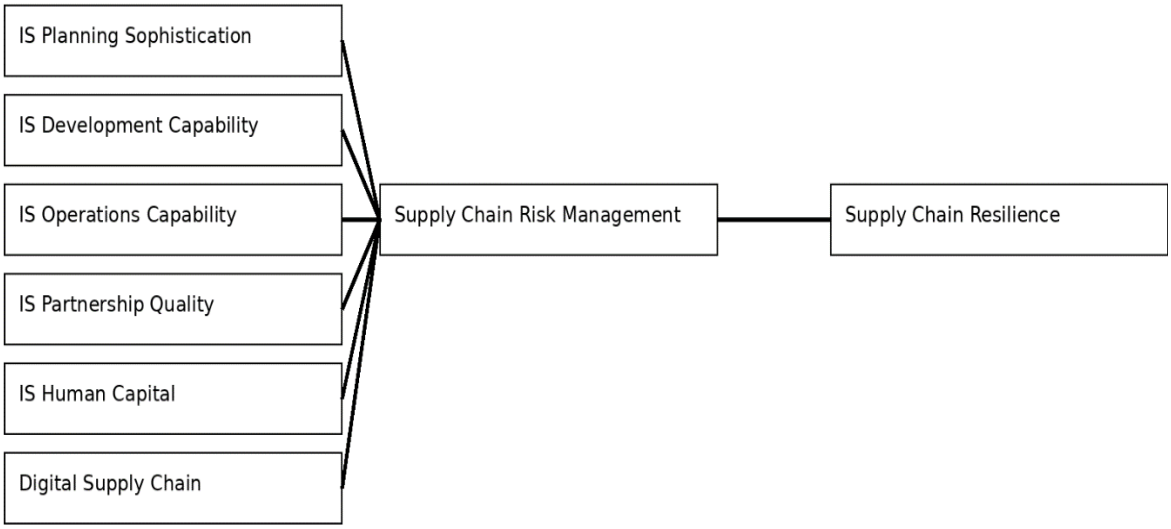

Figure 1: Research Framework

Sampling technique

The industry chosen for this study was the textile industry, where the respondents are employees in this industry. A convenience sampling method was used to select a sample of 450 employees in the textile industry. The use of convenience sampling often results from practical and cost-effective management and employment research, especially when the researcher is unable to reach specific populations (Etikan, 2016). This approach enables effective data collection and ensures that the model reflects the management structure of the enterprise. The findings of this model provide insight into the role of management information systems in improving supply chain risk management in the textile industry. Data collection for this study was done using a self-administered structured questionnaire, which was distributed to 450 employees in the textile industry 370 questionnaires were returned, of which 360 questionnaires are considered suitable for analysis. Self-administered questionnaires are a widely used data collection method in organizational research due to their ability to efficiently collect large amounts of data while maintaining participant anonymity (Clark et al., 2021). This approach ensures that respondents can give their insights freely, and is critical to obtaining unbiased answers. The validity of the responses returned further strengthens the reliability of the survey data.

Model fit and Measurement Model

In AMOS software, model fitness could be assessed through using the fit indices which evaluated that how well the proposed model has been aligned with the observed data. Common

indices include "Chi-square/df, where values below 3 indicate a good fit, CFI (Comparative Fit Index) and TLI (Tucker-Lewis Index)", where values above 0.90 are acceptable. Additionally, RMSEA (Root Mean Square Error of Approximation) values below 0.08 indicate a reasonably good fit, ensuring the model is statistically and practically valid. The model fitness results are predicted in Table 1 which shown that construct has the model fitness.

Table 1: Model fit

it Index	Value	Threshold for Good Fit
CMIN/DF	1.811	Less than 3
CFI	0.964	Greater than 0.95
RMSEA	0.051	Less than 0.05 (ideal), 0.05–0.1 (acceptable)

After the pretesting of the questionnaire, the next step was to assess the measurement model. Furthermore, a measurement model is employed to evaluate association among instruments. In this model, all constructs were allowed to correlate freely. Upon conducting the CFA, it was found that the factor loadings for all constructs were greater than 0.7. Additionally, the convergent validity for all constructs, measured by the Average Variance Extracted (AVE), was above the threshold of 0.5 which shows that construct has the convergent validity (Cheung et al., 2023). In addition, alpha values were also greater than 0.7 which shown the reliability of the construct (Cheah et al., 2018). The above results are predicted in Table 2.

Table 2: Reliability of construct

Variable (Abbreviation)	Items	Loadings	Average	Cronbach's Alpha	AVE
IS Planning Sophistication (ISPS)	ISPS1	0.923	3.14	0.781	0.614
	ISPS2	0.831	3.21		
	ISPS3	0.823	3.30		
	ISPS4	0.784	3.21		
IS Development Capability (ISDC)	ISDC1	0.792	3.05	0.885	0.683
	ISDC2	0.805	3.22		
	ISDC3	0.871	3.17		
	ISDC4	0.812	3.25		
IS Operations Capability (ISOC)	ISOC1	0.894	3.19	0.895	0.678
	ISOC2	0.795	3.23		
	ISOC3	0.789	3.22		
	ISOC4	0.842	3.18		
	ISOC5	0.772	3.21		
IS Partnership Quality (ISPQ)	ISPQ1	0.813	3.13	0.875	0.609
	ISPQ2	0.826	3.24		
	ISPQ3	0.793	3.17		
	ISPQ4	0.828	3.78		
	ISPQ5	0.836	3.22		
IS Human Capital (ISHC)	ISHC1	0.841	3.12	0.932	0.781
	ISHC2	0.861	3.25		
	ISHC3	0.835	3.17		
	ISHC4	0.839	3.21		
	ISHC5	0.789	3.29		

Table 2: Reliability of construct (cont…)

Variable (Abbreviation)	Items	Loadings	Average	Cronbach 's Alpha	AVE
Digital Supply Chain (DSC)	DSC1	0.881	3.05	0.891	0.703
	DSC2	0.839	3.23		
	DSC3	0.819	3.21		
	DSC4	0.781	3.89		
	DSC5	0.773	3.18		
Supply Chain Risk Management (SCRM)	SCRM1	0.794	3.15	0.915	0.758
	SCRM2	0.829	3.21		
	SCRM3	0.893	3.22		
	SCRM4	0.931	3.96		
Supply Chain Resilience (SCR)	SCR1	0.818	3.23	0.917	0.627
	SCR2	0.882	3.25		
	SCR3	0.893	3.21		
	SCR4	0.590	3.18		

Discriminant Validity

Discriminant validity in Table 3 has been predicted through the Fornell and Larcker using the structural equation model (SEM). The discriminant validity could be assessed from the Square root of the construct where each diagonal value should exceed the correlations between that construct and all other constructs (off-diagonal values) (Cheung et al., 2023). In Table 3, all diagonal values are greater than their corresponding off-diagonal values, confirming that each construct is distinct from the others. This finding supports that the constructs are well-defined and adequately separated, ensuring meaningful interpretations of the structural paths within the SEM framework. The Above results are predicted in Table 3 below.

Table 3: Discriminant Validity.

Variable	ISPS	ISDC	ISOC	ISPQ	ISHC	DSC	SCRM	SCR
ISPS	**0.815**							
ISDC	0.672	**0.802**						
ISOC	0.628	0.325	**0.807**					
ISPQ	0.243	0.601	0.624	**0.812**				
ISHC	0.598	0.521	0.612	0.338	**0.829**			
DSC	0.261	0.445	0.701	0.413	0.343	**0.808**		
SCRM	0.182	0.363	0.224	0.641	0.326	0.341	**0.811**	
SCR	0.567	0.231	0.448	0.513	0.239	0.563	0.787	**0.816**

Hypothesis Results

The regression results show that information-sharing planning sophistication positively and significantly impact Supply Chain Risk Management (SCRM). Similarly, ISPC o has a positive and significant effect on SCRM. ISDC also demonstrated a positively and significantly influence on SCRM. ISPQ shows a positively and significantly influence on SCRM. ISHC has a positive and significant effect on SCRM. Lastly, the Digital Supply Chain exhibits a positively and significantly influence on SCRM. Further, the indirect effect results reveal that ISPC positively and significantly influence on SCR through the mediating effect of SCRM.

SCRM also shows a partial mediation between ISDC and SCR. SRCM also partially mediated between ISOC and SCRM. SCRM also partially mediated between ISPQ and SCR. SCRM also partially mediated between ISHC and SCR. SCRM also partially mediated between DSC and SCR. SCRM also has positively and significantly influence on SCR (Figure 2). The results of these hypotheses are summarized in Table 4 below.

Table 4: Empirical Findings

Path	Standardized Beta	t-value	P-value	Result
ISPS → SCRM	0.325	4.253	0.000	Supported
ISDC → SCRM	0.415	5.674	0.000	Supported
ISOC → SCRM	0.374	4.982	0.000	Supported
ISPQ → SCRM	0.295	3.850	0.000	Supported
ISHC → SCRM	0.352	4.423	0.000	Supported
DSC → SCRM	0.462	6.154	0.000	Supported
SCRM->SCR	0.367	3.782	0.000	Supported
ISPS → SCRM → SCR	0.242	3.502	0.001	Supported
ISDC → SCRM → SCR	0.301	4.121	0.000	Supported
ISOC → SCRM → SCR	0.287	3.981	0.000	Supported
ISPQ → SCRM → SCR	0.223	3.154	0.002	Supported
ISHC → SCRM → SCR	0.262	3.753	0.001	Supported
DSC → SCRM → SCR	0.354	4.857	0.000	Supported

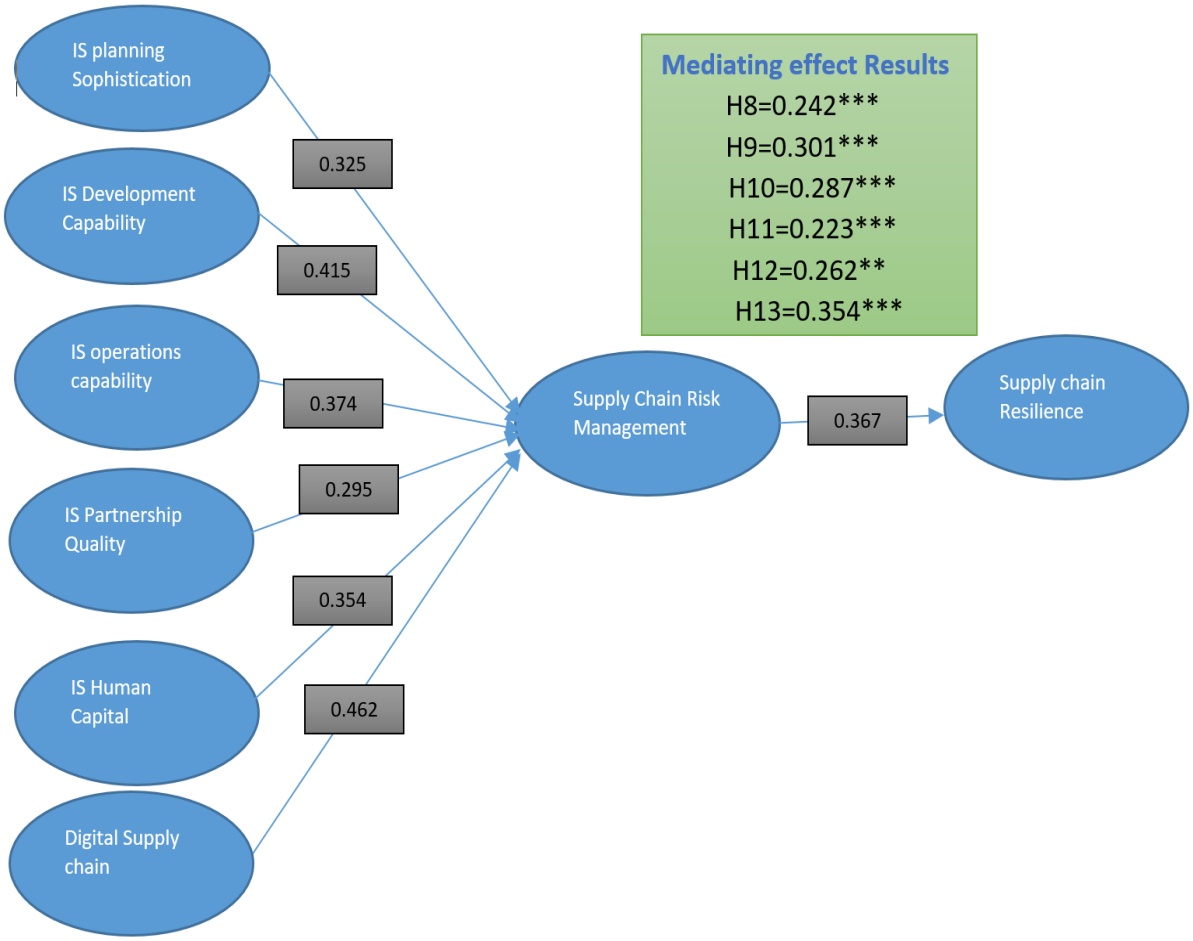

Figure 2: Beta Values

DISCUSSION

This study develops a research concept on the impact of management information systems (MIS) and digital supply chain (DSC) on supply chain resilience (SCR) through supply chain risk management (SCRM) in a Saudi Arabian textile company. This study used a three-step SEM approach (Huo et al., 2020). Structural model results show that information system Planning Sophistication (ISPS) has positively and significantly influence on SCRM of textile companies in Saudi Arabia. This means that firms with advanced ISPS are better equipped to manage and mitigate risks in their supply chains. In the textile industry, which faces fluctuations in raw material costs, international trade turmoil, and demand fluctuations, a structured and strategic IS planning approach is essential. Yazid and Kofarnaisa (2019) found the same results, where they emphasized that organizations with strong policy structures can anticipate risks and implement countermeasures. These findings discussed that improving IS systems and scalability for Saudi textile companies can help them identify potential risks such as supply shortages or production delays, so that they can propose strategies for decreased use before these issues escalate. With increased global connectivity and the complexity of supply chains, effective IS implementation is increasingly important for productivity, especially in fast-moving industries such as textiles. This management ISPS for the SCRM could further increase the competitive advantage of textile companies.

Further depicted results also show that IS development capability (ISDC) also positively and significantly influences the SCCRM of textile companies in Saudi Arabia. This relationship shows that ISDC also plays an important role in the enhancement of SCRM of textile companies in Saudi Arabia. This result highlights the importance of developing internal resources, skills, and infrastructure for strong information systems that can adapt to changing supply chain conditions. Odimarha et al. (2024) supported these findings by suggesting that organizations with strong ISDC are better able to develop customized solutions for risk management. For Saudi textile companies, this capability is crucial to manage risks arising from unexpected problems, such as machine failures or delays in production. Capacity building of the company information systems and optimization can help grow, improve inventory, and improve real-time decision-making. Thus, a strong IS development capacity is a significant factor to improve resilience to business disruptions and ensure productivity in the Saudi textile sector which could increase the competitive advantage in the national and international market.

Similarly, ISOC has also a strong positive and significant effect on the SCRM of textile companies in Saudi. This indicates that the efficiency of IS systems directly contributes to risk reduction in the supply chain. The same results were found in the study of Islam et al. (2024) which found that firms with well-developed ISOC were able to identify risks earlier and respond more effectively. In the Saudi Arabian textile industry, where supply chain disruptions, such as shipment delays or transportation issues can significantly affect delivery times there the capability of the IS system is important for efficient work. Therefore, improving IS capabilities creates the ability to effectively reduce the chances of delays or errors, and empowers companies to respond quickly to changing circumstances. For example, the use of sophisticated IS tools to track procurement, shipment, and manufacturing schedules enables faster decision-making (Al Shanti & Elessa, 2022), so that risks do not intensify into major problems and it will not only improve risk management but also contribute to the overall efficiency of the textile companies.

Further results show that IS partnership quality (ISPQ) also positively and significantly affects

the SCRM of textile companies in Saudi Arabia. This relationship emphasized the importance of marinating strong relationship strong relationships with supply chain partners. The results are consistent with the study of Surucu-Balci et al. (2024) where they argued that social networks played an integral role in the management of risk effectively. In textile companies in Saudi Arabia where the supply chain is often cross-country and incorporates different supply chains, building and maintaining trust between partners is important. Strong partnerships for better communication, transparency, and better communication are important for decreasing the market risk. For example, strong partnerships with suppliers can provide quick solutions if the suppliers are in another country where they could face delays in products. Therefore, a strong partnership strong results in the supply chain not only enhances SCRM but also contributes to efficiency and predictability in Saudi textile companies.

Other important findings show that the digital supply chain (DSC) also positively and significantly influences to the SCRM of textile companies in Saudi Arabia. This result highlights the transformative role of digital technology in improving supply chain risk management. Digital tools such as blockchain, the Internet of Things (IoT), and artificial intelligence, provide greater transparency, real-time data, and predictive analytics, enabling companies to anticipate and effectively manage risks (Rauniyar et al., 2022). Rauniyar et al. (2022) supported these findings where they found that DSC technologies enable organizations as a whole to improve their flexibility and performance by managing the risk of supply chain. Thus, these enforced that textile companies in Saudi Arabia should take investment on the adoption of DSC that could increase the SCRM and this investment in DSC could be a game changer for Saudi textile companies. Technologies such as IoT sensors can monitor raw materials and finished products in real-time, enabling potential risks such as delays or quality issues to be identified before they become critical. Moreover, digital tools can also help companies to adapt more quickly to changes in demand or supply disruptions in improving their ability to proactively manage and mitigate risks. In addition to integrating them into their operations, textile companies could also gain a competitive advantage in managing uncertainties, reducing costs, and increasing supply chain flexibility. Therefore, it is argued that textile companies should pay greater attention to DSC which could increase the product supply chain more effectively which could increase the product's acceptability in the global market.

In addition to previous results, findings show that IS human capital in the textile industry of Saudi Arabia has a positive and significant effect on SCRM. This result shown that in Saudi Arabia's textile sector, experienced people with expertise in information management enhance the management team’s ability to anticipate, assess and mitigate supply chain risks. Professionals skilled in data analytics, system integration, and digital tools enable real-time monitoring of supply chain activities, allowing quick response to problems. This capability also helping to intensify business flexibility, reduce production delays and ensure continuity in the supply chain. Therefore, the development of human capital through information system appears as a strategic asset to reduce risk and improve supply chain speed in the textile industry in Saudi Arabia. The result in line with the study of Oyewole et al. (2024), where they also emphasized that human resource increases the SCRM through increasing ensuring skilled workforce availability, enabling efficient resource allocation, and supporting rapid response to disruptions. These findings enforced that Saudi Arabia textile should emphasized on their human resources to increase their best SCRM. Findings further show that SCRM also positively and significantly impacts on SCR of textile companies in Saudi Arabia. These findings show that when the SCRM of the companies increased then the SCR of the companies

also increased. The results are consistent with the findings of (Al-Ayed & Al-Tit, 2023). These findings suggested that textile in Saudi should focus on SCRM activities to increase their supply chain resilience which could increase the contribution of textile companies to social and economic development.

Finally, the study shows that SCRM plays an important mediating role between management information capabilities and SCR. The mediating effect of SCRM on the relationship between management information system capabilities and SCR emphasizes that effective risk management is necessary to achieve high supply chain performance and flexibility. The mediating effect has been tested first time in the context of Saudi Arabia therefore direct findings could not be supported by the relevant studies. The mediating effect of supply chain risk management has been found in the study of Rashid et al. (2024) where they also argued that the supply chain mediating effect could also be tested in other variables relationships. The study results are further in line with the study of Waqas et al. (2023) who also argued that effective management of risks enables the supply chain to recover more quickly from disruptions and remain efficient. These findings indicated that leveraging management information system capabilities to provide risk systems has improved in the face of challenges such as market fluctuations and supply shortages. The results of the study therefore reveal that the adoption of sophisticated management information system techniques not only improves risk management but also enhances the long-term resilience of the supply chain, leading to attendance so success in the textile industry in the global market.

THEORETICAL AND POLICY MAKERS IMPLICATIONS

The study has several contributions in the theoretical understanding of how MIS and DSC increase SCR with the mediating effect of SCRM in the context of Saudi Arabia textile companies. This framework within the context of Saudi Arabia's textile industry highlighted that how effective MIS and DSC implementation not only directly enhance SCR but also do so indirectly through strong supply chain risk management practices. This emphasized the critical role of risk management in mitigating disruptions within supply chains in a rapidly evolving industry. Furthermore, study contributed in the context of SCR through demonstrating the importance of integrating digital tools with proactive risk management strategies to achieve sustainable operational performance. Furthermore, study also opens a new research directions for scholars to explore the applicability of this model in other industries and regions, thus broadening the scope of knowledge SCR in various cultures. The findings for managers contribute to understanding that investment in improved management information system capabilities is necessary to improve supply chain risk management and resilience. Managers are encouraged to help enhance their organization's IS strategy, development, and operational capabilities to better anticipate and mitigate disruption that will help by enhancing the development involving strong partnerships of the supply chain, which can reduce risks and increase resilience, especially in essential sectors such as textiles. For banks, the study contributes to the recognition of the need to prioritize investments in digital infrastructure and IS capabilities for competitive advantage and long-term sustainability in the supply chain. Supporting these investments will help businesses better manage risks and adapt to future challenges in a dynamic global supply chain.

CONCLUSION AND FUTURE DIRECTIONS

This study develops a research concept on the impact of management information systems and

digital supply chain management on supply chain resilience through supply chain risk management in a Saudi Arabian textile company. Data was collected from 360 employees of textile companies in Saudi Arabia where collect data through using a convenient sampling technique. The structural Equation Modeling technique was employed using AMOS software. The regression results show that all management information system capabilities and digital supply chains have a positively and significantly influence on supply chain risk management. Supply chain risk monument also positively and significantly on supply chain resilience. The indirect mediating effect results also show that supply chain risk management mediated significantly between management information system capability and supply chain resilience. Supply chain risk management is also partially mediated between digital supply chain and supply chain resilience of textile companies in Saudi Arabia. Based on the results of the study, it is recommended that Saudi Arabia textile companies should manage their management information system capabilities and invest in digital supply chains to improve supply chain risk management. Additionally, companies should focus on strengthening supply chain risk management practices as a mediator to bolster supply chain resilience.

The study has various consisted of different limitations that could be addressed in future study to increase the research reliability. Firstly, study tested the mediation model while study has excluded potential moderating variables. Future studies could incorporate moderating factors, such as organizational size or market dynamics, to enhance the robustness of the findings. Second, the research relied solely on a survey-based methodology, which may limit the depth of understanding of participant perspectives. Incorporating interview-based qualitative methods could provide richer, context-specific insights. Lastly, this study focused exclusively on the textile sector, which may limit the generalizability of the findings to other industries. Future research should explore the applicability of the model within the service sector or other industries to validate and expand its relevance. Lastly, study conducted on one country while further research could be explored on more than one countries to know the variations in findings.

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APPENDIX

Survey Instrument

Digital supply chain

1. Applies digital technologies.
2. Transacts with a high proportion of suppliers through digital technologies.
3. Applies digital technologies to transact with suppliers.
4. Applies digital technologies to transact with customers.
5. High transactional volume with customers through digital technologies.

Supply chain risk management

1. Operations risks are being recovered (i.e. clear responsibility, contingency plans).
2. Responding to risks (i.e. alternative transportation, capacity, buffer stocks, suppliers).
3. Risks are being detected (i.e. tracking, inspecting, external and internal monitoring).
4. Risk Prevention (i.e. preventive measures, safety procedures, reliable supplies).

Supply chain resilience

1. Still able to meet demand without diverging from set goals.
2. Able to continue after disruptions.
3. Able to quickly reconfigure resources after interruptions.
4. Capable to anticipate and overcome disruptions.

Human capital information system

1. There is an e-training system in the organizations.
2. There is effective use of the e-training system in the organization.
3. The use of e-training increases professionalism in service.
4. I think e-training practices at the office added value of quick response to customers using online services hence impacting customer satisfaction.

Information System Operations Capability

1. We use automated tools to monitor and fine tune the performance of our computer systems, networks, databases, and telecommunication infrastructure.
2. We have detailed procedures for responding to unplanned system outages.
3. Backup procedures are strictly enforced in all our data centers.
4. We periodically do mock trials to test our disaster recovery plans.
5. We continuously review our security systems and procedures to assess our vulnerability.

Information system sophistication capability

1. IS planning an ongoing process in our organization: planning is not a once-a-year activity.
2. Business units participation in the IS planning process is very high.

3. IS planning is initialized by senior management; senior managemet participation in IS planning is very high.
4. We have a formalized methodology for IS planning.
5. Our planning methodology has many guidelines to ensure that critical business, organizational, and technological issues are addressed in evolving as IS plan.
6. We try to be very comprehensive in our planning, our IS plans cover every facet of IT needs of our organization.

Information system development capability

1. Our systems development process can be easily adapted to different types of development projects.
2. The systems development process is continuously improved using formal measurement and feedback systems.
3. Our systems development process has adequate controls to achieve development outcomes in a predictable manner.
4. Our systems development process is flexible to allow quick infusion of new development methodology, tools, and techniques.

Information system partnership Quality

1. Critical information and knowledge that affect IT projects are shared freely between our business units and IS department
2. Our IS department and business units understand the working environment of each other very well.
3. There is a high degree of trust between our IS department and business units.
4. The goals and plans for IT projects are jointly developed by both the IS department and business units.
5. Conflicts between IS departments and business units are rare and few in our organization.
6. Conflicts between Is department and business units are always resolved through dialog and mutual adjustment.