A Moderated-Mediation Analysis of Supply Chain Efficiency, Flexibility, Integration, and Risk Management

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Abstract

The preparedness and stability of the defense-industry supply chains have been challenged by significant disruptions and risks that can be critical to national security. Despite increasing importance, limited studies have explored the underlying factors (i.e., efficiency, flexibility, integration, and risk management) impacting the supply chain operations of national defense companies. Hence, this study aims at exploring the relational impact of supply chain risk management (SCRM) practices and organizational performance by hypothesizing a moderated-mediation model involving operational efficiency, flexibility, and supply chain integration (SCI). Using the information processing theory, the survey-based data of 2017 respondents was collected from defense-related national institutions in Pakistan. Empirical findings based on structural equation modeling validated a significant positive SCRM Organizational Performance relationship. According to the findings, supply chain risk management is strongly connected to operational efficiency and flexibility. Additionally, the study also substantiates the mediating effects of operational performance (i.e., efficiency and flexibility), along with the significant moderation by supply chain integration in the relationship between risk management and operational efficiency. However, the results do not support the role of operational flexibility in mediating the relationship between SCRM and OP. Furthermore, the role of SCI as a moderator between SCRM operational flexibility was not established. This research is the first to introduce an empirically validated framework of supply chain performance in the defense industry, besides conceptualizing the direct and indirect roles of SCRM, efficiency, flexibility, and integration. This study also navigates some of the critical issues and obstacles faced by the national defense industry and highlights a holistic model that facilitates multistage supply chain decision-making.

Keywords: Supply Chain Management; risk management; operational performance; efficiency; flexibility; firm performance; integration; national defense industry; information processing theory.

JEL Classification: M19

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1.   Introduction

Supply chain activities are deemed to be an essential part of a firm's operations and are considered critical in achieving competitive advantage, especially in the global defense industry (Jeon & Yoo, 2019; Zsidisin et al., 2020). From procuring the raw material, managing the suppliers, and distributing the products and services, the firm's supply chain operations are a critical part of strategic management. In the present global era, where there is a competition shift from individual firms' operations to integrated supply chains, efficient supply chain management (SCM) is deemed to be necessary for achieving competitive advantage (Jeon & Yoo, 2019; Li, Nathan, Nathan & Rao, 2006). The contemporary business practices are dependent on the interlinked relationships within the firm and its stakeholders, driven by the challenges of shifting demands of the customers, seeking more flexibility and timely delivery of products and under increasing cost and budgetary pressures (Datta & Christopher, 2011). The integrated supply chains of companies and stakeholders not only provide a sustainable competitive advantage to the firm but also assure financial gains to the company (Gurtu & Johny, 2021). Despite having positive prospects and promising impact, the supply chain practices and operations are prone to huge risks (Breuer et al., 2013). For example, a famous incident related to supply chain disruptions in Japan in 2011 caused by tsunami and earthquake, created economic fallout on local demand, and supply, as well as affected manufacturing firms across Europe and North America (MacKenzie et al., 2012). Similarly, COVID-19 pandemic crashed the economies of the all countries including businesses, enterprises and supply chains as well (Dohale et al., 2021). As stated by Aon Risk Solutions, supply chain disruptions have increased during the period between 2011 and 2013 from 28% to 42% globally, causing huge financial losses to companies (Sáenz & Revilla, 2014). In Covid-19 pandemic era, SCR increased at highest level, so that the survival of multiple economic sectors became a challenge (Yang et al., 2021). More recently, the current disruption in supply chains across the globe due to Covid-19 pandemic has again highlighted the importance of managing and mitigating supply chain risks (Dohale et al., 2021). Therefore, the need for managing and responding to such risks, particularly in the supply chain domain, has caught the attention of academicians and practitioners (Ghadge et al., 2012; Zhu et al., 2017).

Following the information processing theory (IPT), researchers have identified that the risk mitigation response strategies of the firm are significantly dependent on the information processing abilities (Fan et al., 2017). Literature highlights the need for efficient risk management of supply chains in achieving better organizational performance (Gurtu & Johny, 2021; Manuj et al., 2014). Some of the studies have suggested that the implementation of the SCRM practices manage a firm's supply chain disruption that eventually result in improved financial performance (Dohale et al., 2021). Although the SCRM has been overwhelmingly studied to have its impact on operational performance, organizational performance, and financial performance with mediating and moderating impact of various variables (Manuj et al., 2014; Kilubi & Rogers, 2018; Munir et al., 2020; Shou et al., 2018; Thun & Hoenig,

2011; Kauppi et al., 2016; Lavastre et al., 2014; Yang et al., 2021), there is limited literature support regarding SCRM and organizational performance relationship with mediation of operational performance. Similarly, SCRM practices in relation to the performance of the defense institutions has been an under researched area as sufficient literature support is not available on the variables impacting the said relationship, though certain studies have tried to highlight the importance of SCRM in defense-related national institutions (Jeon & Yoo, 2019; Zsidisin et al., 2020).

Therefore, this study is an effort to fill this visible and potential research gap as it aims at examining the relation between SCRM practices and the performance of national defense-related firms. The study also postulates the intervening impact of operational performance measured in terms of operational performance (i.e. efficiency and flexibility). Furthermore, this study also aims to hypothesize the supply chain integration (SCI) as a moderator in the SCRM Operational Performance relationship. Our study focuses on the following research questions; a) Do SCRM practices positively impact the performance of the national defense institutions? b) Is SCRM and organizational performance relation mediated by operational efficiency and flexibility of defense institutions? c) Does supply chain integration moderate the operational efficiency and flexibility of defense institutions?

The contribution of the study in the literature and body of knowledge is twofold. First, it investigates the impact of SCRM practices on the performance of national defense companies, through the intervening role of operational performance (efficiency and flexibility). This association has previously not been explored specifically related to the national defense institutions (Jeon & Yoo, 2019; Zsidisin et al., 2020). Second, this study also postulates the role of SCI as a boundary condition in our model. Doing so will provide executives, managers, and practitioners with in-depth exposure to a new dimension impacting the supply chain operation thus helping them better plan risk mitigation and management strategies to counter the harmful impact of the risks while capitalizing on the positive risks. Consequently, the findings of our research will facilitate supply chain managers in the national defense industry to practice new and novel ways to curtail the adversities of uncertain and extraordinary supply chain disruptions.

2.   Theory and Literature review

2.1   *Information Processing Theory*

Information processing theory states that the capability of an organization to process information and to deal with uncertain environments leads toward higher performance outcomes and thus firms must align their capabilities with their strategies (Galbraith, 1973). Therefore, supply chain risk management and integration strategies can act as systems of information processing for achieving higher performance outcomes (El Baz & Ruel, 2021;

Fan et al., 2017). In line with these researchers, we also take the theoretical lens of information processing in order to investigate the relationship of supply chain risk management and firm performance with the mediating role of flexibility and efficiency and also the moderating role of supply chain integration.

2.2   *Supply Chain Risk Management*

Supply chain activities, if managed well, add value to the core processes of the organizations and ensure customer satisfaction and competitive advantage (Afraz et al., 2021). Risk in supply chain is described as anything which disrupts any function of the supply chain (Rao and Goldsby, 2009). Similarly, risk management has been described as a set of activities followed by the organizations to manage the adverse effects of the factors causing disruptions in the supply chain (Rangel et al., 2015) proactively even when it is difficult to predict such risks in advance.

These risks might bring unpredicted negative impacts on business transaction variations including negative impacts on market share, profit, cost, and revenue. It consequently results in a negative performance of the organization (Wang, 2018). Supply chain risk (SCR) has the potential to expose organizations to losses both in the short or the long term. It might also affect the upstream and downstream relationships between different actors in the supply chain. Therefore, organizations are required to develop strategies and practices to minimize the risks hidden in supply chain disruptions, and the supply chains should be redesigned to reduce such occurrences in the future. SCR should be taken as seriously as the financial risks (Bode & Wagner, 2015).

Shou et al. (2018) explored the two types of risks for supply chains, namely a) disruption risk and b) risk in the coordination of demand and supply and found that both adversely impacted the organizational performance. Literature also highlights that complexities in the supply chain coupled with the uncertainties in the environment enhance the vulnerability of the firm to risk (Bode and Wagner, 2015). It is also discussed that it is not only the risks that introduce a firm to losses but also the mitigation of risks requires additional cost (Shou et al., 2018). In such cases, organizational performance is adversely affected. SCRM practices help organizations mitigate losses by applying various risk prevention and control methods.

Rangel et al. (2015) define five steps of SCRM including 1) identifying risks; 2) assessing these risks; 3) risk management; 4) monitoring the risk; and finally, 5) the transfer of knowledge related to SCRM. All these steps help organizations reduce the supply chain vulnerability to risks. Foli et al. (2022) defined SCRM in three steps which include 1) identify the risk 2) assess the risk 3) implement the strategies to mitigate the impact of risk. It has also been highlighted that risk detection, responding to risk occurrence, recovery, and risk prevention are different SCRM practices (Shou et al., 2018) and that these practices must be

considered a routine exercise used by the organizations to collect and utilize supply chain information.

2.3   SCRM and Firm Performance

Supply chain risks, complexity and uncertainty have become the main area for academic research (Wang, 2018) due to sudden global level catastrophes like earthquakes, floods and pandemic. Targeting superior performance and managing the risks and uncertainties in supply chains require organizations to collect and process maximum information (Shou et al., 2018). The difference between the required information for the completion of the task and acquired information indicates the uncertainty involved in this process. Supply chain information includes information related to monetary issues, procedures, market situation, technology, quantity, quality, logistics and inventory (Fan et al., 2017). However, despite established importance, the availability of information related to demand, and supply is volatile, multifaceted, and unclear. Fan et al. (2017) also found that SCRs do not have any sequence of occurrence, it may happen at any time in a random pattern, without any connection to previous instances and can occur continuously. This can result in an adverse effect on the firm's performance and thus it is important to manage such risks.

Some researchers have proved that SCRs put a negative effect on organizations' supply chain activities for example logistics (Simangunsong et al., 2012; Gimenez & Ventura, 2005; Sanchez Rodrigues et al., 2010). While, Saminian Darash and Rabinow (2015) proposed that these factors are capable of boosting the organizations' performance, on the contrary, some researchers like Merschmann and Thonemann (2011) reposted lack of any such relationship between SCR and organizational performance. However, the majority of the researchers agree that with better risk management activities, such risks can be mitigated and thus performance is enhanced. In past, researchers focused on manufacturing-focused organizations (Shou et al., 2018) and the logistics service organizations (Wang, 2018).

Based on information processing theory, to reduce uncertainties and maintain stability, firms with substantial risk management capabilities can choose to reduce the gap between the information required and information possessed for implementing the risk management strategies so that they can prevent, respond, and restore from the unanticipated disruptions to the original state or even improved state with higher performance. Our research paper investigates the effect of SCRM practices on the performance of national defense-related institutions and we propose, by using the theory of information processing, that national defense related institutes can enhance their financial performance due to better management of supply chain risks; hence, leading to the following hypothesis for the study:

H1: Supply chain risk management has a significant positive relationship with the firm performance of national defense-related institutions.

2.4   *Operational Flexibility and Efficiency*

Manufacturing operational flexibility refers to the potential of any organization to handle the environmental uncertainties and risks (Merschmann & Thonemann, 2011). Patel et al. (2012) refer manufacturing flexibility to be the transforming capability, from one product to another, of the company by using consistent policies to respond to the market volatilities. Although operational flexibility is a broader concept, strategically speaking it can be explained as an organization's ability to be responsive to the sudden changes in the supply and demand. It is the ability of the company to change key supply chain processes quickly (Merschmann & Thonemann, 2011). The risk management abilities augment operational flexibility with the aid of integrated systems to resolve various information-related risks and issues (Shou et al., 2018). To remain competitive in a dynamic and an ever-changing environment, organizations need to adapt to customized requirements by adapting operational flexibility and supply chain flexibility (Patel, 2011).

Manufacturing operational efficiency is related to quality, functions, stability, and a controlled environment within the organization. Organizations become more efficient through such strategies that lower operational costs to obtain higher returns. However, the efficiency and performance of national defense-related manufacturing organizations are not in terms of profits or returns. The operational efficiency of an organization depends upon the routines, practices, and capabilities of that organization (Lam et al., 2016). The factors responsible for uncertainties and risks in the supply chain and operational processes are handled by applying SCRM practices.

2.5   *Operational Efficiency, Flexibility and the SCRM*

SCRM enhances the operations and performance of organizations through responding to the changes in a quicker way thus diminishing operational losses (Thun & Heoning, 2011; Manujet et al., 2014). This study explains the performance of the operations in two aspects: operational flexibility and operational efficiency. Generally speaking, supply chain practices have a deep impact on the operational performance of the firms (Younis & Sundarakani, 2020). Supply chain risk management practices and techniques including information processing systems and integrated supply chain systems help an organization to reduce the ambiguity and volatility (Fan et al., 2017). An effective and integrated supply chain management is needed for attaining flexibility and efficiency in the critical operations of the firm (Kauppi et al., 2016) and it is also instrumental in meeting predicted demand and prescribed quality (Shou et al., 2018).

SCRM techniques prepare the organizations to be able to find and control such potential risks (Narasimhan & Talluri, 2009). The SCRM techniques also help organizations to avoid reprocessing and reduce errors by using improved information processing methods.

Moreover, these methods also improve efficiency and enhance delivery speed (Fan et al., 2017). Whereas, without using SCRM techniques or using poor management methods in supply chains may cause fruitless loss of resources and time as well. Such companies require extra efforts, more cost or time to tackle the problems whenever any occurrences like an interruption in the production process, delivery of services, or any instability in demand or supply. In such cases, there is no surety of any efficiency, either cost-based or time-based (Shou et al., 2018).

Previous studies focused on numerous features of organizational performance. For instance, Kauppi et al. (2016) studied organizational performance in five aspects, i.e. cost control, operational flexibility, order delivery, better customer service and higher quality. Shou et al. (2018) studied operational efficiency and operational flexibility as functions of operational performance in the manufacturing sector organizations. But previous studies of the organizational performance have ignored public sector firms, especially national defense-related institutions.

This study focuses on exploring the impact of SCRM practices on both operational flexibility and operational efficiency in national defense-related institutions. Shou et al. (2018) also suggested that firms can respond to supply chain risks through taking rapid decisions using the existing information (Shou et al., 2018). Defense-related public sector organizations face a lot of challenges and face risks in their daily operations. We argue that by adopting risk management strategies, defense related institutes can achieve better efficiency and flexibility in their operations. As per the tenets of information processing theory, such firms are successful in integrating the information with their risk management capabilities and thus achieve higher operational performance goals. Thus, we propose our second hypothesis considering the above arguments:

H2: SCRM has a significant positive relationship with the operational performance i.e.(a) efficiency, and (b) flexibility in national defense-related institutions.

2.6   *Mediating role of Operational Efficiency and Flexibility*

A firm's operational performance (flexibility and efficiency) are considered to be critical factors both for improving the organizational performance and for ensuring supply chain efficiencies. Due to these capabilities, firms can offer products and provide services at a cheaper price with a short delivery time (Kortmann et al., 2014). Researchers have highlighted that speed and quality of product and service delivery is directly proportional to the higher returns, profitability, and financial growth of a firm (Vickerya & Marklandb, 1997). In a study by Elgazzar et al. (2012) the influence of various variables relevant to the supply chain including cost, responsiveness, and agility were studied in relation to the financial performance variables including sales and return on assets etc. and were found to be relevant.

Similarly, Yu et al. (2012) explored the impact of operational performance and concluded that firms can improve their end-user satisfaction and performance through dropping the costs associated with delivery and service provisioning and also through improving the quality of their products. Some other studies discuss the impact of efficiency and flexibility on financial performance in manufacturing firms (Shou et al., 2018). Higher efficiency and better delivery time can positively impact a firm's market share and its overall performance (Droge et al., 2004). It can further enable firms to complete the delivery through efficient logistics operations to further improve the performance (Liu & Lai, 2016).

Lam et al. (2016) argue that operational efficiency depends upon the capabilities and routines of the organization. These capabilities and routines not only manage and control the harmful risks that occur but also improve a firm's performance (Narasimhan & Talluri, 2009). But achieving such operational efficiency and flexibility is difficult due to several external and internal risks inherent in the supply chain operations (Ebben & Johnson, 2005). To reduce such losses, different techniques, like, prescribed procedures, contingency planning and buffering strategies are used that ensure the development of a dependable atmosphere in the firms which help boost efficiency by reducing lead time and operational costs during operational activities (Ebben & Johnson, 2005). Hence, organizations performing with increased efficiency and flexibility ensure higher organizational performance. Therefore, the third hypothesis was developed as follows:

H3: The relation between SCRM and organizational performance in national defense-related institutions will be mediated by (a) operational efficiency, and (b) operational flexibility

2.7   *Supply Chain Integration*

Literature suggests that competing effectively in the global market requires organizations to adopt a supply chain integration (SCI) strategy (Bae et al., 2021; Zhao et al., 2008). This external as well as internal integration enhance product development, innovation and improve customer service processes, which consequently increase the performance of the organization (Ralston et al., 2015). Different studies have proposed various definitions of SCI. Some studies explain SCI as uni-dimensional, collaborative relationships of an organization's supply chain with its suppliers or customers (Paulraj et al., 2008; Cousins & Menguc, 2006), whereas other studies assert that SCI is a dyadic relationship between supply chain partners. Similarly, some researchers explained SCI as a flow of parts and materials, whereas others explained it as finances, resources, and information flow. But all the above definitions fail to explain completely the concept of SCI with its strategic nature (Flynn et al., 2010). SCI is used for close coordination within the supply chain. An integrated MIS system makes the SCI fruitful process (Alzzoubi et al., 2022). In a study, Zhao et al. (2008) explained supply chain integration holistically as "the degree to which an organization strategically collaborates with its supply chain partners and manages intra- and inter-organization processes in

order to achieve effective and efficient flows of products and services, information, money, and decisions with the objective of providing the maximum value to the customer at low cost and high speed" (Zhao et. al., 2008, p. 374). Thus, this construct has been proposed and tested with 03 dimensions namely: the customer, the supplier, and the internal integration (Alzzoubi et al., 2022; Bhattiaa & Ali Bhattia, 2019; Zhao et al., 2013). Internal integration is explained here as an integrated process where different sections or departments in an organization can play their role towards a common goal, whereas, external integration refers to establishing a collaborative, integrated relationship with the customers and the suppliers.

2.8   *Moderating Role of Supply Chain Integration*

The effective coordination including smooth information sharing among the different actors involved in the supply chain operations is critical for a firm's performance (Albishri et al., 2020). The previous literature confirmed a significant relationship between the SCI and efficiency of the organization in terms of cost and responsiveness (Bae et al., 2021). For example, some studies explain the bullwhip effect as a reason of customer demand having significant impact on inventories as you go along the supply chain. One reason behind the bullwhip effect includes the decentralization of the decision-making process. It causes the distortion that results in either a delay or misinformation in demand forecast moving up-stream in the supply chain. Danese and Romano (2011) discuss the various strategies which help to diminish the bullwhip effect in supply chains. One of those strategies is operational alignment and sharing of information related to sales and demand data up to the final member of the supply chain. This method helps in mitigating the risks involved in supply chains and lowers the supply chain costs. These costs include transportation cost, order processing cost and inventory cost. The information sharing about the demand positively impacts a firm's supply chain performance (Danese & Romano, 2011).

In the previous studies, most of the scholars studied different aspects of operational performance and its dependence on SCRM. For instance, Kaupi et al. (2016) studied five aspects of operational performance and their relation to risk management. Shou et al. (2018) examined two aspects of operational performance and their relation with SCRM. In a similar vein, SCI with its effect on different variables has already been discussed in past studies (Zhao et al., 2015), for example, its impact on customer service (Swink et al., 2007; Vickery et al., 2003), new product development (Petersen et al., 2005; Ragatz et al., 2002), operational performance (Danese & Romano, 2011; Swink et al., 2007; Cousins & Menguc, 2006), and logistical performance (Gimenez & Ventura, 2005). However, its effect on the relationship between SCR and the organizational performance in the national defense-related institutions has not yet been measured.

The basic features of an organization's supply chain integration are responsiveness and distinctiveness of system components (Bae et al., 2021). Some other characteristics include web-based integration systems, application software and electronic data interchange (Shou et al., 2017). Researchers have presented four functionalities of SCI, a) information sharing, b) system coupling, c) joint decision making and d) collaborative approaches. Information sharing increases the visibility of the products during transportation. They argued that it enhances the effectiveness of SCRM (Shou et al., 2018). Hence, reliable, and timely information sharing, both internally and externally, will induce greater relationship between SCRM practices and the efficiency and flexibility of the organization.

Previous researchers have found a significant relationship of SCI with organizational performance (financial and market) as well as operational performance in the manufacturing sector (delivery cost, manufacturing cost, flexibility, and quality) (Mackelprang et al., 2014; Leuschner et al., 2013). Our research postulates that SCI will play a moderating role between the SCRM capabilities and operational performance relationship in the national defense-related institutions. That is, in the presence of higher integrated supply chain (both externally and internally), the relationship between SCRM and operational performance will strengthen and vice versa. Therefore, we propose our next hypotheses as follows:

H4a: SCI has a significant positive moderating impact on the relationship between SCRM and the operational efficiency in national defense-related institutions in such a way that the relationship is stronger when supply chain integration is high rather than low.

H4b: SCI has a significant positive moderating impact on the relationship between SCRM and the operational flexibility in national defense-related institutions in such a way that the relationship is stronger when supply chain integration is high rather than low.
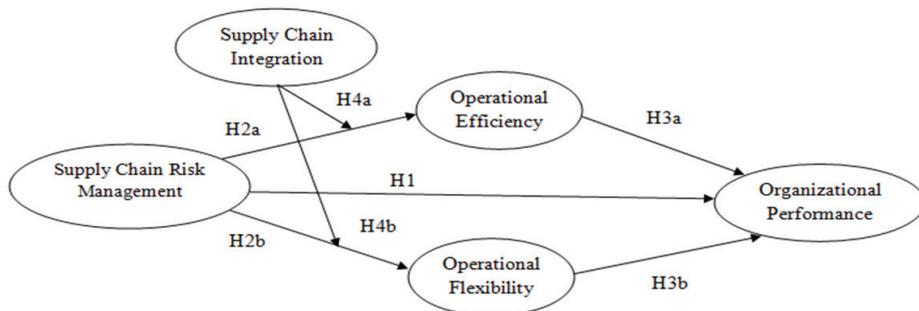

Figure 1: The Conceptual framework

3.   Research design

A survey based quantitative approach, was utilized for data collection of the study. The data was collected from employees of defense-related national institutions in Pakistan. The organizations are performing different supply chain functions with procurement and logistics as the core functions. The selected employees are working with different designations in the supply chain departments in their organizations. Before the questionnaire's distribution for collection of data, it was reviewed by experts in the field for completeness, clarity, readability and structure. The questionnaire was delivered to 30 supply chain managers and supervisors working in different units of the selected organizations. After face-to-face discussions to gather their feedback, items which were not related to these organizations and had low outer loading were deleted. The questionnaires were then distributed to different supply chain managers and supervisors at different units within Pakistan. Some items calculated low outer loading which may restrict the study of the proposed hypothesis. These items were removed from the data for further study of the hypotheses (Hair et al., 2014).

According to Hair et al. (2014) the minimum sample size required is 10 times of the maximum number of formative indicators for a single construct or in the structural model 10 times of structural paths pointing towards a single construct. In this study the maximum number of indicators (i.e. 20 indicators) were used to study the moderating effect of SCI. therefore, the minimum sample size required for the study was 200.

Initially, the questionnaires were shared with 400 employees working in various national defense-related institutions by using non-probability convenience sampling. Out of 400, only 221 were returned completed. Received questionnaires were further checked for validity. After verification 207 were found to be valid for tests. The remaining questionnaires were rejected for being incompletely or wrongly filled in some way. The scale was comprised of two sections, the 1st section collected data about demographics including gender, qualification and professional experience of the respondents, number of employees and the age of the company. Section two consisted of 5 segments comprised of various research variables of the study.

3.1   Measures

Supply chain risk management (SCRM) was measured using four items. The construct was adopted from Shou et al. (2018). Several studies have elaborated different dimensions of SCI. In this study, we considered three dimensions of SCI (Internal integration, customers and suppliers). This approach is fairly aligned with the early studies (Flynn et al., 2010). Seven items are related to customer integration, internal integration contains eight items and five items are related to supplier integration. Operational efficiency is the capability to deliver cost-effective products or services without compromising quality. It was measured

in terms of product or service quality, dependability, service level, etc. In this study, operational efficiency is adopted from Huo et al. (2014). It contained five items. Operational flexibility is the organization's ability to be responsive to the unseen situation of the market. It is the ability of an organization to handle the unanticipated changing environment. It had different dimensions such as mix flexibility, volume, material handling, labour, routing, machine and product customization (Shou et al., 2018), mix new product and modification flexibility (Koste et al., 2004). As this study is related to national defense-related institutions, in this study for measuring operational flexibility (volume, product customization capability and mix flexibility) we studied repeat customers, changes in customers' taste, regulations, new product and customer development. The four-item operational flexibility scale was adopted from Trkman et al. (2016).

Firms' performance scale included the process and product development, the lead time, and the yield expansion, etc. it was an adopted scale used by Rai et al. (2006). Similarly, the four-item customer satisfaction construct was adopted by Zhao et al. (2013), and these items were about customers' response about the products or services offered by the organization. Some items calculated low factor loading which may restrict the study of the proposed hypothesis. These items were removed from the data for further study of the hypotheses (Hair et al., 2014).

4.   Data analysis and results

Due to single-source biases, Harman's single factor test was used to test common method bias (CMB). The CMB is calculated with a single factor to extract basis. The results of all the items showed the values within the threshold limits of the total variance, i.e., below 50%, which means that no bias existed in the data calculated for the study.There are two types of SEM i.e. Covariance based SEM (CB SEM) and PLS-SEM (Hair et al., 2014). In order to confirm or reject a theory CB-SEM is used. SPSS is one of the software which is used to study CB-SEM is SPSS. CB-SEM is used only to test the theory. However, it cannot determine the strength of the model. It is unable to estimate the covariance matrix for sample data. In this context, PLS-SEM also called PLS modeling helps the researchers. It is used to develop theories in exploratory research (Hair et al., 2014). There are many software used for this purpose. SmartPLS is one of the best examples to study PLS-SEM. In this study both applications i.e. SPSS and SmartPLS were used to test the data.

4.1   *Reliability and Validity Tests*

Cronbach's Alpha and Confirmatory factor analysis (CFA) were applied to test the internal reliability and validity of the data collected for each item. Initially, 20 items were measured for the supply chain integration variable. After the CFA analysis, items having values less than the threshold were removed from the subsequent analyses. So, in this study,

nine items were considered for measuring the moderating variable SCI. Similarly, two items out of seven of operational efficiency were also removed. Moreover, items measuring operational flexibility, customer satisfaction and organizational performance were also studied and verified, and the items having factor loading less than threshold limit were deducted. The results of the reliability analysis are presented in Table 1.

The composite reliability value was found more than 0.7 for each construct, while the factor loadings value was more than 0.5 of all the items, which exceeded twice the standard error of the item (Shah & Goldstein, 2006). Similarly, the values for AVE (average variance extracted) for SCRM, Operational Efficiency and Operation Flexibility were more than 0.5. Organizational Performance's AVE was 0.410 and for SCI it was 0.498. The value of AVE is acceptable if more than 0.40 (Menor et al., 2007). Moreover, the AVE estimates were all less than the Composite Reliability values (Hair et al., 2010). Figure II shows a detailed picture of the theoretical model with calculations through SmartPLS version 3 (Zaman, 2020).

Table 1
Factor loadings, reliability, and validity

Construct	Items	Factor Loadings	α	CR	AVE
Supply Chain Risk Management	"RM1 Preventing operations risks (e.g. select a more reliable supplier, use clear safety procedures, preventive maintenance)".	0.810	0.799	0.868	0.623
	"Detecting operations risks (e.g. internal or supplier monitoring, inspection, tracking)".	0.784			
	"Responding to operations risks (e.g. back-up suppliers, extra capacity, alternative transportation modes)".	0.772			
	"Recovering from operations risks (e.g. task forces, contingency plans, clear responsibility)".	0.789			
Organizational Performance	"Product delivery cycle time".	0.579	0.726	0.804	0.410

Table to be Continued

	"Productivity improvements (e.g., assets, operating costs, labor costs)".	0.560			
	"Precise knowledge of customer buying pattern".	0.714			
	"Our customers are pleased with the products and services we provide for them."	0.636			
	"Our customers seem happy with our responsiveness to their problems."	0.741			
	"Customer standards are always met by our plant."	0.588			
Operational Efficiency	"Overall product quality".	0.791	0.752	0.834	0.502
	"Pre-sale customer service".	0.637			
	"Product supports".	0.685			
	"Responsiveness to customers".	0.734			
	"Delivery speed".	0.686			
Operational Flexibility	"Over time, we cater too many of the same customers".	0.766	0.706	0.820	0.536
	"Demand and customer tastes are fairly easy to forecast".	0.604			
	"Regulation strongly affects our market".	0.737			
	"New customers tend to have product-related needs that are different from our existing customers".	0.806			
Supply Chain Integration	"The level of computerization for our major customer's ordering".	0.700	0.873	0.899	0.498
	"The level of communication with our major customer".	0.738			

Table to be Continued

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"The frequency of period contacts with our major customer".	0.707
"The establishment of quick ordering systems with our major supplier"	0.783
"The participation level of our major supplier in the process of procurement and production"	0.690
"We help our major supplier to improve its process to better meet our needs"	0.666
"Data integration among internal functions"	0.612
"The utilization of periodic interdepartmental meetings among internal functions"	0.696
"The use of cross functional teams in new product development"	0.747
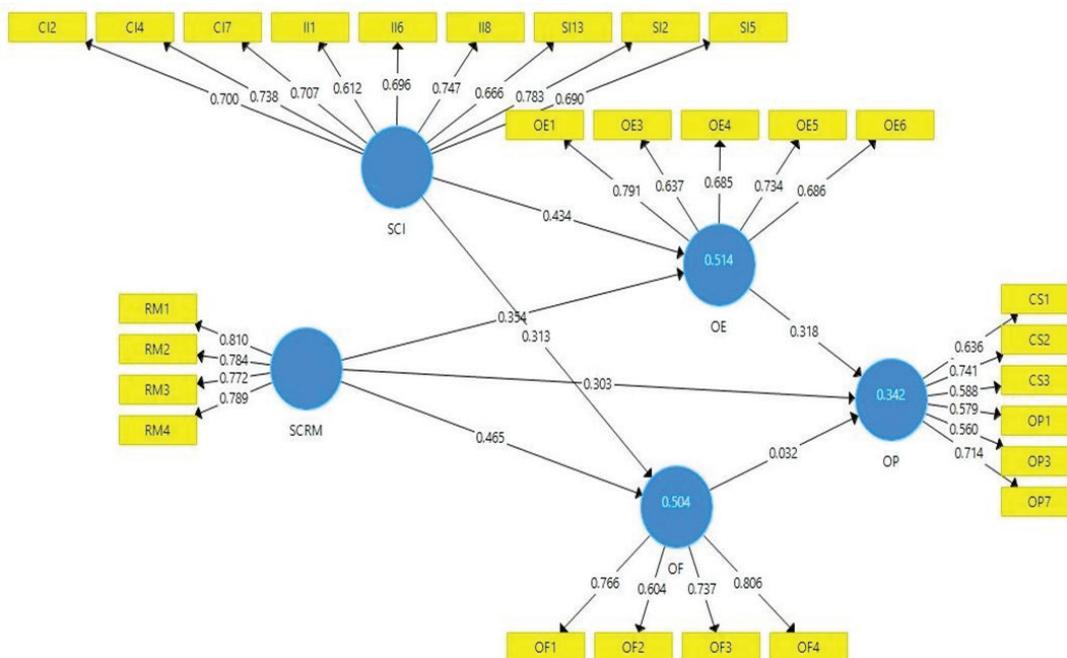
Figure 2: Theoretical Model with calculations through SmartPLS (source: Authors, 2020)

4.2   *Hypotheses Testing*

The test for Variance Inflator Factor confirmed the value to be < than 3.3 (Diamantopoulos & Sigouw, 2006) while the value for the tolerance was more than 0.2. VIF was calculated by using SmartPLS software (Zaman et al., 2019a) and shown in Table 2.

Table 2
VIF Value of all relations (source: Authors, 2020)

Constructs	(1)	(2)	(3)	(4)	(5)
Operational Efficiency (1)			1.89		
Operational Flexibility (2)			2.034		
Organizational Performance (3)					
SCI (4)	1.742	1.742			
SCRM (5)	1.742	1.742	2.126		

Using SmartPLS, Heterotrait – Monotrait Ratio (HTMT) and the Fornell and Larcker's test were performed in order to obtain the discriminant validity (Zaman et al., 2020). The results of the Fornell and Larcker's test are presented in Table 3.

Table 3
Fornell and Larckers results for all variables (source: Authors, 2020)

	OE	OF	OP	SCI	SCRM
OE	0.708				
OF	0.616	0.732			
OP	0.53	0.43	0.64		
SCI	0.665	0.617	0.489	0.706	
SCRM	0.637	0.669	0.527	0.653	0.789

Finally, in order to calculate the discriminant validity, using a partial least squares structural equation model, we calculated the HTMT. The values fell well below the acceptable threshold level of 0.90 thus ensuring the validity of data (Henseler et al., 2015). Table 4 shows the HTMT values of all variables.

Table 4
HTMT Value of all variables

Constructs	(1)	(2)	(3)	(4)	(5)
Operational Efficiency (1)					
Operational Flexibility (2)	0.840	1			
Organizational Performance (3)	0.631	.676	1		
SCI (4)	0.800	.677	.673	1	
SCRM (5)	0.796	. 477	.350	.474	1

The next step was to check the relationship between these variables. We calculated the correlation by taking a bivariate Pearson Correlation test by using SPSS version 25. Table 5 shows the correlation values between different variables. All the values show a positive and strong relationship (0.3<r<0.5).

Table 5
Correlation of all variables

Constructs	(1)	(2)	(3)	(4)	(5)
SCRM (1)	1				
Operational Efficiency (2)	0.617	1			
Operational Flexibility (3)	0.658	0.617	1		
SCI (4)	0.638	0.643	0.616	1	
Organizational Performance (5)	0.463	0. 470	0.379	0.466	1

For testing hypotheses H1 – H2, SEM was used in this study. The test was performed by using SPSS 25 and SmartPLS software (Zaman et al., 2019b). Results of path analysis showing p – value along with standardized path coefficients are presented in Table 6.

Table 6
Results of Path analysis

No	HYP	IV	DV	R Square	F	Beta	*T*	Sig	Path Coefficient
1	H1	SCRM	OP	0.214	56.125	0.481	6.913	0.000	0.303
2	H2a	SCRM	OE	0.380	126.492	0.510	11.247	0.000	0.354
3	H2b	SCRM	OF	0.433	157.260	0.497	12.540	0.000	0.465

The research results suggest the fitness of the SEM model with SRMR = 0.093, d_ULS = 3.485, d_G = 1.259, NFI = 0.578. All the relationships were also suggested to be significant with reported zero p – value is zero for each relation. For H1 (SCRM □ Organizational Performance) the p – value is zero with path coefficient equal to 0.303, which means that the relation is significant. It shows that H1 is accepted. The (SCRM □ Operational Efficiency) relationship is also proven to be significant with path coefficient of 0.354 with significance level of 0.00. It shows that the relation is significant. Moreover, H2b (SCRM □ Operational Flexibility) has p – value equal to zero with path coefficient 0.465, which indicates that a significant relationship. Similarly, the t – value for each of the variable is also greater than threshold value i.e. 1.96 which also recommends its reliability.

Model 4 of Process by Hayes (Preacher & Hayes, 2008) was utilized for testing the H3a and H3b where the mediating roles of operational efficiency (H3a) and operational flexibility (H3b) in SCRM □ Organizational Performance relationship were tested. As shown in Table 7, it is clear that all the values are significant with p < .001, and t – values greater than 2 except the p – value for the mediating relationship of operational flexibility between SCRM and OP is .7905 and its t – value also validates an insignificant relationship hence the H3b is not accepted. Therefore, where our hypothesis H3a is supported, the hypothesis H3b is not supported by the data collected from national defense-related manufacturing organizations in Pakistan.

Table 7

Mediation analysis of supply chain integration (SCI)

Effect	IV	M	DV	Coeff (b)	F	t – value	p	R²
X 🞏 Y path c	SCRM		OP	.4808	56.12	7.49	.0000	0.21
X 🞏M path a	SCRM		OE	.5095	126.49	11.25	.0000	0.38
	SCRM		OF	.4969	157.26	12.54	.0000	0.43
X 🞏 M 🞏 Y	SCRM	OE	OP	.3650	25.07	3.57	.0005	0.27
path c'	SCRM	OF	OP	.0311	25.07	0.27	.7905	0.27

Moreover, in order to validate the mediation, the indirect effect was checked by calculating the difference between total effect and the direct effect, which was 0.2014 between the confidence intervals of 0.0833 and 0.3202. As per the Null hypothesis, 0 value is not included in between lower and upper-level confidence intervals, thus suggests significance of the data is in favor of our hypotheses H3a and H3b.Similarly, for testing the indirect effect of SCRM 🞏 Organizational Performance with operational efficiency and flexibility as a mediator and SCI as a moderator, bootstrap analysis was conducted by using SPSS Process v 3.2 extension by Andrew (Preacher & Hayes, 2008). For this purpose, model 7 is used. The results are presented in Table 8 and Table 9. Where, Table 8 shows the direct effect (does X predict Y) is significant as p – value is 0.0018. Moreover, t – value (3.1616) which validates that the data is significant. The path b (does M predict Y) is also shown in Table 7. The path b (does OE predict OP) is significant whereas operational flexibility is not significant as p = 0.79 and t – value also verifies operational flexibility and performance relationship.

As shown in table that for the mediation of operational efficiency, zero doesn't lie the lower-level confidence interval and the upper-level confidence interval. So, the interaction of SCI and SCRM on operational efficiency is significant, whereas for operational flexibility the results show that the relation is not significant. So, we can say that SCI positively moderates SCRM relationships with both OE. Hence, H4a is confirmed. However, H4b is not significant.

Table 8

Bootstrap test results (direct and indirect effect)

No	Effect	IV	DV	Effect	T	P
1	X 🞏 Y path c	SCRM	OP	.2793	3.1616	.0018
2		OE	OP	.3650	3.5664	.0005
	M 🞏 Y path b					
3		OF	OP	.0311	0.2661	.7905

4.3   Additional Analysis

Table 9 shows the results related to conditional indirect effect (how W moderates in connection with M the relation between X and Y). For testing the moderation effect of SCI, three values of SCI (low, average and high) are taken into consideration. For OE as a mediating variable, the results show that as the value of SCI decreases, the effect value also decreases. Moreover, the zero does not lie between the lower-level and upper-level confidence intervals. This supports hypothesis H4a. Moreover, the interaction coefficient also supports the hypothesis as shown in Table 9.

Table 9
Conditional indirect effect test results (source: Authors, 2020)

No	Effect	IV	M	DV	SCI	Effect	LLCI	ULCI
1	X ▯ W*M ▯ Y	SCRM	OE	OP	-1.1432	.1402	.0607	.2297
2		SCRM	OE	OP	0.3013	.0823	.0312	.1436
3		SCRM	OE	OP	0.8568	.0600	.0102	.1222
4		SCRM	OF	OP	-1.1432	.0146	-.1097	.1279
5		SCRM	OF	OP	0.3013	.0079	-.0606	.0701
6		SCRM	OF	OP	0.8568	.0053	-.0443	.0513

5.   Discussion

This study focuses on exploring the relation between SCRM practices, operational flexibility and efficiency, supply chain integration and organizational performance utilizing the IPT. Although some early research work has already been performed in manufacturing firms, a study in national defense-related institutions was still missing from the literature. In this study, we collected the data from defense-related national institutions in Pakistan. 207 participants were selected for the study of the proposed hypotheses. The collected data was processed through SPSS and SmartPLS 3.0 software to get the results.

The Information Processing theory was utilized in this study to assess the influence of supply chain risk management on organizational performance, with operational efficiency and operational flexibility acting as mediators and supply chain integration acting as a moderator. The goal of this study was to answer certain unaddressed questions that needed more investigation to fill a gap in the literature and to give concrete results to practitioners so that they might benefit from them. By using data from defense-related national institutions in Pakistan from a sample of 207 participants, we found that the influence of supply chain risk management on organizational performance was found significant ($\beta = 0.481$, t =6.913, p =0.00), supported H1. Furthermore, we discovered a strong positive association between supply chain risk management and operational efficiency ($\beta = 0.510$, t =11.247, p = 0.00) and supply chain risk management and operational flexibility ($\beta = 0.497$, t =12.540, p=0.00), thus

H2a and H2b were accepted. According to the findings of this study, operational efficiency and operational flexibility have a mediating function between SCRM and OP. Operational efficiency, according to H3a (β =0.3650, t=3.57, p =0.0005), can have a significant mediating impact on supply chain risk management and organizational performance.

As a result, it has the potential to ease the OP of Pakistan's defense-related national institutions. However, according to H3b of the research, operational flexibility plays an insignificant mediating function between SCRM and OP (β = 0.0311, t =0.27, p =0.7905). Furthermore, the H4a of the study was found to be significant (β =0.3650, t= 3.566, p =0.0005), indicating that the existence of supply chain integration as a moderator increases the connection between SCRM and operational efficiency in national defense-related institutions. However, the study's rejected H4b (β =0.0311, t= 0.2661, p =0.7905) indicated that the connection between SCRM and operational flexibility in national defense-related institutions is decreased when supply chain integration is present as a moderator.
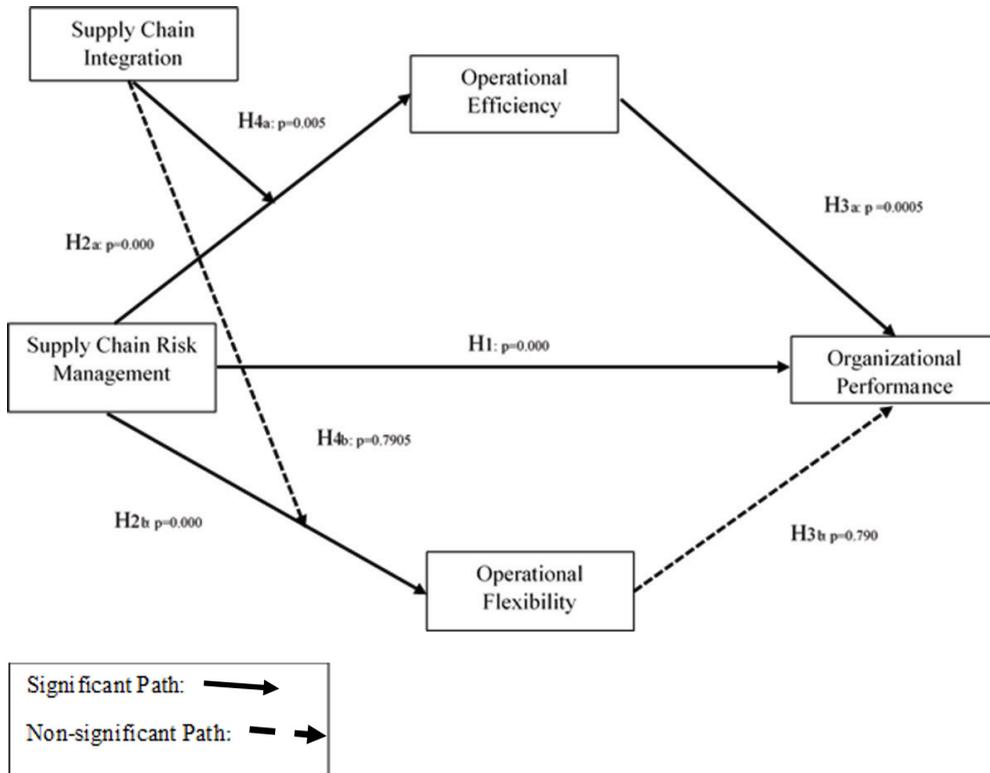

Figure 3: The model results

Our results are in line with previous research by Thun & Hoenig (2011) who found a positive impact of supply chain risk management practices and firm performance. Similarly, Shou et al. (2018) also found evidence of the mediating role of operational performance in the SCRM- performance link. Furthermore, we extend the literature by providing evidence of a holistic construct of supply chain integration instead of supplier integration only. Thus, where previous researchers found the moderating role of external supply chain integration in market responsiveness, we also found evidence of the moderation of supply chain integration on operational efficiency. However, despite our proposed hypothesis, we could not find evidence of the moderating role of SCI on the link between SCI and operational flexibility. One of the reasons of this insignificant relationship might be that the data is collected from national defense-related manufacturing organizations that have less flexibility in their operations. Mostly, defense-related national institutions have a low level of flexibility in their operations as compared to manufacturing organizations. Most of the operations are as per standard operating procedures which do not require any flexibility in their procedures. To test the moderating effect, the bootstrap analysis and conditional indirect effect is measured.

5.1   *Theoretical and Managerial Implications*

This study extends the previous literature on validating the linkages between supply chain risk management practices and the organizational performance outcomes by proposing and testing a model on the national defense-related institutions (Kauppi et al., 2016; Fan et al., 2017; Shou et al., 2018). This paper elaborates the SCRM's impact on organizational performance with the mediating role of operational performance. By utilizing the theoretical lens of information processing theory, our research explores the link of SCRM with operational flexibility and efficiency. The previous studies suggest that sometimes it is hard to explain both variables simultaneously (Kortmann et al., 2014). Few studies have shown the relationship of SCRM with an operational performance by considering both dimensions (Shou et al., 2018). This research also contributes to the previous work to develop the relationship of SCRM with both of these variables simultaneously. As per IPT, SCRM tactics like referable procedures, contingency planning and buffering strategies are applied to prepare a reliable environment. Such an environment decreases the requirement of information processing for others. Moreover, it also increases the capability of processing of information through the sharing of information.

This study also suggests that managers should implement SCRM practices in their organizations. The managers having less knowledge about SCRM and about the increasing rate of risks and uncertainties which SCM is facing on a daily basis may not take this as a serious matter. Due to their unawareness, they may consider the initial costs of SCRM practices higher than the possible future uncertainties and risks. Therefore, they do not invest in it. But in case of any mishap, they face a huge loss, and at that time they may have to bear more cost in the form of losses and recovering assets than the actual investment in SCRM practices. The

supply chain of BMW is a good example of the implementation of SCRM. If they had had multiple suppliers for that product or had information in advance, they may not have faced such a loss. This study also highlights the importance of Operational performance (operational efficiency and operational flexibility) in relation to SCRM. The organizations enjoying the organizational performance with the help of the SCRM practices may also implement it to improve operational performance.

6.   Conclusions and limitations

Using the theoretical lens of IPT, our research is an addition to the existing body of knowledge relevant to the risk management practices in the domain of supply chain management. Our findings confirm the existence of a positive relation between SCRM practices and the organization's performance. Our findings also confirm an indirect relation between SCRM practices and organizational performance through operational efficiency. Furthermore, our research sheds light on the impact of SCI towards the implementation of Supply chain risk management practices. Our research stresses the importance of risk management capabilities in national defense-related manufacturing organizations, and supply chain managers must strive to create and exploit such capabilities in order to improve the operational as well as the overall performance of their firms.

Our study is also limited due to a number of factors and future researchers can utilize these areas for their benefit. First, we have taken an integrated construct of supply chain integration. Researchers can investigate the individual dimensions of the construct and explore their individual impact. Second, national defense-related manufacturing organizations in Pakistan have been taken as a sampling frame for our research. In future, other types of public sector organizations and other types of organizations, like non-profit organizations should also be considered to test our model and generalize our findings across a number of sectors. Finally, we must admit there are other ways to look at the different relationships in our model; e.g. flexibility can be taken as an antecedent to SCRM and efficiency, or the construct of integration can also be tested as an antecedent to efficiency.

References

Afraz, M. F., Bhatti, S. H., Ferraris, A., & Couturier, J. (2021). The impact of supply chain innovation on competitive advantage in the construction industry: Evidence from a moderated multi-mediation model. *Technological Forecasting and Social Change, 162*, 120370.

Albishri, D, Sundarakani, B., & Gomisek, B. (2020). An Empirical Study of Relationships between Goal Alignment, Centralised Decision Making, Commitment to Networking and Supply Chain Effectiveness Using Structural Equation Modelling. *International Journal of Logistics: Research and Applications, 23*(4), 390-415.

Alzoubi, H. M., Elrehail, H., Hanaysha, J. R., Al-Gasaymeh, A., & Al-Adaileh, R. (2022). The Role of Supply Chain Integration and Agile Practices in Improving Lead Time During the COVID-19 Crisis. *International Journal of Service Science, Management, Engineering, and Technology (IJSSMET), 13*(1), 1-11.

Bae, H. S., Grant, D. B., Banomyong, R., & Varadejsatitwong, P. (2021). Investigating the impact of the strength of supply chain integration on cost and responsiveness. *International Journal of Logistics Research and Applications*, 1-19.

Bhattiaa, S. H., & Ali Bhattia, A. (2019). Impact of Supply Chain Risk Management on Organizational Performance: Moderating Role of Supply Chain Integration.

Bode, C., & Wagner, S.M. (2015). Structural drivers of upstream supply chain complexity and the frequency of supply chain disruptions. *Journal of Operations Management, 36*, 215-228.

Breuer, C., Siestrup, G., Haasis, H.-D., & Wildebrand, H. (2013). Collaborative risk management in sensitive logistics nodes. *Team Performance Management, 19*(7), 331-351.

Cousins, P.D., & Menguc, B. (2006). The implications of socialization and integration in supply chain management. *Journal of Operations Management, 24*(5), 604-620.

Datta, P.P., & Christopher, M.G. (2011). Information sharing and coordination mechanisms for managing uncertainty in supply chains: a simulation study. *International Journal of Production Research, 49*(3), 765-803.

Danese, P., & Romano, P. (2011). Supply chain integration and efficiency performance: a study on the interaction between customer and supplier integration. Supply Chain Management: *An International Journal, 16*(4), 220-30.

Diamantopoulos, A., & Siguaw, J. A. (2006). Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management, 17*(4), 263–282.

Dohale, V., Ambilkar, P., Gunasekaran, A., & Verma, P. (2021). Supply chain risk mitigation strategies during COVID-19: exploratory cases of "make-to-order" handloom saree apparel industries. *International Journal of Physical Distribution & Logistics Management, online first*.

Droge, C., Jayaram, J., & Vickery, S.K. (2004). The effects of internal versus external integration practices on time-based performance and overall firm performance. *Journal of Operations Management, 22*(6), 557-573.

Ebben, J.J., & Johnson, A.C. (2005). Efficiency, flexibility, or both? Evidence linking strategy to performance in small firms. *Strategic Management Journal, 26*(13), 1249-1259.

El Baz, J., & Ruel, S. (2021). Can supply chain risk management practices mitigate the disruption impacts on supply chains' resilience and robustness? Evidence from an empirical survey in a COVID-19 outbreak era. *International Journal of Production Economics*, 233, 107972.

Elgazzar, S.H., Tipi, N.S., Hubbard, N.J., & Leach, D.Z. (2012). Linking supply chain processes' performance to a company's financial strategic objectives. *European Journal of Operational Research, 223*(1), 276-289.

Fan, H., Li, G., Sun, H., & Cheng, T.C.E. (2017). An information processing perspective on supply chain risk management: antecedents, mechanism, and consequences. *International Journal of Production Economics, 185*, 63-75.

Foli, S., Durst, S., Davies, L., & Temel, S. (2022). Supply Chain Risk Management in Young and Mature SMEs. *Journal of Risk and Financial Management, 15*(328),1-15.

Flynn, B.B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: a contingency and configuration approach. *Journal of Operations Management, 28*(1), 58-71.

Ghadge, A., Dani, S., & Kalawsky, R. (2012). Supply chain risk management: present and future scope. *The International Journal of Logistics Management. 23*(3), 313-339.

Gimenez, C., & Ventura, E. (2005). Logistics-production, logistics-marketing and external integration: their impact on performance. *International Journal of Operations & Production Management, 25*(1), 20-38.

Gurtu, A., & Johny, J. (2021). Supply Chain Risk Management: Literature Review. *Risks, 9*(1), 1-16.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). A primer on partial least squares structural equation modeling (PLS-SEM). Sage publications.

Henseler, Jö., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*, 115-135.

Jeon, G., & Yoo, H. (2019). An Efficiency Analysis of Supply Chain Quality Management Using the Multi-stage DEA Model: Focused on the Domestic Defense Industry Companies. *Journal of the Korean Society for Quality Management, 47*(1), 163-186.

Kauppi, K., Longoni, A., Caniato, F. and Kuula, M. (2016). Managing country disruption risks and improving operational performance: risk management along integrated supply chains. *International Journal of Production Economics, 182*, 484-495.

Kilubi, I., & Rogers, H. (2018). Bridging the gap between supply chain risk management and strategic technology partnering capabilities: insights from social capital theory. *Supply Chain Management, 23*(4), 278–292.

Kortmann, S., Gelhard, C., Zimmermann, C., & Piller, F.T. (2014). Linking strategic flexibility and operational efficiency: the mediating role of ambidextrous operational capabilities. *Journal of Operations Management, 32*, 475-490.

Koste, L.L., Malhotra, M.K., & Sharma, S. (2004). Measuring dimensions of manufacturing flexibility. *Journal of Operations Management, 22*, 171-196.

Lam, H.K.S., Yeung, A.C.L., & Cheng, T.C.E. (2016). The impact of firms' social media initiatives on operational efficiency and innovativeness. *Journal of Operations Management, 47*, 28-43.

Lavastre, O., Gunasekaran, A., & Spalanzani, A. (2014). Effect of firm characteristics, supplier relationships and techniques used on supply chain risk management (SCRM): an empirical investigation on French industrial firms. *International Journal of Production Research, 52*(11), 3381-3403.

Leuschner, R., Rogers, D.S., & Charvet, F.F. (2013). A meta-analysis of supply chain integration and firm performance. *Journal of Supply Chain Management, 49*(2), 34-57.

Li, S., Nathan, B. R., Nathan, T.S.R., & Rao, S.S. (2006). The impact of supply chain management practices on competitive advantage and organizational performance. *Omega the International Journal of Management Science, 34*, 107-124.

Liu, C.L., & Lai, P.Y. (2016). Impact of external integration capabilities of third-party logistics providers on their financial performance. *International Journal of Logistics Management, 27*(2), 263-283.

Mackelprang, A.W., Robinson, J.L., Bernardes, E., & Webb, G.S. (2014). The relationship between strategic supply chain integration and performance: a meta-analytic evaluation and implications for supply chain management research. *Journal of Business Logistics, 35*(1), 71-96.

MacKenzie, C.A., Santos, J.R., & Barker, K. (2012). Measuring changes in international production from a disruption: case study of the Japanese earthquake and tsunami. *International Journal of Production Economics, 13*8(2), 293-302.

Manuj, I., Esper, T.L., & Stank, T.P. (2014). Supply chain risk management approaches under different conditions of risk. *Journal of Business Logistics, 35*(3), 241-258.

Menor, L.J., Kristal, M.M. and Rosenzweig, E.D. (2007), "Examining the influence of operational intellectual capital on capabilities and performance", *Manufacturing & Service Operations Management, 9*(4), 559-578.

Merschmann, U., & Thonemann, U.W. (2011). Supply chain flexibility, uncertainty and firm performance: an empirical analysis of German manufacturing firms. *International Journal of Production Economics, 130*(1), 43-53.

Munir, M., Jajja, M. S. S., Chatha, K. A., & Farooq, S. (2020). Supply chain risk management and operational performance: The enabling role of supply chain integration. *International Journal of Production Economics, 227*, 107667.

Narasimhan, R., & Talluri, S. (2009). Perspectives on risk management in supply chains. *Journal of Operations Management, 27*(2), 114-118.

Patel, P.C., Terjesen, S., & Li, D. (2012). Enhancing effects of manufacturing flexibility through operational absorptive capacity and operational ambidexterity. *Journal of Operations Management, 30*(3), 201-220.

Patel, P.C. (2011). Role of manufacturing flexibility in managing duality of formalization and environmental uncertainty in emerging firms. *Journal of Operations Management, 29*(1), 143-162.

Petersen, K.J., Handfield, R.B., & Ragatz, G.L. (2005). Supplier integration into new product development: coordinating product, process and supply chain design. *Journal of Operations Management, 23*, 371-88.

Preacher, K.J. and Hayes, A.F. (2008), Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models, *Behavior Research Methods, 40*(3), 879-891.

Ragatz, G.L., Handfield, R.B., & Petersen, K.J. (2002). Benefits associated with supplier integration into new product development under conditions of technology uncertainty, *Journal of Business Research, 55*(5), 389-400.

Rai, A., Patnayakuni, R., & Seth, N. (2006). Firm performance impacts of digitally enabled supply chain integration capabilities. MIS quarterly, 225-246.

Ralston, P. M., Blackhurst, J., Cantor, D. E., & Crum, M. R. (2015). A structure-conduct-performance perspective of how strategic supply chain integration affects firm performance, *Journal of Supply Chain Management, 51*(2), 47-64.

Rangel, D. A., Oliveira, T. K., & Leite, M. S. A. (2015). Supply chain risk classification: discussion and proposal. *International Journal of Production Research, 53*(22), 6868-6887.

Rao, S., & T. J. Goldsby. (2009). Supply Chain Risks: A Review and Typology. *The International Journal of Logistics Management, 20*(1), 97–123.

Sáenz, M.J., & Revilla, E. (2014). Creating more resilient supply chains. *MIT Sloan Management Review, 55*(4), 22-24.

Shah, R., & Goldstein, S.M. (2006), "Use of structural equation modeling in operations management research: looking back and forward", *Journal of Operations Management, 24*(2), 148-169.

Saminian-Darash, L., & Rabinow, P. (2015). Modes of Uncertainty: Anthropological Cases, The University of Chicago Press, Chicago, IL.

Sanchez-Rodrigues, V., Potter, A., & Naim, M.M. (2010). Evaluating the causes of uncertainty in logistics operations. *International Journal of Logistics Management, 21*(1), 45-64.

Shou, Y., Hu, W., Kang, M., Li, Y., & Park, Y. W. (2018). Risk management and firm performance: the moderating role of supplier integration. *Industrial Management & Data Systems, 118*(7), 1327-1344.

Shou, Y., Li, Y., Park, Y.W., & Kang, M. (2017). The impact of product complexity and variety on supply chain integration. *International Journal of Physical Distribution & Logistics Management, 47*(4), 297-317.

Simangunsong, E., Hendry, L.C., & Stevenson, M. (2012). Supply-chain uncertainty: a review and theoretical foundation for future research. *International Journal of Production Research, 50*(16), 4493-4523.

Swink, M., Narasimhan, R., & Wang, C. (2007). Managing beyond the factory walls: effects of four types of strategic integration on manufacturing plant performance. *Journal of Operations Management, 25*(1), 148-64.

Thun, J.H., & Hoenig, D. (2011). An empirical analysis of supply chain risk management in the German automotive industry. *International Journal of Production Economics, 131*(1), 242-249.

Trkman, P., Oliveira, M.P.V.d., & McCormack, K. (2016). Value-oriented supply chain risk management: you get what you expect. *Industrial Management & Data Systems, 116*(5), 1061-1083.

Vickery, S.K., Jayaram, J., Droge, C., & Calantone, R. (2003). The effects of an integrative supply chain strategy on customer service and financial performance: an analysis of direct versus indirect relationships. *Journal of Operations Management, 21*(5), 523-39.

Vickerya, S.K., & Marklandb, G.E. (1997). Dimensions of manufacturing strength in the furniture industry. *Journal of Operations Management, 15*(4), 317-330.

Wang, M. (2018). Impacts of supply chain uncertainty and risk on the logistics performance. *Asia Pacific Journal of Marketing and Logistics, 30*(3), 689-704.

Yang, J., Xie, H., Yu, G., & Liu, M. (2021). Antecedents and consequences of supply chain risk management capabilities: An investigation in the post-coronavirus crisis. *International Journal of Production Research, 59*(5), 1573-1585.

Yang, Y., Chu, X., Pang, R., Liu, F., Yang, P. (2021) Identifying and Predicting the Credit Risk of Small and Medium-Sized Enterprises in Sustainable Supply Chain Finance: Evidence from China. *Sustainability,13*, 5714.

Younis, H., & Sundarakani, B. (2020) The Impact of firm size, firm age and environmental management certification on the relationship between green supply chain practices and corporate performance. Benchmarking: *An International Journal, 27*(1), 319-346.

Yu, C.H., Liu, F.C., Yen, D.C., & Ou, C.S. (2012). A structural model of supply chain management on firm performance. *International Journal of Operations & Production Management, 30*(5),526-545.

Zaman, U. (2020), "Examining the effect of xenophobia on "transnational" mega construction project (MCP) success: Moderating role of transformational leadership and high-performance work (HPW) practices", Engineering, *Construction and Architectural Management, 27*(5), 1119-1143.

Zaman, U., Nadeem, R. D., & Nawaz, S. (2020). Cross-country evidence on project portfolio success in the Asia-Pacific region: Role of CEO transformational leadership, portfolio governance and strategic innovation orientation. *Cogent Business & Management, 7*(1), 1-26 1727681.

Zaman, U., Nawaz, S., Tariq, S. & Humayoun, A.A. (2019). Linking transformational leadership and "multi-dimensions" of project success: Moderating effects of project flexibility and project visibility using PLS-SEM. *International Journal of Managing Projects in Business, 13*(1), 103-127.

Zaman, U., Jabbar, Z., Nawaz, S., & Abbas, M. (2019). Understanding the soft side of software projects: An empirical study on the interactive effects of social skills and political skills on complexity–performance relationship. *International Journal of Project Management, 37*(3), 444-460.

Zhao, X., Huo, B., Flynn, B.B., & Yeung, J., (2008). The impact of power and relationship commitment on the integration between manufacturers and customers in a supply chain, *Journal of Operations Management, 26*(3),368–388.

Zhao, L., Huo, B., Sun, L., & Zhao, X. (2013). The impact of supply chain risk on supply chain integration and company performance: a global investigation. Supply Chain Management: *An International Journal, 18*(2), 115–131.

Zhu, Q., Krikke, H., & Caniels, M. C. J. (2017). Integrated supply chain risk management: a systematic review. *The International Journal of Logistics Management, 28*(4), 1123-1141.

Zsidisin, G.A., Bresler, A., Hazen, B., Snider, K.F. and Wilkerson, T.H. (2020). Research in defense logistics: where are we and where are we going? *Journal of Defense Analytics and Logistics, 4*(1), 3-17.