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Supply Chain Capabilities Towards Supply Chain Performance: Mediating Role of Innovation Capabilities, Moderating role of Supply Chain Agility in the Kingdom of Saudi Arabia

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Abstract: Enhancing the GDP of Saudi Arabia Kingdom and raising the living standards of the general populace are both greatly aided by the manufacturing sector. Enhancing this sector relies on enhancing the supply chain management performance through strengthening the supply chain capabilities, innovation capabilities, and supply chain agility within this sector. Hence, this study aimed to design a comprehensive model to enhance the SC performance in the manufacturing companies in KSA by examining the SC capabilities, innovation capabilities, and SC agility as strong determinants of the SC performance; a total of 285 questionnaires selected from the manufacturing companies in KSA using a convenience sampling method. The study applied SEM with SMART-PLS 4 to analyze the data collected from the supply chain managers in the KSA manufacturing companies. The study results support all three direct effect hypotheses; the direct impact of the SC capabilities on SC performance, the direct impact of the innovation capabilities on the SC performance and the direct impact of the innovation capabilities on the SC performance. Also, the result of the study supports the mediating impact of the innovation capabilities on the impact of SC capabilities on the SC performance and supports the moderating role of the SC agility on the impact of the innovation capabilities on the SC performance. The study provides very important implications to the supply chain managers in the manufacturing companies in KSA to improve their supply chain performance to gain competitive advantage by applying the model of SC capabilities, innovation capabilities and SC agility in the manufacturing industry.

Keywords: SC Capabilities, Innovation Capabilities, SC Agility, SC Performance, Manufacturing Companies

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قدرات سلسلة التوريد نحو رفع أداء سلسلة التوريد: الدور الوسيط للابتكار والدور المعدل لمرونة سلسلة التوريد في المملكة العربية السعودية

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مستخلص البحث: إن تعزيز الناتج المحلي الإجمالي للمملكة العربية السعودية ورفع مستويات المعيشة لعامة السكان يتم دعمهما بشكل كبير من قبل القطاع الصناعي في المملكة. ويعتمد تعزيز هذا القطاع على تعزيز أداء إدارة سلسلة التوريد من خلال تعزيز قدراتها وقدرات الابتكار، ومرونة سلسلة التوريد. وقد هدفت هذه الدراسة إلى تصميم نموذج شامل لتعزيز أداء سلسلة التوريد من دراسة أثر قدرات سلسلة التوريد، وقدرات الابتكار، وسرعة سلسلة التوريد كعوامل مؤثرة على أداء سلسلة التوريد. تتكون عينة الدراسة من 285 من شركات التصنيع تم اختيارها باستخدام طريقة العينة الملائمة. تم تحليل البيانات التي تم جمعها باستخدام أسلوب نمذجة المعادلات المهيكلة من خلال برنامج SMART-PLS 4. أظهرت نتائج الدراسة التأثير المباشر لقدرات سلسلة التوريد على أداء سلسلة التوريد، والتأثير المباشر لقدرات الابتكار على أداء سلسلة التوريد، والتأثير المباشر لقدرات الابتكار على أداء سلسلة التوريد. كما أن نتيجة الدراسة تدعم التأثير الوسيط لقدرات الابتكار على تأثير قدرات سلسلة التوريد على أداء سلسلة التوريد، وتدعم الدور الوسيط لرشاقة سلسلة التوريد في تأثير قدرات الابتكار على أداء سلسلة التوريد. توفر الدراسة آثارًا مهمة جدًا لمدراء سلسلة التوريد في شركات التصنيع في المملكة العربية السعودية لتحسين أدائها الخاصة بهم للحصول على ميزة تنافسية من خلال تطبيق نموذج الدراسة

كلمات مفتاحية: قدرات سلسلة التوريد، قدرات الابتكار، رشاقة سلسلة التوريد، أداء سلسلة التوريد، الشركات الصناعية

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1. Introduction

Saudi Arabia is one of the fastest-growing countries in the world in terms of manufacturing products, with a manufacturing industry reported a yearly growth rate of 7.5%. The manufacturing industry in Saudi Arabia contributes approximately 10% to the country's GDP, which is a substantial proportion compared to other sectors (Yas et al., 2021). To enhance the manufacturing sector in KSA, management should start by improving their supply chain and enhancing the supply chain performance towards innovative competitiveness (Ali & Ali, 2013). Enhancing the performance of SCM in Saudi Arabia is crucial to remain competitive in the rapidly expanding economy. Most manufacturing sectors are deficient in their supply chain, which poses a significant obstacle in adapting to the current challenging economic conditions. In recent years, manufacturing sectors in Saudi Arabia have made efforts to effectively manage the difficult challenge of fulfilling the needs of a range of customers. They have achieved this by creating an organizational structure that leverages the combined resources of many critical business units. The result is a continuously increasing number of satisfied customers who place their trust in the final products (AlTaweel, 2021). The current study aims to identify the factors that can improve supply chain performance in the manufacturing sector in KSA.

According to research by Zhang et al. (2020), supply chain management is becoming more important as an approach for manufacturing in the 21st century that may improve organizational competitiveness. To make industrial organizations more responsive and flexible, the idea of supply chain management has been proposed as a competitive strategy to integrate suppliers and customers. Manufacturing SC performance could be enhanced with the integration of various functions, leading to possible advantages including reduced inventory, superior delivery service, and accelerated product development cycles (Govindan et al., 2022).

In addition, supply chain management faces significant obstacles on a worldwide scale, including, but not limited to, increasing levels of competition, narrowing profit margins, and liberalization in numerous commercial settings. To increase market share and profitability, the majority of large organizations are constantly seeking new and innovative operating solutions (Sodhi & Tang, 2021). Enterprises across the globe have come to recognize the significance of supply chain management (SCM) because discrete manufacturing markets, accelerated by mass customization and e-commerce, are pressuring manufacturers and retailers to reduce manufacturing lead times, speed up distribution, and shorten planning cycles. The importance of innovation and SC capabilities in improving supply chain performance and overall performance towards competitiveness is growing for outstanding firms' viability (Saragih et al., 2020).

Haddouch et al. (2019) highlight the significance of supply chain capabilities derived from innovative techniques that can improve SC management procedures through the implementation of seamless relationships among distributors, manufacturers, customers, and suppliers. Capabilities that contend with complex processes and environmental uncertainty to meet customer expectations and improve organizational processes with new technologies are also known as SC capabilities. In addition to SC procedures and processes that have been enhanced through technology, SC capabilities also include process, service, and product enhancements that have been made to increase efficiency and customer satisfaction (Kwak et al., 2018). In addition, SC capabilities are an effective indicator of SC performance because they increase flexibility and delivery, reduce costs and lead times, increase quality, and improve the ability to adapt to a dynamic business environment (Abdallah et al., 2021).

According to Albuhisi and Abdallah (2018), the key to success in today's environment is a company's ability to adapt to its dynamic environment and maintain its performance. According to Ayoub and Abdallah (2019), "agility" is the ability of a business to adapt quickly to changing market conditions and survive. According to recent research (Samdantsoodol et al., 2017; Abdallah and Nabass, 2018), flexibility is a key component of SC management in the present era. Furthermore, in today's competitive business climate, supply chain agility (SCA) is hailed as the single most important component for success. This is because SC agility aids organizations in detecting shifts in the market, managing supply and demand simultaneously, and reducing lead times (Bidhandi and Valmohammadi, 2017). According to Abu Nimeh et al. (2018), manufacturing organizations and their key SC partners are using SCA to help them respond faster and more effectively to market dynamics and customer needs.

Nonetheless, the existing literature lacks empirical evidence regarding the effect of SC capabilities, on SC performance (Ayoub & Abdallah, 2019). In addition, the role of innovation capabilities in enhancing SC performance is an under-investigated area in the literature. Similarly, no empirical evidence exists regarding the effect of SC agility as a model in the SC performance model. The current study will bridge the gap in the previous literature by enhancing the model of the direct impact of the SC capabilities towards SC performance with innovation capabilities as mediator and SC agility as moderator, and empirically examining this model in the context of the manufacturing companies in KSA.

2. Literature Review

2.1 SC Capabilities

According to Irfan et al. (2019), a company's supply chain capabilities are defined as its capacity to identify, access, and modify internal and external resources and information to facilitate the entire supply chain. Asamoah et al. (2021) noted that SC capabilities encompass a wide range of approaches, such as information exchange, cooperation and coordination, integration of business activities, and responsiveness of the supply chain system. All the necessary steps in the supply chain procedures are covered by these four methods. In addition, several studies have shown that capabilities are dynamic, allowing organizations to learn and adapt quickly to changes in their environment. As indicated above, researchers think that supply chain competencies and capabilities demonstrate a greater level of company capabilities, requiring a broader range of information integration (Zimmermann et al., 2020). Because of the general perception that achieving such capabilities is difficult, companies occasionally find themselves under heavy competitive pressure from competitors (Queiroz et al., 2021). According to Rajaguru and Matanda (2019), supply chain capabilities can preserve the quality of valuable sources.

2.2 Innovation Capabilities

By the findings of Distanont and Khongmalai (2020), innovation refers to the systematic progression, adoption, and modification of manufacturing procedures to enhance efficiency and the standard of products. Additionally, it involves the development, adoption, and adaptation of business strategies to enhance the overall performance of a company. According to Ghobakhloo et al. (2021), innovation can be understood by looking at how it affects process technologies, product development and management practices. Innovation capabilities were identified as crucial within the framework of supply chain management in a study by Sabahi and Parast (2020). Innovation capabilities regarded as an organization's capacity to build creative capabilities should boost performance and yield competitive advantages, according to RBV. Wang and Hu (2020) state that enhancing organizational efficiency and maintaining market competitiveness should be the end goal of all innovative capabilities. This study will look at the relationship between SC capabilities and performance through the lens of innovation capabilities as a mediating variable in the context of KSA manufacturing enterprises.

2.3 SC Agility

The ability to quickly and easily adjust to novel situations is a component of agility. According to Arokodare et al. (2019), this is a quality of a successful business that can handle changes in quick succession. According to Dubey et al. (2018) and Nabass and Abdallah (2018), SC agility refers to the ability to quickly detect and react to market conditions. Additionally, it is described as a company's capacity to modify strategies and activities across the SC to make it more responsive to environmental changes and dynamics (Garrido-Vega et al., 2023). The ability of SC members to realign the SC network and its operations to meet evolving customer needs and expectations is referred to as SC A by Chan et al. (2017). According to Al Humdan et al. (2020), the capacity of an agile SC to adapt to dynamics and the ability within the SC to be aware of such dynamics are the two primary components of SC agility. Specifically, this corresponds to the capacity to identify and benefit from opportunities in the market as well as the capability to manufacture and provide innovative products at a reasonable cost when required (Muna et al., 2022). Lastly, according to Centobelli et al. (2020), an agile supply chain can lead to more product releases, faster delivery levels, customer satisfaction, shorter lead times, better quality, better service levels, and lower costs. The purpose of this research is to examine how SC agility moderates the relationship between innovation capabilities and SC performance as it concerns KSA manufacturing companies.

2.4 Supply Chain Performance

The literature on supply chain performance describes it as a set of interconnected components that, taken together, establish the SC system's efficacy and efficiency (Asamoah et al., 2019). Numerous academic works have discussed different levels of supply chain performance. There are both quantitative and qualitative metrics at these levels. Customer satisfaction, information integration, material flow integration, risk management quality, and supplier performance are qualitative indicators of SC's performance (Sharma et al.,2020). The quantitative metrics of supply chain performance include factors like lower response times to customer inquiries, quicker turnaround times, higher fulfillment rates, faster product deliveries, lower costs, and higher returns on investment (Lima-Junior & Carpinetti, 2017). The study by Azeem (2022) presents the following as additional metrics for supply chain performance: material accuracy, planning and projections, on-time product delivery, reliability and consistency in delivery, accurate understanding and oversight of SC costs, fast customer response, inventory management, validation and responsiveness and the linked proceed of products from suppliers to distribution retail establishments.

2.5 Hypothesis Development.

The relationships between the study variables; SC capabilities, innovation capabilities, SC agility and SC performance will be discussed in the following sections. Furthermore, the hypotheses to be tested in the context of manufacturing companies in KSA will be formulated next. The model of the recent study shown in Figure 1.

next. The model of the recent study shown in Figure 1.

2.5.1 SC Capabilities and Supply SC Performance

While managing SC capabilities is fundamental to any business, performing consequently becomes more essential than ever in today's competitive marketplace (Saragih et al., 2020). This is because SC capability addresses the question of how to improve SC performance, which in turn strengthens the company's competitive advantage and impacts overall performance (Kim & Shin, 2019). In addition, the capacity to reduce costs and increase customer satisfaction are two ways in which SC capabilities improve SC performance, which in turn increases firm profits (Fatorachian & Kazemi, 2021). Improving SC performance is a great way to strengthen SC capabilities, which in turn enhances the business's competitive advantage. Supply chain capabilities improve every aspect of the supply system by integrating internal and external data and resources. According to Shishika et al. (2023), SC capabilities are a company's ability to identify, use, and integrate internal and external resources. Based on the above discussion, the current study will examine the impact of the SC capabilities on the SC Performance in the manufacturing companies in KSA. The following hypothesis represents this relationship:

H1: SC capabilities have a direct and positive impact on SC Performance.

2.5.2 SC Capabilities and Innovation Capabilities

The literature on SC capabilities relies on the innovation capabilities to improve SC innovation and SC performance (Wang & Hu, 2020). SC capabilities refer to tools that can improve firm processes directed for efficient supply chain management through innovation capabilities in the integration with suppliers, manufacturers, distributors, and customers (Sabahi & Parast, 2020). The combination of supply chain capabilities and innovation capabilities offers substantial advantages to enterprises, including cost and lead-time reduction, the invention of new operational strategies, and the development of flexibility (Hong et al., 2019). The study of Flint et al. (2008) explored innovation capabilities as antecedents for supply chain capabilities. Resources when attached together as SC capabilities can lead to increase the level of specialization and innovation capabilities (Nayal et al., 2023). The study by Gellman (1986) cited in Karahan and İpekçi (2022) analyzed the innovative performance of deregulated railroads and identified the following as obstacles to innovation in the allied industry: regulation, labor influence, and a lack of innovation from channel members. The study by Wendra et al. (2019) conducted in manufacturing companies illustrated the importance of SC capabilities on the innovation capabilities toward organization performance. Based on the above discussion, the current study will examine the impact of the SC capabilities on the Innovation Capabilities of the manufacturing companies in KSA. The following hypothesis represents this relationship:

H2 SC Capabilities have a direct and positive impact on the Innovation Capabilities.

2.5.3 Innovation Capabilities and SC Performance

The SC of a company must have innovative capabilities to satisfy the needs of international clients given the fierce competition that organizations currently face in the global market (Tan and Sousa, 2015). The innovativeness of the SC therefore becomes a key factor in whether or not a company succeeds in the long run (Zimmermann et al., 2020). One of the main drivers of competitiveness in the manufacturing sector marketplaces is innovation capabilities and their impact on SC performance (Fan et al., 2021). By closing the performance gap caused by external environment dynamics, it helps firms achieve superior performance (Wang & Hu, 2020). Nonetheless, different forms of innovation have been shown to improve SC Performance levels in certain studies (Ayoub & Abdallah, 2019). Based on tسhe above discussion, the current study will examine the impact of the innovation capabilities on the SC performance in the manufacturing companies in KSA. The following hypothesis represents this relationship:

H3: Innovation Capabilities have a direct and positive impact on the SC Performance.

2.5.4 Mediating Role of the Innovation Capabilities on the Impact of the SC Capabilities on the SC Performance

The impact of innovation capabilities on supply chain performance is considered an important research area in the new dynamic environment in the manufacturing sector (Wang & Hu, 2020). There has been a lack of investigations of the innovation capabilities and SC capabilities to achieve the SC performance in the previous literature as a strong determinant of the competitive advantage (Abeysekara et al.,2019). In this regard, a current study based on the RBV and dynamic capabilities perspective will be added to the research of SCM by examining the mediating role of the innovation capabilities on the impact of the SC capabilities and SC performance in the manufacturing companies in KSA, based on the researcher knowledge there is no study yet examine this mediating impact in this relationship. The following hypothesis represents this relationship:

H4: There is a Mediating Role of the Innovation Capabilities on the Impact of the SC Capabilities on the SC Performance.

The Moderating Role of SC Agility on the Impact of the Innovation Capabilities on the SC Performance

Agility allows SC parties to take advantage of possibilities in volatile markets, act rapidly in response to lucrative opportunities, and predict and satisfy market requirements (Ayoub & Abdallah, 2019). Aslam et al. (2020) found that SC Agility created new chances for manufacturers and suppliers to enhance SC capabilities in the context of the supply chain and create new products. The ultimate objective of SC agility is to continuously improve SC performance through innovative problem-solving. Achieving this goal requires actively seeking out and capitalizing on market possibilities, as well as enhancing the innovation capabilities of the company's SC. This allows for the timely and cost-effective supply of innovative products and services to clients (Samdantsoodol et al., 2017). Businesses can improve their SC performance by being agile, which helps them to detect market dynamics fast and respond innovatively and promptly (Chen, 2019). Additionally, SC agility strengthens the bonds between SC parties, enhancing their capacity for innovation and enhancing SC performance (Tarigan et al., 2021). SCA develops the relationships and enhances the parties' ability to innovate together by increasing commitment and trust. Although, based on the researcher's knowledge there is no previous studies which have examined this relationship, the present study will add to the literature on the innovation capabilities and supply chain performance by examining the moderating role of SC agility in the manufacturing companies in KSA. The following hypothesis formulate examines this relationship.

H5: There is Moderating Role of SC Agility on the Impact of the Innovation Capabilities on the SC Performance

2.6 Theoretical Framework

This study's theoretical background draws from both the dynamic capabilities perspective (DCP) and the resource-based view (RBV). The RBV perspective views the company as an accumulation of its physical and intangible resources (Barney,

1991). It argues that scarce, valued, imperfectly imitable, and difficult-to-substitute resources are the fundamental source of sustainable competitive advantage. According to this hypothesis, the supply chain has better performance when SC agility, innovation capabilities, and SC capabilities all work together. A company's dynamic capabilities are its ability to adapt to its ever-changing business environment through the creation, integration, and redesign of internal and external resources (Teece, 2007). The firm can improve responsiveness, conceive and implement new and innovative capabilities to various SC problems and difficulties, and achieve better performance thanks to its dynamic capability of being flexible, both internally and along the SC. The capabilities of the SC will be expected to improve SC performance in two ways: directly and indirectly through innovation and agility, according to DCP. Manufacturing enterprises in KSA will empirically test the suggested model, which is based on studies by (Abdallah et al.,2021; Manzoor et al.,2022; Ayoub & Abdallah, 2019; Mandal & Scholar, 2011). As shown in Figure 1, the current study's recommended model.

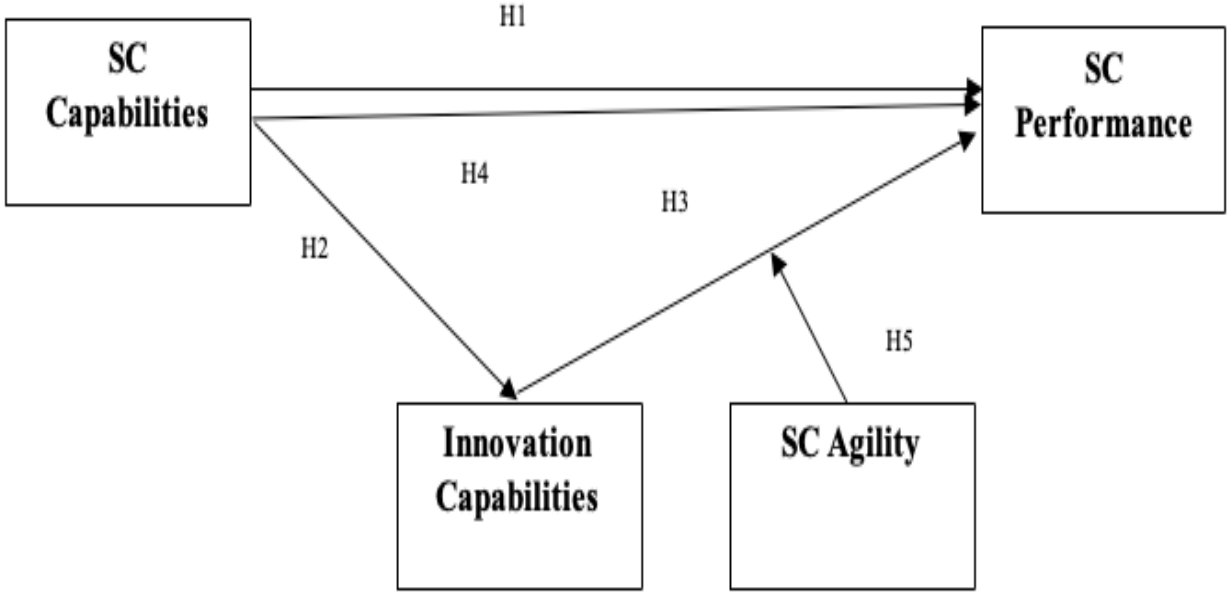

Figure 1: Theoretical Framework

3. Research Methodology

3.1 Design and Procedures

This study uses empirical approach to examine the connection between SC capabilities, Innovation Capabilities and SC Agility and SC performance. The study adopts quantitative data collection from KSA manufacturing companies. Moreover, the study relies on previous studies as secondary data. To analyse the data; SPSS and SMART-PLS were used to achieve the study goals.

3.2 Population and sample

The target populations for this study are the supply chain managers who work with Saudi Arabia manufacturing companies at the time of research. Over the past ten years, the manufacturing industry in Saudi Arabia has primarily been controlled by the production of oil, gas, and petrochemicals. This is due to the country's abundant hydrocarbon resources and the relatively low costs associated with extracting them. However, the Saudi industrial sector aims to stay up to date with global manufacturing trends, where producers are focused

on increasing production efficiency using new technologies. The manufacturing sector is a key component of the Saudi Vision 2030 plan, aimed at enhancing the competitiveness of domestic products and preserving local market shares. The plan emphasizes the importance of boosting productivity and quality. The primary objective of developing this sector in accordance with the goal is to establish a robust economy and ensure long-term sustainable growth. Saudi Arabia's objective is to foster the growth of lucrative sectors such as food, medicine, medical supplies, defense industries, oil and gas, petrochemicals, mining, and chemicals (2021-Saudi Arabia Manufacturing Industry Sector,2021). Based on this argument and related to the importance of the manufacturing sector in KSA, it was chosen to be the area of this study.

The convenience sampling method was applied in this study to select a sample size 285 manufacturing companies' supply chain managers. To lower the overall cost of the research, particularly the costs associated with traveling and administering surveys, online procedures were utilized. Consequently, the closed-ended surveys were made and sent out to the recruited staff using Google Drive. The chosen supply chain managers were notified via Facebook, WhatsApp, or e-mail after the online survey was created. After two weeks, the Google Drive link was closed to all participants who had not responded to the survey questions. However, participants were given the option to stop participating in the study at any time without giving a reason or notice. Following data collection, we analyzed the results using Smart-PLS 4.

3.3 Measurement

The measures of SC capabilities and the independent variable of this study were adopted from earlier study by Liao et al., (2017). SC capabilities were measured by five items; while the innovation capabilities were measured by five items also adopted from a study by (Singhry, 2015). Moreover, SC agility measurement was adopted from the study of Betts and Tadisina (2009) and measured by five items. Finally, SC performance measured by seven items adopted from the study of (Singhry, 2015). The items of the study variables are included in Appendix A. The questionnaire used five Likert scale to rate the responses of the respondents from strongly agree to strongly disagree based on the study of (Sekaran & Bougie 2016).

3.4 Data Analysis

The findings from an SPSS and SMART-PLS path modeling analysis of the data are illustrated in the following sections. The internal consistency reliability, discriminant validity and convergent validity, as well as the descriptive statistics, are displayed in the findings. Moreover, the measurement model and structural model analysis will be shown next.

3.4.1 Structural Equation Modelling (SEM)

The PLS-SEM path model findings consist of a two-step approach; evaluating the measurement model, to measure the reliability and validity, and the structural model, to test the study hypotheses. (Figure 2).

3.4.2 Measurement Model Evaluation

The measurement model of the study consists of the reliability of the individual item, the internal consistency of reliability, discriminant validity, content validity and also convergent validity as suggested by Hair, et al., (2014). The measurement model of the study is displayed in figure 2:

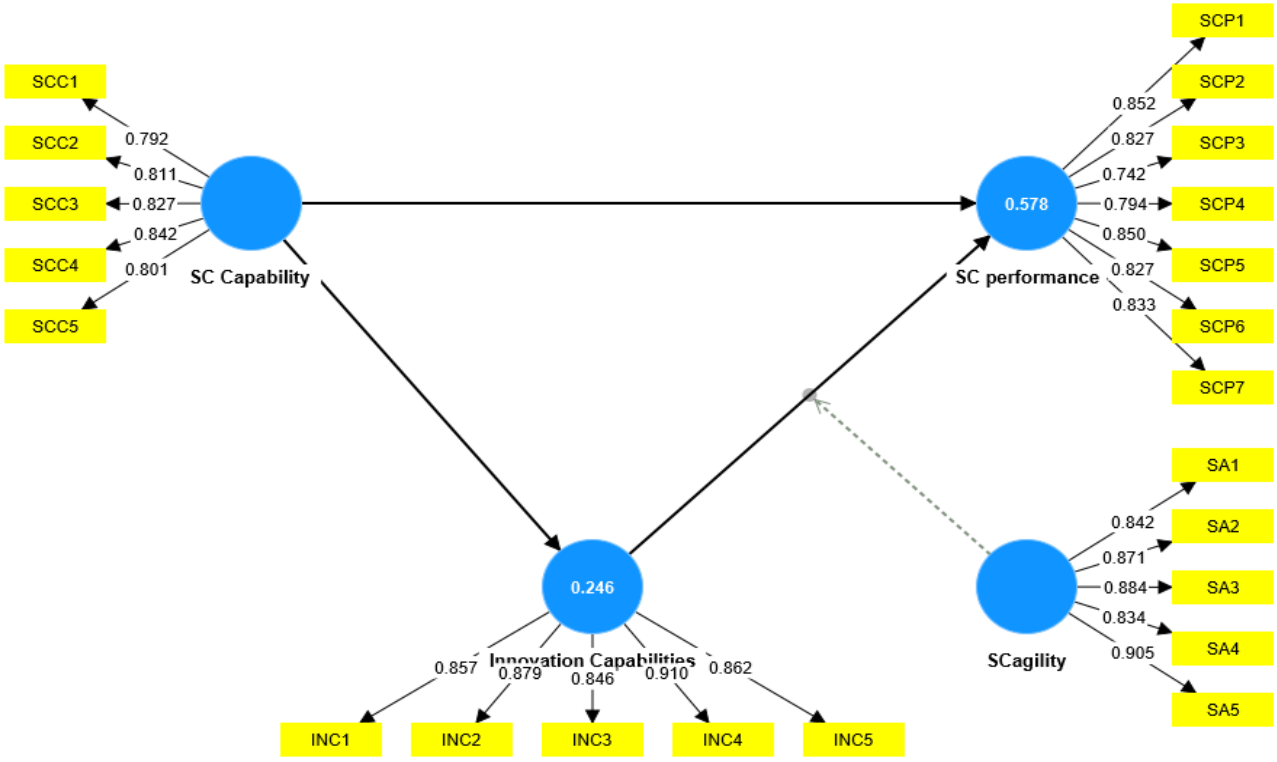

Figure 2: The measurement model of the study

The outer loadings of the latent variable measur

e the items' reliability as shown in figure1. The results illustrated that all items in this study had loadings that satisfied the acceptable level of 0.40 (Hair et al., 2014). The internal consistency reliability represents the degree to which all components of the scale are measured, as shown in Figure 2. Moreover, Cronbach's alpha and the composite reliability coefficient are used indices in research for measuring the internal consistency and reliability of a scale, especially one with multiple components.

Thus, the internal consistency, composite reliability and Cronbach's alpha is displayed in Table1.

Table 1: Assessment for Measurement Model

		Indicators Reliability	**Internal consistency**	**Convergent validity**	**Reliability**
Construct	Items (Indicators)	loading >0.70	CR >0.70	AVE >0.50	Cronbach's Alpha >0.70
SC capability	SCC1	0.792	0.908	0.664	0.874
	SSC2	0.811			
	SSC3	0.827			
	SCC4	0.842			
	SCC5	0.801			
Innovation capability	INC1	0.857	0.94	0.758	0.92
	INC2	0.879			
	INC3	0.846			
	INC4	0.910			
	INC5	0.862			
SC Agility	SA1	0.842	0.938	0.753	0.918
	SA2	0.871			
	SA3	0.884			
	SA4	0.834			
	SA5	0.905			
SC performance	SCP1	0.852	0.934	0.67	0.918
	SCP2	0.827			
	SCP3	0.742			
	SCP4	0.794			
	SCP5	0.850			
	SCP6	0.827			
	SCP7	0.833			

As Hair, et al. (2014) asserted, the composite reliability should be more than .70 to evaluate internal consistency of reliability. Also, the composite reliability coefficients of the study's constructs are all above the minimum reliability acceptable level of 0.70, indicating good internal consistency of the variables. According to Hair et al. (2014), AVE determines convergent validity. The variance of a construct compared to other constructs in the same model is projected to be less than its AVE value. However, AVE values of 0.5 or higher are normally acceptable. The Average Variance Extracted (AVE) coefficients in Table 1 show convergent validity for all constructs in this investigation. Hence, to assess the discriminant validity of the measuring model, Smart-PLS used the cross loading and Fornell and Larcker approaches which will be shown next. The first discriminant validity measure is cross loadings. There must be more factor loading on the associated construct than correlation with the other constructs (cross-loading) for each item (Purwanto, 2021). Thus, cross-loading explains discriminate validity. Table 2 shows the measurement model variable cross-loading analysis results.

Table 2: Cross-loadings for Overall Measurement Model

	Innovation Capabilities	**SC Capability**	**SC performance**	**SC agility**
INC1	0.857	0.436	0.526	0.671
INC2	0.879	0.494	0.618	0.684
INC3	0.846	0.385	0.566	0.734
INC4	0.91	0.391	0.538	0.705
INC5	0.862	0.442	0.612	0.786
SA1	0.766	0.388	0.547	0.842
SA2	0.857	0.436	0.526	0.871
SA3	0.879	0.494	0.618	0.884
SA4	0.846	0.385	0.566	0.834
SA5	0.61	0.391	0.538	0.905
SCC1	0.401	0.792	0.443	0.387
SCC2	0.36	0.811	0.466	0.352
SCC3	0.414	0.827	0.521	0.397
SCC4	0.462	0.842	0.482	0.462
SCC5	0.378	0.801	0.46	0.37
SCP1	0.626	0.514	0.852	0.624
SCP2	0.564	0.479	0.827	0.573
SCP3	0.512	0.489	0.742	0.503
SCP4	0.466	0.391	0.794	0.444
SCP5	0.526	0.485	0.85	0.503
SCP6	0.505	0.488	0.827	0.481
SCP7	0.558	0.481	0.833	0.549

The cross-loadings shown in table 2, the table show that each item's factor loading (in bold) on its related construct was stronger than its correlation with the other constructs. The discriminating validity assessment proved the study measurements' validity. Fornell–Larcker is the second discriminant validity criterion. Variable correlation utilizing Fornell-Larcker approach to test measurement model discriminant validity is shown in Table 3.

Table 3: Variable Correlation-Root Square of AVE

	Innovation Capabilities	SC Capability	SC performance	SC agility
Innovation Capabilities	0.871			
SC Capability	0.496	**0.815**		
SC performance	0.66	0.583	**0.819**	
SC agility	0.982	0.485	0.647	0.868

Fornell and Bookstein (1982) state that when the calculated square root of AVE is greater than the correlation between the factors accounting for each pair, the discriminate validity occurs. This is displayed in bold in table3. As was the case in this study's correlation matrix, the value should be greater than the other off-diagonal elements in the rows and columns. This showed that the criteria for the measures' discriminating validity had been met.

3.4.3 Structural Model Findings

The size and significance of the structural parameter estimates, as shown in the path diagrams by one-headed arrow, are not considered during a structural parameter evaluation. This assessment concludes by verifying the structural model's accuracy based on hypothesized relationships between identified and assessed variables. This study estimated the structural model using PLS-SEM and bootstrapping using 5000 replicates to test hypotheses. This included inner model R2, F2, and p-value tests (Hair et al., 2014). Figure 2 illustrates the structural (inner) model with p-value and beta coefficient of construct correlations.

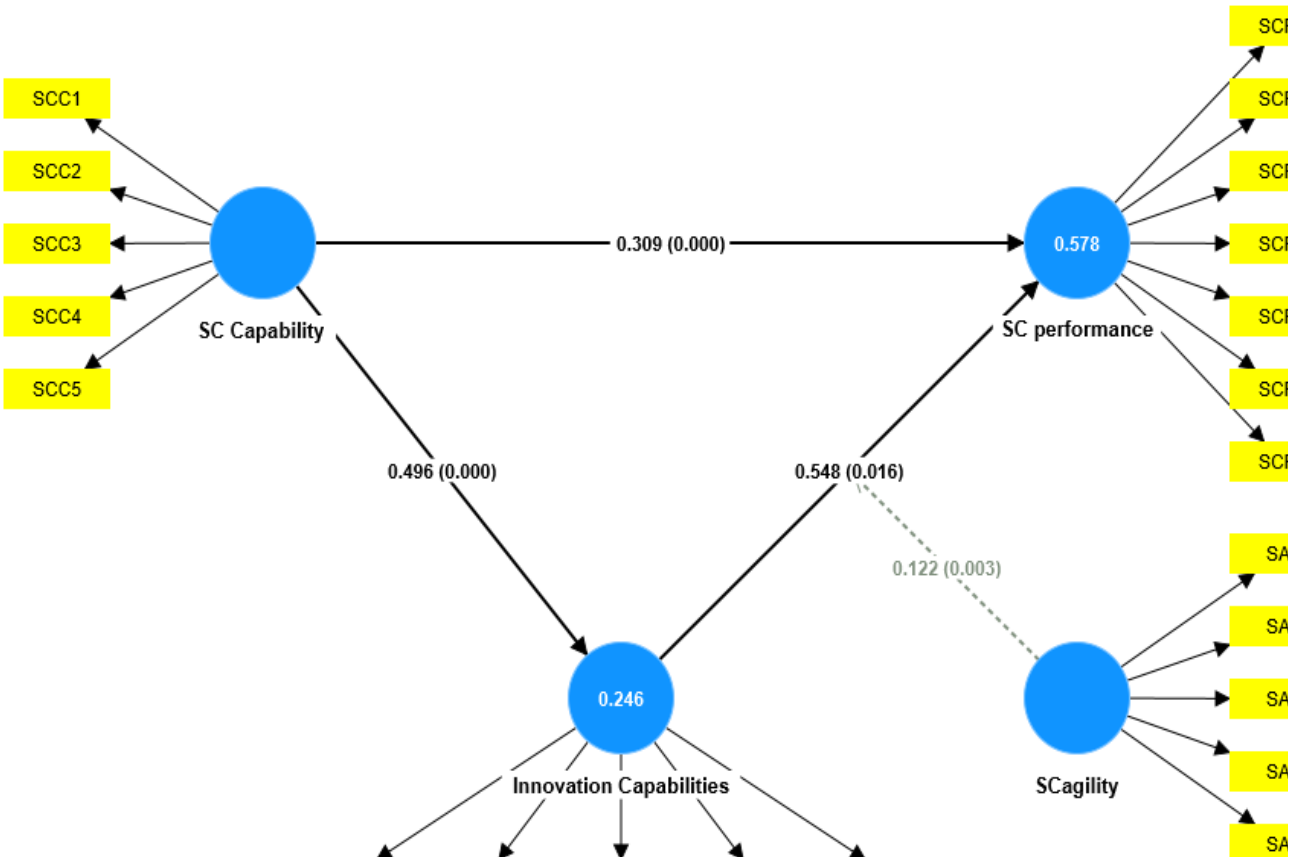

Figure3: The Structural Model path coefficient and P value of the study

Calculating (R2) is done when the changes between two variables in the correlation exist. Table 4 and Figure 3 show the results of this analysis, which was generated using the Smart-PLS algorithm function.

Table 4: R2 of the Endogenous Variables

Variables Relation	R^2	R^2 Adjusted
SC performance	0.578	0.573
Innovation capabilities	0.246	0.244

Based on the findings of the structural model with R2 values and path coefficients, SC capabilities, innovation capabilities, and SC agility may account for 57.8% of the variation of SC Performance manufacturing companies in the Kingdom of Saudi Arabia. Moreover, 24.6% of the variance in Innovation capabilities can be explained by differences in SC capabilities and SC agility. Consequently, Cohen (1988) offers a benchmark for evaluating the extent of an effect. The effect size F2 is an approach that can be used to assess the significance of a predictor's influence on an endogenous variable. The F2 statistic is used to assess the significance of an exogenous construct's contribution to an endogenous one. Study Cohen (1988) the value of the effect sizes F2 of values of 0.35, 0.15 and 0.02 are regarded as high, medium and small effect sizes respectively. Table 12 presents the assessments of the coefficient of effect size F2.

Table 5: Effect Size of the Exogenous Constructs

Latent Construct Relation	F^2	Effect Size
SC capabilities -> SC performance	0.168	High
SC capabilities -> innovation capabilities	0.327	High
innovation capabilities -> SC performance	0.024	Small
SC agility x Innovation Capabilities->-> SC performance	0.133	Small

As described in Table 5, the effect size of the exogenous constructs on the endogenous were ranged between small, medium and high based on the study (Cohen, 1988).

3.4.4 Hypotheses Testing (Path Coefficient)

This section discusses the findings of the path coefficient which was used to examine the hypotheses of the study. The findings of direct (H1 to H3), are presented in Figure 3 and also in Table 6. The numbers in the bracket represent the p-value in, and the values next to the bracket represent the co-efficient value (beta value).

Table 6: Structural Model Assessment for the direct effect hypotheses

		Path coefficient Beta	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision
H1	SC capabilities -> SC performance	0.309	0.061	5.064	0	Supported
H2	SC capabilities -> innovation capabilities	0.496	0.042	11.772	0	Supported
H3	innovation capabilities -> SC performance	0.548	0.227	2.415	0.016	Supported

Notes: Significant level at ** = $p < 0.05$,

Assessment of the whole model is presented in figure3. The three direct effect hypotheses were supported by the data collected from the study respondents, including H1 about the effect the SC capabilities on the SC performance, H2 about the effect of SC capabilities on the innovation capabilities, H3 about the effect of the innovation capabilities on the SC performance within manufacturing companies in the Kingdom of Saudi Arabia.

Indirect Effects (Mediation Effect) of the Innovation Capabilities

The mediation analysis was used to determine the mediation effects of innovation capabilities as a mediating variable on the effects of SC capabilities as an independent variable on SC performance as the dependent variable.

Table 7 shows the mediation bootstrapping output.

Table 7: meditation effect

No.	Hypothesis	Indirect effect (β)	p-value	Confidence Interval (BC)		Decision
				LL	UL	
H4	SC capabilities- innovation capabilities -SC performance	0.272	0.017	0.04	0.498	Supported

The result of the study supports the study hypothesis H4 which represents the mediation effect of the innovation capabilities on the impact of the SC capabilities on the SC performance within manufacturing companies in the Kingdom of Saudi Arabia.

Moderation Effect of the SC Agility

The moderation effect of the SC agility was analyzed in this study on the impact of the innovation capabilities and SC performance, the result of the moderation analysis shown in fFigure 3 and Table 8.

Table 8: Moderation Effect

		Path coefficient Beta	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision
H5	SC agility x Innovation Capabilities -> SC performance	0.122	0.041	2.938	0.003	Supported

The result of the study support study hypothesis H5 which represents the moderation effect of the SC Agility on the impact of the innovation capabilities on the SC performance within manufacturing companies in the Kingdom of Saudi Arabia.

4. Discussion and Conclusion

The result of the study shows that there is a statistically significant influence of the SC capabilities on the SC performance in manufacturing companies in the KSA. The result supports all the study hypotheses; the result supports the significant impact of the SC capabilities on the SC performance, this result is confirmed by previous studies of Saragih et al., (2020) and Puspita et al. (2020). In addition, the impact of the SC capabilities on the innovation capabilities is also supported in this study, these results are combatable with the study of Li et al. (2023) and study of (Liao & Li, 2019). Also, the study supports the significant impact of the innovation capabilities on the SC performance, this result is supported by the study of (Zimmermann et al.,2020). Related to the mediating impact of the innovation capabilities on the SC capabilities and SC performance suggested by many studies that distinguished the ability of innovation to enhance all supply chain capabilities to achieve the SC performance as studies of (Najar et al., 2022). The study by Abdallah et al. (2021) confirmed the ability of SC agility to influence the model of innovation capabilities and SC performance.

Finally, many studies in the literature, such as studies by Manzoor et al. (2022), supports the relationship between SC capabilities, Innovation capabilities, and SC agility to achieve SC performance. RBV theory and DCV, respectively, regarded SC capabilities and innovation capabilities as one of the most important capabilities of the organization that can improve SC performance. Moreover, SC agility is suggested as one of the important strategic supply chain capabilities that can support SC performance. Based on the researcher's knowledge there are no studies yet examining SC agility as a moderator, and innovation capabilities as a mediator in the SC capabilities and SC performance model in the context of manufacturing companies in KSA.

5. Implications

The recent study presents a comprehensive model that incorporates variables related to supply chain (SC) capabilities and innovation capabilities, along with the presence of SC agility within the supply chain. The aim is to enhance the performance of the supply chain, which subsequently improves the overall performance of manufacturing companies in KSA. This, in turn, has an impact on the ability to meet customer needs and achieve other business objectives, such as profitability and cost reduction.

This study offers valuable insights for decision-makers by identifying the characteristics that improve both supply chain performance and business performance. The study's findings can be used to provide policy suggestions that promote the creation of successful models for supply chain capabilities, innovation capabilities, supply chain agility and performance in the supply chain practice and strategy. Manufacturing businesses can collaborate and establish a consensus on efficient supply chain management to improve performance thus providing manufacturing companies in KSA a competitive advantage.

The recent study offers theoretical implications for the supply chain literature. The findings of this study confirm that the performance of supply chains may be improved by the utilization of innovation capabilities, supply chain capabilities, and supply chain agility. According to the dynamic capability theory (DCT), businesses improve their business value and performance by possessing creative capabilities. In this study, the determinants of supply chain (SC) performance are explored, namely the SC capabilities and innovation capabilities, with the presence of SC agility. The study's findings emphasize the importance of supply chain capabilities (SC) and innovation capabilities in enhancing the future performance of supply chains. This study emphasizes the significance of supply chain agility. The results illustrate the necessity of an agile supply chain in the context of an innovative supply chain environment, as it is crucial for achieving optimal performance.

6. Limitations and Future Research

Data for this study was collected using a survey questionnaire. In addition, this study utilized a cross-sectional approach, which simply documents the participants' opinions at a particular point in time. It is suggested that future studies consider employing longitudinal research designs to more properly establish cause-and-effect linkages. One further limitations of this study pertain to its methodology. Specifically, the study only employed a quantitative technique to determine the influence of the factors under investigation. In future research within the domain of supply chain management, it may be beneficial to prioritize "depth" rather than "quantitative width," similar to the method implemented in this study. The qualitative approach can offer different viewpoints and enhance understanding of the issue under investigation. The qualitative and quantitative approaches mutually enhance each other resulting in greater outcomes. Furthermore, future research could investigate the study model in a different setting and industry, beyond the manufacturing enterprises in KSA that were examined in this study. The study investigates the influence of supply chain (SC) capabilities on SC performance, considering the mediating role of innovation capabilities and the moderating role of SC agility. For future research, other factors can be explored as mediators and moderators between SC capabilities and SC performance, and the results can be compared with those of recent studies.

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Google Scholar: https://scholar.google.com/citations?user=McVNoj0AAAAJ&hl=en

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8. APENDIX A

Questionnaire items of the Study and previous literature adapted from

Construct	Items indicators		Reference
SC capability	SCC1	We are willing to simplify supply chain processes and eliminate superfluous or redundant activities.	(Liao et al.,2017)
	SSC2	Our company offers superior items and efficient delivery capabilities.	
	SSC3	We maintain strong relationships with our customers and partners.	
	SCC4	We possess the capacity to resolve issues for clients.	
	SCC5	We possess the ability to standardize and consolidate products and services.	
Innovation capability	INC1	We have enhanced our capacity to choose partners for collaboration and improved our ability to derive knowledge from past collaborative experiences.	Singhry,2015)
	INC2	We have enhanced our capacity to implement continuous improvement and customer-centric principles.	
	INC3	We have enhanced our capacity to comprehend the interrelation between supply chain management and other fields.	
	INC4	We have enhanced our capacity to effectively handle gradual enhancements and modifications to products, processes, and systems.	
	INC5	We have enhanced our capacity to choose partners for collaboration and improved our ability to derive knowledge from past collaborative experiences.	
SC Agility	SA1	Our supply chain reduces manufacturing lead-times	Betts & Tadisina, (2009)
	SA2	Our supply chain increase frequency of new product introductions	
	SA3	Our supply chain increase level of customization	
	SA4	Our supply chain improves level of customer service	
	SA5	Our supply chain improves delivery reliability	
SC performance	SCP1	The supply chain enables us to decrease the expenses associated with manufacturing.	Singhry,2015)
	SCP2	The supply chain enables us to minimize overall expenses.	
	SCP3	The supply chain enables us to minimize inventory expenses.	
	SCP4	The supply chain enhances our ability to improve client responsiveness and service.	
	SCP5	The supply chain facilitates timely product delivery and minimizes out-of-stock occurrences.	
	SCP6	The supply chain enhances our market share.	
	SCP7	The supply chain enables us to decrease the expenses associated with manufacturing.	