

# The Impact of Digital Supply Chain on Strategic Agility: The Mediating Role of Organisational Culture: Applying to the Saudi Health Sector

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**Abstract:** This study examines the impact of the digital supply chain on strategic agility in the Saudi healthcare sector, mediated by organisational culture. The research included a sample of 384 employees in the sector and used a questionnaire to assess the relationship between the digital supply chain and strategic agility. The results showed that each dimension of the independent variable (digital supply chain) had a significant effect on the independent variable, while each dimension of the mediating variable (organisational culture) had a significant effect on the mediating variable. These results suggest that there is a significant effect between the dimensions of organisational cultures and strategic agility, providing actionable insights for researchers and practitioners. The study also makes recommendations for future research. The healthcare sector faces constant challenges in dealing with advanced technology, globalisation and changing patient trends. In order to respond quickly and effectively to change, health organisations must emphasise the importance of managing and allocating resources by creating competitive and sustainable supply chains.

**Keywords:** Digital Supply Chain; Strategic Agility; Organizational Culture

## 1. Introduction

Improving organisational performance remains a critical element among both public and private sector organisations to meet peoples' needs and expectations effectively [1], reducing cost, improving quality [2], and tackling market uncertainty [3]. Therefore, organisations, particularly healthcare organisations, are adopting digital technologies to meet business environment challenges and enhance systems integration [4]. It is also beneficial to stay competitive in today's market [5]. Hence, supply chain managers are trying to cut costs and develop more agile, flexible, and connected systems to gain market value and meet the rapidly changing consumer behaviour and market volatility [6].

Thus, Gulf Corporation Council countries, particularly Saudi Arabia, have launched its 2030 ambitious vision to transform its healthcare sector by improving healthcare quality and reducing cost [7]. This move aimed to well establish and raise the level of service provided to beneficiaries to reach developmental sustainability while moving the health sector to a digital supply chain environment to improve the health system through a series of initiatives while clarifying responsibilities within the Saudi Arabian healthcare system [8].

The health sector faces constant challenges in dealing with advanced technology, globalisation, and ever-evolving patient trends [9]. Therefore, to face the intense competition in this sector, effective strategies must be developed and implemented to respond to change quickly and effectively [10]. Hence, since health organisations are expected to provide high-quality services to beneficiaries, they must emphasise the importance of managing and allocating their resources by creating competitive and sustainable supply chains [11].

However, the high unpredictability of the variables surrounding that chain prevents it from delivering the expected high value to stakeholders. Thus, the concept of strategic agility in supply chain operations is essential to transform all parts of it to become more responsive to change [12]. This focus on agility means opportunities to achieve greater performance stability [13]. Indeed, the concept of strategic agility has been effectively combined with flexibility to create strategic conditions that are adaptable to internal and external variables [14] and thus, linked to improved organisational performance and, consequently, increased customer satisfaction and trust [15].

A common definition of agility in the literature is the ability of an organisation to respond effectively to change by adopting agility as it seeks to become more competitive, pursuing a wide range of differentiation strategies [16]. Regarding global competitiveness, supply chain agility has been identified as a prerequisite for organisational success [17]. With the widespread use of technological development [18], digital supply chains have become fully dependent on digital transformation and its tools, such as tracking technologies, radio frequency, RFID, and GPS, which includes

organising, planning, coordinating, developing and strategising [19]. This means that coordinated logistics services are provided through multiple methods, including inventory management, scheduling, and trend analysis, making them more efficient [20].

Supply Chain integration refers to connecting different key members who participate in operations under one stage [21]. Therefore, dealing with management techniques for this integration enhances the collective performance of distribution and final product support [22]. It also would, increasing increase the efficiency of the flow of goods, exchanging information and sharing resources to increase mutual benefits in terms of internal integration (represented by cooperation between departments and departments of the company to resolve conflicts that can occur and affect the company's performance) [23], and supplier integration (represented by communication, interaction and cooperation between organisations and their suppliers, ensuring the flow of resources [24].

The supply chain bullwhip is a common phenomenon in supply chains where small changes in product demand are greatly amplified as we move up the chain (e.g. suppliers and manufacturers), due to inaccurate forecasting, order effects, and information delays, and its effects include increased inventory, supply shortages, increased costs, and difficulty in managing the chain [25].

In the same context, organisational culture connects people, work, and work groups [26]. Culture is the "mind of the organisation"; culture provides a system of accepted meanings for employees to interpret the strategy and associated actions needed to implement the strategy [27]. Hence, strategic innovation supported by organisational culture is vital in digital transformation, and the importance of organisational culture for digital transformation is widely recognised in the literature [28]. There is a lack of empirical research on how organisational culture impacts supply chain digital transformation and strategic agility [29] [30], specifically on how organisations can cultivate a culture conducive to digital [31] [32]. Therefore, there is a need to uncover the specific organisational culture that managers and leaders need to adopt and achieve strategic agility in this process [33] [34] [35].

### 1.1 Research gap

The Saudi Ministry of Health's supply chain digitisation initiatives are essential to building a more efficient and sustainable health system [36]. Through these initiatives, the ministry seeks to improve healthcare quality, reduce costs, increase efficiency, and enhance transparency [37]. These initiatives include the availability of an integrated inventory management system between different levels in the supply chain [38]. Also, a smart warehouse equipped with the latest technologies to store and distribute medicines and medical supplies in five regions of Saudi Arabia, namely Riyadh, Eastern, Western, Northern and Southern regions [39].

In addition, they also aim to establish a sub-warehouse in all Saudi regions, which ensures the safety of products and speeds up deliveries, with the integration of e-sourcing, to facilitate procurement and supply procedures [40]. Finally, a strategic partnership with manufacturers and distributors should be built to ensure the availability of medicines and medical supplies at competitive prices and high quality [41]. Therefore, to ensure the effectiveness of these initiatives, they need the ability to quickly adapt to the rapid changes in the global health environment and effectively respond to emerging health challenges through the availability of strategic agility to achieve the vision of the Saudi Ministry of Health 2030 [42]. Hence, there is a need to explore how digital supply chains in the Saudi healthcare sector affect strategic agility by mediating organisational culture.

In addition, many scholars, including Bak et al. [39], said that having strategic agility in the healthcare industry is determined by the willingness to adapt and effectively handle change, impacting the shift in health strategies and the adaptability of employees. This is influenced by establishing a clear vision for healthcare's future making swift and flexible strategic decisions amidst changing circumstances [43].

Additionally, integrating medical devices and health information systems to enhance patient care is crucial to provide accurate and comprehensive information about the patient's health condition, such as heart rate, blood pressure, and blood sugar levels [44]. For example, Saudi MoH's strategic agility efforts include focusing on the National Health Transformation Program and the presence of smart hospitals [45] [46].

Therefore, several researchers attempted to explore and understand the challenges faced by the digitalisation of the supply chain. For example, a study by Bak et al. [47] aimed to understand the challenges facing the digital supply chain in the Indian healthcare sector. Their result showed that there are eight areas where the challenges arise [48]. Other studies by Rodríguez-González et al. Felipe et al. Cao et al. aimed to explore the relationship between supply chain and organisational culture. Yet their results show that there is no significant between supply chain and organisational cultures [49]. Further, previous studies have called the researchers to understand other countries with different

cultures as it is vital to the success of the digital supply chain implementation, The organisational culture, with its characteristics of a development-oriented, collectivist and rational culture, is positively related to all dimensions of the supply chain. However, with the exception of hierarchical culture, it is negatively related to internal integration and customers. [50]

Hence, as the existing literature provides mixed results on the impact of digital supply chains on strategic agility, it is hoped that this study will facilitate the discussion on the many possibilities for the Saudi Ministry of Health. This discussion aims to move towards digitisation and its ability to enable the agility of previously developed strategies and adapt them to the new situation.

## 1.2. Significance of the study

Healthcare supply chains are vital to providing medical services and saving lives [51].The COVID-19 pandemic has posed an unprecedented challenge to supply chains in the health sector, revealing both their strengths and weaknesses [52]. The pandemic has led to radical shifts in the chain, highlighting the need for greater agility in supply strategies and the ability to adapt to changing circumstances [53].The COVID-19 pandemic has taught us the importance of enhancing agility by making quick decisions, enhancing adaptability, and improving the availability of medical beds and vital medicines [54].The digital supply chain relies on information and communication technology (ICT) to optimise traditional supply chain processes, including artificial intelligence (AI),[55] advanced analytics, autonomous operation, cloud networking, and paperless operation. These technologies include artificial intelligence, advanced analytics, autonomous operation, cloud networking, and paperless operation [56].Using a digital supply chain aims to increase efficiency and improve collaboration and communication between companies and partners in the supply chain. It includes several critical dimensions, such as extensive data collection, building strong networks, knowledge management, and customer Contact Monitoring [57].

Therefore, they are focusing on optimising the structure of digital supply chain management and the many benefits of supply chains combined with strategic agility and making it an agile chain [58],including agility as part of the response to increasing competition in the global market [59].In the worldwide market, it has been argued that digital supply chains should act as a catalyst for growth due to the critical role of strategic partnerships and advanced technology platforms [60].Hence, the ultimate goal emphasised in the performance of digital supply chains with strategic agility is continuous improvement, which may lead to long-term patient and patient and beneficiary health services satisfaction [61].Thus, due to constantly emerging environmental changes and complex health sector challenges, it is essential to develop an effective competitive model to analyse the factors that affect strategic agility in supply chain digital transformation by supporting the culture of agility[62].

This study was conducted from a distinct perspective to ensure that organisational culture supports the impact of digital supply chains on strategic agility, as organisational culture is one of the necessary pillars for adopting strategic agility[63].Thus, it would help the health sector in Saudi Arabia by enhancing its knowledge about developing effective strategies to move towards digital supply chains for hospitals and exploring new opportunities implied by the concept of strategic agility. Also, to build digital and agile supply chains as part of improving organisational performance [64].Thus, the following research questions will guide this study.

RQ1. What are the factors that promote a digital supply chain?

RQ2. How does the digital supply chain impact on strategic agility?

RQ3. How does the digital supply chain impact on organisational culture?

RQ4. How does organisational culture impact the relationship between digital supply chain and strategic agility?

The research question identified in this study is intended to provide a critical analysis of the factors that can enhance the effectiveness of the digital supply chain and its impact on strategic agility in the health sector.The mediating role of organisational culture and its elements (Organisational beliefs, Organisational expectations, the ability to manage and adapt to change) is also investigated in order to draw more insights related to digital transformation [65].in the context of supply chains and hospitals with a robust organisational culture can be flexible in their strategies [66].In the context of specific arguments about supply chains and strategic agility, this study contributes significantly to the literature by comprehensively exploring the elements of digital supply chains and strategic agility in the Saudi health sector.The study discusses the theoretical and practical implications of better responsive digital supply chains and strategic agility by leveraging a robust organisational culture. Furthermore, the theoretical framework contributes to the literature by improving knowledge of strategic agility.Thus, researchers, practitioners in various fields, and academics can improve their understanding of the digital supply chain's theoretical and practical implications and strategic agility by mediating organisational culture.

Through a systematic review of existing academic literature, this study aims to elucidate supply chain digital transformation on strategic agility by mediating organisational culture and suggesting directions for future research in this burgeoning field.

The work was organised as follows: Identifying the relevant research issue (Section 1: Introduction), literature review (Section 2: Literature review), description of data and methodology (Section 3: Description of data and methodology), results (Section 4: Findings) Discussion (Section 5: Discussion) and finally, conclusions and implications of the findings (Section 6: Conclusions).

## 2. Literature Review

### 2.1 Digital Supply Chain and Strategic Agility

Profit-oriented organisations tend to increase operational efficiency and eliminate waste to improve their position in the market [67]. Therefore, healthcare organisations find themselves in a difficult situation, mainly because they must focus on reducing costs and increasing revenues to provide continuously improved healthcare services [68]. Hence, there is a need for strategic agility to be built in the healthcare supply chain, which cannot be done without a proper risk analysis that must cover the whole spectrum of the chain in order to improve the healthcare system and its quality for patients [69].

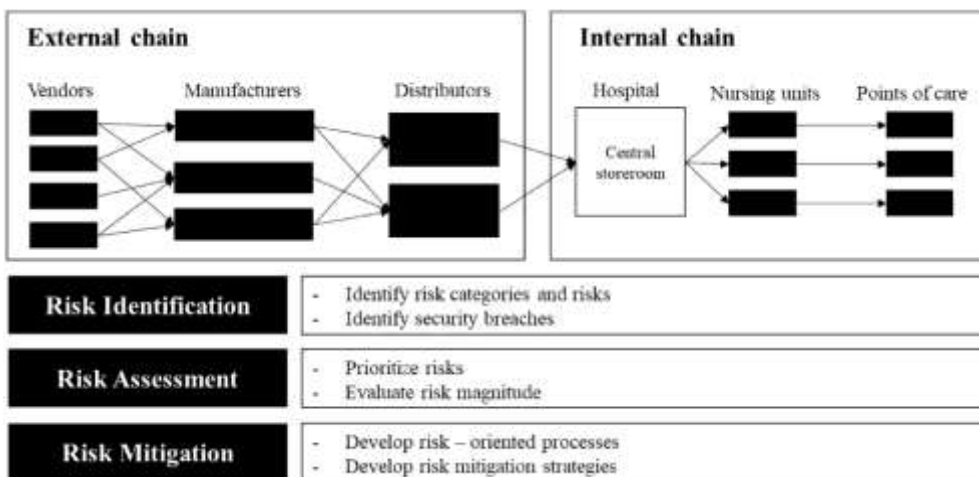


Figure 1. Risk in the healthcare supply chain.

Source: Senna, et al.(2023)

The previous figure shows that the healthcare supply chain faces additional risks, such as long waiting times for a medical appointment. Generating agility in healthcare supply chains means reducing uncertainty through rapid decision-making, generating adaptive capacity that allows the system to reconfigure itself and improving the availability of hospital beds, ventilators and life-support medicines. Supply chain risks arise for several reasons, such as disruptions in material flows, information flows, knowledge flows, control flows, and coordination, which require moving to integrate digital transformation into the chain [70].

Also, Bright Ojo explained that digital technologies help decision-makers deal with disruptive events, enhancing the agility of healthcare supply chains. Resilient healthcare supply chains' supply chain-supported organisational capabilities include long-term collaborative planning and strategic alliances based on trust and shared goals. Digitisation of the healthcare supply chain ensures the availability of critical medical supplies and equipment to treat patients during health emergencies [71].

According to Arji et al. supply chain digitalisation reflects a set of tools and techniques that can be implemented to integrate supply chain management inside and outside the organisation's boundaries [72]. The pharmaceutical supply chain has faced significant challenges in terms of lack of infrastructure, distribution networks, and limited transparency, requiring the use of technologies such as blockchain, artificial intelligence, and the Internet of Things (IoT) to enhance traceability, improve inventory management, and optimise distribution methods.) Blockchain technology enables supply chains to share and distribute data in the healthcare supply chain (HCSC) [73].

### 2.2 Digital Supply Chain and Organisational Culture

Digital supply chains are a complex process that requires more than just adopting new technologies [74]. It requires a radical change in organisational culture, as organisations must adopt a new mindset based on flexibility, innovation, and collaboration [75].

Organisational culture has become an accepted and prioritised aspect in many organisations seeking change [76]. Many managers consider culture an essential asset that guides management and human resources and forms the models of behaviour and relationships that must be followed and guided by them [77]. Furthermore, it is an intellectual framework that guides the members of the same organisation, regulates their actions and relationships and confirms specific values such as innovation, excellence, leadership, and overcoming competitors while supporting the organisation's susceptibility to change and keeping pace with the developments taking place around it [78]. This is reflected in the relative stability of the culture and its firmness in the minds of employees and their following of its instructions, which is clearly mirrored in their behaviour and relationships towards facing technological changes and new technologies that require a strong culture that supports this [79].

organisational culture is also defined as the adaptive behaviour within the organisation from new beliefs through organisational values and beliefs [80]. In light of this definition, organisational culture is a pattern of beliefs, values and learned ways of dealing with how members of the organisation should behave [81]. However, this pattern may be unwritten or non-verbal behaviour that describes how things are done to give the organisation its unique character [82].

In addition, it has also been defined by Senbeto, Hon., as the whole complex that includes knowledge, belief, art, morals, ethics, law, custom, and any abilities that a person acquires as a member of society [83]. While other scholars have described organisational culture as the collective behaviours uniting organisation members around shared core values and beliefs, organisational culture facilitates adaptation to external changes and internal resource integration. It underpins the management system, shaping practices and behaviours that embody the organisation's guiding principles. It is the ingrained assumptions and beliefs shaping the social environment within the organisation, setting formal and informal expectations for members and guiding interactions both internally and externally [84].

The relationship between organisational culture and digital supply chains is essential for the success of digitisation initiatives [85]. When the culture promotes innovation and accountability, embracing new technologies and adjusting procedures becomes simpler. Employees who are afraid of job loss or struggling with new technologies might resist digitalisation [86]. Leaders must establish a data-driven organisational culture that promotes change and development [87]. This culture requires employees to collect, analyse, and base decisions on data. In conclusion, digitalisation necessitates strong cooperation among various sections and branches within the company, emphasising the need for a culture of collaboration that promotes the exchange of knowledge and skills [88].

### 2.3 Organisational culture and strategic agility.

Arokodare, & Falana ., asserted the importance of organisational culture, which has become a vital component of the organisation's management when drawing its policies and building its strategies to enhance the chances of success of the organisation [89]. Thus, most health institutions need to have the ability to adapt to environmental changes and how to face them by having the ability to make the right decisions quickly [90]. This is a result of the high uncertainty in the conditions of the environment surrounding the institutions and the turbulence of that environment [91].

Thus, strategic management using traditional methods no longer works [92]. Therefore, for these organisations to survive, it is critical to adapt modern methods to overcome these obstacles, and strategic agility is one of the contemporary methods to maintain the organisation's performance in a sustainable and better way through continuous change management and flexible dealing [93]. Strategic agility refers to the ability to dynamically modify or reshape the company and its strategy in the changing business environment, and this is achieved by constantly anticipating and adapting to customer needs and trends without abandoning the company's vision [94].

The demand for high-quality healthcare from patients has grown, which requires orientation towards strategic agility [95], which impacts the performance of workers in the health sector and also shows that hospitals must promote a culture of innovation. Further, there is a need for hospital leadership to prioritise strategic agility and support the culture of innovation [96] while noting that strategic agility is a well-known dynamic capability that helps organisations to align the supply chain with customer demands, especially healthcare, as it has an impact on healthcare performance [97].

### 2.4 Digital Supply Chain, Strategic Agility and Organisational Culture

Digital supply chains are the foundation of an organisation which aims to link suppliers, manufacturers, distributors, and customers [98]. In light of the rapid changes in the economic and technological environment, strategic agility has become an urgent necessity for organisations that seek to survive and compete. Organisational culture plays a crucial role in achieving this agility, forming the values and beliefs that guide employee behaviour and decision-making [99].

The strategic agility of supply chains is characterised by flexibility and the ability to adapt to sudden changes in the market and the external environment [100]. This agility depends on various factors, including technology, infrastructure, processes, and human resources [101]. Organisational culture also has a role in the effectiveness of digital supply chains by looking for new ways to improve processes and develop services while developing employees' skills and providing them with the necessary knowledge to keep pace with technological developments, so strategic agility in digital supply chains is critical, and to achieve this agility by combining strategic agility with a strong organisational culture, companies can achieve a sustainable competitive advantage. As a result of exploring the relationship between Digital Supply Chain, Strategic Agility and Organisational culture, the following hypothesis has been developed

### 2.5. Hypothesis

Healthcare organisations face various pressures regarding digital transformation caused by uncertainty after the COVID crisis, as it positively impacts strategic agility and renewal. And that strategic agility positively affects strategic renewal [102]. Hence, the digitisation of supply chains has become necessary in the fast-paced business world, and the COVID-19 pandemic has highlighted the importance of this digitisation. With the challenges posed by the pandemic, organisations are looking for more flexible and efficient ways to manage their operations through strategic agility. The following hypotheses were developed:

- Hypothesis 1 (H1). Digital Supply chain has a significant impact on strategic agility.
- Hypothesis 2 (H2). Digital Supply chain has a significant impact on organisational culture.
- Hypothesis 3 (H3). Organisational culture has a significant impact on strategic agility.
- Hypothesis 4 (H4). Digital supply chains have a significant impact on strategic agility by mediating Organisational culture

As illustrated in Figure 2, the conceptual framework of this study represents three dimensions of the digital supply chain, three dimensions of strategic agility, and four dimensions of organisational culture, with the influential relationship between the study variables as follows:

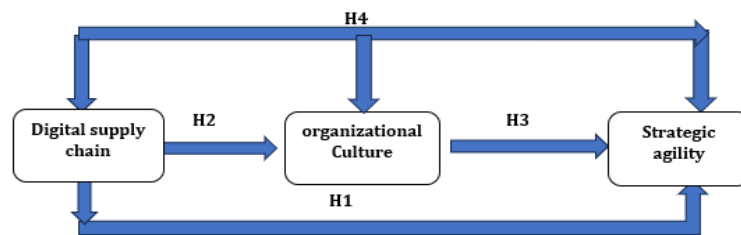


Figure (2), Conceptual framework of this study

## 3. Data, Descriptive Statistics, and Methodology

### 3.1 Methodology

The current study utilises quantitative research methodology as the focus for understanding the impact of digital supply chains on strategic agility by mediating organisational culture. Quantitative research is the process of collecting and analysing numerical data [103]. Quantitative research helps reveal patterns and averages and make predictions about the relationships between specific variables. The specificity of quantitative research methodology allows for the generalisation of the research findings to broader populations [104]. Therefore, quantitative research findings are considered to have better reliability and validity than qualitative research in these situations. This study has shown that the digital supply chain has an impact on strategic agility and organisational culture and that organisational culture as a mediating variable has a role in the influence of the digital supply chain on strategic agility. The study has utilised a correlational research design to analyse the stated research objectives.

### 3.2. Data

This study collected primary data from Saudi health sector workers through a five-point Likert-scale questionnaire, which constituted the quantitative data collection method. As shown in a survey by Pescaroli et al. [105] a Likert scale-based form is commonly used to measure different study variables. Therefore, this type of questionnaire, widely used

to measure participant responses, was deemed appropriate for the current study. Moreover, the measures of the variables were adapted from different previous studies with minor modifications. However, this adaptation was made based on the specific dimensions that apply to the target health workers in this study.

Since the population is very large number of workers in the Saudi health sector, targeted respondents were selected who work in supply chain management, logistics, health informatics management and others who have sufficient knowledge of the study structure in the Saudi health sector in the Eastern Province, whether in (government hospitals, health centers, dispensaries, primary care centers), and the data collection process extended for nearly two months from September to November 24, and the questionnaires were prepared in an electronic version and were sent via email, WhatsApp, paper hand . The questionnaires were prepared in an electronic version and were sent by email, and WhatsApp, eventually, 116 questionnaires were returned and completed, they had missing data, making them invalid and unusable, out of 500 questionnaires, [106]. As a result, 384 questionnaires were accepted and used, representing a response rate of 76. 8%, Table 1 presents Demographic information and organisational details of the participating companies.

The table (1) shows the demographic profile of respondents. Accordingly, it indicated that more than half of the respondents are males (260, 68.1%). Regarding educational level, most respondents have a bachelor's (176, 46.2%), and the rest of the education categories come after that. The table also indicates, regarding the experience variable, that the largest experience category is 5–10 (34.9%), followed by the experience category of 10–15 (29.9%), and the rest of the experience Categories come after that:

Table (1) Demographic profile of respondents

Title 1	Title 2	Title 3	Title 4
<b>Gender</b>	Male	260	68.1
	Female	121	31.9
<b>Education</b>	Bachelor's	176	46.2
	Diploma	125	32.8
	Postgraduate	80	21.0
<b>Experience</b>	less than 5	77	20.2
	5-10	133	34.9
	10-15	114	29.9
	15 and above	57	15.0

Source: researcher based on SPSS Output.

### 3.2.2. Reliability and Validity

Testing the questionnaire reliability and validity, reliability refers to the degree to which the results obtained by measurement and procedure can be replicated, while validity expresses the degree to which a measurement measures what it purports to measure [107], Table (2) testing the reliability of the questionnaire, the researcher used Cronbach's Alpha coefficient, this coefficient varies between zero (no reliability) and one (maximum reliability); and in testing its validity, self-validity coefficient was calculated as the square root of the reliability coefficient, tables (1) show the results of Cronbach's Alpha coefficient for the reliability and self-validity for the Questionnaire sections and the included paragraphs under each section related to the research topic as follows:

Table (2) The reliability and self-validity of questionnaire sections related to the research topic

Dimensions	Number of paragraphs	Reliability coefficient (Alpha)	Validity coefficient
The independent variable (Digital Supply chain)	9	0.833	0.913
The mediating variable (Organisational culture)	12	0.906	0.952

The dependent variable (Strategic Agility)	9	0.847	0.920
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Source: researcher based on SPSS Output.

Table (2) shows The Reliability coefficient (Alpha) for Section One of the questionnaire "Digital Supply Chain" is (0.833), and the Validity coefficient is (0.913). The Reliability coefficient (Alpha) for Section Two of the questionnaire "Organisational Culture" is (0.906) and the Validity coefficient is (0.952). The Reliability coefficient (Alpha) for Section Two of the questionnaire "Strategic Agility" is (0.847) and Validity coefficient is (0.920). Based on the previous results, it could be concluded that the study instrument is reliable and valid.

### 3.2.3. Descriptive of Digital Supply Chain

Table (3) shows the responses of the study sample about the paragraphs related to the independent variable, which is the "Digital Supply chain". It was found through the answers that there is a large percentage agreeing with these paragraphs as a whole, and this is shown from the general mean row, which is (41 + 51 = 92%) and 7% of the sample gave a neutral answer, while the ratio (1 + 0 = 1%) of the sample size does not agree to these paragraphs, The value of the Standard deviation (0.67) with a percentage less than the general mean value (4.42) to confirm The difference in the ratio of dispersion in the views of the participants for the study sample and the proportion of this dispersion is not large, as the value of the coefficient of variation (15.24%), which confirms the validity of the sample data. Also, by looking at the values of the coefficient of variation for each of the paragraphs of the question, the paragraphs can be arranged in terms of least dispersion [with the least coefficient of variation] as shown in the Rank column.

Table (3) the descriptive statistics of Digital Supply chain

Paragraph	Levels [Frequency / Percent]				Mean	Standard deviation	Coeff. of variation	Rank
	Strongly Disagree	Disagree	Neutral	Agree				
<b>Digital technology (DG).</b>								
The hospital has increased investment in digital supply chain technology	1	2	25	167	186	4.40	0.66	14.98%
	0%	1%	7%	44%	49%			
The hospital uses cutting-edge, automated technology to load and unload medical supplies	1	5	25	130	220	4.48	0.70	15.65%
	0%	1%	7%	34%	58%			
The hospital uses smart technology such as wireless networking and remote sensing to optimise transportation and tracking of medical supplies	1	4	22	153	201	4.44	0.68	15.21%
	0%	1%	6%	40%	53%			
<b>Improved communication and collaboration (IC).</b>								
The hospital seeks to establish a good relationship of mutual trust and cooperation with suppliers.	1	4	26	139	211	4.46	0.69	15.53%
	0%	1%	7%	36%	55%			
Information is shared between hospital purchasing and warehousing departments that is effective for internal logistics operations.	1	5	23	181	171	4.35	0.68	15.57%
	0%	1%	6%	48%	45%			
Information is shared about the flow and movement of materials in the supply chain	2	3	25	181	170	4.35	0.68	15.74%
	1%	1%	7%	48%	45%			

from their arrival at warehouses to their delivery to the hospital.									
Improving process and data visibility (IP).									
Integrated warehouse management systems are available to better organise and coordinate warehouse operations	1	2	26	169	183				
	0%	1%	7%	44%	48%	4.39	0.66	15.07%	2
Monitoring and tracking systems allow for accurate location and movement of medical supplies within the warehouse.	2	1	19	133	226				
	1%	0%	5%	35%	59%	4.52	0.65	14.47%	1
Software platforms help coordinate and optimise shipping and delivery processes.	1	5	31	158	186				
	0%	1%	8%	41%	49%	4.37	0.71	16.28%	3
General mean	1	3	25	157	195	4.42	0.67	15.24%	
	0%	1%	7%	41%	51%				

Source: researcher based on SPSS Output.

### 3.2.4. Descriptive of Organisational Culture

Table (4) shows the responses of the study sample about the paragraphs related to the mediating variable, which is "Organisational culture ". It was found through the answers that there is a large percentage agreeing with these paragraphs as a whole, and this shown from the general mean row, which is (39 + 52 = 91%) and 8% of the sample gave a neutral answer, while the ratio (1 + 0 = 1%) of the sample size does not agree to these paragraphs, The value of the Standard deviation (0.69) with a percentage less than the general mean value (4.42) to confirm The difference in the ratio of dispersion in the views of the participants for the study sample and the proportion of this dispersion is not large, as the value of the coefficient of variation (15.67%), which confirms the validity of the sample data.

Table (4) the descriptive statistics of Organisational culture

Paragraph	Levels [Frequency / Percent]					Mean	Stand-ard de- viation	Coeff. of varia- tion	Rank
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree				
<b>Organisational Values (OV).</b>									
The hospital's work culture incorporates the values of integrity	1	5	24	135	216				
	0%	1%	6%	35%	57%	4.47	0.70	15.59%	2
Hospital staff cooperate in providing excellent service.	1	1	31	154	194				
	0%	0%	8%	40%	51%	4.41	0.67	15.24%	1
The hospital adopts innovative and uncommon methods of dealing with the supply of medical supplies	1	3	30	152	195				
	0%	1%	8%	40%	51%	4.41	0.69	15.68%	3
<b>Organisational beliefs (OP).</b>									
	1	5	15	158	202	4.46	0.66	14.83%	1

There is an atmosphere of connectedness between management and staff	0%	1%	4%	41%	53%				
There is an alignment between my personal beliefs and those of the hospital	1	4	36	154	186				3
						4.36	0.72	16.44%	
The hospital management is interested in involving employees in decision-making	0%	1%	9%	40%	49%				2
	1	4	21	135	220				
	0%	1%	6%	35%	58%	4.49	0.67	15.01%	
<b>Organisational expectations (OE).</b>									
The hospital management believes in administrative authorisation for employees to purchase medical supplies	1	1	32	140	207				2
	0%	0%	8%	37%	54%	4.45	0.68	15.29%	
The hospital management determines fair rewards according to the level of performance	1	3	29	149	199				3
	0%	1%	8%	39%	52%	4.42	0.69	15.58%	
The hospital management meets my expectations of material and moral rewards	1	4	22	165	189				1
	0%	1%	6%	43%	50%	4.41	0.67	15.24%	
<b>The ability to manage and adapt to change (TA).</b>									
I do my best to achieve the expected goals	1	3	31	160	186	4.38	0.69	15.77%	3
	0%	1%	8%	42%	49%				
Hospital management participates in decision-making	1	3	22	144	211				1
	0%	1%	6%	38%	55%	4.47	0.67	14.89%	
The hospital management holds regular meetings with the staff	2	4	19	140	216				2
	1%	1%	5%	37%	57%	4.48	0.69	15.39%	
<b>General mean</b>	1	3	30	147	200	4.42	0.69	15.67%	
	0%	1%	8%	39%	52%				

Source: researcher based on SPSS Output.

### 3.2.5. Descriptive of Strategic Agility

Table (5) shows the responses of the study sample about the paragraphs related to the dependent variable, which is "Strategic Agility ". It was found through the answers that there is a large percentage agreeing with these paragraphs as a whole, and this is shown from the general mean row, which is (40 + 53 = 93%) and 6% of the sample

gave a neutral answer, while the ratio (1 + 0 = 1%) of the sample size does not agree to these paragraphs, The value of the Standard deviation (0.65) with a percentage less than the general mean value (4.46) to confirm The difference in the ratio of dispersion in the views of the participants for the study sample and the proportion of this dispersion is not large, as the value of the coefficient of variation (14.65%), which confirms the validity of the sample data.

**Table (5) The descriptive statistics of Strategic Agility**

Paragraph	Levels [Frequency / Percent]					Mean	Stand ard devi- ation	Coeff. of variation	Rank
	Strongly Dis- agree	Disagree	Neutral	Agree	Strongly Agree				
<b>Sensing Agility y (SA).</b>									
Hospitals can screen, monitor and capture events	2 1%	5 1%	27 7%	157 41%	190 50%	4.39	0.72	16.45%	3
The hospital can monitor the movements of its suppliers	1 0%	5 1%	23 6%	157 41%	195 51%	4.42	0.69	15.59%	2
The hospital seeks to learn about new supply offerings in medical tools and supplies	1 0%	2 1%	32 8%	172 45%	174 46%	4.35	0.68	15.57%	1
<b>Agility of the decision-making process (D).</b>									
The hospital seeks to collect and store information related to its work from a variety of sources	1 0%	3 1%	36 9%	147 39%	194 51%	4.39	0.71	16.20%	3
The hospital has the ability to make appropriate decisions based on available information.	1 0%	2 1%	30 8%	141 37%	207 54%	4.45	0.68	15.38%	1
Plans are made through which the reconfiguration of staff and the creation of new competitive procedures are guided	1 0%	4 1%	28 7%	134 35%	214 56%	4.46	0.70	15.69%	2
<b>Agility of practice (AP).</b>									
The hospital has the ability to reconfigure	1 0%	4 1%	20 5%	122 32%	234 61%	4.53	0.67	14.77%	1

its resource dynamics.									
The hospital seeks to shape supply chain relationships according to new business plans.	2	1	30	147	201				
						4.43	0.69	15.66%	2
The hospital has the ability to quickly make sourcing decisions.	1	5	24	163	188				
						4.40	0.69	15.68%	3
<b>General mean</b>	1	2	22	151	205	4.46	0.65	14.65%	
	0%	1%	6%	40%	53%				

Source: researcher based on SPSS Output.

#### 4. Results and Discussion

This section presents the Structural Equation Models (SEM) and also the Characteristics of Structural Equations Models (SEM). It also studies the relationship between the variables using structural equation models.

##### 4.1 Structural equation models (SEM)

Structural Equation Models (SEM) constitute one of the advanced statistical methods that are used to analyse the correlations among interlocking variables (theoretical methods) and to test the adequacy between these variables and the data collected or observed through a study sample. SEMs can also be considered an assumed model for the direct and indirect linear correlations among observed and latent variables. These correlations can be represented in the form of a diagram. SEMs form a general analytical framework for a number of models, such as Path Analysis, Manova, and Confirmatory Factor Analysis, as they all constitute stages and parts of Structural Equation Models [108].

##### 4.2. Characteristics of Structural Equations Models (SEM)

SEM is characterised by several qualities, including:

- They used to test the correlations among the variables from an affirmative rather than an exploratory perspective. In this sense, the researcher has to apply statistical analysis to data after framing the theoretical models to ensure the research's adequacy of the data collected and the assumed model. This process takes the reversal direct of the process of the exploratory model.
- SEM aims to test the validity of the model dominated by latent variables, which represent concepts that can be hardly measured directly but can be assessed through several observable variables that are measurable, which can be paragraphs or dimensions.
- Traditional statistical methods usually assume that independent variables do not have the defect of measurement. So, the variables are inserted in the analysis with all their variances, including the measurement variance. However, SEM has the privilege of filtering latent variables from measurement errors or residuals.

##### 4.3. Study the relationship between the variables using structural equation models

In this section, we analysed and explained the relationship between the independent variable (digital supply chain) and the dependent variable (strategic agility) and whether the variable (Organisational culture) mediates that relationship. The relationship will be analysed to see if there are dimensions for each variable and to show the impact

of those dimensions on the relationship. In this case, the three variables (independent, dependent, and mediator) are latent variables (Unobserved, endogenous variables), and we will explain the model's goodness of fit and its adequacy in explaining the relationship. Finally, we study the significance of the paths proposed by the study model and the effect of mediation, whether direct or indirect, and whether it is complete or partial.

Figure (3) shows the Full Empirical Model, which is (the empirical Path Model between fear of Digital Supply chain, Strategic Agility and Organisational culture).

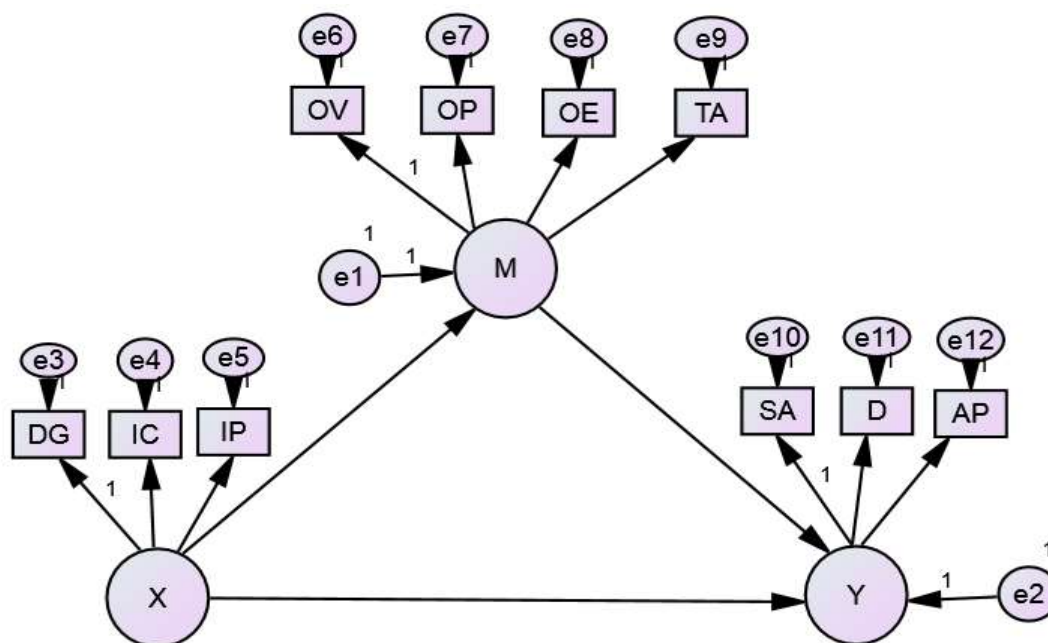


Figure (3): The Empirical model

where:

- **Digital technology (DG), Improved communication and collaboration (IC) and Improving process and data visibility (IP)** are the dimensions of the independent variable (X), which is (Digital Supply chain).
- **Organisational Values (OV), Organisational beliefs (OP), Organisational expectations (OE) and The ability to manage and adapt to change (TA)** are the dimensions of the dependent variable, which is (Organisational culture).
- **Sensing Agility (SA), Agility of the decision-making process (D) and Agility of practice (AP)** are the dimensions of the dependent variable, which is (Strategic Agility).

Regarding the diagnosis of the model and ensuring the validity of the measurement model, it is as follows:

The theoretical model consists of a set of causal relationships explained for the study; within this model, which is also called the analysis model, where each relationship is supported by a hypothesis, The general model of the study consists of three latent variables, namely (Digital Supply chain, Strategic Agility and Organisational culture). In contrast, the observed variables are the dimensions that comprise each latent variable.

Table (6): Measurement variables for the study model

The latent variables	the observed variables	Number of paragraphs
----------------------	------------------------	----------------------

Digital Supply chain	DG, IC and IP	9
Organisational culture	OV, OP, OE and TA	12
Strategic Agility	SA, D and AP	9

Based on the structural equation modelling method, and to know the goodness of fit of the measurement model with the information related to the study, we use indicators called goodness of fit indicators, and they are as follows:

Table (7): goodness of fit indicators

Index	The standard result	The re- comment sult
CMIN/DF	Between 1 and 2 the model is good with a significant level $\leq 0.01$ .	
	Between 2 and 5 the model is acceptable with a 2.388 significant level $\leq 0.01$ .	Accepted
	More than 5 of the model is rejected	
Root Mean Square Error of Approximation (RMSEA)	0.08 or less	0.044 Accepted
Goodness-of-Fit Index (GFI)		0.975
Adjusted Goodness-of-Fit Index (AGFI)		0.935
Normed Fit Index (NFI)	0.9 or more	0.913 Good
Comparative Fit Index (CFI)		0.991
Tucker-Lewis Index (TLI)		0.962

Source: researcher based on AMOS Output.

The researcher conducted goodness-of-fit tests for the purpose of obtaining the greatest degree of reliability for using structural equation modeling. After using the AMOS 22, we concluded that the model is suitable for all indicators of goodness of fit, which supports the validity of the proposed study model.

Figure( 4) shows the results of the structural model for the study variables

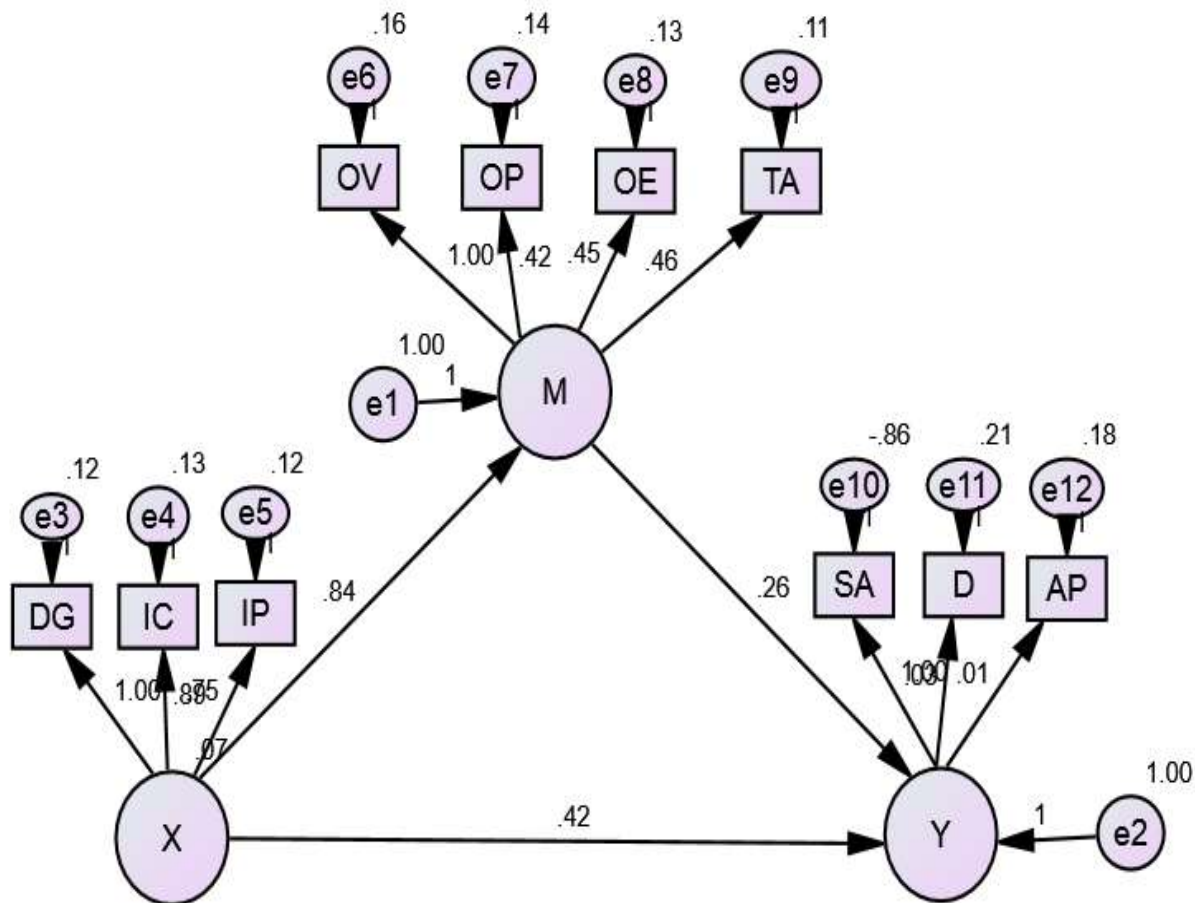


Figure ( 4): The model results

Source: researcher based on AMOS Output.

Table (8) the paths for the relationships between the study variables

Hypothesis	path	Standard Path coefficient	<i>p</i>	Decision
H1	X ---> Y	0.424	0.000***	Supported
H2	X ---> M	0.84	0.005***	Supported
H3	M ---> Y	0.26	0.000***	Supported

Source: researcher based on AMOS Output.

\*\*\* Significant at a level of significance less than 1%

From Table (8): We note that all parameters' values between the independent variable (Digital Supply chain), the mediating variable (Organisational cultures), and the dependent variable (Strategic Agility) are significant because their probability values are all less than 1%.

Based on the above, we reject the null hypothesis and accept the alternative hypothesis for each of the three main hypotheses of the study, meaning that there is a significant relationship between the three variables.

The following table (9) can be used to indicate the direct and indirect effects and whether the mediation is (partial or complete):

Table (9) the direct and indirect effects and whether the mediation is (partial or complete).

Hypothesis	path	Direct effect	Indirect effect	Decision
H4	X--->M--->Y	0.424 (P=0.000)	0.218 (P=0.000)	Partial mediation

We note that the direct effect is significant ( $P = 0.008 < 0.01$ ), and the indirect effect is significant ( $P 0.000 < 0.01$ ), which means that the mediation is partial. This means that organisational culture Impacts the relationship between the Digital Supply chain as an independent variable and Strategic Agility as a dependent variable.

Table (10) also shows the extent to which the dimensions of the variables contribute to the estimation of each variable as a latent variable

Table (10) shows the paths between each latent variable and its dimensions

	path		Standard Path coefficient	<i>p</i>	Decision
X	--->	DG	1		
X	--->	IC	0.748	0.005***	Supported
X	--->	IP	0.892	0.000***	Supported
M	--->	OV	1		
M	--->	OP	0.421	0.000***	Supported
M	--->	OE	0.448	0.000***	Supported
M	--->	TA	0.458	0.000***	Supported
Y	--->	SA	1		
Y	--->	D	0.025	0.005***	Supported
Y	--->	AP	0.012	0.097*	Supported

Source: researcher based on AMOS Output.

\*\*\* Significant at a level of significance less than 1%

\* Significant at a level of significance less than 10%

The results showed that each dimension of the independent variable, which is (Digital Supply chain), has a significant effect ( $P = 0.000 < 0.01$  for all dimensions) on the independent variable. Also, each dimension of the mediating variable, which is (Organisational cultures) has a significant effect on the mediating variable. Therefore, the dependent variable will be affected by those dimensions, which means that there is a significant effect between the dimensions of the Organisational cultures and the Strategic Agility.

## 5. Conclusion

### 5.1 Research contribution

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This research paper explores how the digital supply chain affects strategic agility through the mediating role of organisational culture. To our knowledge, this is the first research study on the Saudi health sector. This study's results prove the proposed model's validity and contribute to theory and application. The results also provide evidence of the relationship between these three variables as follows:

First: It is clear from the results that the digital supply chain had a positive impact on strategic agility, which reflects that strategic agility is one of the critical variables for the shift towards a digital supply chain in terms of the ability of the Saudi health sector to borrow the volume of changes in health services as well as its ability to make appropriate decisions to move towards a digital supply chain with proper practices for this. This verifies the validity of the first hypothesis of the research, "Digital Supply chain has a significant impact on strategic agility" These results are consistent with the findings of previous studies, for example, (39)(72)(102)

Second: The digital supply chain had a positive impact on organisational culture, which reflects that organisational culture is one of the critical variables for the shift towards the digital supply chain in terms of the availability of values, customs and traditions, as well as organisational norms, in addition to adapting to changes. This validates the second hypothesis of the research: Digital Supply chain has a significant impact on organisational culture. These results are consistent with the findings of previous studies, such as those by (31)(32)(88).

Third: It is also worth noting that organisational culture had a positive impact on strategic agility, reflecting that strategic agility is one of the critical variables to support a robust organisational culture for the Saudi health sector to become agile with its challenges. This verifies the validity of the third hypothesis of the research: Organisational culture has a significant impact on strategic agility. These results are consistent with the findings of previous studies, such as (89)(90)(102)

Fourth: Finally, it is clear that the organisational culture had a direct mediating role in the positive impact of the digital supply chain on the strategic agility of the Saudi health sector, based on the fact that the trend towards digitising this basket depends primarily on adopting a strong, cohesive organisational culture that calls for this, in addition to the ability of the Saudi health sector to sense changes in the external environment and the agility of its strategies in the long term. This verifies the validity of the fourth hypothesis of the research: Digital supply chains significantly impact strategic agility by mediating Organisational culture.

## 5.2. Limitations and avenues for future research

This study explores how digital supply chains affect strategic agility by mediating organisational culture. A questionnaire distribution was conducted on a sample of Saudi health sector workers to investigate the relationship between these three variables. Although the paper contains theoretical and practical contributions, it is also important to clarify limitations and avenues for future research directions. First, this research model was tested through the opinions of Saudi health workers, and thus, future research could apply this research to health sectors in different countries. Second, other influence factors may also have an impact on this research. Therefore, future research could consider other variables, such as "artificial intelligence", "smart robots", and "digital warehouses", which may affect the digital supply chain; in addition, future research could also explore the impact of digital organisational culture on strategic agility

Third, future research can also look for tools and techniques that can be used to measure strategic agility in the digital supply chain. Finally, this research uses descriptive data to test the relationship between the variables. Future research can collect quantitative data to test hypotheses and provide more robust results.

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