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Investigating the interplay between supply chain agility, human capital and supply chain performance in the healthcare sector of Jordan

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A B S T R A C T

This study investigates the impact of supply chain agility on supply chain performance in Jordan's healthcare settings. The moderation role of human capital in this relationship was also investigated. This study adopted a quantitative approach and utilized an online questionnaire to collect data from 139 managers at different levels in various hospitals in Jordan. The Statistical Package for Social Sciences (SPSS) version 23 was used for data analysis. The results of hypothesis testing using multivariate regression analysis showed that human capital has a positive and statistically significant impact on supply chain performance and supply chain agility. Human capital has been identified as an important organizational resource that can result in favorable performance. Such an organizational resource may also help healthcare institutions obtain a competitive edge by responding to patients' treatment, which is urgently required.

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1. Introduction

Healthcare is an industry in which human-to-human interactions are key; therefore, an organization's brand value is directly linked to that of staff members. A hospital's ability to recruit and retain a large workforce and maintain a positive reputation further improves its organizational productivity (Alsmairat et al. 2023; El Dahshan et al., 2018). Employees are common denominators and are essential for improving and expanding human or relational capital (Halder, 2018). The unit's capabilities are established based on the reliability and availability of necessary purposes. However, Lin (2017) shows that human capital resources (HCRs) are associated with economic parity or best practice outcomes. Literary streams that distinguish between strategic and general human capital resources are both related to firm-level outcomes (Marginson, 2019).

A study conducted by Aryee et al. (2016) provides a basic description of human capital (HC), which demonstrates people's knowledge, skills, and capacities. These concepts establish a strong link between HC and worker motivation, growth, and well-being. Theorists such as Arena and Uhl-Bien (2016) define HCRs in a way that benefits those who work at the firm level and seek to increase their competitive advantages. Consequently, organizational results are given more attention in strategic HC. Shahadat et al. (2023) investigated digital technologies impacting SC performance to improve the competitive, dynamic business environment. The study collected data from 150 questionnaires received from the management of the ready-made garment (RMG) industry situated in Bangladesh. These findings illustrate the positive impact of improvement tactics on SC performance. The study concluded that digital technology is a major source for improving SC capabilities and dealing with unpredicted downfalls in business operations (Shahadat et al., 2023). Lee and Mangalaraj (2022) studied the use of big data analytics in various business dynamics including supply chain. A systematic review was conducted to elaborate on the details of the findings and innovation of big data from an interdisciplinary perspective. This study elaborates on the achievement and performance of organizations in improving the performance of various business dynamics (Lee & Mangalaraj, 2022).

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A network, system, or process that focuses on the movement of materials from production to distribution in one direction is referred to as supply chain management (Alsmairat & Aldakhil, 2022). This process also incorporates the movement of information that offers controlled mechanisms (Rakovska & Stratieva, 2018). The supply chain (SC) network must deliver high-quality products that satisfy consumers' interests and preferences to be considered a successful delivery (Saa'da et al., 2022). Healthcare agility (HA) is demonstrated through progressive human resource capital. Remarkable advancements in HA have been observed in the performance of healthcare SCs. HC includes the labor force, productive labor, skilled workers, and productive managerial personnel. HA enables a business to quickly adapt to changing consumer needs (Jermsittiparsert & Kampoomprasert, 2019). Different methods have been used to investigate various facets of the concept of "agility." According to previous studies (Mandal, 2018), a propitious tool for different industrial companies and organizations to cope with increased performance and competitive capacity is a culture that values and rewards agility from its employees. However, according to healthcare-related studies (Sindhwani et al., 2019), human capital is a crucial component that correlates with healthcare and agility performance. Patients require healthcare, and the service sector must be able to respond quickly to their needs. Owing to its flexibility and ability to incorporate new technologies, viewpoints, and information, human capital can help many healthcare facilities to expand. Many studies have characterized the capacities of HC and HA as the effectiveness and engagement of human SC performance (HSCP). Many healthcare institutions require substantial amounts of HC to satisfy patient demands, which SC performance (SCP) may provide (Mani et al., 2018). Research that used HSCP intervention investigated the relationship between firm capabilities and firm agility performance to raise the value of business performance and competitive human capital capabilities (Wiengarten et al., 2018). Several sub-units in healthcare systems are heavily integrated service processes that address the needs of patients receiving treatment. There are various combinations of services, facilities, patient status, and an integrated healthcare system framework that deals with the various components of healthcare services and their problems. Building a model for operational performance measurement that follows the limitations and requirements of the healthcare system is essential. The effectiveness of the processes completed by departments can be used to gauge the overall operational success of a healthcare system (Bhattacharjee and Ray, 2014).

The lasting competitive advantage of the healthcare supply chain has not been thoroughly studied, although the healthcare sector has faced significant competitive hurdles because of their network alliance (Hussain et al.2023; Hong et al., 2012). In addition, a sizable number of businesses are affected by a lack of human capital. The fundamental cause of poor healthcare agility and performance is a lack of human resources (Rungsrisawat and Jermsittiparsert, 2019). These issues must be resolved with the assistance of human resources and the efficiency of the healthcare supply chain. In our research model, we included a moderator variable, human capital, and hypothesized that it has an impact on both supply chain performance and agility in healthcare environments. The research questions addressed in this study were as follows:

Is there a positive relationship between supply chain agility and performance in the healthcare industry?
Does human capital moderate the relationship between supply chain performance and agility in the healthcare environment?

Although research in supply chains is abundant, there remains a gap in the literature on the mediating effect of healthcare specialists or human capital to enhance the impact of the association between supply chain agility and performance. This study aimed to provide valuable insights for developing a system that prioritizes human capital to enhance healthcare agility and performance.

2. Theoretical Background:

2.1 Supply Chain Agility (SCA)

The idea of supply chain agility (SCA) as a factor in success and an indicator of a firm's competitive advantage has received considerable attention for a longer period (Gligor et al., 2013). Agility is a technique for predicting an organization's strength based on indicators such as speed, inventiveness, flexibility, and quality (Al-Shboul & Alsmairat,2023). Customer-driven products and services can be offered in a rapidly changing market context by integrating reconfigurable resources and best practices in a knowledge-rich environment (Sukati et al., 2012). Some authors have described SCA in terms of operations (Brusset, 2016), but few have demonstrated it as a management philosophy (Calatayud et al., 2019) or strategy (Fayezi et al., 2016). Furthermore, the specific idea of SCA has formed in the literature because of drawing on the numerous viewpoints of "agility" developed within the various fields to which the broad concept of agility is applicable. Moreover, some scholars have commented on SCA's multidisciplinary nature (Gligor et al. 2013; Russell & Swanson 2019).

2.2 Supply Chain Performance (SCP)

Supply chain management (SCM) is crucial for healthcare organizations to achieve quality dimensions because it controls efficiency and effectiveness (Chopra & Meindl, 2007). Improving efficiency by decreasing waste in processes and determining the dominant power of any tool, technique, method, or technology to enhance healthcare delivery and services globally are the primary concerns facing healthcare systems (Mushtaha & Alsmairat, 2023). In the context of healthcare, a supply chain is the sequential use of the physical and technological resources needed to provide patients with affordable high-quality care. Healthcare Supply Chain Logistics is a set of procedures involving personnel from several teams and the

transportation of goods that healthcare professionals need to perform, such as medications, surgical instruments, and other products. The supply chain in health care seeks to identify departmental weaknesses and recommend solutions to strengthen them. To attain the desired health outcomes, it seeks to identify weak areas and raise investments in global health. Improved procedures, effective resource use, content staff, successful treatment, and contented patients are all benefits of an efficient supply chain in the healthcare industry (Arora & Gigras, 2018). Senna et al. (2023) stressed the matter of high service expectations of various business owners from the human resources of the supply chain at a very low cost. The authors concluded that the HC fulfilled its sole responsibility of keeping revenue flow consistent. However, the rupture in the supply chain in healthcare leads to flawed supply chain services in other SC services. The authors presented a supply chain model with empirical validation using statistical equations. A covariance equation modeling method was adopted to structure the model. This study revealed an association between supply chain integration (SCI), risk management (RM), and supply chain 4.0 (antecedents) with supply chain performance SCP. The study provided evidence of the association between the study factors and the impact of the study factors on public and private healthcare sectors while demonstrating a moderating effect of SCI, RM, and supply chain 4.0 (antecedents) on supply chain performance (Senna et al., 2023). Asamoah et al. (2023) brought attention to the vital role of supply chain management in maintaining and keeping the healthcare sector functional. This study performed a quantitative analysis of the impact of SC visibility (SCV) on Ghana's health service. The study used the Kumasi Metro Health Directorate as a case study and adopted a questionnaire associated with the mentioned case study for the survey. Both inferential and descriptive statistics were employed, and a regression analysis was performed to establish the effect of supply chain visibility on performance. This study revealed improved SCV measures employed at the Kumasi Metro Health Directorate.

The study also identified technological constraints such as the lack of interaction between automated structures, manual procedures, and communication, which lead to an inconsistent flow of data for stakeholders (Asamoah et al., 2023). Tukamuhabwa and Benjamin (2023) investigated the agro-food supply chain performance. The study displayed limited advancement and a higher risk of rupture in agro-food supply chains while stressing the need to explore this fundamental area. Therefore, the author contributes by performing a cross-sectional survey to explore the relationship between supply chain orientation (SCO) and performance (SCP). This study adopted partial least squares structural equation modeling. The results revealed a significant positive effect of SCO on SCP. Furthermore, supply chain risk management was noted to have a mediating effect on the association between SCO and SCP (Tukamuhabwa & Benjamin, 2023).

3. Human Capital

Human capital can be characterized as the knowledge, experience, abilities, and other attributes, such as personality traits and interests of each individual in an organization (Boon et al., 2017), and these factors distinguish one employee from another. The literature highlights that investing in human capital can improve an organization's capability to perform and achieve success. From a broad perspective, human capital is entrenched in the skills and expertise of both managers 'and employees' (Jin et al. 2010). However, other academics have criticized human capital studies as being too broad (Jin et al., 2010). According to the literature, attitudes, and skills are the most significant aspects of human capital. HC becomes a substantial strength for an organization, and the reasons that could be considered are specificity and novelty (Cai et al., 2016).

3.1 Conceptual framework and hypothesis development

As Fig. 1 shows, our conceptual framework suggests that human capital moderates the relationship between SC agility and HCSC performance. The following model is proposed:

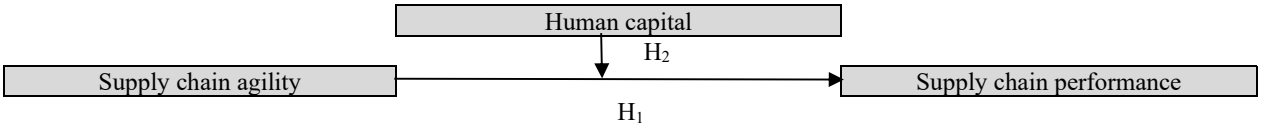

Fig. 1. Research model

3.2 The Association of Supply Chain Agility (SCA) and Supply Chain Performance (SCP) in Healthcare Industry

Remarkable changes in healthcare agility have been observed in the performance of healthcare supply chains. The information transmitted along the supply chain considerably benefits agility and the accompanying lead-time reduction. Providing information decreases the uncertainty, time, and cost of the ordering process. On the other hand, shorter lead times allow businesses to focus on and optimize demand information sharing. On the other hand, longer lead times require enterprises to invest time and resources to integrate their planning and forecasting data with supply chain partners (De Treville et al., 2004). Cherian et al. (2023) investigated the impact of COVID-19 on supply chain agility (SCG), supply chain resilience (SCR), and information technology (IT) across construction industries in India. The study employed confirmatory factor analysis to analyze the data received from the 2020 questionnaire from the construction industries in Southern India. The results support the hypothesis that SCG, SCR, and IT capabilities have a high impact on increasing SC performance and maintaining

sustainability goals (Cherian et al., 2023). Tarigan et al. (2021) in their study stressed the need to improve internal integration in SC performance, which is severely affected by the COVID-19 pandemic. This study mainly focused on the supply of raw materials and finished goods in the country. Data were collected from 456 construction workers and other staff in this industry in Indonesia. This study employed a partial least squares (PLS) regression model for data analysis. The study proposes nine hypotheses by using interdepartmental data sharing to advance SC agility, resilience, and partnerships, which will in turn improve food service and delivery for on-time provision of the necessities of the state (Tarigan et al., 2021). Hospitals can provide effective treatment if SC functions are performed efficiently. Responding to patients' treatment needs as soon as possible is critical for achieving a competitive advantage in healthcare services. As a result, healthcare units may be able to respond better to patients' treatment demands through efficient SC performance. Healthcare agility (HCA) strives to respond to patients' needs as quickly as possible, which can be strengthened by the efficient operation of critical SC procedures (Mandal, 2018). Previous studies have demonstrated that businesses that are more agile than their rivals in many crucial areas of their operations tend to dominate them. By creating an agile supply chain, businesses may react quickly to shifting market conditions and pay less to have inventory on hand, thus increasing their capital returns (Al Humdan et al., 2020). Healthcare SC performance attempts to increase responsiveness by increasing patient flow throughout the system (Baltacioglu et al., 2007). Hence, we contend that higher levels of SC performance in the healthcare industry would translate into higher HCA levels.

H_1: *Supply chain agility and supply chain performance in the healthcare industry are negativelyassociated.*

3.3 Moderating Role of Human Capital (HC) in the relationship between Supply Chain Agility (SCA) and Supply Chain Performance (SCP) in Healthcare Industry

Human capital consists of a workforce, efficient labor, skilled employees, and effective management. Healthcare agility is demonstrated via increasing human capital. Healthcare agility enables a business to adapt quickly to changing consumer needs (Jermsittiparsert & Kampoomprasert, 2019). Because of its agility and the integration of new facilities, viewpoints, and information, human capital can support the growth of numerous healthcare centers. Human capital improves agility in the healthcare setting because it quickly and accurately satisfies firm customer requirements (Chiasera et al., 2018), supporting human capital theory, which is crucial for stabilizing human capital within the constraints of healthcare agility, thus ensuring patient well-being and satisfaction. Healthcare facilities require human capital to boost their supply chain management so that they can interact with customers and patients more efficiently. A survey-based study discovered direct linkages among human capital, operational flexibility, and production time to obtain a competitive edge. According to another study, human capital strategies are critical for ensuring agile, cost-effective, and high-quality operations (Jin et al., 2010). By using HC as a valuable, complex, and unique resource in the development of effective SC performance, healthcare SCs can obtain a competitive edge. The performance of numerous processes engaged in crucial SC functions is referred to as SC performance. Many human resource management techniques moderate the benefits of human capital in supply chains, operational effectiveness, and company innovation (Huo et al., 2015). Businesses should improve their performance by allowing an effective balance of alignment and flexibility between SCM and human resources management. In this regard, human capital resource practices can significantly enhance a firm's capabilities focused on SCM from both intra- and inter-organizational perspectives, resulting in high performance (Ho et al., 2020). HC stands for company-specific specialized skills, knowledge, and expertise. Therefore, effective implementation could lead to improved performance through improved learning (Huang & Li, 2017). In the literature, the use of efficient human capital resources for improved supply chain performance in the health sector has proven expedient. Therefore, we hypothesized that HC has a significant impact on SCA and SCP in the healthcare industry.

H_2: *Human capital moderates the relationship between Supply Chain Agility (SCA) and Supply Chain Performance (SCP) in the healthcare industry.*

4. Methodology

4.1 Population and Sample

According to the online sample size calculator "Raosoft" 200 questionnaires were distributed with a 95% confidence interval and 5% margin of error. A total of 139 questionnaires were distributed to male and female participants for analysis and were used in the hypotheses testing. Questionnaires were distributed online from October 2022 to January 2023. The participants in the current study were doctors, nurses, ray technicians, procurement officers/purchasing managers, pharmacists, and lab technicians. The goal was to obtain feedback from various capacities by not limiting the responses to a single community or hierarchy. This study was conducted at various hospitals in Jordan. The study results demonstrated that out of the total 139 responses, 79 (56.8%) were male, and participants in the age group 36-46 years were higher than other age groups 72 (51.8%), 75 (54%) had a bachelor's degree, and the most reported profession was nursing 63 (45.3%). The other demographic characteristics are shown in Table 1.

Table 1
Demographic characteristics of the participants.

Variables	Frequency	Percent	Variables	Frequency	Percent
Gender					
Male	79	56.8			
Female	60	43.2			
Age groups			**Education level**		
25-35	33	23.7	BA	75	54
36-46	72	51.8	MA	42	30.2
above 47	34	24.5	PhD	22	15.8
Profession			**Type of Healthcare**		
Doctor	50	36	Military Hospital	27	19.4
Nurse	63	45.3	Health Ministry	61	43.9
Ray technician	2	1.4	Private Hospital	13	9.4
Procurement Officer/Purchasing Manager	17	12.2	Educational Hospital	35	25.2
Pharmacist	4	2.9	Charity and Int'l org	3	2.2
Lab Technician	3	2.2			
Number of Beds			**Salary**		
less than 50	34	24.5	less than 1000	88	63.3
50-150	32	23	1000-2499	43	30.9
151-251	27	19.4	2500-3999	4	2.9
252 and above	46	33.1	4000 and more	4	2.9
Job Position					
General Manager	2	1.4	Head of Department	46	33.1
Vice General Manager	5	3.6	Nursing Assistance	8	5.8
Vice of Technical Assistance	4	2.9	Supervisor of Department	17	12.2
Vice of Assistance affairs	7	5	Supervisor of Nursing	26	18.7
Supervisor of Doctors	10	7.2	Purchasing Supervisor/manager	7	5
Specialist Admin	7	5			

4.2 Instrument development and measures

The investigations in this study were conducted using a questionnaire. The questionnaire consisted of pre-designed questions, and the participants were asked to complete the online survey. Participants were first assigned a unique code at the discretion of their identity. Furthermore, they were made aware of the novelty of the study and how their data were used. It was made clear that they may withdraw from participating anytime they encounter any violation of their privacy, which will not impact their profession in any way. No physical harm was permitted during the study period. The questionnaire was fabricated into two sections. The first part comprised demographic variables such as age, gender, education level, job title, healthcare setup, number of beds, salary, and position. The second part comprised five items on human capital, 5 items on healthcare agility, and 4 items on dolphin choirperformance. HC, SC agility, and SCP were measured on a five-point Likert scale (1 = 'strongly disagree" to 5 = 'strongly agree') (Mandal & Santanu, 2018).

4.3 Data Analysis

Principal component analysis was used to extract factors with eigenvalues greater than 1. Varimax rotation was used to facilitate the interpretation of the factor matrix. Factor loadings should be higher than 0.70 according to the recommended parameters for proper construct development (Ab Hamid et al., 2017). The degree of concordance across several approaches for assessing the same concept is referred to as convergent validity. For convergent validity, critical ratios >2, standardized loadings >0.5, and average variance predicted >0.5 are the suggested cut-offs (Fornell & Larcker, 1981; Hair et al., 2010; Anderson & Gerbing, 1988). The approach developed by Fornell and Larcker was used to assess the discriminant validity. The construct validity of all constructs and items was found to be significant (p=0.001). Discriminant validity was investigated by studying the inter-construct correlation coefficients. For a measurement model's discriminant validity to be deemed acceptable, the minimum average variance extracted (AVE) should be greater than the squares of the between-construct correlation coefficients (Hong & Cho, 2011). A linear regression model was employed for hypothesis testing.

4.4 Reliability and Validity

The reliability of the measures was assessed using Cronbach's alpha. The alpha values ranged from 0.884 to 0.914 (Hair et al., 2010). In addition, Table 3 presents the results of the convergent validity.

Table 2
Convergent validity

	HC1	HC2	HC3	HC4	HC5	AG1	AG2	AG3	AG4	AG5	P1	P2	P3	P4	TOTAL
HC1	1	.701**	.622**	.582**	.551**	.512**	.469**	.480**	.417**	.293**	.349**	.428**	.531**	.504**	.677**
HC2	.701**	1	.758**	.515**	.532**	.432**	.430**	.376**	.350**	.305**	.288**	.415**	.447**	.456**	.631**
HC3	.622**	.758**	1	.602**	.606**	.490**	.465**	.498**	.456**	.425**	.363**	.470**	.536**	.486**	.703**
HC4	.582**	.515**	.602**	1	.731**	.610**	.624**	.535**	.576**	.503**	.498**	.475**	.513**	.546**	.764**
HC5	.551**	.532**	.606**	.731**	1	.607**	.579**	.577**	.484**	.375**	.444**	.443**	.552**	.527**	.735**
AG1	.512**	.432**	.490**	.610**	.607**	1	.784**	.725**	.609**	.658**	.640**	.705**	.726**	.698**	.855**
AG2	.469**	.430**	.465**	.624**	.579**	.784**	1	.736**	.645**	.559**	.619**	.658**	.691**	.637**	.827**
AG3	.480**	.376**	.498**	.535**	.577**	.725**	.736**	1	.777**	.648**	.618**	.643**	.770**	.689**	.848**
AG4	.417**	.350**	.456**	.576**	.484**	.609**	.645**	.777**	1	.665**	.630**	.622**	.673**	.609**	.796**
AG5	.293**	.305**	.425**	.503**	.375**	.658**	.559**	.648**	.665**	1	.730**	.677**	.565**	.540**	.742**
P1	.349**	.288**	.363**	.498**	.444**	.640**	.619**	.618**	.630**	.730**	1	.713**	.582**	.591**	.754**
P2	.428**	.415**	.470**	.475**	.443**	.705**	.658**	.643**	.622**	.677**	.713**	1	.676**	.635**	.797**
P3	.531**	.447**	.536**	.513**	.552**	.726**	.691**	.770**	.673**	.565**	.582**	.676**	1	.776**	.844**
P4	.504**	.456**	.486**	.546**	.527**	.698**	.637**	.689**	.609**	.540**	.591**	.635**	.776**	1	.816**

HC: human capital, AG: agility, P: performance
** denotes P- value <0.05

In the present study, discriminant validity was also found to be significant among all constructs; however, it was not discriminant between supply chain performance and agility, as shown in Table 3.

Table 3
Discriminant Validity

	HC latent	AG latent	P latent
HC latent	0.774	0.663**	0.649**
AG latent	0.663**	0.787	0.879
P latent	0.649**	0.879	0.768

HC: human capital, AG: agility, P: Performance
** denotes P- value <0.05

4.5 Testing Hypotheses

A high degree of correlation (R= 0.883) was observed when the linear regression model was applied, it was also observed that the regression model predicted the dependent variable significantly (F= 5241.45, p= 0.000). The coefficient table shows that human capital and supply chain agility contributed significantly to the model (p <0.05), as shown in Table 5.

Table 4
Hypotheses testing using multivariate linear regression model.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Decision
		B	Std. Error	Beta			
1	(Constant)	0.034	0.183		0.187	0.852	
	Human Capital	0.145	0.066	0.118	2.203	0.029	Supported
	Supply Chain Agility	0.847	0.057	0.800	14.911	0.000	Supported

Dependent Variable: Supply Chain Performance

5. Discussion

The purpose of this study was to determine the association between supply chain agility and supply chain performance (**H1**). The results provide evidence of a successful and impactful association between supply chain agility and performance in the health care industry. If these two factors coincide under appropriate human capital, a successful association will provide many benefits to the healthcare industry. These results failed to reject H1 of the current study. This study is particularly relevant, given the recent challenges facing the healthcare industry, including increasing competition and the need for better healthcare and medical services. The provision of better healthcare and medical services, as well as the rise in competition between medical institutions to attract more patients, are some of the recent difficulties faced by the healthcare sector (Budgett et al., 2017). Numerous recent studies have examined how hospital SC management (SCM) influences the efficiency and quality of healthcare facilities and services (Mohammadian et al., 2021). Oliver and Weber (1982) use the term SCM to describe the practice of coordinating improvements throughout the SC to boost efficiency and productivity. It is the coordination of several departments throughout the SC, as well as the exchange of goods, information, and money, to satisfy customers and increase efficiency and competitiveness (Vaishnavi et al., 2019). Our findings support the notion that HC plays a significant and positive role in healthcare SC performance, particularly agility. Moreover, our data suggest that the positive impact of HC on healthcare SC performance is moderated by the role of HC in supply chain management.

It was presumed that HC had a moderating impact on the relationship between SC agility and healthcare supply chain performance (**H2**). The results demonstrate a higher level of contribution of human capital to improving the positive association between SC agility and performance in healthcare development. This result coincides with Hypothesis **H2.** The hypothesis states that HC has a positive moderating impact on healthcare SC performance in supply chain management. The impact of human capital on supply chain performance was significantly evident, according to the current study's regression model. These results coincide significantly with Hypothesis **H2.** This was examined in the present study. According to Mandal et al. (2018) and Rizvi (2011), it is favorable to use efficient human capital resources to increase SCP in the healthcare sector. To maximize their ability to adapt to changing environmental conditions, healthcare organizations must prioritize agility. Our study highlights the importance of ongoing employee training and effective human capital resource management practices in achieving this goal. Specifically, we found that the proper assignment of personnel to appropriate positions and the use of human resource management (HRM) techniques and principles can increase employee efficiency and ultimately improve the performance and productivity of healthcare organizations. Additionally, fair HRM practices can improve employees' commitment to the organization and job satisfaction.

Researchers have attempted to uncover the elements influencing supply chain agility to provide an ideal environment for the installation of technologies in healthcare companies. As a result, these organizations are more capable of adapting to changing environmental circumstances and acting as an active network of members whose composition varies over time (Wu and Barnes, 2010). Internal management changes have revealed insufficient approaches that show progress in the operation of such hospitals and medical facilities, which are directly overseen by governments and are particularly common in developing nations (Musazadeh et al., 2013).

All firm's human resources form its foundation, and SCM also plays a major role in how well an organization performs. Consequently, the human resources and supply chain management (HRSCM) system has been developed to play a supportive role in the development of an organization's value chain. An organization can improve SCM effectiveness by implementing HRM practices at a low level and when connected with SCM. This would provide an advantage in the throat market (Kureshi et al., 2009).

One of the key requirements of SCM agility is ongoing employee training. The efficacy and efficiency of employees can be increased using appropriate HRM principles and techniques, which will ultimately lead to an increase in the performance and productivity of the business. The art of assigning personnel to appropriate positions can be broadly used to define HRM. In addition, it aims to create and maintain positive relationships within a company at all administrative levels. Employee commitment to the organization and job satisfaction can both be attributed to a fair HRM system (Mahalleh et al., 2022).

With the adoption of HC as a key resource, the literature has filled the gaps in the research to analyze the role of HC in the growth of healthcare SC performance, as well as the research call for examining the causes of agility from an organizational perspective (Brusset, 2016). The development of HC is an important factor in enabling the performance of the healthcare SC, and as a result, improves the agility of the sector.

6. Conclusion

In conclusion, we failed to reject **H1**, which shows a positive association between supply chain agility and performance in the healthcare industry. Furthermore, our findings suggest that SCP and agility are affected by HC. Hypothesis **H2**, on the impact of HC on supply chain agility and performance, failed to reject and hence described the significane of human capital resources. Organizations should emphasize the value of using intellectual capital for routine and strategic activities. Every organization in the healthcare SCs should recognize the value of coordinated efforts; it may also help healthcare institutions obtain a competitive edge by responding to patients' treatment needs more rapidly. Furthermore, this study conceptualized and empirically developed the concepts of HC, HCP, and SC agility.

7. Theoretical and Practical Implications

This study makes a substantial contribution to the existing literature. Exploring the influence of HC on the relationships between predictors and performance not only contributes to a better understanding of HC and the role of key competitive drivers but also highlights regional differences that may help managers consider these issues when developing more effective strategies. HC has been identified as an important organizational resource that can result in favorable performance. Such organizational resources may also help healthcare institutions obtain a competitive edge by responding to patients' treatment needs more quickly. In addition, this study conceptualized and experimentally developed the concepts of HC, HCA, and healthcare SC performance in the healthcare sector. As a result, this study provides a solid foundation for future research in the healthcare industry from organizational learning and resource-based perspectives. This study found that human capital has a positive impact on healthcare supply chain (SC) agility, responsiveness, and efficiency, which suggests that investing in human capital resources can lead to improved performance and productivity in the healthcare sector. It also highlighted the important role of human capital supply chain performance (HCSCP) in moderating the relationship between human capital

and healthcare supply chain agility (HCA). This implies that efforts to improve HCSCP can lead to better healthcare supply chain agility and, consequently, better healthcare outcomes.

This study underscores the importance of healthcare supply chain management (SCM) in enhancing the efficiency and quality of healthcare facilities and services. Specifically, the study found that HC plays a crucial role in improving SCM effectiveness, and consequently, healthcare supply chain performance. This highlights the need for ongoing employee training as a key requirement in healthcare supply chain agility. This suggests that healthcare organizations must invest in employee training and development programs to improve their agility and responsiveness to changing environmental conditions.

Our study provides important insights for healthcare organizations seeking to improve their performance and agility. By prioritizing HC and implementing effective HRM practices, organizations can enhance their SC performance and respond better to changing environmental conditions. The findings of this study are particularly relevant and timely as the healthcare industry continues to face new challenges. Further research is needed to expand these findings and develop a more comprehensive understanding of the relationship between HC and healthcare SC performance.

8. Limitations and Future Research

Our study contributes to the literature by filling gaps in research on the role of HC in healthcare SC performance and organizational agility. However, there are certain limitations to our study, including the relatively small sample size and use of an online questionnaire, which may have introduced response bias. Future studies should address these limitations and explore the impact of HC on healthcare SC performance and agility.

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