

## The impact of sourcing strategies and logistics capabilities on organizational performance during the COVID-19 pandemic: Evidence from Jordanian pharmaceutical industries

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### ABSTRACT

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Achieving and maintaining good business performance is a core concern of every business entity. This quantitative study investigates the impact of sourcing strategies and logistics capabilities on the performance of Jordanian pharmaceutical enterprises using partial least square structural equation modeling (PLS-SEM). The views and perceptions of 951 managers and assistant manager respondents working in Jordanian pharmaceutical companies were gathered anonymously via an electronic online questionnaire using a convenience sampling technique. The findings revealed that sourcing strategies and logistical capabilities have a significant positive impact on organizational performance in pharmaceutical companies. Insourcing, near-sourcing, few / many suppliers, joint ventures, and virtual enterprises were perceived to be effective sourcing strategies in improving organizational performance. In contrast, outsourcing, and vertical integration were perceived to have a negligible impact on the performance in the context of pharmaceuticals. Furthermore, the findings confirmed that individual logistic capabilities (safety and compliance, storage, delivery, and imports and exports) of pharmaceutical firms were perceived as impacting positively on firm performance. This research provides useful insight for decision makers in pharmaceutical companies in Jordan when reviewing their supply chain, particularly during challenging and turbulent times such as the COVID-19 pandemic.

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### 1. Introduction

As clearly demonstrated throughout the COVID-19 pandemic, the pharmaceutical supply chain is one of the most important within the healthcare system (Sazvar et al., 2021), and given that medicine is considered a strategic commodity, the smallest supply chain disruption can result in severe crises. As a result, pharmaceutical product distribution needs to combine cost minimization with full-service standard compliance while taking full account of risks due to uncertainty (Goodarzian et al., 2020; Al-Madi et al., 2021). Decisions and strategies relating to supply chain design and operations are directly related to the product and given that within the pharmaceutical industry there are increasingly complex product portfolios, and progressively stringent regulations, the costs of pharmaceutical supply chains are rising (Sarkis et al., 2021). In this volatile climate, supply interruptions frequently result in reduced returns on profitability and leverage, as well as a decrease in productivity, market-share, and goodwill; all of which have an influence on profitability (Freije et al., 2021). The role of sourcing strategies and logistic capabilities is therefore of key importance in pharmaceutical supply chains, yet despite this importance, there is limited research available which fully explores this relationship, particularly in the context of developing countries such as Jordan (Singh et al., 2016). This study therefore aims to help fill this gap by providing further evidence and understanding of this relationship in the context of the pharmaceutical industry, during one of its most challenging periods.

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## 2. COVID-19 and the current context

The COVID-19 situation is constantly developing and changing. It is unclear if short-term changes and reactions will lead to a new 'normal'. It is possible that adjustments to present ideas or new theoretical breakthroughs may be required. The COVID-19 pandemic adds to the knowledge that the three pillars of supply sustainability are closely intertwined (Mahdi & Nassar, 2021). Economic repercussions have occurred as a result of supply chain disruptions across businesses; certain non-essential enterprises have been unable to recover entirely (Paul et al., 2021a,b; Al-Madi et al., 2021). In the aftermath of COVID-19, it is likely that the intense focus on risk management across pharmaceutical networks and supply chains will continue, despite the inevitable increase in costs (Kelleher et al., 2020). In 2020, 94 percent of Fortune 1000 organizations experienced supply chain interruption because of the Covid-19 outbreak. Supply interruption management has received a lot of attention from practitioners and academics. A wide range of solutions to mitigate the impact of production breakdowns have subsequently been proposed, including demand shifting, conditional sourcing, supplier diversity, logistics planning, recovery, and many others (Gharoun et al., 2021).

The pharmaceutical industry is one of the largest in Jordan, and it was one of the first countries in the Arab world to start manufacturing and exporting common medicines on a global scale. Manufacturers are predominantly located in industrial zones around Amman, and the sector benefits from a highly skilled workforce (Salih et al., 2019). However, the country was particularly impacted by COVID-19 with one of the highest reported infection rates per capita in the world in 2020 (Ministry of Health, 2020). The pandemic, more than ever before, brought to the fore the need to build in reliance into the pharmaceutical supply chain and the importance of sourcing strategies and logistics capabilities.

## 3. Literature Review

### 3.1 The Pharmaceutical Supply Chain

The management of the pharmaceutical supply chain is a complex process that requires the engagement and participation of a wide range of stakeholders including pharmaceutical manufacturers, wholesalers, distributors, information providers, regulatory agencies, and customers, (Kamboor et al., 2018; Singh & Goh, 2019; Settanni et al., 2017; Silva & Mattos, 2019). It ultimately seeks to ensure that medicines are made available in the right quantity, with the right quality, to the right place and customers, at the right time, and at the optimum price that is acceptable to the wider healthcare system (Muhia et al., 2017; Al-Madi et al., 2021).

### 3.2 Global Sourcing

There are several advantages to global sourcing efforts, including cost savings, access to technological superiority, availability if domestic capacity is depleted, and the potential to bring domestic goods under intense competition (Bianchi et al., 2021). Common global sourcing challenges include greater supply risk, production time, a lack of expertise, opposition to change, as well as differences in culture (Kurpjuweit et al., 2021). Different sourcing strategies that have been tailored to each of a company's primary product groupings are often required (Freije et al., 2021). Clearly, product organization sourcing methods are required owing to varying supplier market circumstances (Yazdani et al., 2021a,b). Supply chain techniques that include redundancy, such as having numerous supply sources, mitigate the immediate effect of a supply chain interruption by buying time (Kamalahmadi et al., 2021). With trends such as global buying and lean manufacturing, the danger of supply chain interruption has grown rapidly in recent years, as well as the consequences of disruptions may be significant. Recent research emphasizes the necessity of adopting mixed strategies by integrating diverse proactive policies or including both prevention and intervention countermeasures. In reality, many businesses use a combination of techniques. For example, to avoid catastrophic interruptions, Huawei (China's largest worldwide supplier of communications and information technology, infrastructure, and smart devices) combines proactive procurement processes and safety inventories. Supply interruption has emerged as a key risk for enterprises worldwide (Butt, 2020, 2021). To participate in the domestic market, an organization may employ two decision levers: price modification and order split between dependable but expensive suppliers and/or inexpensive but unreliable suppliers (Chaturvedi, 2021). Supply interruption is attributable to a variety of factors, including shipping delays, regulatory delays, and quality issues, to mention a few (Ferreira et al., 2020, 2021). Firms have recently adopted sourcing methods that include a mix of supply, such as a lower-cost supplier inside a developing economy and a more dependable production facility right before the end market (Al Shraah et al., 2021). This method helps to protect against future supply disruptions while also controlling expenses (Trautrim et al., 2020).

### 3.3 Sourcing Strategies

Sourcing strategies and planning have a huge impact on procurement performance (Huma et al., 2020), and there are a wide range of strategies a company can use; each with its own advantages and disadvantages (Chondrakis & Sako, 2020). In essence, sourcing strategies are a set of strategic sourcing decisions that influence the protracted sustainability of supply chain management (McMaster et al., 2020). As a result, the advantages and dangers of extensive distribution operations must be carefully weighed (Jo et al., 2020). Supply chain flaws resulting from poor sourcing decisions result in a loss of value for shareholders. Sourcing has therefore evolved into a critical strategic choice in the face of supply disruption concerns (Sarkis, 2021).

Insourcing logistics refers to when a firm operates its logistics in-house and will own and operate the transport, buildings, equipment, and expertise itself to deliver the logistics functions of the business (El Mokri et al., 2016). It offers the advantage of a high degree of visibility and control over all operations but is also time intensive and can lead to inflexibility which is something that can be detrimental in the pharmaceutical industry (Haial et al., 2021; Al-Madi et al., 2021). Outsourcing is a solution in which one business aids another organization to meet their goals and objectives (Suresh & Ravichandran, 2021). For a business, there are several forms of outsourcing, such as logistics management outsourcing, human resource management outsourcing, and information and technology outsourcing (Rintala et al., 2021). As a result of globalization, more businesses are focusing on their core competencies, which is why outsourcing is becoming increasingly crucial. A firm may outsource their logistics for a variety of reasons, including the desire to focus on its firm's multiple operations or to enhance the effectiveness of its business (Nevo & Kotlarsky, 2020; Al-Madi et al., 2021). Outsourcing logistics allows a firm to influence the efficiency of its goods by concentrating much more on organization; outsourcing also cuts costs such as labor and transportation. It may also help a firm boost its performance and effectiveness by delivering the right products at the right time (Khan et al., 2021). As a result of globalization, it has been argued that more companies should focus on their core competencies, which is why outsourcing is becoming increasingly crucial (Goletz & Bahamonde-Birke, 2021). There are several motivations for a firm to outsource their logistics, including the desire to focus on their multiple operations or to increase business efficiency. The actions and reactions to the COVID-19 pandemic are unparalleled in modern processes and supply systems (Amankwah-Amoah, 2020). Academicians and researchers are trying to determine how the pandemic will force a reconsideration of key academic concepts and ontology. Relatively brief environmental sustainability advantages exist, but long-term implications are yet unknown and require further investigation (Settembre-Blundo et al., 2021). Sustainability, as well as adaptability, are complementary concepts that must be investigated together (Tseng et al., 2021).

Near-sourcing is a strategy used when the supply chain strategy focuses on core competencies and on achieving improvements in profitability, efficiency and flexibility, and is commonly used for commodities requiring time or temperature-control management such as pharmaceuticals (Sykes, 2018). During the pandemic, there was a resurgence in the regionalization of certain supply chains within the pharmaceutical industry in order to mitigate against the risk of logistics disruptions (Gereffi, 2021). Another sourcing strategy considered in this study is vertical integration which involves business expansion with firms at different stages of the production pathway such as suppliers or distributors. Within a pharmaceutical context, vertical integration as a sourcing strategy can deliver several benefits though achieving alignment across entire organizational ecosystems and across the supply chain. Firms may use vertical integration to be able to access lower priced or higher quality raw materials, or vertically integrate in the other direction to access new geographical markets (Liknaw and Shimels, 2020). Post COVID-19, it has been argued that vertical integration may present new opportunities for pharmaceutical firms and may become an increasingly popular sourcing strategy (Jenkins et al., 2021).

The 'few' or 'many' suppliers sourcing strategy is focused on achieving the optimum numbers of suppliers in the chain. The 'many' suppliers sourcing strategy is typically based on price with suppliers competing against each other, and then retaining responsibility for key factors such as technology, expertise, forecasting, cost, quality, and delivery. The 'few' suppliers sourcing strategy focusses on longer term relationships with fewer suppliers in the chain, with the benefits of economies of scale and emphasis on quality improvement (Aamer, 2018). Joint ventures provide another option in terms of enhancing a firm's sourcing capabilities. Joint ventures represent one of the most advanced strategic partnerships for pharmaceutical firms and are commonly used as a means of entering an emerging market. They allow firms to have more control and flexibility than other partnership options but can require large capital investment. During the pandemic, there have been calls for more joint ventures between global COVID-19 vaccine manufacturers and local pharmaceutical companies to create regional manufacturing hubs to accelerate the production and transfer of the vaccine. It is argued that such ventures may incentivize pharmaceutical companies to share not only their patents but also their tacit production (Fu et al., 2021). A further sourcing strategy that may be considered are virtual enterprises. Increasingly, pharmaceutical firms are looking to drive out risk and enhance quality through virtual manufacturing and supply networks. The term 'virtual enterprise' was first coined to explain the virtual links amongst organizations that were supported by information technology. In times of crisis, such as the pandemic, traditional sourcing strategies do not support the flexibility or resilience needed by a supply chain. The key benefits of virtual enterprises in the pharmaceutical context are therefore the sharing of resources and technology, optimization of collaborations, improved flow of information and knowledge, reduction in physical coordination costs, greater flexibility, and access to one another's innovations and markets (Wamba et al., 2019).

### *3.4 Impact of sourcing strategies on organizational performance*

Sourcing is a process that is used by both private and public entities (Bagul & Mukherjee, 2020; Al Shraah, et al., 2021). It is described as the acquisition of services and goods from sources outside of the company (Hock-Doepgen et al., 2021). Strategy can be defined as a company's positioning to maximize the value of the capabilities that differentiate it from competitors (Adigüzel, 2020). Most strategic concepts have one thing in common: they all attempt to optimize organizational value while improving its efficacy in competitive industry (Suoniemi et al., 2020). Sourcing is the purposeful utilization of outside resources needed to complete tasks that would normally be handled through internal personnel and resources (Pustovrh et al., 2020; Al-Madi et al., 2021). Companies that use a well-managed sourcing deal can obtain a competitive advantage in areas that otherwise would be unprofitable.

There are a number of dimensions from which organizational performance in the supply chain can be assessed. One such dimension involves the ‘customer perspective’, which includes measuring levels of customer satisfaction, understanding customer needs and requirements, actively gathering and using customer feedback, and building loyalty and brand identity. Another dimension of performance includes the financial perspective. This perspective of performance focuses on factors such as financial goals, profit levels, and measures such as return on investment and return on equity. A third dimension is to view performance through a process perspective. This encompasses factors such as time delivery performance, wastage levels, quality control processes, and skills and competences. A final dimension, which is featured in this study, includes viewing performance from a learning and growth perspective. This focuses on factors such as training and development, employee involvement, and innovation culture. Studies have suggested that these perspectives of supply chain performance are associated with sourcing strategies and logistic capabilities in certain contexts (Pakurár et al., 2019) and so is an area that is further explored by this study, and the context of the pharmaceutical industry.

### 3.5 Impact of logistic capabilities on organizational performance

Logistics are the foundation of any business and put simply, involve the movement of goods and services from one location to another (Pascucci, 2021). Logistics capabilities are defined as the specialized skills, attributes and knowledge within a firm that helps it to manage its logistics activities such as transportation and distribution of raw materials and finished goods, in an efficient, safe and effective way (Mandal et al., 2017). Logistics capabilities are one of the key dynamic capabilities of a firm, affecting the creation of business models, as well as the formulation of the firm’s business strategies. They have been identified as being important in relation to responding to unexpected events or supply chain disruptions. According to Matwiejczuk (2020), logistics capabilities can be developed in both the “real sphere” where they are associated with processes such as transport, storage, and handling, and in the “regulatory sphere” where they are associated with decision processes such as the flow of materials and information, and the subsequent management of these (Al-Madi et al., 2021).

Safety and compliance logistics capabilities feature highly within the highly regulated pharmaceutical industry. Pharmaceutical manufacturers must ensure and demonstrate full end-to-end compliance with government-overseen regulations for their products throughout the entire supply chain, including adhering to import and export regulations. Drug safety is a particular consideration in the industry as it is at risk from theft and counterfeiting. As a consequence, ensuring traceability in the supply chain, from raw material supply to finished products to patients, has become of critical importance and an important logistics capability. Another key logistics capability focuses around storage and delivery. Many pharmaceutical products are more susceptible to temperature variations, and as a result end-to-end temperature control has become increasingly important in the supply chain and the management of this is key. According to Matwiejczuk (2017), logistics capabilities play a crucial role in creating business competitive advantage creation and call for further investigation into their influence on business and market success, as well as the long-term competitive position on the market.

## 4. The Model of Study

Based on the previous literature review, the research conceptual model for this study is illustrated in Fig. 1:

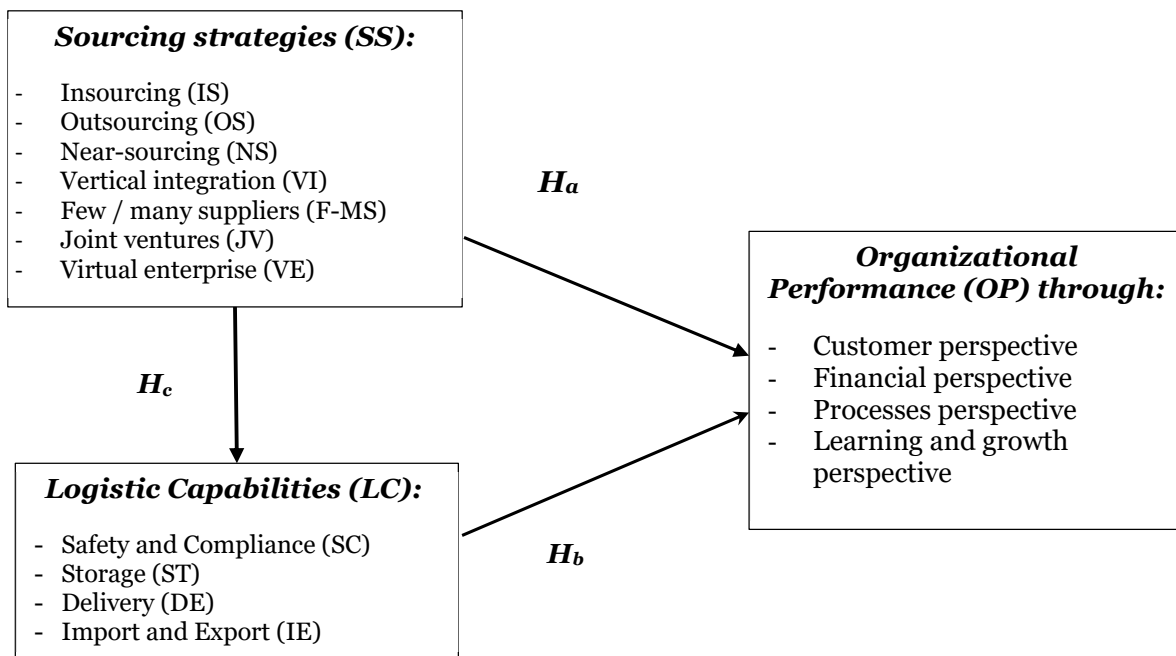


Fig. 1. Research Model

#### 4.1 Research Questions and Hypotheses

Following a comprehensive review of the current literature and the conceptual model in Fig. 1, the following research questions were set:

- What is the perceived impact of sourcing strategies on organizational performance in Jordanian pharmaceutical firms?
- What is the perceived impact of logistic capabilities on organizational performance in Jordanian pharmaceutical firms?

These questions were then extrapolated into three main hypotheses (*Ha*, *Hb*, and *Hc*), and each hypothesis includes a group of sub-hypotheses, which were then tested as the core part of this study:

***Ha: Sourcing strategies (SS) has a positive impact on organizational performance (OP).***

*Ha1: Insourcing has a positive impact on organizational performance.*

*Ha2: Outsourcing has a positive impact on organizational performance.*

*Ha3: Near-sourcing has a positive impact on organizational performance.*

*Ha4: Vertical integration has a positive impact on organizational performance.*

*Ha5: Few/many suppliers have a positive impact on organizational performance.*

*Ha6: Joint venture has a positive impact on organizational performance.*

*Ha7: Virtual enterprise has a positive impact on organizational performance.*

***Hb: Logistics capabilities (LC) have a positive impact on organizational performance (OP).***

*Hb1: Safety and compliance have a positive impact on organizational performance.*

*Hb2: Storage has a positive impact on organizational performance.*

*Hb3: Delivery has a positive impact on organizational performance.*

*Hb4: Export and import have a positive impact on organizational performance.*

***Hc: Sourcing strategies have a positive impact on Logistics capabilities (LC).***

## 5. Research Methodology

This study adopted a quantitative, cross-sectional, and surveyed based approach. The overall philosophy underpinning the study was that of pragmatism. The study gathered the perceptions and views of managers and assistant managers working within a sample of Jordanian pharmaceutical firms, using an anonymous electronic questionnaire.

### 5.1 Measurement

Consistent with other studies referred to in the literature review, this study used measurement scales to measure the different constructs. The choice of items for inclusion in the study was influenced by a study of logistics capability in an e-commerce market by Joong-Kun & Sink (2008). The sourcing strategies included 7 items including: insourcing (IS), outsourcing (OS), near-sourcing (NS), vertical integration (VI), few / many suppliers (F-MS), joint ventures (JV), and virtual enterprise (VE). The logistics capabilities items included: Safety and Compliance (SC); Storage (ST); Delivery (DE); and Import and Export (IE). Finally, the last construct of organizational performance included 4 items: Customer perspective; Financial perspective; Processes perspective; and learning and growth perspective. All measurements were based on a 5 points Likert scale ranging from strongly agree (5) to strongly disagree (1).

### 5.2 Data Collection Process

An online questionnaire was developed on Google forms. A convenience sampling approach was taken targeting managers and assistant managers working within Jordanian pharmaceutical firms using social media platforms such as Facebook, WhatsApp, and Instagram. 978 questionnaires were completed. 951 were quality checked and considered suitable for the study and the rest were screened out due to being outliers or completed by respondents who were not within the target population. The data was then exported into Microsoft Excel (CSV) file and the file was encoded into Smart-PLS 3.3.3. a version using 5000 sub-sampling (Lia et al., 2020).

### 5.3 Data Analysis Techniques

The study used a partial least square structural equation model (PLS-SEM) analysis (Hair et al., 2017; Haq & Awan, 2020) as a data analysis tool. PLS-SEM is a dual-stage estimation process which involves a measurement model and structural model assessment (Sarstedt et al., 2017). The measurement model aimed to estimate the reliability and validity (discriminant and convergent validity) of the constructs and indicators of constructs in the model. Meanwhile, the structural model assessment aimed to test the hypotheses statistically. In the measurement model, the study focused on Cronbach alpha ( $\alpha$ ),

construct reliability (CR), factor loadings (FD), average variance extracted (AVE), Fornell and Larcker criterion, and Heterotrait-Monotrait ratio (HTMT). The indicator reliability was estimated through  $\alpha$  and CR. In addition, FD was estimated to measure the indicator reliability. AVE was used to measure the convergent validity where the core purpose was investigating findings of association between constructs. The discriminant validity involved estimating the distinct properties of the variables from other variables in the model (Hair et al., 2010). The study used two measures to capture the discriminant validity, Fornell and Larcker ratio, and HTMT ratio. Both are measures of association and capture the homogeneity and multicollinearity among constructs (Ab Hamid et al., 2017). The second stage was a structural model assessment (Hair et al., 2017), where the hypotheses were tested. The study considered p-values and t-statistics to capture the statistical significance of the relationships.

**6. Analysis and Results**

*6.1 Demographics Summary*

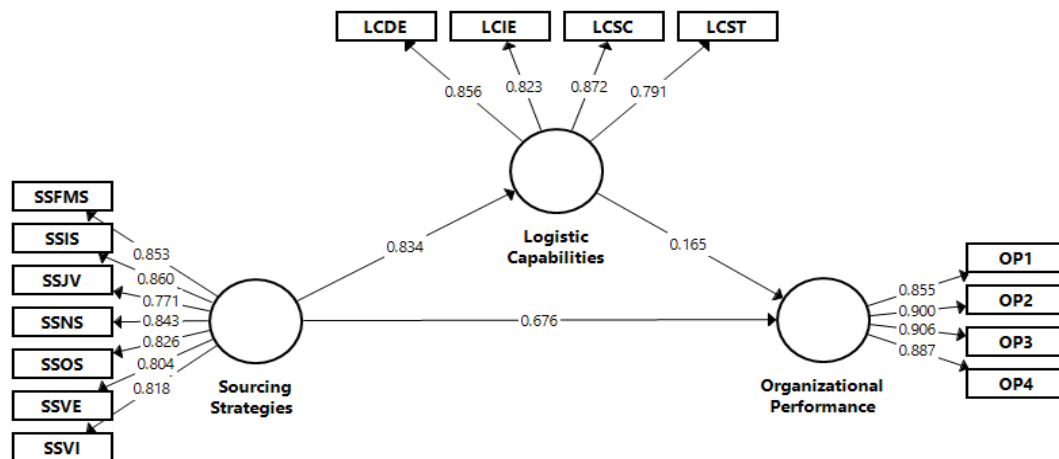
Table 1 depicts the demographic profile of the respondents. There were 56.89% male and 43.11% female respondents. This research focused on managerial level staff from pharmaceutical companies; hence 51.21% percent were managers in pharmaceutical companies and 48.79% were assistant managers. Almost 90% percent of respondents had bachelor’s degrees, master’s degrees, and diplomas however only 5% of them were Ph.D. holders. In addition, they belonged to diverse experience backgrounds.

**Table 1**  
Demographic summary

<b>Gender</b>		
Male	541	56.89%
Female	410	43.11%
<b>Job role</b>		
Managers	487	51.21%
Assistant Managers	464	48.79%
<b>Education</b>		
Bachelors	316	33.23%
Master	306	32.18%
PhD	48	5.05%
Diplomas and other	281	29.55%
<b>Experience</b>		
1 to 3 years	198	20.82%
4 to 6 years	185	19.45%
7 to 9 years	201	21.14%
10 to 12 years	191	20.08%
12 years and above	176	18.51%
	<b>n = 951</b>	<b>100%</b>

*6.2 Measurement Model Assessment*

The measurement model outcomes are illustrated in Fig. 2 and Table 2 along with descriptive statistics such as the mean and standard deviation. The measurement model outcomes were satisfactory for all measures. The outcomes were above the threshold point (Hair et al., 2017); 0.70 for both Cronbach alpha and construct reliability (CR), hence the contract reliability was satisfactory. Likewise, the factor loadings were above 0.70 (Hair et al., 2017) indicating indicator or item’s satisfactory reliability for all items within each construct. All AVE coefficients above 0.50 (Hair et al., 2017) were indicating a higher convergent validity among constructs.



**Fig. 2.** Measurement Model

**Table 2**

Descriptive statistics and Measurement model outcomes

Constructs	Code	FD	$\alpha$	CR	AVE	M	SD
Sourcing Strategies			0.922	0.937	0.681	3.819	1.021
	SSFMS	0.853					
	SSIS	0.860					
	SSJV	0.771					
	SSNS	0.843					
	SSOS	0.826					
	SSVE	0.804					
	SSVI	0.818					
Logistics Capabilities			0.856	0.903	0.699	3.694	1.078
	LCDE	0.856					
	LCIE	0.823					
	LCSC	0.872					
	LCST	0.791					
Organizational Performance			0.910	0.937	0.787	3.977	1.039
	OP1	0.855					
	OP2	0.900					
	OP3	0.906					
	OP4	0.887					

Note: FD=Factor Loadings, CR=Construct Reliability, AVE=Average Variance Extracted, and  $\alpha$ =Cronbach Alpha, M = Mean, SD = Standard

The discriminant validity was measured through Fornell and Larcker criterion and the Heterotrait-Monotrait ratio (HTMT). Table 3 depicts the outputs of the Fornell and Larcker ratio, where the square root of all diagonal values were greater than off-diagonal values. This indicates that the condition for discriminant validity was maintained, and constructs were discriminately valid for estimation. HTMT is another alternative to the Fornell and Larcker ratio. Table 4 delineates that all coefficients were below 0.85 or 0.90, hence HTMT values were below the prescribed criteria indicating the discriminant validity condition was fulfilled. Therefore, the outputs of both Fornell and Larcker and the HTMT ratio confirmed the discriminant validity of the constructs.

**Table 3**

Fornell and Larcker Criterion

	Logistic Capabilities	Organizational Performance	Sourcing Strategies
Logistic Capabilities	<b>0.836</b>		
Organizational Performance	0.729	<b>0.887</b>	
Sourcing Strategies	0.834	0.814	<b>0.825</b>

**Table 4**

HTMT Ratio

	Logistic Capabilities	Organizational Performance	Sourcing Strategies
Logistic Capabilities			
Organizational Performance	0.818		
Sourcing Strategies	0.835	0.84	

### 6.3 Structural Model Assessment

The structural model assessment involved hypothesis testing. This study proposed a set of 14 hypotheses in total. In particular, these hypotheses were classified into the main hypothesis and sub-hypothesis, where the main hypotheses were *Ha*, *Hb*, and *Hc*, and seven sub-hypotheses for *Ha* and four *Hb* were proposed. The results for all hypotheses are depicted in Table 5 and Fig. 3.1, 3.2, and 3.3 respectively. The output of the first hypothesis shows that sourcing strategies meaningfully predict the organizational performance in pharmaceutical companies as *T statistics* = 19.182; *p value* = 0.000, *Ha* is accepted. *T statistics* = 64.814; *p value* = 0.000 shows that the second hypothesis *Hb* was approved and there exists a positive relationship between sourcing strategies and logistic capabilities. Likewise, the third hypothesis *Hc* proved a positive significant relationship between logistic capabilities and organizational performance where *T statistics* = 4.415; *p value* = 0.000.

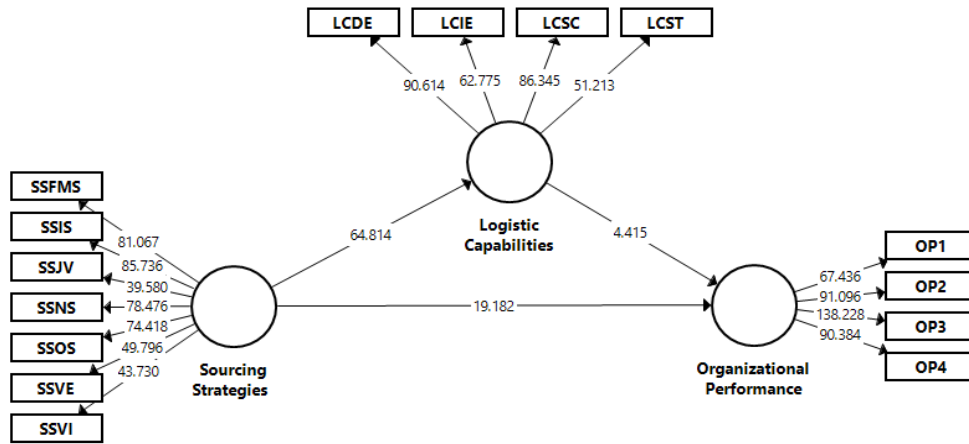
Among the seven sub-hypotheses for *Ha*, five were accepted while two were rejected. In particular, *Ha*<sub>2</sub> and *Ha*<sub>4</sub> were rejected where outsourcing and vertical integration were found to have an insignificant relationship with organizational performance as *T statistics* = 0.622; *p value* = 0.267 and *T statistics* = 1.009; *p value* = 0.157. The other five hypotheses were accepted where in-sourcing, near sourcing, few/ many suppliers, joint venture and virtual enterprise meaningfully predicted organizational performance in Jordanian pharmaceutical companies. Hence *Ha*<sub>1</sub>, *Ha*<sub>3</sub>, *Ha*<sub>5</sub>, *Ha*<sub>6</sub> and *Ha*<sub>7</sub> were accepted as *T statistics* = 10.944; *p value* = 0.000, *T statistics* = 5.745; *p value* = 0.000, *T statistics* = 5.289; *p value* = 0.000, *T statistics* = 5.193; *p value* = 0.000 and *T statistics* = 6.080; *p value* = 0.000 respectively. In other words, insourcing, near sourcing, few / many suppliers, joint ventures, and virtual enterprise were found to positively influence organizational performance. In addition, safety and compliance was found to have a positive significant impact on

organizational performance thus,  $Hb_1$  was accepted under  $T$  statistics = 4.700;  $p$  value = 0.000. In addition, storage and delivery were also meaningfully predictive of a positive impact on organizational performance under  $T$  statistics = 2.929;  $p$  value = 0.003 and  $T$  statistics = 12.83;  $p$  value = 0.000 respectively, hence  $Hb_2$  and  $Hb_3$  were accepted. Finally, exports and imports also showed a positive relationship with organizational performance, hence  $Hb_4$  was accepted as  $T$  statistics = 5.230;  $p$  value = 0.000.

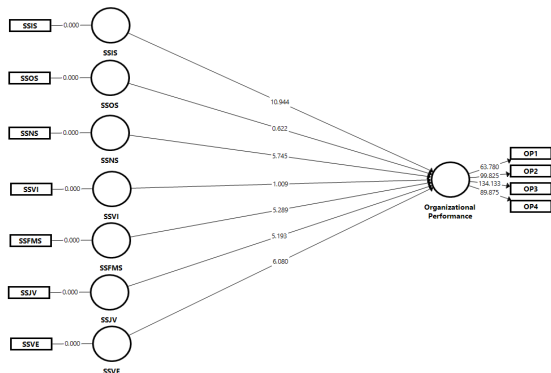
**Table 5**  
Structural model assessment

Hypothesis	Paths	(O)	(M)	STDEV	T Statistics	P Values	Results
$H_a$	SS → OP	0.676	0.674	0.035	19.182	0.000	Supported
$H_b$	SS → LC	0.834	0.835	0.013	64.814	0.000	Supported
$H_c$	LC → OP	0.165	0.167	0.037	4.415	0.000	Supported
$H_{a1}$	SSIS → OP	0.368	0.368	0.034	10.944	0.000	Supported
$H_{a2}$	SSOS → OP	0.018	0.017	0.028	0.622	0.267	Not Supported
$H_{a3}$	SSNS → OP	0.170	0.169	0.030	5.745	0.000	Supported
$H_{a4}$	SSVI → OP	-0.031	-0.030	0.031	1.009	0.157	Not Supported
$H_{a5}$	SSFMS → OP	0.170	0.170	0.032	5.289	0.000	Supported
$H_{a6}$	SSJV → OP	0.120	0.121	0.023	5.193	0.000	Supported
$H_{a7}$	SSVE → OP	0.158	0.157	0.026	6.080	0.000	Supported
$H_{b1}$	LCSC → OP	0.169	0.169	0.036	4.700	0.000	Supported
$H_{b2}$	LCST → OP	0.118	0.118	0.04	2.929	0.003	Supported
$H_{b3}$	LCDE → OP	0.429	0.427	0.033	12.83	0.000	Supported
$H_{b4}$	LCIE → OP	0.148	0.148	0.028	5.230	0.000	Supported

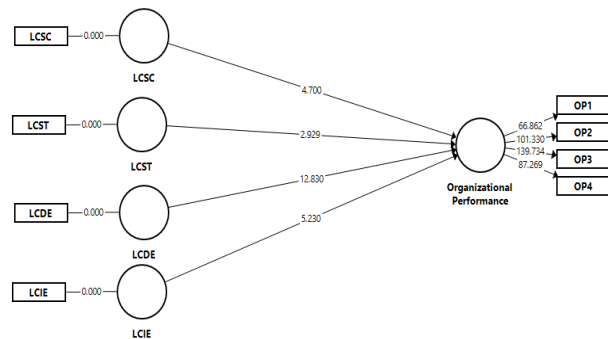
Logistic Capabilities = LC, Organizational Performance = OP, Sourcing Strategies = SS, Original Sample = (O), Sample Mean (M), Standard Deviation



**Fig. 3.1.** Structural Model Assessment



**Fig. 3.2.** Structural Model Assessment



**Fig. 3.3.** Structural Model Assessment



## 7. Discussion

Sourcing strategies are a set of strategic sourcing decisions that influence the protracted sustainability of supply chain management (McMaster et al., 2020). As a result, the advantages and dangers of extensive distribution operations must be carefully weighed (Jo et al., 2020). There are several advantages to global sourcing efforts, including cost savings, access to technological superiority, availability if domestic capacity is depleted, and the potential to bring domestic goods under intense competition or risky conditions (Bianchi et al., 2021; Al-Madi et al., 2021). Common global sourcing challenges include greater supply risk, production time, a lack of expertise, opposition to change, as well as differences in culture (Kurpjuweit et al., 2021). Different sourcing strategies that have been tailored to each of a company's primary product groupings are often required (Freije et al., 2021).

The current research investigated the impact of sourcing strategies and logistics skills on the performance of Jordanian pharmaceutical enterprises using partial least square structural equation modeling (PLS-SEM). This research is based on quantitative, cross-sectional, and surveyed based data. The overall philosophy of this study is positivism. The data was collected at a single point in time. The unit of analysis was managers and assistant managers of Jordanian pharmaceutical firms. To gather information, a questionnaire survey was used. The questionnaire was created using Google Forms. The questionnaire was then disseminated to respondents in Jordanian pharmaceutical enterprises using convenience sampling. This study employed PLS-SEM based on a two-stage estimation technique that includes the evaluation of both the measurement model and the structural model (Sarstedt et al., 2017). The assessment model aimed to evaluate the validity and reliability (discriminant and convergent validity) of the model components and construct indicators. In addition, the structural model evaluation seeks to statistically test the conceptual model of the study.

The results for Cronbach alpha and construct reliability (CR) are both more than 0.70, indicating that the contract dependability is good. Similarly, the factor loadings are more than 0.70, showing that the indicators or items are reliable for all items or build indicators inside each construct. Table 3 shows the Fornell and Larcker ratio outputs when the square root of all diagonal values is greater than the square root of all off-diagonal values. It indicates that the criteria for discriminant validity is still met and that constructs are discriminately valid for estimation. HTMT is a new alternative to the Fornell and Larcker ratio. Table 4 shows that all coefficients are less than 0.85 or 0.90, suggesting that HTMT values were less than the stipulated requirement, demonstrating that the discriminant validity condition was met. The structural model evaluation process includes hypothesis testing. These hypotheses were divided into two categories: major hypothesis and sub-hypothesis, with the main hypothesis being  $H_a$ ,  $H_b$ , and  $H_c$ , and seven sub-hypotheses for  $H_a$  and four  $H_b$  presented. Table 5 and Fig. 3.1, 3.2, and 3.3 show the results for all hypotheses, accordingly.

The first main hypothesis  $H_a$  results demonstrated that sourcing strategies meaningfully enhancing organizational performance in pharmaceutical businesses, with T value of 19.182, and p value=0.000,  $H_a$  accepted. This result conforms with views of Bianchi et al. (2021), Chondrakis and Sako (2020), Al-Madi et al. (2021), and McMaster et al. (2020). Five of the seven sub-hypotheses for  $H_a$  were accepted, while two were rejected. Particularly,  $H_{a2}$  and  $H_{a4}$  were rejected, which means outsourcing and vertical integration have an insignificant impact on organizational performance. On the other hand, five hypotheses ( $H_{a1}$ ,  $H_{a3}$ ,  $H_{a5}$ ,  $H_{a6}$ , and  $H_{a7}$ ) were supported and accepted, which are in-sourcing, near-sourcing, few/many suppliers, joint venture, and virtual enterprise. In other words, insourcing, close sourcing, a small number of suppliers, joint ventures, and virtual enterprises have a significant impact on organizational performance of pharmaceutical companies in Jordan during Covid-19 pandemic. Therefore, safety and compliance have a considerable beneficial influence on organizational performance. Furthermore, storage and distribution have been shown to have a significant influence on organizational performance of pharmaceutical companies in Jordan during Covid-19 pandemic. The findings of  $H_a$  sub-hypotheses are consistent with the findings of Kurpjuweit et al. (2021), Yazdani et al. (2021), and Huma (2020). The findings of current study also indicate that exports and imports have a strong association with organizational success. These findings are essential for Jordan's pharmaceutical industry's management.

The second main hypothesis  $H_b$  was accepted with T value of 64.814, and p value=0.000 indicates that it is accepted and that there is a positive association between logistic capabilities and organizational performance of pharmaceutical firms in Jordan. The sub-hypotheses of  $H_b$  were also accepted. These results oppose the views of Pascucci (2021), Matwiejczuk (2020), Matwiejczuk (2017), Al-Madi et al. (2021), and Mandal et al. (2017). The findings also concur with the findings of a study conducted by Hussain et al., (2019), which emphasized the statistically significant impact of strategic supplier's partnership on organizational performance. Therefore, the firms should build a long and robust relationship with their suppliers to reduce cost and receive products and services of a high quality which leads to enhanced performance of the organization. The third main hypothesis,  $H_c$ , demonstrated a positive significant link between sourcing strategies and logistic capabilities, with T value of 4.415, and p value=0.000. This result concurs with the views of Chondrakis and Sako (2020), El Mokri et al. (2016), and Haial et al. (2021).

## 8. Conclusion

Organizational performance is one of the key primary objectives of any business, and studies have suggested that sourcing strategies and logistic capabilities are a major source of business success and corporate strategy. However, there is limited

research to understand this relationship within the context of pharmaceutical companies especially in developing countries such as Jordan. Therefore, this study, using partial least square structural equation modeling (PLS-SEM), aimed to investigate the impact of sourcing strategies and logistics capabilities on the performance of Jordanian pharmaceutical firms, from the perspective of 951 management level pharmaceutical workers. The main hypotheses found that sourcing strategies and logistic capabilities have a positive significant impact on firm performance. Individually, five out of seven sourcing strategies were found to be perceived as more effective in improving organizational performance including: insourcing, near-sourcing, few / many suppliers, joint ventures, and virtual enterprise. In contrast, outsourcing, and vertical integration, were found to have an insignificant impact on firm performance. Therefore, to enhance the probability of Jordanian pharmaceutical firms' success during Covid-19 pandemic, it is necessary to support outsourcing and vertical integration. All the world now cooperates to face this pandemic.

In addition, the findings demonstrated a positive impact of individual logistics capabilities of safety and compliance, storage, delivery, and import and export, on firm performance. The findings from this study add to the existing literature in two important ways. Firstly, it explores the impact of seven sourcing strategies on organizational performance. Secondly, it investigates the role of four logistics capabilities in improving organizational performance. These findings will be of interest to pharmaceutical organizations in Jordan and wider afield as they will assist in decision making when considering and selecting relevant and optimal sourcing strategies for pharmaceutical firms, particularly during challenging times such as the COVID-19 pandemic. However, the pharmaceutical firms should exploit their logistic capabilities to build a long and robust relationship with their suppliers to reduce cost and receive products and services of a high quality which leads to enhanced performance of the organization.

### 9. Limitations and areas for future research

Although this study delivered some useful findings that help to address the gap in evidence in this field, there were a number of limitations that should be acknowledged. Firstly, this study was solely quantitative in nature and it may have been beneficial to gather qualitative data about managers' experiences and views of sourcing strategies and logistic capabilities specific to the pharmaceutical industry in order to understand this phenomenon better. It is also accepted that this study focused only on managers working within pharmaceutical companies but there may be some merit in exploring the experiences of those working in other industries but within the context of a developing country such as Jordan. Furthermore, the timing of this study, during a global pandemic, may well have impacted on the findings, and a repeat of the study conducted post-pandemic may generate different results. These limitations have identified areas where future research and investigation may be beneficial for those working within supply-chain logistics.

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