

# EXAMINING THE IMPACT OF THE ORGANIZATIONAL IMMUNE SYSTEM ON STRATEGIC ENTREPRENEURSHIP IN PHARMACEUTICAL COMPANIES: THE MEDIATING ROLE OF ORGANIZATIONAL INNOVATION

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## Abstract

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This investigation fills a significant knowledge gap by examining the impact of internal organizational procedures on strategic outcomes in ever-moving markets. In particular, the influence of the organizational immune system (OIS) on the accomplishment of organizational innovation (OI) and strategic entrepreneurship (SE). The study also focused on pharmaceutical businesses listed on the Amman Stock Exchange in Jordan to survey how OI intermediated the link between OIS and strategic business. A total of 181 individuals at the managerial level (including managers, representatives and subordinates) contributed to the survey. Partial least squares structural equation modeling (PLS-SEM) was used to analyze the data. It has been shown that both OI and SE are significantly influenced by the organization's immune system. The results also showed that the link between OIS and SE was mediated by OI. This research is useful for organizations looking to be more entrepreneurial in their strategic approach, as it shows how an organization's immune system can be used to drive innovation within the company, which in turn leads to long-term success.

**Keywords:** Organizational Innovation, Strategic Entrepreneurship, Organizational Immune System, Jordanian Pharmaceutical Companies

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## 1. INTRODUCTION

The importance of strategic entrepreneurship (SE) has increased because the global business

environment is regularly changing very rapidly, driven by forces such as globalization, new communication and information technologies, and fierce competition at local, regional and global

echelons. According to Ireland et al. (2003), SE is an important factor to keep the firm in the market, to be more competitive and to adapt to the new environment in order to spread out and survive. This is because it makes organizations much more resilient to environmental constraints. SE can hardly be considered a choice: rather, it is a need. When SE is employed in organizations, it can benefit from opportunities and address deficiencies, thus guaranteeing sustainable development and optimization of supplies (Ferreira et al., 2013).

In this context, the organizational immune system (OIS) appears as an essential mechanism that strengthens the ability of the organization to reach. Based on the knowledge of dynamic capabilities (Teece, 2016) and the absorption theory of capacity (Cohen, 1998), it can be conceptualized as the internal ability of the company to detect, interpret and respond to external threats and disruption — as a biological immune system. This perspective is in accordance with Kiziloglu's (2015) that OIS supports the adaptability and flexibility of the organization and allows quick and effective responses to challenges in an uncertain and ambiguous environment. As a result, many current organizations seek to level OIS strategically and to ensure sustainable survival, achieve organizational excellence and ensure interesting competitive advantages (Duchek, 2020; Burnard & Bhamra, 2011). However, the maintenance of this balance requires organizational innovation (OI) in today's rapidly developing trade environment because OI allows companies to reconfigure resources, transform challenges into opportunities and implement effective innovation strategies (Teece, 2016).

The relationship between OIS (as predecessor), OI (as a mediator) and SE (as a result) by OIS, OI and SE is both complementary and synergistic. While OIS enhances organizational resistance to sudden and unplanned changes and supports the generation of new solutions, OI increases improvement of products, services and operational efficiency (Damanpour & Aravind, 2012). This trio forms the core of our theoretical framework that integrates dynamic capabilities and absorption perspectives of capacity to explain how internal adaptive mechanisms (OIS) innovation processes (OI), which in turn shift strategic business results (SE).

Despite the growing scientific interest in these constructions, there is an accurate gap in the research area. Although previous studies have examined the links between innovations and SE (Damanpour, 2017) and between knowledge management processes and innovation within the Jordanian pharmaceutical industry (Dahiyat, 2015), no empirical study has explicitly examined the role of OIS in particular, in an emerging economy or a specific industry. This study deals with this gap, focusing on Jordanian pharmaceutical companies that face growing pressures-including increasing operating costs, developing healthcare regulations and intensive competition (Al-Qudah, 2018). It does not cause robust OI and high OI to be maintained.

The aim of this research is to: 1) explore the direct impact of OIS on SE and on OI; 2) to assess the direct effect of OI on SE; 3) test the mediation of OI in the relationship between OIS and SE.

The central research question is:

*RQ: What extent do OI mediate the relationship between OIS and SE in Jordanian pharmaceutical companies?*

Methodically, the study uses a quantitative approach and uses a structured survey completed by managers in the pharmaceutical sector in Jordan. The data was analyzed by SmartPLS to test hypothetical relationships.

The study offers theoretical and practical contributions. Theoretically, it spans the critical gap by providing empirical evidence of the mediation function of OI between OIS and SE, while the new integration framework is based on dynamic capabilities and absorptive capacity theory. It practically offers special knowledge for managers in the pharmaceutical industry on how to strengthen internal adaptive systems and use OI to strengthen strategic business, especially volatile regulatory and competitive environment. The findings also support the development of resistance-oriented strategies that allow companies not only to survive but to benefit from disruption.

This article is structured as follows: Section 2 summarizes theoretical literature on OIS, OI and SE, develops a conceptual framework and presents research hypotheses. Section 3 describes in detail the research methodology, including sampling, data collection and analytical procedures. Section 4 represents the results of data analysis. Section 5 deals with findings in the light of existing theory and practice. Finally, Section 6 concludes a study summary of key knowledge, recognition of restrictions and offering recommendations for future research.

## 2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### 2.1. Organizational immune system

The actual start of use of the organizational immunity concept dates to Degus (1997, as cited in Asaad & Hameed, 2023) introduced his study called "corporate immunity", in which he advocated treatment of companies as living organisms that can adapt and interact with the environment to survive and prosper. This biological metaphor, although interesting, requires anchoring in proven strategic management theories that guarantee theoretical strictness and empirical truthfulness. It can also be defined as a set of organizational forces designed to protect the organization from internal and external threats, ensuring its survival and continuity (Al-Badayneh, 2021). Also, Saeed (2025) further clarified and claimed that OIS consisted of a set of procedures, policies and programs that reflect in operations and processes aimed at the protection of the organization from violations, deviations and external threats-especially in volatile sectors such as pharmacies.

The importance of OIS is in its role as a protective barrier against danger and threats in the constantly changing and unpredictable working environment. In addition, OIS claimed that a strong immune system increases the flexibility of the organization, mainly due to a complex and uncertain working environment. However, this perspective remains largely normative. Empirical

validation—especially in highly regulatory contexts such as the pharmaceutical industry (Damanpour, 2017). In this context, Asaad and Hameed (2023) emphasized that OIS provides valuable knowledge of the internal abilities of the organization to perceive the risks and threats necessary for the organization to remain stable, efficient and competitive in a rapidly changing business environment. Critically, recent work by Alayoubi et al. (2020) combines such capabilities with dynamic abilities theory, indicating that OIS acts not only as a defensive mechanism, but as a strategic activator of adaptation and innovation — especially in integration with organizational and memory systems.

As far as OIS dimensions are concerned, most of the studies have agreed on three key dimensions for this construction (Assayah, 2020; Majeed & Lafta, 2022):

1. *Organizational learning*: Organizational learning is defined as all efforts and procedures for the development of knowledge within the organization (do Adro & Leitão, 2020). This dimension closely deals with the theory of dynamic abilities (Alayoubi et al., 2020), which assumes that companies must constantly reconfigure resources to respond to environmental changes. In the pharmaceutical sector, Damanpour (2017) have shown that organizational learning, if associated with transformation leadership, significantly increases innovation capacity — causes not only reactive but also proactive curriculum. It is a multi-level process aimed at gaining knowledge for constant improvement (Mahmood & Adel-Al-Jader, 2021).

2. *Organizational memory*: Organizational memory concerns a tank where all the events and experiences that the organization has undergone for future use, as well as the results of organizational learning (Ghafoor et al., 2016). This dimension, based on the theory of organizational memory, ensures that experiential knowledge is codified and accessible, thus minimizing redundancy and increasing resistance. However, its effectiveness depends on the information management infrastructure — the gaps recorded in Jordanian pharmaceutical companies (Dahiyat, 2015).

3. *Organizational genes*: The term “organizational genes” is a metaphorical construct that requires operational clarification to prevent conceptual uncertainties. It refers to the main factors determining the identity of the organization and the unique features that contribute to success and differ from other organizations. To increase its construction validity, this dimension should be reconstructed as “basic strategic identity” or “institutional DNA”, including permanent values, mission, culture and organizational structure that form strategic reactions (Damanpour, 2017). Such attributes are particularly important in regulated industries, where the trust and history of compliance serve as a defence against the threats to reputation.

## 2.2. Strategic entrepreneurship

Strategic entrepreneurship integrates orientation on search opportunities for business education, focusing on the advantage of strategic management to manage sustainable values (Ireland et al., 2003). While business emphasizes creativity and risk,

strategic management prefers the orchestration of resources and competitive location. Their synthesis within companies allows companies to explore new opportunities and take advantage of existing benefits — duality is necessary in volatile markets (Hitt et al., 2017). Critically, it is not only additive, but synergistic: its efficacy depends on the alignment of business agility with a strategic discipline, often overlooked in descriptive accounts.

SE is defined as accepting innovation throughout the organization and business philosophy in all operations (Abd El-Maksoud, 2024). It also increases employees’ skills, decision-making and problem-solving, improving the quality of the product and competitive sustainability (Ferreira et al., 2017). However, this potential is dependent on context. In regulated sectors such as drugs, innovations with compliance must be harmonized. Damanpour (2017) found that companies integrating business proactivity with strategic guidance would achieve excellent innovation, while Dahiyat (2015) has noted that Jordanian pharmaceutical companies often suppress business initiatives due to bureaucratic inertia.

The importance of creativity in the middle of uncertainty and harmonization of internal abilities with external possibilities (Faridian, 2023; Arifyanto et al., 2021). However, its influence is alleviated by dynamic abilities. Alayoubi et al. (2020) claim that this is only evident in the performance where the organization can identify, acquire and reconcile. Resources, especially in the knowledge-demanding industry, where the absorption capacity is essential.

Four dimensions constitute SE (Al-Sulaeman & Hassan, 2021; Ireland et al., 2003):

1. *Entrepreneurship culture*: This includes values and standards that promote risk-taking, innovation and initiative (Hitt et al., 2017). However, in contexts with high regulations, such as drugs, such cultures are often alleviated. Damanpour (2017) describes “controlled business”, where innovations in structured research and development frames — nuances in general models are missing.

2. *Entrepreneurship leadership*: The leaders inspire teams to manage opportunities and, at the same time, manage resources (Covin & Slevin, 2017). In the Pharma sector in Jordan, Dahiyat (2015) found that efficient leaders associate visionary thinking with regulatory expertise, allowing faster commercialization, misunderstanding of the need to context the leadership of institutional restrictions.

3. *Entrepreneurial mindset*: This reflects cognitive orientation on flexibility, innovation and tolerance of ambiguity (Ireland et al., 2003). Alayoubi et al. (2020) confirm that business thinking only provides innovations if they are built into dynamic capabilities.

4. *Strategic resource management*: This includes the use of rare, inimitable resources — tangible and intangible — to create a competitive advantage (Genç, 2012). This dimension, based on sources, gains explanatory power through the theory of dynamic abilities (Alayoubi et al., 2020). In addition, Dahiyat (2015) identifies qualified personnel and regulatory knowledge as critical intangible assets in Jordanian pharmaceutical companies whose strategic deployment allows quick adaptation.

### 2.3. Organizational innovation

Organizational innovation is an essential element for organizational progress and a robust foundation for sustainable development, ensures optimal use of resources, increases transparency, supporting the growth of the organization, supporting knowledge and achieving organizational goals (Hoai et al., 2022). This perspective assumes linear correlation between innovations and performance that may not be applicable in heavily regulated industries where regulatory compliance could reduce experimentation (Dahiyat, 2015). The aim of the OI is to specify organizational practices according to external development, in particular the introduction of environmental regulations and advanced technologies, in accordance with organizational structures to ensure survival in the midst of global competition (Bataineh et al., 2024). Recent evidence of the pharmaceutical sector underlines that successful OI requires not only adoption, but strategic integration of innovation in existing administration frames (Damanpour, 2017; Alawamleh et al., 2023).

OI can be defined as the implementation of new and innovative ideas, services or processes at an organizational level to improve the ability of the organization to achieve intended goals (do Adro & Leitão, 2020). It can also be defined as an offer of improved products or services compared to previous offers, developing new marketing methods, or creating new organizational structures to achieve organizational excellence (Damanpour, 2017). In the same context, Alawamleh et al. (2023) claimed that OI is a renewal within the organization, either in response to environmental challenges or to obtain a competitive advantage. Critically, Alayoubi et al. (2020) link OI to dynamic ability theory and claim that innovation is not an isolated act, but the ability rooted in the ability to perceive opportunities, use them through reconfiguration of resources and adequately transform operations-partially vital in rapidly developing industries.

OI derives its importance from its ability to improve productivity and profitability and increase the market share (Damanpour, 2017). In addition, innovation contributes to the flexibility of the organizational organization, adaptation to environmental changes, future predictions, capitalization of new opportunities and resistance to market disturbance by providing added value that is difficult for competition (Arsawan et al., 2022). In the Jordanian pharmaceutical context, however, Dahiyat (2015) noted that excessive risk aversion and rigid hierarchy often prevent such a climate and reveal tension between theoretical ideals and institutional reality.

As far as OI dimensions are concerned, scientists' opinions vary. The current study has accepted the dimension identified in most studies (Ehrami, 2017; do Adro & Leitão, 2020; Kiziloglu, 2015):

1. *Administrative innovations*: Administrative innovations concern the administrative elements of planning, organization, management and control of updates of politicians, strategies, procedures and organizational structures. As a result, the organizational structure is more motivating for employees' behavior and prepares the organization to solve problems arising from the external

environment (do Adro & Leitão, 2020). Unlike technological innovations, administrative innovations focus on internal processes and management-like management systems, or decision-making protocols that are often less visible, but equally critical to allow strategic dexterity (Bataineh et al., 2024).

2. *Technological innovations*: Technological innovations include several technical and industrial steps that lead to the development of new products or services on the market. This contributes to improving production efficiency and creating a sustainable competitive advantage. The importance of technological innovation is to improve the services of recipients, provide flexibility and strengthen the image of the organization, which is more attractive to the target audience (Ehrami, 2017; Kiziloglu, 2015). In healthcare and pharmaceuticals, recent studies (Damanpour, 2017; Alawamleh et al., 2023) emphasize that technological innovation, AI-controlled platform for digital health-must be supported by administrative reforms to achieve scalability and regulatory compliance.

### 2.4. Organizational immune system and strategic entrepreneurship

Numerous studies have examined the correlation between organisational immunity and SE. For example, Gomes et al. (2022) pointed out the associations between organizational learning capabilities as one of OI aspects and SE with a focus on entrepreneurial orientation and innovation. The researchers found that organizational learning activities supporting SE in Brazilian companies. Borhom (2022) also discovered a substantial association between organizational immunity and SE in secondary schools in the southern governorates of Palestine. Similarly, Hmood and Hasan (2022) emphasized the beneficial impact of OIS on improving strategic performance in both public and private banks in Iraq. Al Khasabah (2025) observed empirical evidence supports the relationship between organizational DNA and institutional excellence among a sample of 236 employees in Jordanian universities. Furthermore, Assayah (2020) examined the correlation between organizational immunity and strategic technology change in Jordanian industrial firms, concluding a coherent and sequential link between organizational immunity and technological change decisions. Considering the above-described links and associations:

*H1: A statistically significant relationship exists between OIS and SE in Jordanian pharmaceutical companies.*

### 2.5. Organizational immune system and organizational innovation

Numerous studies have examined the correlation between organizational immunity and OI across various environments. The research has established a connection between organizational immunity and organizational creativity, while innovation serves as a mediator in the relationship between organizational immunity and organizational performance. Hadjer and Amina (2023) found

an empirical relationship between organizational innovation and organizational DNA components in Algerian companies. Kiziloglu (2015) identified the significant influence of organizational learning on the inventive staff capacity in the Turkish banking industry. In addition, Mansouri et al. (2014) have shown that organizational memory is a critical factor influencing OIs in Uzbek industrial companies. Research by Hamidizadeh and Eggesadi (2012) revealed that organizational learning is a key element influencing OI, as stated in the case study of the oil company Tangyuan in Iran. Dahiyat's (2015) study also presented an integrated model for knowledge acquisition and innovation in the Jordanian pharmaceutical industry and highlighted the strong and significant effects of knowledge integration and application as a mediating factor in the relationship between knowledge acquisition and innovation. The study García-Morales et al. (2008) also confirmed that there is a close relationship between transformational leadership as a dimension of the OIS, OI, and organizational performance, and that these relationships are strengthened more in organizations with a high level of organizational learning. In view of the above links and associations:

*H2: A statistically significant relationship exists between OIS and OI in Jordanian pharmaceutical companies.*

## 2.6. Organizational innovation and strategic entrepreneurship

Correlation between OI and SE has been clearly demonstrated in several previous studies. Al-Besisi and Al-Shamasi (2022) also identified a substantial positive correlation between the dimensions of the OI and the achievement of SE among employees at the Ministry of Economy and Planning in Saudi Arabia. In this context, other researchers found a specific association between OI and some of SE dimensions (Majeed & Lafta, 2022; Amin & Mhaibes, 2024). Alayoubi et al. (2020) identified a robust positive correlation between the requirements of SE and the achievement of OI at the Palestine Technical College. Karboli and Srour (2024) reported a significant effect of innovative leadership behaviours on the achievement of strategic leadership. Pihie et al. (2014) reported a positive

association between OI and SE in Malaysian secondary schools. Considering the aforementioned relationships and associations:

*H3: A statistically significant relationship exists between OI and SE in Jordanian pharmaceutical companies.*

## 2.7 Organizational immune system, organizational innovation, and strategic entrepreneurship

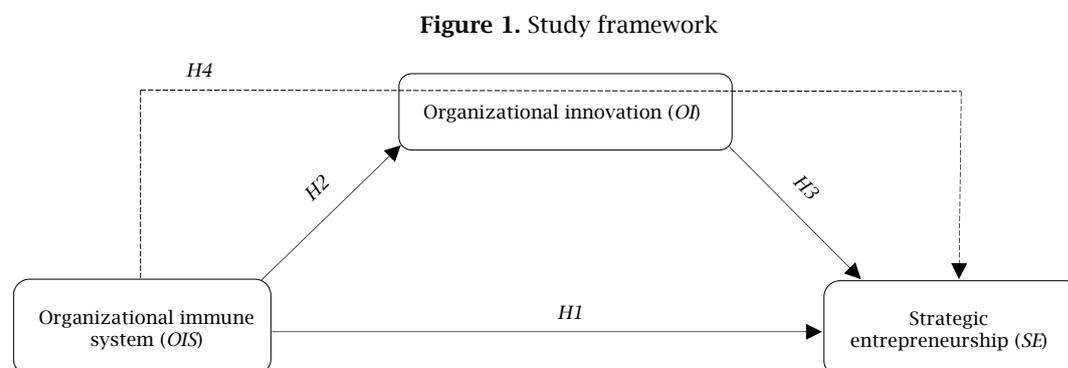
An overview of previous studies revealed that while the links between the OIS and the OI, as well as between OI and SE, were explored, they have not yet been examined in an integrated manner, particularly regarding the mediating role of OI in the relationship between OIS and SE within the context of Jordanian pharmaceutical companies. This gap is particularly important because the framework of the mainstream strategic management, such as the theory of dynamic abilities (Alayoubi et al., 2020), indicates a logical sequence: Robust OIS increases organizational stability and threat detection, which in turn creates psychological and structural safety needed to risk and experiment. The OI then serves as a mechanism through which new ideas are developed and implemented, which ultimately allows dual pursuit of behavior in finding opportunities and benefits (Ireland & Hitt, 2005). In a regulated environment, such as the Jordanian pharmaceutical sector, where Dahiyat (2015) documented a high level of bureaucratic resistance to changes, this mediation path may be critical: OIS could balance external and internal disturbances, allowing companies to build innovative capacity to support business strategy. The fourth hypothesis was therefore formulated as follows:

*H4: OI mediates the relationship between OIS and SE in Jordanian pharmaceutical companies.*

## 3. RESEARCH METHODOLOGY

### 3.1. Research framework

Figure 1 displays the interrelationship between the three study variables, where *OIS* represents the independent variable, *SE* represents the dependent variable, and *OI* serves as the mediating variable.



Source: Authors' elaboration.

### 3.2. Research design

This descriptive-analytical study conducted an overview of the literature to create a theoretical framework in addition to a field survey using a questionnaire to collect data from the target sample. A cross-sectional method was adopted to explore the relationship between OIS, SE and OI in Jordanian pharmaceutical companies. Partial least squares structural equation modeling (PLS-SEM) was used because of its suitability for predictive modeling, its statistical power in handling relatively small samples, and its ability to handle configural structures (Hair et al., 2010). Alternative methods, such as covariance-based structural equation modeling (CB-SEM) and case studies, were considered but found to be incompatible with the goal of quantitatively testing hypothesized relationships across a representative sample within a limited time frame and resource settings. This design allows for simultaneous data collection, facilitating the examination of associations between the study variable.

### 3.3. Population and sample

This study mainly focused on Jordanian pharmaceutical companies listed on the Amman Stock Market. Thirteen businesses, among which there are a total of four hundred and twelve respondents in management (including subordinates, heads of departments and managers). Based on the work of Sekaran and Bougie (2016), a minimum sample size of 201 was identified as this represented 48.78% of the entire population. The researcher attended to potential non-response issues and reduced the risk of sampling errors by increasing the response rate by 55%. The questionnaire was sent to 227 participants and received 181 valid responses for a response rate of 79.73%.

### 3.4. Data collection instrument

The survey was divided into four sections. The characteristics of the sample and information about the organization of the study were presented in the first section. The second part consisted of 15 questions that evaluated three aspects of OIS,

which are organizational genes (*OG*), organizational memory (*OM*), and organizational learning (*OL*). These items were used and adapted from research by Abd El-Maksoud (2024). The third part encompassed eight questions to measure *SE* according to Abd El-Maksoud (2024), and in the fourth part, seven items were used to measure *OI* according to a modified form of Gunday et al. (2011). The answer from the respondents was measured on a 5-point Likert scale, scored from 1 (strongly disagree) to 5 (strongly agree).

Procedural and statistical measures were also implemented to control for potential common method bias of the corresponding Likert-type scales. To avoid social desirability bias, participants completed the questionnaire anonymously, and item wording was carefully constructed to minimize ambiguity. Statistically, Harman's one-factor test was conducted, revealing that no single factor accounted for more than 50% of the dispersion, indicating that common method bias was not a significant problem. Additionally, the instrument was pretested through a pilot study with 25 managers from two pharmaceutical companies outside the Jordanian study sample. In light of feedback from the pilot study, minor refinements were made to some items. In addition, all constructions have shown acceptable reliability (e.g., Cronbach's alpha > 0.7), supporting the validity of the tool and contextual suitability for the Jordanian pharmaceutical sector.

## 4. DATA ANALYSIS

For data analysis, this study employed the Statistical Package for the Social Sciences (SPSS) to generate descriptive statistics, and PLS-SEM was run using SmartPLS 4 to test the hypotheses. PLS-SEM was selected for its ability to model the complex relationships between latent constructs, including mediation.

### 4.1. Descriptive statistics of study variables

Table 1 indicates that the mean values of the *OIS* components were 4.31 for *OL*, 4.29 for *OM* and 4.24 for *OG*. Additionally, the mean value of *SE* components was 4.33, while that of *OI* components was 4.18. These high values serve as a strong indicator of their significance to the study sample.

**Table 1.** Arithmetic means and standard deviations of the study variables

Constructs	Items	Minimum	Maximum	Mean	Std. deviation
Organizational immune system	<i>OL</i>	2.80	5.00	4.31	0.477
	<i>OM</i>	2.80	5.00	4.29	0.484
	<i>OG</i>	2.40	5.00	4.24	0.498
Strategic entrepreneurship	<i>SE</i>	3.33	5.00	4.33	0.452
Organizational innovation	<i>OI</i>	2.29	5.00	4.18	0.501

Source: Authors' elaboration.

### 4.2. Data screening

In this study, the skewness and kurtosis tests were used as a preliminary step to ensure the absence of outliers or missing values, as well as to verify that

the data follows a normal distribution. As shown in Table 2, the kurtosis values are lower than  $\pm 2$ , confirming the acceptable data distribution as proposed by Singh and Sharma (2016).

**Table 2.** Results of the normal distribution test

Constructs	Items	Statistic	Skewness		Kurtosis	
			Statistic	Std. error	Statistic	Std. error
Organizational immune system	OL	181	-0.552	0.181	0.264	0.359
	OM	181	-0.421	0.181	0.083	0.359
	OG	181	-0.744	0.181	0.947	0.359
Strategic entrepreneurship	SE	181	-0.292	0.181	-0.784	0.359
Organizational innovation	OI	181	-0.574	0.181	0.554	0.359

Source: Authors' elaboration.

#### 4.3. Assessment of the measurement model

Reliability and validity of the study constructs were determined by testing the convergent validity and discriminant validity of the study instrument, using SmartPLS 4, as follows:

##### 4.3.1. Convergent validity

A test on convergent validity was performed. This was to determine whether there was variance among

the measurements, as recommended by Cheah et al. (2018). This test includes evaluating composite reliability (CR), outer loadings and average variance extracted (AVE), where their respective values must be greater than 0.60, 0.60, and 0.50. Additionally, Cronbach's alpha was used to assess the internal consistency reliability of the constructs, with a required minimum value of 0.70 as recommended by Hair et al. (2010).

**Table 3.** Results of convergent validity and Cronbach's alpha for the overall model

Construct	Items	Factor loading	AVE	Composite reliability	Cronbach's alpha
Organizational immune system	OL	0.807	0.607	0.912	0.897
	OM	0.827			
	OG	0.833			
Strategic entrepreneurship	SE1	0.752	0.546	0.906	0.880
	SE2	0.681			
	SE3	0.781			
	SE4	0.728			
	SE5	0.804			
	SE6	0.742			
	SE7	0.744			
	SE8	0.669			
Organizational innovation	OI 1	0.677	0.601	0.913	0.888
	OI 2	0.735			
	OI 3	0.776			
	OI 4	0.825			
	OI 5	0.758			
	OI 6	0.820			
	OI 7	0.824			

Source: Authors' elaboration.

Table 3 shows results that confirm the convergent validity of the study model because the external load exceeded 0.60 in accordance with Chin et al. (2008). In addition, CR for all variables exceeded the threshold value of 0.70, and the AVE exceeded 0.50, as designed in Hair et al. (2010). Similarly, the values of Cronbach's alpha were higher than the 0.70 limit value, as suggested by Nunnally and Bernstein (1994).

##### 4.3.2. Discriminant validity

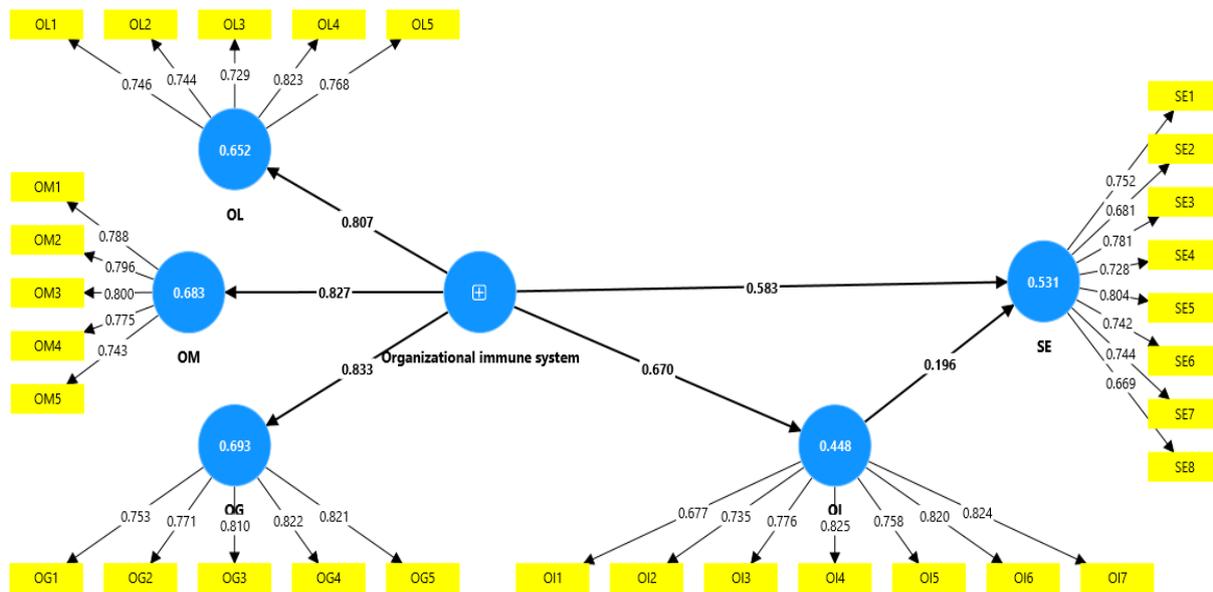
This study utilized Fornell and Larcker's (1981) method in assessing discriminant validity. As shown in Table 4, each construct score value is greater than the other values external to the diagonal in both the rows and columns of the correlation matrix. This indicates that all constructs exhibit discriminant validity at an adequate level (Fornell & Larcker, 1981).

**Table 4.** Discriminate validity results

Items	OG	OI	OL	OM	SE
OG	0.796				
OI	0.613	0.775			
OL	0.507	0.481	0.763		
OM	0.509	0.546	0.531	0.781	
SE	0.651	0.586	0.522	0.578	0.739

Source: Authors' elaboration.

Figure 2. Results of the PLS algorithm



Source: Authors' elaboration.

4.4. Structural model assessment

To analyze the proposed hypotheses of the study and verify their validity, testing of statistical significance of the coefficients of the path through t-values and reliability intervals through bootstrapping according to the recommendations of Hair et al. (2010) and Wetzels et al. (2009). Direct effects were used in testing direct hypotheses (H1, H2 and H3), while indirect effects were applied in

testing the hypothesis of mediation (H4) (Soto-Acosta et al. 2016). In addition, to assess the structural model several tests designed Hair et al. (2017) were made, including variance inflation factor (VIF), to explore multicollinearity, predictive relevance (Q<sup>2</sup>) assess the model's predictive power, coefficient of determination (R<sup>2</sup>) for endogenous variables to measure explained dispersion and effect size (F<sup>2</sup>) to ascertain the impact of exogenous variables.

Table 5. Evaluation results for the structural model

Hypotheses	Path shape	F <sup>2</sup>	VIF	R <sup>2</sup>	Q <sup>2</sup>
H1	OIS – SE	0.400	1.813	0.526	0.546
H2	OIS – OI	0.813	2.317	0.445	
H3	OI – SE	0.045	2.218		

Source: Authors' elaboration.

Table 5 shows that the predictive value (R<sup>2</sup>) for SE is 0.526 and for OI is 0.445, indicating that approximately 52% of the variance in SE is explained by two variables, namely OIS and OI. Similarly, approximately 44% of the variance in OI is explained by one variable: OIS. It is important to note that the R<sup>2</sup> value exceeds the threshold of 19% set by Chin (1998). On the other hand, for the exogenous predictors, the table shows that the F<sup>2</sup> values were 0.400, 0.813, and 0.045, indicating large, large, and small effects, respectively (Cohen, 1988). Additionally, the predictive relevance (Q<sup>2</sup>) value for SE is 0.546. This value is higher than 0, which is an affirmation that the model has predictive relevance (Chin, 2010). Finally, the table demonstrates that all VIF values were lower than 5, which means that the variables

did not suffer from a multicollinearity issue as proposed by Hair et al. (2017).

4.4.1. Hypotheses testing

Results of hypothesis testing, as presented in Table 6, show a positive effect of OIS on SE with a statistical significance of  $\beta = 0.583$ ,  $t = 8.503$ ,  $p < 0.001$ . Positive effect of OIS on OI was also shown in the Table 6, at a significance level of  $\beta = 0.670$ ,  $t = 18.159$ ,  $p < 0.001$ . Similarly, the results confirm that OI positively impacts SE ( $\beta = 0.196$ ,  $t = 2.484$ ,  $p < 0.001$ ). Therefore, the statistical results presented in the table demonstrated support for H1, H2 and H3.

Table 6. Results of hypotheses testing

Hypotheses	Path shape	Std. beta	Std. error	t-value	p-value	Confidence intervals		Decision
						Lower limit (2.5th percentile)	Upper limit (97.5th percentile)	
H1	OIS – SE	0.583	0.069	8.503	0.000	0.438	0.711	Supported
H2	OIS – OI	0.670	0.049	18.159	0.000	0.569	0.758	Supported
H3	OI – SE	0.196	0.079	2.484	0.013	0.046	0.354	supported

Source: Authors' elaboration.

#### 4.4.2. Examination of the mediating variable

In exploring the mediating role of *OI* in the relationship between *OIS* and *SE*, the approach proposed by Preacher and Hayes (2008) was applied. Results shown in Table 7 reveal a positive and statistically significant effect of *OI* in

the relationship between *OIS* and *SE* ( $\beta = 0.327$ ,  $t = 2.333$ ,  $p < 0.000$ ). Additionally, the confidence interval (CI) did not exceed 0, suggesting that *OI* imparted a statistically significant mediating effect to the conjectured relationship, and so, *H4* was supported.

Table 7. Mediation effect

<i>H</i>	Relationship	Std. beta	Std. error	<i>t</i> -value	<i>p</i> -value	Confidence intervals		Decision
						LL (2.5)	UL (97.5)	
<i>H4</i>	<i>OIS</i> – <i>OI</i> – <i>SE</i>	0.327	0.056	2.333	0.000	0.029	0.252	Supported

Source: Authors' elaboration.

## 5. DISCUSSION

This study explored the relationship between *OIS* and *SE*, with the role of *OI* as a mediating variable, to achieve four primary objectives as follows: 1) to analyze the impact of *OIS* on *SE*; 2) to examine the effect of *OIS* on *OI*; 3) to analyze the impact of *OI* on *SE*; 4) to verify the mediation of *OI* in the relationship between *OIS* and *SE*. The PLS technique was employed in testing the four research hypotheses to achieve the objectives.

The results of *H1* testing revealed a statistically significant effect of *OIS* on *SE*. These findings are consistent with the results of other similar studies that statistically found a positive correlation between *OIS* and *SE* (Gomes et al., 2022; Hmood & Hasan 2022; Borhom, 2022; Al Khasabah, 2025; Assayah, 2020). One possible description for this finding may be the importance of Jordanian pharmaceutical companies to *OIS* as a strong line of defence against environmental threats and hazards that would hinder their growth and stability. This means that managers can initiate innovative and bolder leadership methods in enterprises. Strategic decisions that increase development and competitive advantage are more likely to be successful if the concern is adaptable and ready to face trials as well.

The results of the *H2* test are consistent with those of other studies (Mansouri et al., 2014; Hamidizadeh & Eghtesadiand, 2012; Dahiyat, 2015), which confirmed the existence of a statistically significant relationship between the impact of *OIS* on enhancing *OI*. This conclusion can also be explained by the fact that the Jordanian pharmaceutical industry also notices that *OIS* increases the absorption capacity for shocks, crises and adaptation to environmental changes. Working with *OIS*, an organization can protect its capital and create an environment that supports innovation through a secure and reliable infrastructure. Rather, workers feel that it is okay to "push the boundaries", be pioneering, and even take risks, which lend themselves to the *OI* environment or culture when they have stability in their role, such as knowing what they are responsible for. This was consistent with the results of Farzaneh et al. (2021), who discovered a direct and statistically significant association between *OI* and the ability to learn, both of which are key values of innovation success.

The results of testing *H3* showed a positive effect of *OI* on *SE* in pharmaceutical companies operating in Jordan. These findings are consistent with previous studies that have found that *OI* has a positive impact on *SE* (Al-Besisi & Al-Shamasi,

2022; Amin & Mhaibes, 2024; Alayoubi et al., 2020; Pihie et al., 2014). This result can be explained by the fact that employees in these facilities are well aware of the importance of *OI* in competitive markets and its key role in implementing new managerial and technical practices. It also develops employees' abilities to generate innovative ideas, keep pace with technological developments, and replace traditional practices with innovative and entrepreneurial strategies, all of which collectively enhance the achievement of *SE*.

The results of the *H4* testing indicated the importance of *OI* as a mediating variable in the relationship between the *OIS* and *SE*. This result can be explained by stating that the *OIS* creates a safe and motivating environment for work, providing psychological safety and supporting experimentation, which in turn facilitates *OI*. This, in turn, allows for the implementation and development of strategic initiatives that undoubtedly contribute to achieving *SE*. The findings of the current study are consistent with what was stated in the study of Dahiyat (2015) regarding the importance of *OI* as an intervening variable that helps, with the presence of *OIS*, to achieve adaptation and create a balance between the disturbances that prevail in the internal and external environment and develop innovative capabilities, which helps in achieving *SE*.

From a management perspective, Jordanian pharmaceutical companies should enhance the capabilities of the *OIS* as both an operational tool and a strategic asset, enabling them to adapt to and respond to market changes. These companies should also consider improving their innovation processes as a bridge towards:

1. Accepting unconventional ethical ideas and forming work teams that drive innovation and excellence within pharmaceutical companies.

2. Providing a space of operational freedom that allows for the dissemination and launch of *OI* initiatives based on *OIS* insights. From an empirical perspective, this study may attract the attention of researchers and academics through the conceptual model it presents, leading to further research and studies that address the variables of this study in other fields and sectors.

## 6. CONCLUSION

In this work, we focused on the pharmaceutical industry in Jordan, and while considering the direct links between *OIS*, *OI* and *SE*, we also investigated the intervening effects of *OI* in the relationship between *OIS* and *SE*. A survey was conducted to

obtain responses using a quantitative methodology. Of the 227 surveys, only 181 actually contributed to usable responses in the end. The findings suggest that, from a practical point of view, top management in Jordanian pharmaceutical companies can strengthen OIS and OI, which help organizations go through environmental uncertainty and maintain a competitive advantage. This study offers three different posts. First, it provides a contextual contribution by focusing on the insufficiently explored Jordanian pharmaceutical sector-in-line regulation, a knowledge-intensive industry that faces rapid technological and market changes. Secondly, it provides integrative theoretical benefit by empirical testing of the cohesive framework “OIS → OI → SE”. Thirdly, it brings a practical contribution by identifying managerial levels that can be available:

investing in OIS and supporting the culture of experimenting (OI) to unlock business results.

This paper also includes several limitations to be considered for future research opportunities. First of all, this paper relied on a cross-sectional design for data collection, so it would be appropriate to conduct a future study using a longitudinal design. This would help in understanding the causal relationships between the study variables over time. Secondly, the study was applied in the Jordanian pharmaceutical companies. For this reason, it would be more appropriate to conduct studies in other sectors, such as the financial and tax sectors or the telecommunications sector in Jordan. Future research could also use the same variables to conduct a comparative study between Jordanian pharmaceutical companies and regional companies.

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