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Enhancing Organizational Resilience to Climate Change through Smart Business: An Empirical Study of the Jordanian Pharmaceutical Manufacturing Sector

Yanal Mahmoud Kilani[1], Majdi Alsaaideh[2]

[1]Isra private university

[2]Isra university

yanal.alkilani@iu.edu.jo, Majdi.alsaaideh@iu.edu.jo

Abstract. This study investigates the role of smart business in increasing the resilience of internal operations to climate change in the Jordanian pharmaceutical manufacturing sector. Drawing on the Business Continuity Management (BCM) theory, the study examines the impact of five dimensions of smart business (climate risk assessment, sustainable resource management, supply chain resilience, climate adaptation plans, and data-driven decisionmaking) on organizational resilience. A quantitative approach was employed, using a questionnaire survey of 317 production managers, operations managers, and manufacturing managers in Jordanian pharmaceutical manufacturing organizations. The results, analyzed using multiple regression and linear regression, reveal that smart business has a significant positive influence on internal operations resilience to climate change, explaining 72.8% of the variance in the dependent variable. Data-driven decision-making emerged as the most influential dimension, followed by climate adaptation plans and climate risk assessment. The findings highlight the importance of adopting smart business models and techniques to enhance organizational resilience to climate change, particularly in the pharmaceutical manufacturing sector. The study contributes to the limited research on smart business and resilience in this context and offers practical insights for managers seeking to improve their organizations' ability to withstand climate-related disruptions. Limitations and directions for future research are discussed.

Keywords: Smart Business, Climate risk assessment, Sustainable resource management, Supply chain resilience, Climate adaptation plans, Data-driven decision-making

1. Introduction

Continuing changes in climate will affect the internal and external operations of organizations (Dingle and Stewart, 2020). Orr and Inoue (2019) believes that climate fluctuations would change the level of availability of natural resources such as water, energy, and raw materials. As for Balogun et al. (2020), it was found that these climate changes make the sustainability process difficult to achieve, which would affect future generations. Meanwhile, Hertwich et al. (2020) found that climate fluctuations increase natural risks such as floods, droughts, and storms, which threatens the safety of working personnel, infrastructure, and the supply chain.

García-Muiña et al. (2020) indicates that smart businesses are able to track climate fluctuations and suggest different alternatives to ensure continuous internal operations. This is done through the devices it relies on, such as sensors, monitoring devices, and energy and resource management systems. A study by Davis et al. (2021), the study aimed to examine the impact of environmental fluctuations and climate changes on food supply chains, given that any disruption in supply chains could cause periodic food shortages, high prices, or low quality. The study reviewed previous literature and reached the conclusion that there is an impact of various advanced technologies in increasing the resilience of the supply chain on its mechanism of dealing with environmental and climate fluctuations.

Mikulewicz and Taylor (2020), researchers have indicated that climate change is most apparent and affecting the African continent as a result of its location. The study conducted a comprehensive review of previous literature. Study concluded that there is an impact of integrating advanced technologies with sustainability strategies in enhancing the resilience of African organizations in dealing with climate fluctuations through the ability of these technologies to provide **climate risk strategies** capable of directing efforts towards confronting fluctuations flexibly within **climate adaptation strategies** that enable organizations to deal with any unexpected environmental events**.**

Rosenstock et al. (2020), researchers referred to **climate-smart business models** as the foundations of sustainable development capable of enhancing productivity and mitigating the effects of climate change. Through a review of previous literature, the study reached the conclusion that climate-smart business models provide the entire organization from the bottom of the pyramid to the top with access to the required resources in a sustainable manner, including financing and access to markets, in addition to the ability to adapt and be resilient that can enhance inclusiveness. In addition to that, climate-smart business models guarantee **fast decision making that is based on real-time data**.

Most of previous studies have connected between climate change and agricultural organization on the bases of food production, agriculture and farming as they are the main sections that are influenced by climate change. However, the concept of climate change has the ability to influence all other vital sections in the business environment. The current study seeks to highlight the fact that climate change has a much higher dreadful potential impact at intense sectors like agriculture however it is much wider beyond agriculture. The effects of climate change, including temperature rising, water patterns changing and the increase of frequency of extreme weather phenomena, bring us huge problems. As energy, automotive, manufacturing, tourism, and insurance sectors are all involved. In this regard, the sector of energy has to be changed to one that is pollution free and more environmentally friendly through the use of renewable methods of creating energy like solar and hydroelectricity. Public transportation service providers need to be able to cope up with the rapid changes in infrastructure demands and the increase in the need for environment protection. Producers should develop strategies to deal with supply chain bottlenecks, resource scarcity and climate-related catastrophes, such as a flood, etc. The climate change will subsequently draw tourists to new visitors who will change the destinations and tourists' preferences. The insurance carriers are experiencing, an increase in the peril and cost with the catastrophic feather events. On the pharmaceutical level, climate change influences the variability of weather patterns and increases temperatures which can change the availability and quality of those resources essential for the production process of pharmaceutical drugs. Take for instance, the issue of water scarcity, which is a matter of concern in Jordan. It seems that this can worsen as among the effects

of reduction rainfall and increased evaporation rates, one of which is the water availability and quality for industrial processes. As the temperatures increase and in addition this affects the conditions of storage and transportation of temperature sensitive pharmaceutical products that may only be stored under particular temperature and humidity conditions for them to have the desired effect. Climate change-driven events like heatwaves or floods can also hamper supply chains, resulting not only in abrupt delays of imported raw materials but also in subsequent interruptions in the delivery of finished products. Equally important is the possibility of rapid spread of diseases and the appearance of new pathogens because of the width of temperature fluctuations which could cause the development of new drugs or changes in drug formulations.

Based on the previously presented related study, the literary gap lies in the interest of resilience and climate change. All available studies focused on organizations within the agricultural sector of those organizations which operates within food manufacturing. The ongoing connection between agriculture and climate change is basically attributed to the conviction among researchers that climate change can only influence food supply chains, or food manufacturing, or only farms and crops sector. This current study aims to change their orientation towards pharmaceutical manufacturing organization as they are also effected by climate change.

From that point, the current study aims to examine the role of smart business in increasing resilience of internal operations of climate change among pharmaceutical organizations in Jordan. Researcher has chosen the quantitative methodology to realize aim of study. The following model was built in order to highlight the relationship between variable and extract study's hypotheses:

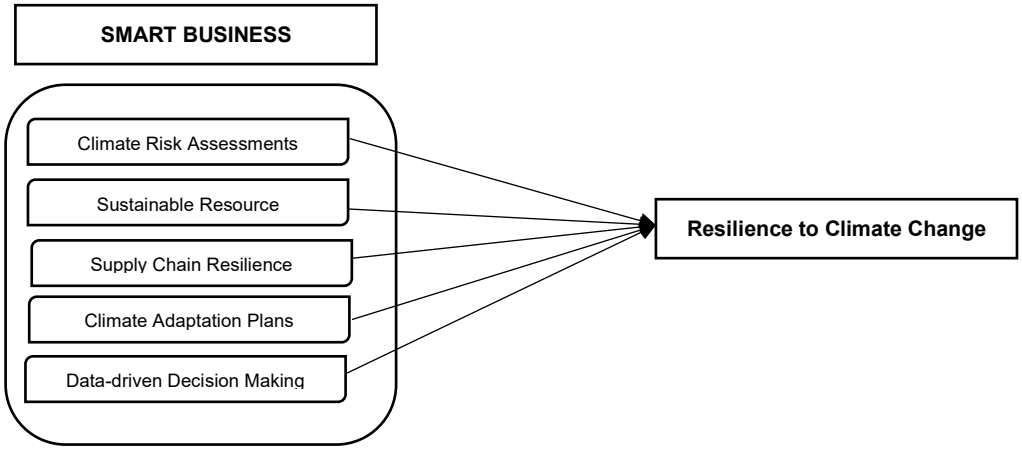

Fig.1: Study Model **(Fakhruddin et al., 2022; Andronie et al., 2021; Tsai et al., 2021; Xiang et al., 2021)**

From the above model, following hypotheses were extracted:

H: Smart business has a statistically significant influence on organizational internal operations resilience to climate change

H1: Climate risk assessment has a statistically significant influence on organizational internal operations resilience to climate change

H2: Sustainable resource management has a statistically significant influence on organizational internal operations resilience to climate change

H3: Supply chain resilience has a statistically significant influence on organizational internal operations resilience to climate change

H4: Climate adaptation plans has a statistically significant influence on organizational internal operations resilience to climate change

H5: Data-driven decision-making has a statistically significant influence on organizational internal operations resilience to climate change

It is worth mentioning here that the study launches it aim based on the underpinning theory of Business Continuity Management (BCM). The British Standards Institution (BSI) coined this theory back in the 90s. Its main aim is to ensuring business continuity during and after any sudden and unexpected events. It also provides a framework for identifying risks and provides strategies to mitigate the effects of these events on the internal operations of the organization. In other words, we have here employed theory of Business Continuity Management (BCM) as the main theory of our min hypothesis based on the fact that mixing business continuity theory with the hypothesis that "Smart business has strengthened organizational internal operations resilience to climate change" can supply a considerably improved knowledge of the whole before-and-during climate change-related impacts situation. Business continuity theory demonstrate the meaning of readiness, agility, risk management to keep no conversely acting operations during the claustra space disruptions. However, the organizations that incorporate smart business practices, those being sustainable resource management, supply chain diversification, risk assessment into the decision-making process, are more equipped to meet the unfavorable effects caused by climate change and are therefore more resilient. The smart business strategies rolled out by organizations for instance, the proactive way, helps the organization to increase its resilience to climate scenarios. Sustainable resource management is a good way to lessen the powerful influence that climate change has on scarcity of resources. Due to the resource scarcity, there will be limited availability of the critical part of the manufacturing and service process. Engaging in diversification of supply chains can be useful in minimizing reliance on certain areas or companies that are, generally, exposed to the climate risks and thus are more susceptible to climate related failures.
The goal of examining smart business (climate risk assessment, sustainable resource management, supply chain resilience, climate adaptation plans, and data-driven decision-making) can help enhance climate resilience of internal operations in Jordanian pharmaceutical manufacturing sector is of different dimensions. The target is to determine the level of preparedness and adaptability of the sector to shocks and disruptions in climate change. This research will therefore try to uncover the existing smart business practices, it will be done in order to know the areas that need further modification and those that can be enhanced to contribute to the improvement of smart business. Secondly, this approach aims to measure the actual contribution of such initiatives towards the development resilience. A comprehensive assessment study should be conducted to analyze the effect of climate risk assessment, sustainable resource management practices, and other intelligent business strategies.

2. Literature Review

2.1. Smart Business

According to Sadiq et al. (2021) and Ballina (2022), smart business (SB) refers to the technologies and innovations that are employed in order to increase the excellence of business performance. In general, the concept of SM is based on optimal exploitation of the power of digitization and digital technology in performing graphical analyzes based on artificial intelligence that are capable of improving the efficiency of the organization's internal and external operations (Yin et al., 2022). Leszkiewicz et al. (2021) indicate that the SB principle stems from several technologies that the organization adopts in order to enhance its production efficiency and ensure a higher level of quality based on rationalization of time and effort. Among the technologies used in the field of SB are data analytics, machine learning, as well as the automation of internal and external processes. Gyde and McNeill (2021) also add that remote work today has become one of the basics of SB as it depends on virtual communication through augmented reality and innovative business models.

SB contributes to improving and developing the resilience of the organization's internal and external processes through the idea of automating these processes and analyzing their data in order to deal with

duplicate tasks and sudden events that require quick action (Lian, 2021; Hashem, 2021; Hashem & Hasoneh, 2021). Yoon (2021) emphasizes the same idea, pointing out that SB helps, through advanced big data analysis, to understand the patterns of inputs, analyze them, and indicate possible strategies if the environment in which these patterns operate differs.

Húdik et al. (2019) also referred to the ability to deal with environmental variables, while Qian et al. (2023) emphasized the ability of the SB to instantly access real information and impose virtual communication between different parties in order to supply information in real time. In general, SB provides many services to organizations to ensure resilience in internal and external operations. These technologies and services include (Bechtsis et al., 2022; Tseng et al., 2022; Bibri, 2021; and Balogun et al., 2020):

Climate risk assessment

In this aspect, SB contributes to assessing potential climate risks based on information and data received from the programs used and the advanced sensors on which the organization relies. It analyzes incoming data based on machine learning techniques, and then predicts potential risks and their impact on internal operations in terms of time and risks and guides preventive measures.

Sustainable resource management

Sustainable management enhances the sustainability of resources based on technologies such as remote sensing and the Internet of Things. Various technologies are able to monitor the mechanism and level of resource consumption (water, energy, raw materials), analyze the level of consumption, and direct towards plans for sustainability in consumption.

Supply chain resilience

SB gives resilience to supply chains by enhancing communication and relationships between suppliers, manufacturers and distributors through intelligent supply chains. It monitors the movement of products or materials, predicts potential changes related to climate and weather, ensures continuity of supply, and reduces risks and costs.

Climate adaptation plans

SB provides plans and strategies that help the organization model its work in order to adapt to the new circumstances surrounding it, evaluates these plans and proposes the necessary amendments in order to ensure continuity. These are usually guaranteed by a continuous supply of information and data.

Data-driven decision-making

The idea of making decisions based on real information in real time is vital and important in increasing the resilience of internal operations(Hashem,2016). By collecting data, analyzing it, and forecasting expected fluctuations, the organization can monitor the main performance indicators (KPIs) and detect changes and deviations contained in the results presented. This helps you make smart, informed decisions based on data-driven knowledge.

2.2. Internal Operations and Climate Change

According to Santos et al. (2021), internal operations in organizations refers to the series of organizational activities and practices that take place within the organization in order to achieve pre-established strategic goals. Internal operations include administrative tasks, planning, management, human resources, and production and marketing (Nhemachena et al., 2020). Internal operations in organizations are usually affected by climate conditions in terms of changes in the environment and surrounding conditions, which may affect the smooth running of these operations (Arora, 2019). An example of this is the supply chain that may be subject to delays or disruption as a result of climate fluctuations (Carlson et al., 2022). In addition to risk management strategies that may need modifications to suit the new climate conditions (Malhi et al., 2021).

Internal operations in organizations are affected by climate variability through its impact on supply chain, risk management, resource sustainability, and product and service innovation (O'Neill et al., 2020). In order to adapt to climate variability, organizations should adopt resilience strategies and smart technology to monitor and track climate conditions, and develop appropriate procedures to deal with climate challenges and reduce negative impacts (Jansson and Hofmockel, 2020).

2.3. Internal Operations Resilience

Polyviou et al. (2020) noted that resilience of internal operations in organizations indicates the organization's ability and well to adapt to potential changes and modify its internal behaviors and practices in order to ensure interaction and integration with new challenges. Marcucci et al. (2022) emphasized that the resilience of internal operations gives the organization the advantage of dealing with sudden changes and new requirements of customers. It ensures resilience in operations and introduces new business models when needed, and its resilient practices are based on quick and effective adjustments in the field of supply and services.

Essuman et al. (2020) indicates that internal resilience depends on many factors, including the adoption of appropriate technology and appropriate techniques in order to provide a high level of resilience and adaptation within these processes. As for Bento et al. (2021) pointed out that effective guidance of the technological techniques used has a major role in improving the outcomes of internal operations, and developing a mechanism for responding to sudden changes in the surrounding environment. On the other hand, both Tarigan et al. (2021) and Razak et al. (2023) emphasized that resilience in its usual sense today is linked to the adoption of modern technologies based on rapid decision-making based on information supplied upon request.

3. Methods and Materials

3.1. Methodology

Current study was built based on quantitative approach as it is able to depend on a larger sample size which will help in generalizing the results. In addition to that, quantitative methodology enables the reapplication process for more insights and deeper data.

3.2. Tool of Study

The researcher built a questionnaire to be the main tool of study. The questionnaire depended on previous studies and statements were synthesized in order to suit the Jordanian environment, previous studies included *(Fakhruddin et al., 2022; Andronie et al., 2021; Tsai et al., 2021; Xiang et al., 2021)*. It was designed on Likert 5-point scale that ranged between 5 strongly agree to 1 strongly disagree and appeared in two main sections. The first took into perspective demographics of study sample (gender, age, qualifications and experience). The other section contained statements related to study sub-variables including (Climate risk assessment, Sustainable resource management, Supply chain resilience, Climate adaptation plans, Data-driven decision-making) as according to table 1. The questionnaire was distributed and self-administered electronically through Google Forms for four consecutive weeks in order to collect primary data. Validity of questionnaire items were tested through presenting the questionnaire on a group of specialized academics for the sake of arbitration. Statements that they agreed on were left, other were modified and the ones that they noted to omit were deleted.

Table 1. Statements Distribution Study Variables

Variable	# of Statements
Smart Business	
Climate risk assessment	5
Sustainable resource management	5
Supply chain resilience,	5

Climate adaptation plans	5
Data-driven decision-making	5
Resilience to Climate Change	**7**

Source: self-designed

3.3. Population and Sampling

The study's population included production managers, operations managers, and manufacturing managers within the pharmaceutical manufacturing industry in Jordan. A convenient sample of 400 persons was selected in a suitable manner to serve as a representation of the research population. The researcher successfully obtained a total of 317 correctly completed questionnaires throughout the application procedure, resulting in a response rate of 79.2%, which is considered statistically acceptable.

3.4. Statistical Processing

The researchers selected the Statistical Package for Social Sciences (SPSS) v. 29th as the primary program for doing the analysis in this study. The reliability and consistency of the study instrument were assessed using Cronbach's Alpha test (α). The obtained Alpha value, which was found to be more than 0.70, showed that the questionnaire demonstrated good levels of reliability and consistency, as shown in Table 2. Additional statistical tests used in the study included measures of central tendency such as mean and standard deviation, as well as more advanced techniques such as multiple and linear regression.

Table 2. Alpha test

variable	α
Climate risk assessment	0.78
Sustainable resource management	0.747
Supply chain resilience	0.792
Climate adaptation plans	0.719
Data-driven decision-making	0.794
Resilience to Climate Change	0.825

Source: self-designed

4. Results and Discussion

4.1. Demographic Results

Frequency and percentages of respondents' demographics were calculated in table 3. Results indicated that majority of respondents were males forming (66.9%) of study sample who held an MA degree forming 49.8%. also it was noted that majority of respondent had an experience of 10-13 years in the field forming 43.5%.

Table 3. Demographic Results

	f	%
Gender		
Male	212	66.9
Female	105	33.1
Education		
BA	34	10.7
MA	158	49.8
PhD	125	39.4
Experience		

2-5	36	11.4
6-9	112	35.3
10-13	138	43.5
+14	31	9.8
Total	**317**	**100.0**

Source: Spss output

4.2. Questionnaire Analysis

Table 4 presented mean (μ) and standard deviation (σ) of questionnaire statements. It was seen that all statements were positively received by respondents as they all scored higher than mean of scale 3.00. The highest mean was scored by (**Supply chain resilience**) 4.01/5.00 compared to the lowest (**Climate risk assessment**) 3.72/5.00 but still positive as it was higher than mean of scale.

Table 4. Questionnaire Analysis

	μ	σ
Through smart techniques, organizations can run complete climate risk assessment	3.779	.869
Such techniques help clarify vulnerabilities and potential risks of climate change on operations.	3.000	1.145
Organizations can evaluate risks of extreme weather and its influence on resources availability	3.912	.826
Such evaluation help to predict risks on supply chain distribution	3.921	.884
It enables organizations to run regulatory changes on internal operation in accordance with climate change	4.013	.968
Climate risk assessment	**3.725**	**.626**
Smart business techniques enable smart operations resilience	3.744	1.029
It can implement resilient practices in accordance with climate change	4.054	.755
It focuses on energy optimization and waste management	4.047	.780
Water conservation is a key issue in smart business techniques	4.117	.713
Mitigating climate change is more attainable through smart business techniques	4.047	.780
Sustainable resource management	**4.002**	**.527**
Smart business connects between SC resilience and internal operations resilience	4.066	.787
SC distribution is always mitigated through smart business techniques	4.174	1.102
Smart business present possibilities of diversifying suppliers and presenting alternative sourcing options	3.991	.877
This can promote long-term solutions for internal operations	4.082	.783
Smart business eases the communication and collaboration with suppliers through the process	3.748	.759
Supply chain resilience	**4.012**	**.500**
Adaptation plans are presented through smart business techniques for more protection	3.691	.674
Smart business techniques can simplify internal operation in cases of climate instability	3.814	.857
There are strategies, plans, points and milestones presented through smart business for direct application	3.836	.688
Resilience is a key issue in all presented strategies	4.164	.724
Strategies and milestones are all responsive to implementation	4.082	.679
Climate adaptation plans	**3.917**	**.499**
Smart businesses supports fast decision-making	3.950	.973
Through smart business techniques, decision are made based on real time authentic data	4.095	.806
Climate instability and resilience is reported to decision makers in the real time	3.968	.779
Different techniques are used to collect data regarding climate and weather instability	3.972	.760
Predictive modeling is used in order to ease the process of decision-making	4.000	.893
Data-driven decision-making	**3.997**	**.522**
Resilience supports organizations to adapt to climate change in less time	3.814	.720

Resilience supports organizations to respond directly to climate and weather changes	3.760	.795
Resilient internal operations help in mitigating the influence on unstable climate conditions	4.091	.857
Organizations that are aware of climate change can always adapt their internal operation according to the situations	4.006	.811
Ongoing resilient supports efforts for a fast and responsive action from organizations	3.871	1.058
On-time decision making help in decreasing the negative influence of weather conditions on internal operations	4.019	.917
Resilient in internal operation can predict the needed infrastructure and equipment for a well-built responsiveness	3.890	.884
Resilience to Climate Change	**3.922**	**.607**

Source: Spss output

4.3. Hypotheses Testing

Multiple regression test was used in order to realize the main hypothesis that argued "Smart business has a statistically significant influence on organizational internal operations resilience to climate change". Multiple test results indicated a correlation coefficient of r = 0.853 with a strong and significant relationship between the independent and dependent variables. Moreover, previous research has shown that the independent factors account for 72.8% of the observed variability in the dependent variable under scrutiny. F value has statistical significance at a significance level of 0.05. This discovery suggests that Smart business has a statistically significant influence on organizational internal operations resilience to climate change.

Table 5. Main Hypothesis Testing

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			R	R Square
		B	Std. Error	Beta	t	Sig.		
1	(Constant)	-.563	.191		-2.954	.003	.853[a]	.728
	Climate risk assessment	.595	.034	.614	17.651	.000		
	Sustainable resource management	-.458	.060	-.397	-7.596	.000		
	Supply chain resilience	.036	.060	.030	.608	.544		
	Climate adaptation plans	.545	.049	.449	11.140	.000		
	Data-driven decision-making	.454	.045	.391	10.196	.000		

Source: Spss output

Linear regression was used as an approach to test the sub-hypotheses of study, following findings were reached:

For the first hypothesis, correlation coefficient of r = 0.496 was reached with a medium and significant relationship between the independent and dependent variables. Moreover, previous research has shown that the independent variable accounts for **24.6%** of the observed variability in the dependent variable being examined. F value has statistical significance at a significance level of 0.05. The present

discovery suggests that Climate risk assessment has a statistically significant influence on organizational internal operations resilience to climate change.

In the second sub-hypothesis, a correlation coefficient of r = 0.217 was reached and a weak and significant relationship between the independent and dependent variables. Moreover, previous research has shown that the independent variable accounts for **4.7%** of the observed variability in the dependent variable being examined. F value has statistical significance at a significance level of 0.05. The present discovery suggests that Sustainable resource management has a statistically significant influence on organizational internal operations resilience to climate change.

As for the third hypothesis, correlation coefficient of r = 0.254 was scored with a weak and significant relationship between the independent and dependent variables. Moreover, previous research has shown that the independent variable accounts for 6.5% of the observed variability in the dependent variable being examined. F value has statistical significance at a significance level of 0.05. The present discovery suggests that Supply chain resilience has a statistically significant influence on organizational internal operations resilience to climate change.

In the fourth hypothesis it was reached that correlation coefficient of r = 0.564 suggested a medium and significant relationship between the independent and dependent variables. Moreover, previous research has shown that the independent variable accounts for **31.8%** of the observed variability in the dependent variable being examined. F value has statistical significance at a significance level of 0.05. The present discovery suggests that Climate adaptation plans has a statistically significant influence on organizational internal operations resilience to climate change.

The fifth hypothesis confirmed a correlation coefficient of r = 0.639 with a medium and significant relationship between the independent and dependent variables. Moreover, previous research has shown that the independent variable accounts for **40.9%** of the observed variability in the dependent variable being examined. F value has statistical significance at a significance level of 0.05. The present discovery suggests that Data-driven decision-making has a statistically significant influence on organizational internal operations resilience to climate change.

Table 6. Sub-Hypotheses Testing

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			R	R Square
		B	Std. Error	Beta	t	Sig.		
1	(Constant)	2.130	.179		11.876	.000	.496[a]	.246
	Climate risk assessment	.481	.047	.496	10.132	.000		

H1: Climate risk assessment has a statistically significant influence on organizational internal operations resilience to climate change

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			R	R Square
		B	Std. Error	Beta	t	Sig.		
1	(Constant)	2.921	.256		11.432	.000	.217[a]	.047
	Sustainable resource management	.250	.063	.217	3.947	.000		

H2: Sustainable resource management has a statistically significant influence on organizational internal operations resilience to climate change

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	R	R Square
1	(Constant)	2.682	.267		10.031	.000	.254[a]	.065
	Supply chain resilience	.309	.066	.254	4.670	.000		

H3: Supply chain resilience has a statistically significant influence on organizational internal operations resilience to climate change

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	R	R Square
1	(Constant)	1.235	.223		5.529	.000	.564[a]	.318
	Climate adaptation plans	.686	.057	.564	12.118	.000		

H4: Climate adaptation plans has a statistically significant influence on organizational internal operations resilience to climate change

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	R	R Square
1	(Constant)	.951	.203		4.686	.000	.639[a]	.409
	Data-driven decision-making	.743	.050	.639	14.760	.000		

H5: Data-driven decision-making has a statistically significant influence on organizational internal operations resilience to climate change

Source: Spss output

4.4. Discussion

Current study aimed at examining the way smart business can increase resilience of internal operation on order to face climate changes. Variables of smart business chosen included (climate risk assessment, sustainable resource management, supply chain resilience, climate adaptation plans, data-driven decision-making). Quantitative methodology was used, and a questionnaire was distributed on a sample of (317) production managers/operations managers/manufacturing managers/in the Jordanian pharmaceutical manufacturing organizations.

Smart business has a statistically significant influence on organizational internal operations resilience to climate change

Depending on SPSS, results indicated the acceptance of what the study hypothesized "Smart business has a statistically significant influence on organizational internal operations resilience to climate change" with a variance of 72.8% in the dependent variable (resilience of internal operations). As for the previously chosen sub-variables, it was seen that they all had an influence that ranged between medium and weak correlation.

The highest sub-variable in influence appeared to be data-driven decision-making with a correlation coefficient of r=0.639 explaining a variance of 40.9%. This indicated that the idea of making decision based on real time authentic data help organizations to generate more resilient internal operations that matches the needs to climate change. This agreed with Rosenstock et al. (2020) who argued that climate-smart business models provide a fast decision making that is based on real-time data. This meant that

data-driven decision-making has a statistically significant influence on organizational internal operations resilience to climate change.

In the second rank there appeared the sub-variable of climate adaptation plans with a correlation coefficient of r = 0.564 explaining a variance of 31.8%. The adaptation plans give the organizations that ability to rea the changed based on given data, sort and classify them and then guarantee that the plans are able to meet those changes without any obstacles that can effect internal operations. This agreed before with Mikulewicz and Taylor (2020) who noted that climate risk strategies direct efforts towards confronting instability and present more flexibly within climate adaptation strategies, this enable organizations to deal with any unexpected environmental events. On the same level climate risk assessment appeared to be influential with a correlation coefficient of r = 0.496 explaining **24.6%**. This referred to the same idea, the changes in the climate is transferred in a form of data and information to the responsible parties. Then accommodations and changes are made on the plans as according to the assessments given previously. The result meant that the 4th hypothesis was accepted and climate adaptation plans has a statistically significant influence on organizational internal operations resilience to climate change.

Both variables of sustainable resource management and supply chain resilience came with a weak correlation and a variance that explained 6.5% and 4.7% in the dependent variable respectively. The reason for the weak influence is attributed to the fact the aspects of sustainability and resilience of supply chain might be considered an external operation more than internal operations. Although they are a part of the internal operation, but they still have segments of them that are controlled through the external operations including suppliers, management and the market share. Generally speaking, sustainable resource management and supply chain resilience are interconnected and important for improving a company's internal operations. However, companies can face multiple challenges in achieving effective impact of sustainable resource management and enhancing the resilience of their supply chain and internal operations. This indicated the acceptance of the 2nd and 3rd hypotheses which argued that sustainable resource management and Supply chain resilience has a statistically significant influence on organizational internal operations resilience to climate change.

5. Conclusion

The study proved that adopting smart business models and techniques have the ability to increase resilience of internal operations towards climate change. As it was seen in the previous studies, most of them were directed towards food manufacturing and agriculture. It is expected that the current study will be a changing in the route towards adopting smart business and exploiting its resilience to climate change in a field other than agriculture. However, the influence is apparent, and it cannot be denied that utilizing smart business solution not only can guarantee a high level of resilience, it can also guarantee more resilient approach to communications given that internal operation contains supply chain characteristics among its elements. Regarding the underpinning theory of the study, it was found that smart business adoption contributes a lot to business continuity management in terms of presenting alternatives in case of instability.

5.1. Practical and Theoretical Implications

Current study was based on both theoretical and practical implications. From a theoretical perspective, the current study may grab organizational attention towards the fact that smart business models for climate change aren't exclusive to agricultural fields. Just as agriculture is influenced by climate change, other fields like manufacturing, education and medicine might be influenced as well.

From a practical perspective, the study provides practical proposals, results and insights in order to support the resilience of internal operations and increase their ability to withstand ongoing climate

fluctuations. In addition to considering that adopting smart business models is an explicit and not implicit trend towards environmental sustainability in all its forms.

In other words, by a studying on smart business strategies to have in depth knowledge and the ability of making climate resilient strategies, we can see how the internal operations of the pharmaceutical manufacturing industry in Jordan can be improved. Through studying the implementation results, managers can get the idea on whether these procedures improve the resilience of the organization or not. Usually, the managers can use that information to enhance their decision-making skills that can enable them to find effective strategies to contain climate change, stabilize their business and maintain business continuity. Besides, the smart business practices are scrutinized concerning the expanding attention towards the challenges of microclimates in pharmaceuticals manufacturing industry. It is huge in terms of empirical evidence gathering and providing practical steps to be applied in future research and decision making processes. Moreover, it builds the foundation for the construction of a robust and stable pharmaceutical sector.

5.2. Recommendations

According to reached results, author suggested the following:

- Increase organizational awareness of resilience in all operations not just the internal operations
- Prepare the IT infrastructure ahead and make sure that the infrastructure is well-built and reinforced to adapt to any new techniques.
- The need to develop and adopt adaptation-based strategies in order to address the risks associated with climate variability

5.3. Limitations of Study

Current study was limited to the following:

- Production managers/operations managers/manufacturing managers/in the Jordanian pharmaceutical manufacturing organizations operating in Jordan through the fiscal year 2021-2022
- There was no indication of using financial reports of data through the analysis process
- The study was limited to the questionnaire as the only tool and there were no interviews involved

5.4. Future Studies

Launching from results and conclusion, researcher suggested the following:

- Carry out a longitudinal research that examine the influence of adopting smart business models on organizations' resilience and its role in supporting performance
- Analyze case studies of organizations that adopted smart business model as an approach to increase resilience in internal operation in fields other than agriculture.

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