

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm**The mediating role of ICT on the impact of supply chain management (SCM) on organizational performance (OP): A field study in Pharmaceutical Companies in Jordan****Hazem Khaled Shehadeh^{a*}, Ahmad Yahiya Bani Ahmad^b, Mahmoud Allahham^c and Ma'en Al-Sager^d**^a*Department of Business Administration Faculty of Economics and Business Administrative Sciences University, Zarqa, Jordan*^b*Department of Financial and Accounting Sciences Middle East University, Amman, Jordan*^c*Department of Supply Chain and Logistics College of Business Luminus Technical University College, Amman, Jordan*^d*Department of Business Administration Faculty of Economics and Business Administration Zarqa University Zarqa, Jordan***A B S T R A C T***Article history:*

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This research aims to identify the Mediating role of ICT on the Impact of supply chain management (SCM) on organizational performance (OP), a field study: of pharmaceutical companies in Jordan. To achieve the aim of the research, the researcher used the descriptive analytical approach. The research population is all the employees in the three pharmaceutical companies listed on the Amman Stock Exchange (1,528), A suitable sample content of (400) employees was chosen, questionnaires were distributed using Google Forms, and the percentage of correct questionnaires was (85%), The research concluded that SCM with its dimensions has an impact on OP in pharmaceutical companies in Jordan, CRM does not exhibit a notable impact on the dependent variable OP and this research provides robust support for ICT mediating the relationship between SCM and OP in pharmaceutical companies in Jordan. The research recommended pharmaceutical companies to explore strategies to enhance their customer relationships and it also recommends pharmaceutical companies to invest in and enhance ICT infrastructure and capabilities, this research also recommends future studies to examine the role of artificial intelligence (AI) instead of (ICT) mediator between (SCM) and (OP).

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1. Introduction

In an environment characterized by rapid technological advancements, shifting market dynamics, and intensified competition, the pursuit and maintenance of high levels of Organizational Performance (OP) have taken center stage as a pivotal objective for companies worldwide. This heightened emphasis on OP is driven by the recognition that it plays a multifaceted role, encompassing various dimensions such as financial, environmental, and operational indicators. Within the pharmaceutical sector, the significance of exceptional OP is further magnified, as it directly correlates with the timely availability of critical medical products that profoundly impact public health and overall well-being. When viewed through a management lens, OP can be conceptualized as an evaluative activity that empowers organizations to assess and juxtapose their objectives, historical patterns, past decision-making processes, and various operational aspects and product lines (Lee et al., 2022). It serves as a barometer of an organization's capacity not only to achieve its predefined goals but also to endure, expand, and thrive in a complex and ever-evolving business environment (Shalgham & Aberna, 2023). The pharmaceutical industry, characterized by its intricate supply chain networks, stringent quality requirements, and dynamic regulatory landscape, presents a compelling backdrop for investigating the interplay between SCM practices and OP. Recently, there has been a rise in interest in SCM since it has taken on a more central role in businesses, particularly big ones, to better service their consumers and

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achieve a competitive edge (Salem & Jeffrey, 2023). In recent years, the integration of ICT into SCM operations has introduced a transformative dimension to the relationship between SCM and OP. ICT, encompassing digital platforms, data analytics, real-time communication tools, and automation, has the potential to revolutionize supply chain processes, enhance visibility, optimize decision-making, and reshape traditional business models. The convergence of SCM and ICT offers new avenues for streamlining operations, mitigating disruptions, and adapting swiftly to market demands, thereby influencing the overall OP of pharmaceutical companies. Amidst these complexities, the Kingdom of Jordan stands as a unique context for investigating the intricate interplay between SCM, ICT, and OP within the pharmaceutical sector. Jordan's pharmaceutical companies operate within a regional and global arena, serving diverse markets with varying regulatory frameworks and socio-economic conditions. As these companies navigate the challenges of maintaining a delicate balance between cost efficiency and quality assurance, the role of both SCM practices and ICT integration becomes pivotal in shaping their performance outcomes. This research aims to examine how ICT moderates the impact of SCM on OP in Jordan's pharmaceutical industry, this research intends to provide both theoretical insights and practical implications that can inform strategies for optimizing supply chain operations and enhancing overall OP in the pharmaceutical sector. Ultimately aiming to contribute to the broader understanding of how these factors collectively shape the operational landscape of pharmaceutical organizations and facilitate informed decision-making for improved performance outcomes, In this paper, the researcher will abbreviate the terms as follows: Supply Chain Management (SCM) and its dimensions, including Customer Relationship Management (CRM), Supplier Relationship Management (SRM), and Supply Chain Integration (SCI); Organizational Performance (OP) and its dimensions, Financial Performance (FP), Environmental Performance (EP), and Operational Performance (OPP); and Information Communications Technology (ICT).

2. Research Problem and Questions:

In the realm of organizational dynamics and performance enhancement, numerous studies have extensively explored the concepts of SCM, OP, and the role of ICT. While these studies provide valuable insights into these individual domains, there remains a gap in the research landscape when it comes to comprehensively investigating the interplay between these factors within the unique context of pharmaceutical companies in Jordan. The extant literature has delved into the significance, characteristics, and outcomes associated with SCM and OP. However, the explicit examination of how ICT moderates the relationship between SCM practices and OP within the pharmaceutical sector of Jordan has been largely unexplored.

The rationale behind focusing on the Mediating role of ICT is rooted in the transformative potential of technological advancements within the pharmaceutical sector. This sector operates within a complex environment characterized by stringent regulations, dynamic market demands, and a critical need for efficient supply chain operations. Moreover, on the field side, the dynamic landscape created by the COVID-19 pandemic has brought forth unprecedented challenges and opportunities. As pharmaceutical companies navigated through uncharted waters, adopting novel strategies and technological solutions became crucial for sustaining operations and optimizing organizational performance. However, the role of ICT as a Mediating factor in the relationship between SCM and OP within this context remains relatively unexamined. By reviewing the research problem, the main question can be formulated as follows:

Does ICT Mediating the Impact of SCM on OP in Pharmaceutical Companies in Jordan?

Sub-Questions:

1. What is the level of SCM in Pharmaceutical Companies in Jordan?
2. What is the level of OP in Pharmaceutical Companies in Jordan?
3. Is there an impact for SCM on OP and ICT in Pharmaceutical Companies in Jordan?
4. Is there an impact of ICT on OP in Pharmaceutical Companies in Jordan?

3. Research Importance

Within the realm of contemporary business administration, this research attains paramount significance by delving into the multifaceted variables it scrutinizes. The focal points of SCM, OP, and the Mediating role of ICT resonate profoundly within the dynamic landscape of the pharmaceutical sector. This resonance reflects the ever-evolving dimensions of global trade and the intricate integration of technology. Theoretical importance stems from addressing an underrepresented area. This research uniquely examines how SCM, ICT, and OP interact in pharmaceutical companies, revealing unexplored dynamics. Unlike typical studies, it delves into intricate SCM-ICT interconnections, unveiling their joint impact on performance. This enriches theoretical comprehension while introducing novel insights into these vital interdependencies. Practically, this research gains importance due to pharmaceutical companies' central role in Jordan's economy. Their contributions to GDP and digital transformation underline their significance. Understanding ICT's moderation between SCM and OP is crucial for operational efficiency, supply chain resilience, and strategic decision-making enhancement.

4. Research Objective:

This research is going to examine the Mediating role of ICT on the impact of SCM on OP in pharmaceutical companies in Jordan.

Sub-Objectives:

1. Explaining the concepts and dimensions of SCM, OP, and ICT.
2. Studying whether SCM impact OP in pharmaceutical companies in Jordan.
3. Studying if ICT moderates the impact of SCM on OP in pharmaceutical companies in Jordan.
4. Presenting recommendations to the mangers in the pharmaceutical companies in Jordan, regarding enhancing the dimensions of SCM, and the role of ICT which will contribute to enhancing OP.
5. In addition to the recommendation for future studies.

5. Research Model

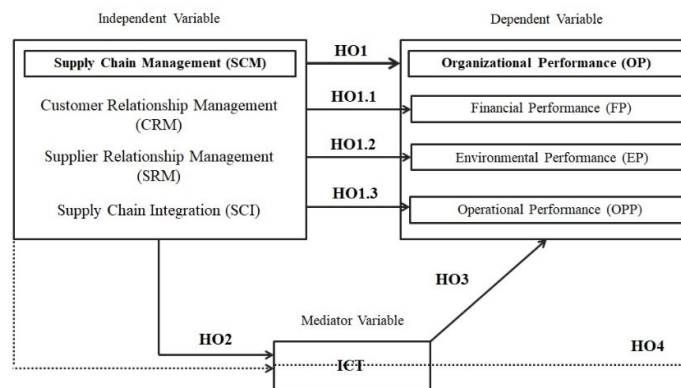


Fig. 1. Research Model

The research model was designed in the light of reviewing these previous studies:

SCM: (Hassan, 2021; Abu Khashaba, 2022; Ahmed et al., 2023).

OP: (Adhikara & Nur Diana, 2022; El Hakmi, 2023).

ICT: (Hailu et al., 2023; Abdullahi & Mohamud, 2023).

6. Research Hypotheses

The Main Hypothesis

H₀₁: *There is no statistically significant impact at the level of ($\alpha \leq 0.05$) for SCM (CRM, SRM, and SCI) on OP (FP, EP, and OPP) in pharmaceutical companies in Jordan.*

Sub-Hypotheses:

H_{01.1}: *There is no statistically significant impact at the level of ($\alpha \leq 0.05$) for SCM (SRM, SRM, and SCI) on FP in pharmaceutical companies in Jordan.*

H_{01.2}: *There is no statistically significant impact at the level of ($\alpha \leq 0.05$) for SCM (SRM, SRM, and SCI) on EP in pharmaceutical companies in Jordan.*

H_{01.3}: *There is no statistically significant impact at the level of ($\alpha \leq 0.05$) for SCM (SRM, SRM, and SCI) on OPP in pharmaceutical companies in Jordan.*

H₀₂: *There is no statistically significant impact at the level of ($\alpha \leq 0.05$) of SCM (SRM, SRM, and SCI) on ICT in pharmaceutical companies in Jordan.*

H₀₃: *There is no statistically significant impact at the level of ($\alpha \leq 0.05$) of ICT on OP (FP, EP, and OPP) in pharmaceutical companies in Jordan.*

H₀₄: *There is no statistically significant impact at the level of ($\alpha \leq 0.05$) for SCM (SRM, SRM, and SCI) on OP (FP, EP, and OPP), and the mediating role of ICT in pharmaceutical companies in Jordan.*

7. Research Limitations

Human Limits: All the staff in pharmaceutical companies included in the Amman Stock Exchange - Jordan.

Location Limits: Pharmaceutical companies included in the Amman Stock Exchange - Amman/Jordan.

Time Limits: 3.8.2023- 28.8.2023.

8. Letriture Review

The relationship between (SCM), (ICT), and (OP) has drawn a lot of attention in the dynamic world of today's organizations, with an emphasis on the Mediating role of ICT in the link between SCM and OP, the goal of this literature review is to synthesize existing studies to explain the concepts related to the research. By examining relevant studies and theoretical frameworks, this review sets the stage for understanding the intricate connections that drive organizational success. According to Zhang et al. (2023), SCM is an organized process of managing resource flows from raw material sourcing, product manufacturing, and delivery to end customers and has a big impact on the supply network and business objectives. SCM is the mix of planning, implementation, coordinate, and control of the organization's operations and activities to produce goods and services to meet the market needs (Cahyono et al., 2023). The primary aim of SCM is to enhance the level of trust and collaboration among multiple partners within the supply chain ecosystem. This objective is coupled with the aspiration to achieve visible enhancements in inventory management and the rate of inventory expansion. The foundation of SCM lies in the meticulous management of inventory, serving as the initial touch point from which the evaluation of overall system performance gains sharper clarity across a spectrum of stakeholder viewpoints (Zaman et al., 2023; Jasin et al., 2023; Cahyono et al., 2023).

A recent study conducted on Jordan's pharmaceutical companies by AlBrakat et al. (2023) aimed to assess the impact of green supply chain practices on export performance. The study focused on decision-makers within Jordan's pharmaceutical companies. The study's findings underscored the significant influence of green supply chain dimensions on the export performance of Jordan's pharmaceutical industry. Considering these outcomes, the researchers advise managers within pharmaceutical organizations to formulate a sustainability policy outlining the organization's commitment to environmental responsibility, including specific goals and objectives aimed at reducing its ecological footprint. Alam (2022) carried out an additional study with the goal of assessing the impacts of supply chain management practices on OP within manufacturing firms. The study employed convenience sampling and linear regression analysis on a sample of 200 participants employed across diverse manufacturing firms in Karachi, Pakistan. The findings underscored the significant impact of strategic supplier partnership, knowledge management capability, and customer relationships on organizational performance. The study recommends adopting SCM practices and making strategies on the basis of these factors to enhance Organizational performance. A Research conducted by Al-Saaida and Al-Saed (2020) examined the impact of SCM on service quality within the nutrition departments of private hospitals in Jordan. The study encompassed a sample of 40 hospitals situated in Amman, Jordan. The findings of the study illuminated a significant impact of SCM practices on the overall quality of services rendered by these hospitals. In light of these compelling results, the study recommended enhancing operational practices in this domain, and enhances the awareness of nutrition department directors regarding the significance of comprehending the stages and trends of SCM.

Based on these previous studies (Hassan, 2021; Abu Khashaba, 2022; Ahmed et al., 2023), this study adopted three dimensions of SCM: CRM, SRM, and SCI.

According to Cierna and Sujova (2022), CRM represents a strategic shift within enterprises, transitioning from a product-centric approach to one that centers on the customer. The aim of CRM is to craft value for customers, comprehend their requirements, and present services that augment value, CRM also aims to establish long-term relationships with customers in order to generate value between customers and the company. (Meha, 2021; Ferrer-Estévez et al., 2023). Alshurideh et al. (2023) refer to CRM as the method employed to effectively oversee an organization's interactions with both current and prospective customers. This involves cultivating enduring and reliable partnerships through data analysis and historical assessment, ultimately fostering enhanced relationships with key clientele. CRM empowers managers to elevate their business and establish a robust foundation for enhancing organizational performance. It encompasses the potential of the Supply Chain (SC) to cultivate loyalty, trust, and seamless collaboration among partners, fostering enduring sustainable performance and long-term customer relationships (Yihdegoet al., 2019; Alam, 2022); a quantitative study by Alshourah, (2019) examined the relationship between CRM integration and organizational performance in Jordanian banks. Data from 155 commercial bank managers were analyzed using correlation and regression analysis. The findings revealed that CRM Functionality positively

and significantly impacted various aspects of bank performance. However, Data Integration did not show a significant relationship with financial performance. It's important to note that this study focused exclusively on banks in Amman. The practical implications of the study suggest that building an extensive and effective CRM integration is vital for improving performance and competitiveness within Jordan's banking sector. This research contributes to understanding CRM integration in the context of Jordanian banks.

In the realm of modern business practices and supply chain management, Supplier Relationship Management (SRM) has emerged as a pivotal concept with far-reaching implications. According to Leppänen's recent research findings in 2023, SRM represents a comprehensive management process designed to establish a well-structured framework for nurturing and meticulously overseeing the associations between organizations and their suppliers. The overarching objective of SRM is to harness the maximum benefits that can be derived from these supplier affiliations, all while systematically and strategically managing the interactions and engagements with these crucial business partners. A core facet of SRM involves the meticulous selection of engagements with suppliers. These selections are made with a discerning eye toward ensuring that they align seamlessly with the overarching strategic direction and objectives of the company. This strategic alignment is paramount in optimizing the value and advantages that can be realized through these supplier relationships. In a related perspective, as articulated by Baloch and Rashid in their 2022 definition, SRM is characterized as a strategic approach and a set of practices that an organization deploys to efficiently oversee and manage its interactions and relationships with its suppliers. This strategic approach encompasses a wide spectrum of activities, processes, and initiatives all aimed at enhancing and optimizing the collaboration, communication, and overall cooperation between a company and its extensive network of suppliers. By offering a comprehensive perspective on SRM, this multifaceted framework underscores the importance of strategic alignment, efficient management, and the overarching objective of reaping the maximum advantages and value from supplier relationships. As organizations strive for excellence in their supply chain practices, the role of SRM becomes increasingly pivotal in securing competitive advantages and operational efficiency. Raza (2023) defined SCI as the comprehensive business approach of amalgamating every facet encompassing the sourcing to delivery processes. It involves forging tighter bonds among all the interconnected links, with the aim of enhancing the creation of superior services or products. SCI is the harmonious synchronization and cooperative interaction of various phases, roles, and entities encompassing a supply chain. This amalgamation aims to optimize the collective efficiency, agility, and efficacy of the supply chain. It necessitates the meticulous orchestration of activities, processes, and communication channels to ensure smooth operations (Dobilas, 2023).

According to Cahyono et al. (2023), OP stands as a pivotal determinant in ensuring the sustainability of a company. It epitomizes the degree of achievement in realizing the company's objectives. Consequently, the measurement of performance assumes paramount significance, serving as a crucial tool to facilitate the attainment of seamless and prosperous business operations. Organizations can construct suggestions for production demand as well as plans for storage and manufacture with the help of effective SCM planning. These suggestions assist organizations decide how to best use their resources, which has a significant impact on their overall OP (Salem & Jeffrey, 2023). According to Shalgham and Aberna (2023), the indicator of an organization's ability to achieve its objectives and to survive and expand is called organizational performance. Additionally, it demonstrates how well the organization's organizational structure and its constituent parts work together to achieve the organization's objectives. A study conducted on pharmaceutical companies in Jordan by Shraah et al. (2022), found distinctly that both sourcing strategies and logistical capabilities wield a notably positive influence on the OP of pharmaceutical companies. Among the sourcing strategies, insourcing, near-sourcing, few/many suppliers, joint ventures, and virtual companies emerge as potent contributors to enhanced organizational performance. Conversely, the impact of outsourcing and vertical integration on performance within the pharmaceutical context is perceived to be negligible. Additionally, the findings corroborate the affirmative effect of individual logistic capabilities within pharmaceutical firms on overall performance. This research furnishes invaluable insights for decision-makers within Jordan's pharmaceutical sector, particularly when reassessing supply chains amidst challenges, such as the unprecedented upheaval brought about by the COVID-19 pandemic.

Based on these previous studies (Adhikara & Nur Diana, 2022; El Hakmi, 2023), this research adopted three dimensions of OP: FP, EP, and OPP.

Financial Performance (FP) serves as a vital barometer of an organization's overall health and effectiveness in the broader business landscape. According to Shalgham and Aberna's insights in their (2023) research, FP encompasses the tangible financial outcomes that an organization delivers to its community and stakeholders. This can be quantified through various key performance indicators, including but not limited to increased sales figures, enhanced productivity, and the ongoing improvement of the company's financial standing. Essentially, FP becomes a pivotal gauge of the organization's capacity to generate financial value, not only for itself but also for the benefit of its wider community and the various stakeholders it serves. Furthermore, the nuanced perspective offered by Muhammad et al. (2023) in their definition accentuates the idea that FP is not solely about financial metrics but also entails a broader evaluation of how an organization efficiently and effectively utilizes its financial resources. This extends to the strategic deployment of financial assets in a manner that aligns with the organization's overarching goals and objectives. In essence, FP reflects the organization's prowess in resource management, ensuring that financial resources are harnessed in a way that optimally contributes to the achievement of its strategic ambitions. In today's dynamic and highly competitive business environment, the concept of FP carries paramount importance. It transcends mere financial figures and becomes a testament to an organization's ability to not only generate profits but also to do so in a manner that resonates with its mission, vision, and values while benefiting the community and stakeholders it serves.

As organizations seek sustainable growth and long-term success, the effective management and enhancement of FP emerge as key strategic imperatives. In their research, Gogel et al. (2020) corroborated the existence of a comprehensive framework comprising four primary dimensions that collectively constitute the multifaceted concept of FP. These dimensions encompass:

Profitability: This pertains to the organization's ability to generate surplus income, reflecting its effectiveness in managing revenues and costs.

Liquidity: The measure of an organization's capability to meet short-term financial obligations, ensuring smooth operational continuity and safeguarding against potential financial crises.

Organizational Growth: This dimension encompasses the organization's capacity to expand its operations, market presence, and influence over time, indicating sustainable development and strategic adaptability.

Financial Balance: Ensuring equilibrium between various financial factors, such as debt and equity, risk and return, as well as short-term and long-term obligations, contributing to overall stability and resilience.

Together, these four interrelated goals interplay to establish a holistic understanding of FP, reflecting the organization's ability to navigate dynamic financial landscapes while striving for optimal outcomes. Environmental Performance (EP) is an intricate concept that transcends the conventional notions of environmental impact assessment. According to the precise definition put forth by Muhammad et al. in their (2020) research, EP entails a comprehensive evaluation of the environmental repercussions arising directly from the intricate tapestry of an organization's business operations. These operations are seamlessly woven into the very fabric of its operational framework, exerting an undeniable influence on the ecological dynamics of the surrounding environment. In essence, EP serves as a holistic lens through which we can discern the environmental footprints left by organizations in the wake of their operations, recognizing that these footprints extend far beyond mere surface-level impacts. However, as Dkhili and Dhiab (2019) aptly argue, EP remains a multifaceted and intricate notion that defies simplistic measurement. Its complexity arises from its inherent linkage with not only an organization's pollution footprint and energy consumption but also its multifarious management initiatives consciously deployed to mitigate and curtail the far-reaching repercussions of environmental degradation. In essence, EP is an amalgamation of both the direct environmental consequences of business activities and the strategic efforts made by organizations to minimize their adverse effects on the environment. This multifaceted nature underscores the challenges in quantifying and assessing EP comprehensively. In a related study conducted by Dzikrianyah et al. (2023), the intricate relationship between green supply chain management practices and EP within small and medium enterprises (SMEs) in Indonesia was explored. The study engaged 89 managers and proprietors of Indonesian SMEs as respondents, providing valuable insights into the practical aspects of EP. Notably, the findings unveiled a significant correlation between the adoption of green supply chain management practices and the enhancement of environmental performance within SMEs, shedding light on the pragmatic steps organizations can take to improve their EP. In the contemporary landscape where environmental sustainability is a paramount concern, EP assumes even greater significance. It becomes not only a measure of environmental responsibility but also a key driver of organizational success and resilience in an era where ecological balance and business prosperity are intertwined. OPP, a concept subject to diverse interpretations among scholars, reflects the intricacies of organizational functioning. Some scholars, like Younus (2023), characterize it as "the adeptness with which an organization attains its objectives, skillfully harnessing available resources to not only achieve efficiency but also to ensure a qualitative edge in the execution of its endeavors." Additionally, Al Junaidi (2020) refers to it as the successful culmination of a specific task, meticulously evaluated against predetermined benchmarks encompassing precision, thoroughness, completeness, and celerity, thereby embodying the multifaceted nature of operational excellence.

ICT is a term that holds significant importance across a wide spectrum of technologies and is closely linked to the utilization of computers and communication systems, as stated by the Encyclopaedia of Computer Science (Ciroma, 2014; Wang et al., 2023). According to Bhattacharjee and Deb (2016), UNESCO (2002) further defines ICT as a multidisciplinary domain encompassing scientific, technological, and engineering facets, coupled with management strategies employed in handling information and applications, while also addressing socio-economic and cultural considerations (Qureshi et al., 2022). In their recent study, Abdullahi and Mohamud (2023) highlighted the widespread interest among businesses in optimizing their supply chain management (SCM) by leveraging Information and Communication Technologies (ICTs). The evolving landscape of ICTs offers fresh avenues for companies to refine their supply chain interactions and collaborations with suppliers. This adoption of ICTs has the potential to enhance various aspects of supply chain activities. One of the key advantages of integrating ICT into SCM is its ability to facilitate real-time and precise information exchange (EI), which is made possible through the utilization of ICT tools such as the internet, ERP, SCI, CRM, and other relevant technologies within the supply chain. The substantial role of ICT in supply chain management and its interconnectedness with supply chain stakeholders is clearly evident. It contributes significantly to the seamless and efficient functioning of the supply chain, addressing challenges such as workload, extended lead times, responsiveness, and data discrepancies in various supply chain operations. Moreover, ICT empowers businesses to expand and enhance the effectiveness of their supply chain operations, thereby boosting production and overall performance. Additionally, ICT tools aid in coordinating diverse aspects of the supply chain, including inventory management, procurement of raw materials, distribution, and transportation channels (Abdullahi & Mohamud, 2023; Kamble et al., 2023). In a study conducted by Kumar et al. (2020), which delved into the relationship between ICT,

SCM practices, and operational performance (OP) in the agri-food supply chain, 121 executives and officers from a public food distribution agency participated. The findings of this study underscored the significant association between ICT and SCM practices. Furthermore, the recent developments in ICT technologies, such as big data analysis, the Internet of Things, blockchain, among others (Zhang et al., 2023), have opened up opportunities for the creation of intelligent supply chains.

9. Research Methodology

A descriptive-analytical approach was used in this research, focusing on the mediating role of ICT on the relationship between SCM and OP within Jordanian pharmaceutical companies. To achieve the research, the research utilized a suitable sample from the research population and collected primary data through a questionnaire consisting of 30 paragraphs and designed on a five-point Likert scale. Data analysis was conducted using SPSS software.

10. Research Population and Sample

Table 1 presents data on the size of the population, sample, and the count of questionnaires distributed by each pharmaceutical company included in the Amman Stock Exchange. A suitable sample was employed to determine the Research's sample size.

Table 1
Distribution of Questionnaires for Each Company

Name of the Company	Population Size	Representation Ratio Out Of Population Size	Number Of Questionnaires
Dar Al-Dawa for Development and Investment (DADI)	858	56%	225
Jordan Pharmaceutical (JPM)	522	34%	137
Philadelphia Pharmaceutical Industry (PHIL)	148	10%	38
Total	1,528	100%	400

The questionnaire was distributed using Google Forms; however, approximately (60) questionnaires were excluded. The questionnaires subjected to actual analysis accounted for (85%) of the total.

11. The Validity and Reliability of the Questionnaire:

11.1 Structure Validity

Table 2
Structure Validity Test

Variables	Correlation Coefficient	P-Value
CRM	0.734**	0.000
SRM	0.826**	0.000
SCI	0.922**	0.000
FP	0.889**	0.000
EP	0.867**	0.000
OPP	0.864**	0.000
ICT	0.954**	0.000

**Correlation is significant at the 0.01 level

Table (2) shows all “correlation coefficients” are less than 0.01, the highest “correlation coefficients” are (0.942), which belongs to the “ICT”, and the lowest belongs to the “CRM” (0.734).

11.2 Internal Consistency

The Cronbach’s α values are acceptable if they are greater than 0.70.

Table 3
Internal Consistency (Cronbach’s α)

Variables	Cronbach’s α
CRM	0.816
SRM	0.877
SCI	0.915
FP	0.766
EP	0.798
OPP	0.935
ICT	0.901
All items	0.912

From Table 3 above, it's evident that the entire research variables exhibit Cronbach's α values exceeding **0.7**. The "OPP" dimension boasts the highest value at **0.935**, whereas the "FP" dimension holds the lowest at **0.766**. The Cronbach's α coefficient for all items is consistently **0.912**.

11.3 The Multicollinearity

Table 4
VIF and Tolerance

Variables	VIF	Tolerance
CRM	4.331	0.219
SRM	4.213	0.425
SCI	3.752	0.352

From Table 4, all the calculated variables are less than 8, and the tolerance is more than 0.1 in other words there is no Multicollinearity.

11.4 Normality Test

Table 5
The Normality of the Research's Variables

Variables	Value test	P-value
CRM	0.323	0.107
SRM	0.523	0.082
SCI	0.275	0.124
FP	0.133	0.108
EP	0.332	0.225
OPP	0.299	0.181
(ICT)	0.425	0.280

Table 5 shows the p-values for the variables, all of which exceed 0.05. This confirms that the variables indeed adhere to a normal distribution.

11.5 Goodness of fit research

Table 6
Indicators Goodness of Fit for Research Model

Chi Square χ^2 Calculated	Chi Square χ^2 Table	DF	Sig	NFI	CFI	GFI	RAMSEA
406.521	7.62	3	0	0.979	0.968	0.982	0.0751

GFI: Goodness of fit index

NFI: The Bentler-Bonett normed fit index

CFI: The comparative fit index

RMSEA: Root Mean Square Error of Approximation

All goodness-of-fit indicators in Table 6 demonstrate a satisfactory fit. The researcher observed a significant Chi Square (χ^2) value of 406.521 at a significance level of $\alpha \leq 0.05$, exceeding the critical Chi2 value of 7.62. Additionally, the Root Mean Square Error of Approximation (RMSEA) is 0.0751, below the 0.080 threshold, indicating a well-fitting model. The Goodness of Fit Index (GFI) is approximately 1, with a value of 0.981. The Comparative Fit Index (CFI) equals 1.000, exceeding the 0.9 threshold, and the Normed Fit Index (NFI) is 0.998, also exceeding the 0.9 criterion. These findings confirm the suitability of the data for path analysis testing.

Table 7
Means and Standard Deviation of SCM dimensions

Items	Means	Level	Importance
1. CRM	3.45	Medium	2
2. SRM	3.59	Medium	1
3. SCI	3.51	Medium	3
SCM	3.53	Medium	

The results indicate that the SRM dimension has the highest mean score within the realm of SCM, at 3.59. This signifies that it is the dimension most extensively implemented by the pharmaceutical companies, the CRM dimension achieved the lowest

mean score of 3.45, placing it in the medium level category. Furthermore, the findings reveal that SCM obtained a medium-level mean score of 3.53. This suggests that pharmaceutical companies exhibit a moderate level of commitment to implementing SCM practices.

Table 8

Means and Standard Deviation of OP dimensions

	Items	Means	Level	Importance
1.	FP	3.54	Medium	2
2.	EP	3.21	Medium	3
3.	OPP	3.59	Medium	1
	OP	3.51	Medium	

The results reveal that the **OPP** dimension boasts the highest mean score among the various aspects of **OP**, registering at 3.59. This suggests that pharmaceutical companies exhibit a strong interest in this particular dimension. Conversely, the **EP dimension garnered the lowest mean score at 3.21**, placing it in the medium-level category. Additionally, the findings indicate that **OP** achieved a moderate mean score of 3.51, reflecting the pharmaceutical companies' emphasis on implementing practices related to **OP at a medium level**.

12 Test of Hypotheses

12.1 Test of First Main Hypothesis

Table 9

Results of Test of First Main Hypothesis

Model Summary			ANOVA			I.V	Coefficient		
R	R ²	R ² Adjust	F	DF	P-Value		B	T	P-Value
				3		CRM	0.031	0.253	0.246
0.852	0.725	0.716	93.236		0	SRM	0.462	4.782	0.003
						SCI	0.454	4.891	0

Table 9 illustrates the results for the research's dependent variable OP and the independent variables (CRM, SRM, and SCI). These variables exhibit a significant impact due to their P-Value of 0.000, which is less than 0.05. Additionally, the calculated **F value is (93.236)**, exceeding the F value table of 2.70. Consequently, we reject the first main hypothesis and accept the alternative, which asserts that there is a statistically significant impact for SCM and its dimensions (CRM, SRM, SCI) on OP and its dimensions (FP, EP, OPP) in pharmaceutical companies in Jordan, it also shows that there is a positive (strong) correlation between the independent variable dimensions and the dependent variables, which is demonstrated by **R-value (R= 0.852)**, which is more than (0.5). Also, **R² -value equal (0.725)** and **Adjust R² (0.716)** after excluded error from R² -value, that indicates the **SCM with its dimension's** contribution to **OP with its dimensions** about 72.5%, and the remaining percentage is because of other factors.

In addition the values of the calculated t values of the variables (SRM 4.782, SCI 4.891), are more than the t value table (1.986), and the P-Values for t are less than (0.05), it means that there are a statistically significant impact for the SRM, SCI on the dependent variables (**OP**), While **CRM dimensions hasn't impact on OP**.

The following explains the estimated regression equation derived from the result of the test main hypothesis test: (B-Coefficient= 0.712).

$$OP = 0.712 + 0.462 (SRM) + 0.454 (SCM).$$

12.1.1 Stepwise Regression

Table 10

Results of Stepwise Regression Analysis for First main hypothesis

Variables	Model Summary			ANOVA	
	R	R ²	R ² Adjust	F	P-Value
1 SRM	0.834	0.695	0.654	186.654	0.000
2 SRM SCI	0.853	0.727	0.706	196.911	0.000

The stepwise result classified the independent variables into two groups; the first one includes the SRM, which has the highest contribution to the dependent variable **OP** estimated by (69.5%). The second group includes two dimensions SRM, and SCI, that raise contribution the group to (72.7%) we can conclude the Balanced Contract has the second highest contribution on **OP**.

12.2 Test of Sub- Hypothesis

12.2.1 Test First Sub- Hypothesis

Table 11

Results of test of First Sub- Hypothesis

Model Summary			ANOVA			I.V	Coefficient		
R	R ²	R ² Adjust	F	DF	P-Value		B	T	P-Value
0.812	0.659	0.636	105.067	3	0	CRM	0.041	0.364	0.629
				102		SRM	0.432	4.58	0
				105		SCI	0.365	4.12	0

Table 11 presents the dimensions of the independent variables (CRM, SRM, and SCI) and their significant impact on the first dimension of the dependent variable FP, with a P-Value of 0.000, which is less than 0.05. The calculated F value, is (105.067), exceeds the F value table of 2.70. Consequently, we reject the first sub-hypothesis and accept the alternative, which asserts a significant impact at the level of significance ($\alpha \leq 0.05$) for SCM, along with its dimensions (CRM, SRM, and SCI), on FP in pharmaceutical companies in Jordan. Table (11) also demonstrates a *positive (strong)* correlation between the independent variable dimensions and FP, as evidenced by an R-value of R=0.812, exceeding 0.5. Furthermore, the R²-value is equal to 0.659, and the Adjusted R² is 0.636 after excluding error from R²-value. These values indicate that **SCM contributes about 65.9% to FP**, with the remaining percentage attributed to other factors. Additionally, the calculated t-values for the variables (SRM 0.432, SCI 0.365) exceed the t value table of 1.986. Moreover, the P-Values for t are less than 0.05, signifying a statistically significant impact for SRM and SCI on FP. However, it's worth noting that CRM dimensions do not have a significant impact on FP.

The following explains the estimated regression equation derived from the result of the test main hypothesis test: (B-Coefficient= 0.837).

$$FP = 0.837 + 0.432 (SRM) + 4.12 (SCI).$$

12.2.2 Test Second Sub- Hypothesis

Table 12

Results of test of Second Sub- Hypothesis

Model Summary			ANOVA			I.V	Coefficient		
R	R ²	R ² Adjust	F	DF	P-Value		B	T	P-Value
0.801	0.641	0.626	115.067	3	0	CRM	0.035	0.354	0.562
				102		SRM	0.464	4.71	0
				105		SCI	0.418	4.45	0

Table 12 reveals the impact of independent variable dimensions (SCI, SRM, and SCI) on the first dimension of the dependent variable EP, with a P-Value of 0.000, indicating significance below the 0.05 threshold. The calculated F value, amounting to 115.067, exceeded the F value table of 2.86. Consequently, we reject the first sub-hypothesis and accept the alternative, which posits a significant impact at the level of significance ($\alpha \leq 0.05$) for SCM, along with its dimensions (CRM, CRM, and SCI), on EP in pharmaceutical companies in Jordan. Furthermore, Table 12 highlights a "positive (strong)" correlation between the independent variable dimensions and EP, as demonstrated by an R-value of R=0.801, exceeding 0.5. The R²-value equals 0.641, and the Adjusted R² is 0.626 after excluding error from R²-value, indicating that SCM contributes about 64.1% to EP, with the remaining percentage attributed to other factors. Additionally, the calculated t-values for the variables (SRM 4.71, SCI 4.45) are significantly greater than the t value table of 1.986. Moreover, the P-Values for t are less than 0.05, indicating a statistically significant impact for SRM and SCI on EP. However, it's noteworthy that CRM dimensions do not have a significant impact on EP.

The following explains the estimated regression equation derived from the result of the test main hypothesis test: (B-Coefficient= 0.930).

$$EP = 0.930 + 0.464 (SRM) + 0.412 (SCI).$$

12.2.3 Test Third Sub- Hypothesis

Table 13

Results of test of Third Sub- Hypothesis

Model Summary			ANOVA			I.V	Coefficient		
R	R ²	R ² Adjust	F	DF	P-Value		B	T	P-Value
0.862	0.743	0.768	102.057	3	0	CRM	0.028	0.337	0.461
				102		SRM	0.478	4.92	0
				105		SCI	0.432	4.87	0

Table (13) indicates the significant impact of independent variable dimensions (CRM, SRM, SCI) on the first dimension of the dependent variable OPP, with a P-Value of 0.000, below the 0.05 threshold. The calculated F value, amounting to 102.057, exceeds the F value table of 2.86. Consequently, we reject the first sub-hypothesis and accept the alternative, which posits a significant impact at the level of significance ($\alpha \leq 0.05$) for SCM, along with its dimensions (CRM, SRM, and SCI), on OPP in pharmaceutical companies in Jordan. Moreover, Table (13) also reveals a "positive (strong)" correlation between the independent variable dimensions and OP, as demonstrated by an R-value of R=0.862, exceeding 0.5. The R²-value equals 0.743, and the Adjusted R² is 0.768 after excluding error from R²-value, indicating that SCM contributes about 74.3% to OPP, with the remaining percentage attributed to other factors. Additionally, the calculated t-values for the variables (SRM 0.478, SCI 0.432) significantly exceed the t value table of 1.986. Furthermore, the P-Values for t are less than 0.05, signifying a statistically significant impact for SRM and SCI on OPP. However, it's important to note that CRM dimensions do not have a significant impact on OPP.

The following explains the estimated regression equation derived from the result of the test main hypothesis test: (B-Coefficient= 0.783).

$$\text{OPP} = 0.783 + 4.92 (\text{SRM}) + 4.87 (\text{SCI}).$$

12.3 Test Second Main- Hypothesis

Table 14

Results of test of Second Main- Hypothesis

Model Summary			ANOVA			I.V	Coefficient		
R	R ²	R ² Adjust	F	DF	P-Value		B	T	P-Value
0.893	0.797	0.783	118.143	3	0	CRM	0.005	0.245	0.862
				102		SRM	0.534	5.82	0
				105		SCI	0.398	4.73	0

Table (14) presents the significant impact of independent variable dimensions (CRM, SRM, SCI) on the mediating variable ICT, with a P-Value of 0.000, below the 0.05 threshold. The calculated F value, amounting to 118.143, exceeds the F value table of 2.86. Consequently, we reject the second main hypothesis and accept the alternative, which posits a significant impact at the level of significance ($\alpha \leq 0.05$) for SCM, along with its dimensions (CRM, SRM, and SCI), on ICT in pharmaceutical companies in Jordan. Furthermore, Table (14) also reveals a "positive (strong)" correlation between the independent variable dimensions and ICT, as demonstrated by an R-value of R=0.893, exceeding 0.5. The R²-value equals 0.797, and the Adjusted R² is 0.783 after excluding error from R²-value, indicating that SCM contributes about 79.7% to ICT, with the remaining percentage attributed to other factors. Additionally, the calculated t-values for the variables (SRM 5.82, SCM 4.73) significantly exceed the t value table of 1.986. Furthermore, the P-Values for t are less than 0.05, signifying a statistically significant impact for SRM and SCI on the mediating variable ICT. However, it's important to note that CRM dimensions do not have a significant impact on ICT.

The following explains the estimated regression equation derived from the result of the test main hypothesis test: (B-Coefficient= 0.109).

$$\text{ICT} = 0.109 + 0.534 (\text{SRM}) + 0.398 (\text{SCI}).$$

12.4 Test Third Main- Hypothesis

Simple linear regression was used to test the third-main hypothesis at the significance level ($\alpha \leq 0.05$).

Table 15

Result of Third-Main Hypothesis

M.V	R	R ² Adjust	B	D.V	t-table value	t –Calculated value	SIG	
ICT	0.878	0.77	0.769	0.735	OP	1.986	17.87	0

Table 15 displays significant findings regarding the impact of the mediating variable (ICT) on the dependent variable OP. The calculated t-value of 17.870 exceeds the t table value of 1.986, indicating a statistically significant impact. Additionally, the significance level of t is less than 0.05, leading us to accept the hypothesis asserting a statistically significant impact at $\alpha \leq 0.05$ for ICT on OP in pharmaceutical companies in Jordan. Furthermore, Table (15) also highlights a strong positive correlation between the mediating variable and the dependent variables, evidenced by an R-value of $R=0.878$, exceeding 0.5. ICT's contribution to OP is substantial at 77% ($R^2 = 0.770$), with the remaining percentage attributed to other factors.

As for the B value, which stands at 73.5%, this signifies that a one-unit increase in ICT will result in a 0.735 increase in OP.

The following explains the estimated regression equation derived from the result of the test third-main hypothesis test: (B-Coefficient= 0.941)

OP = 0.930+ 0.735 (ICT).

12.5 The Fourth Main Hypothesis

Table 16
Result of Forth main hypothesis

Variables	Direct Impact		Indirect Impact		Total Impact	
	SCM	ICT	SCM	ICT	SCM	ICT
ICT	0.936	0	0	0	0.936	0
OP	0.321	0.521	0.512	0	0.842	0.512

Table 16 reveals that there is only one indirect impact, which measures 0.526, and it pertains to the indirect impact of SCM on OP through ICT. This finding increases the total impact of SCM on OP to 0.842. Interestingly, the result indicates that the indirect impact on OP through ICT, at 0.512, is greater than the direct impact of SCM on OP, which is 0.321. Consequently, we reject the fourth main hypothesis and embrace the alternative, signifying a significant impact at the level of significance ($\alpha \leq 0.05$) for SCM, along with its dimensions (CRM, SRM, and SCI), on OP, encompassing (FP, EP, and OPP), with ICT playing a mediating role in pharmaceutical companies in Jordan, figure (2) Presents the Path Direction in the Research Model for Path Analysis.

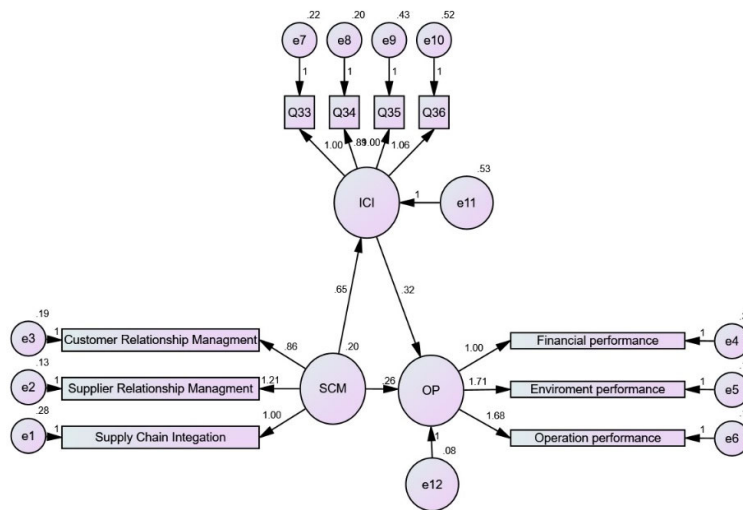


Fig. 2. Model of Path Analysis

13. Conclusions

-The results from the first main question revealed a significant impact of **SCM with its dimensions (CRM, SRM, and SCI) on OP with its dimensions (FP, EP, and OPP) in Jordanian pharmaceutical companies.** This underscores the pivotal role of SCM in elevating the level of OP in these companies. Additionally, the relationship between these variables is not only positive but also robust, implying that any positive changes in the dimensions of SCM will lead to a favorable impact on OP. Furthermore, it is noteworthy that SCM dimensions contribute significantly; accounting for approximately 72.5% of the variation in OP. SRM stands out with the highest contribution at 69.5%, while CRM does not exhibit a notable impact on the dependent variable. Moreover, SCM, specifically through its dimensions, exerts a significant influence on FP, which is one

of the aspects of OP. This relationship is characterized as strong and positive, meaning that alterations in SCM dimensions will positively affect FP. SCM contributes significantly, explaining about 65.9% of the variance in FP. Notably, SRM has the most substantial impact on FP at 64.9%, whereas CRM does not significantly influence FP. The results match with (Alam, 2022).

-SCM, with its dimensions, plays a pivotal role in enhancing various facets of OP. Notably; it significantly contributes to improving EP, with the relationship between these variables being strong and positive. SCM dimensions collectively account for approximately 64.1% of the variance in EP this results match with (Dzikriansyah, 2023), and among these dimensions, SRM stands out with the highest contribution at 62.8%, while CRM does not exert a notable impact on EP. Similarly, SCM, through its dimensions, exerts a significant influence on OPP, an essential aspect of OP. The relationship between these variables is characterized as strong and positive, meaning that changes in SCM dimensions positively affect OPP. SCM contributes substantially, explaining about 74.3% of the variance in OPP. Once again, SRM leads in contribution at 65.9%, while CRM does not significantly affect OPP. Furthermore, the results of the second main question reveal that implementing SCM dimensions (CRM, SRM, SCI) has a significant impact on various dimensions of OP (FP , EP , OPP). This underscores the role of SCM in enhancing OP, including ICT levels. The relationship between these variables remains positive and strong, indicating that positive changes in SCM dimensions will positively impact ICT. SCM dimensions collectively contribute significantly, explaining around 79.9% of the variance in ICT this results match with (Kumar et al., 2020). Once more, SRM takes the lead in contribution at 74.3%, while CRM does not significantly influence ICT.

- ICT plays a pivotal role in enhancing OP within pharmaceutical companies. The findings underscore a significant and positive impact of ICT on OP, with ICT contributing approximately 77%. Furthermore, a one-unit increase in ICT corresponds to a 0.77 increase in OP, highlighting the direct relationship between the two.

-The fourth hypothesis reveals a significant indirect impact of SCM, with ICT acting as a mediating factor in its relationship with OP within pharmaceutical companies. This research provides robust support for ICT mediating the relationship between SCM and OP across all cases. Regarding SCM, the results indicate a medium level of implementation within pharmaceutical companies, with an arithmetic mean of 3.56. This reflects a moderate level of interest and implementation of SCM practices, and this medium level varies across the different dimensions. SRM stands out with the highest arithmetic mean of 3.59, while SCI and CRM share a similar medium-level score. Similarly, the level of OP in pharmaceutical companies is also rated at a medium level, with an arithmetic mean of 3.51. This signifies a moderate level of interest and implementation across various OP dimensions, with all dimensions showing the same medium-level score. Notably, OPP achieves the highest arithmetic mean of 3.59, while FP and EP maintain a similar medium-level rating. However, the EP dimension receives the lowest mean score among the OP dimensions.

14. Recommendation

Based on the results, this research recommends the following:

1. While CRM showed a relatively lower impact in the research, it should not be neglected; this research recommends pharmaceutical companies to explore strategies to enhance their customer relationships, which may lead to increased customer satisfaction and loyalty.
2. This research recommends pharmaceutical companies to invest in and enhance ICT infrastructure and capabilities.
3. This research recommends enhancing SCM practices in pharmaceutical companies in Jordan.
4. This research recommends emphasizing SRM in pharmaceutical companies in Jordan.
5. This research recommends pharmaceutical companies to evaluate their EP dimensions and explore ways to improve them.

Recommendation for Future Studies

This research recommends future studies to research the impact of green supply chains (GSC) on OP, this research also recommends examining the impact of artificial intelligence (AI) on SCM and OP and exam the role of artificial intelligence (AI) instead of (ICT) to as a mediator between SCM and OP. Another suggestion for future studies examining the impact of smart supply chains (SSC) on OP.

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