MODEL OF SUPPLY CHAIN PRACTICES TOWARDS SUSTAINABLE SUPPLY CHAIN MANAGEMENT FOR THE JORDANIAN PHARMACEUTICAL INDUSTRY

HASSAN OLAYAN MUHAMMAD SHTAWI

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HASSAN OLAYAN MUHAMMAD SHTAWI

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Nama Pelajar (Name of Student)	:	**Hassan Olayan Muhammad Shtawi**

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Tandatangan

|		
Nama Penyelia/Penyelia-penyelia (Name of Supervisor/Supervisors)	:	**Assoc. Prof. Ts. Dr. Mohd Kamarul Irwan bin Abdul Rahim**

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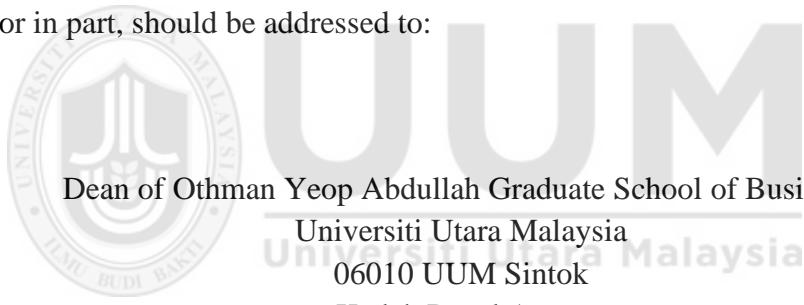
ABSTRACT

The pharmaceutical sector in Jordan is evolving rapidly, becoming more advanced and competitive on a global scale. This shift underscores the importance of implementing effective supply chain management (SCM) practices that promote sustainability in social, economic, and environmental aspects. This study examines the perceptions of top managers in Jordan's pharmaceutical industry regarding their SCM practices, the role of information and communication technology (ICT), and the impact on the sustainability of the supply chain. A key contribution of this research is the development of a new theoretical framework that links supply chain practices (SCP) including supplier partnerships, customer relationships, the level and quality of information sharing, and postponement with sustainable supply chain management (SSCM), conceptualized through the environmental, economic, and social pillars. ICT acts as a mediating factor in this relationship. This study uses a quantitative research approach, employing a structured questionnaire to collect data from 313 managers, resulting in a 95.8% response rate. The data were analyzed using Partial Least Squares-Structural Equation Modeling (PLS-SEM), with bootstrapping techniques applied for hypothesis testing to evaluate direct and indirect relationships within the model. Sixteen hypotheses were tested using the measurement model and structural model. However, only ten hypotheses received empirical support. The findings support most of the proposed hypotheses, demonstrating ICT's direct, indirect, and mediating roles on SCP and SSCM. The model explained 61% of the variance in sustainability outcomes, highlighting the significant impact of supply chain practices on sustainable performance. This research provides valuable insights for pharmaceutical companies in Jordan, offering a roadmap for enhancing their sustainability initiatives through improved SCM practices. It highlights the importance of integrating ICT to drive sustainable outcomes, assisting managers in addressing current and future supply chain challenges.

Keywords: Supply chain practices; Sustainable supply chain management; Information and communication technology; Pharmaceutical sector; Jordan

ABSTRAK

Sektor farmaseutikal di Jordan sedang berkembang pesat, menjadi lebih maju dan kompetitif di peringkat global. Perubahan ini menekankan kepentingan melaksanakan amalan pengurusan rantaian bekalan (SCM) yang berkesan untuk mempromosikan kelestarian dalam aspek sosial, ekonomi, dan alam sekitar. Kajian ini memeriksa persepsi pengurus atasan dalam industri farmaseutikal di Jordan mengenai amalan SCM mereka, peranan teknologi maklumat dan komunikasi (ICT), dan impaknya terhadap kelestarian rantaian bekalan. Sumbangan utama kajian ini adalah pembangunan rangka kerja teori baharu yang menghubungkan amalan rantaian bekalan (SCP) termasuk perkongsian pembekal, hubungan pelanggan, tahap dan kualiti perkongsian maklumat, serta penangguhan dengan pengurusan rantaian bekalan lestari (SSCM), yang dikonseptualisasikan melalui alam sekitar, ekonomi, dan sosial. ICT berperanan sebagai faktor perantara dalam hubungan ini. Kajian ini menggunakan pendekatan penyelidikan kuantitatif, dengan menggunakan soal selidik terstruktur untuk mengumpul data daripada 313 pengurus, dan mencapai kadar respons sebanyak 95.8%. Data dianalisis menggunakan *Partial Least Squares-Structural Equation Modeling* (PLS-SEM), dengan teknik *bootstrapping* digunakan untuk ujian hipotesis bagi menilai hubungan langsung dan tidak langsung dalam model tersebut. Enam belas hipotesis telah diuji menggunakan model pengukuran dan model struktur. Walau bagaimanapun, hanya sepuluh hipotesis yang menerima sokongan empirikal. Hasil kajian menyokong kebanyakan hipotesis yang dicadangkan, menunjukkan peranan langsung, tidak langsung, dan perantaraan ICT terhadap SCP dan SSCM. Model tersebut menerangkan 61% daripada varians dalam hasil kelestarian, menekankan impak signifikan amalan rantaian bekalan terhadap prestasi lestari. Kajian ini memberikan pandangan berharga kepada syarikat farmaseutikal di Jordan, menawarkan pelan tindakan untuk mempertingkatkan inisiatif kelestarian mereka melalui amalan SCM yang dipertingkatkan. Ia menekankan kepentingan mengintegrasikan ICT untuk mendorong hasil lestari, membantu pengurus menangani cabaran rantaian bekalan semasa dan masa depan.

Keywords: Amalan rantaian bekalan; Pengurusan rantaian bekalan lestari; Teknologi maklumat dan komunikasi; Sektor farmaseutikal; Jordan

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LIST OF ABBREVIATIONS

APLs	Active Pharmaceutical Ingredients
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CMV	Common Method Variance
CLM	Control Lifecycle Management
CR	Customer Relationship
EFA	Exploratory Factor Analysis
GIZ	Dutch Gessellschafi für Internationale Zuzammenabrbiet
ICT	Information and Communication Technology
KPLs	Key performance for Individuals
OP	Organization Performance
PPC	Production Planning and Control
SEM	Structural Equation Modeling
SCM	Supply Chain Management
SSCM	Sustainable Supply Chain Management
SQ	Service Quality
SCP	Supply Chain Practices
TBL	Triple Bottom Line

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Since the early 1980s, the pharmaceutical sector worldwide has witnessed the supply chain management concept and has realized the worth of a customer and the need to respond quickly to customer requirements while considering economic and social considerations. In Jordan, the pharmaceutical sector is regarded as one of the most important economic sectors (Citaristi, 2022; Fathelrahman et al., 2016). Since 1962, this sector has continued to grow up to today. Ensuring the success of this sector always requires more attention to sustainable supply chain management (World Bank, 2017). The Jordanian Pharmaceutical Association JPA has several goals that revolve mainly around protecting professional interests, cooperating with the internal federation, preserving pharmacists' rights, maintaining professional ethics, encouraging scientific research, and protecting pharmacists and their families in need and old age.

The pharmaceutical sector in Jordan is becoming increasingly sophisticated, vibrant, and globally competitive; therefore, a better understanding of the factors that influence this sector is required (Khdour et al., 2022). Additionally, the challenges of increasing global competition have led the pharmaceutical industry in Jordan to improve organization's performance toward obtaining competitive advantages to ensure survival, and growth, become efficient, and improve the quality of service. One such strategy is to focus on work conditions and customer needs, such as supply chain management (SCM), with existing staff having values of interest, especially concerning vital goods such as medicine (Sharabati, 2021). Moreover, because of liberalization and the globalization of international trade, the production factors

sourcing and consumer products from worldwide destinations are enhancing the interdependence between producers and wholesalers in international Supply Chains (Khan et al., 2020). From that point, it can be said that the distribution of competitiveness in a physical exchange with the rest of the world is now crucial for economic growth and development. In the supply chain (SC) context, it is necessary to implement management practices that promote the company and overall SC performance and focus on social, economic, and environmental concerns (Freitas et al., 2021). For that, supply chain management (SCM) should also be concerned with its sustainability.

Sustainability is an attempt to formulate a program integrating various levels of human action, which was often considered separately before, based on moral reflection regarding human responsibility for the environment. And when considering the complexity of sustainability in the context of supply chain management, it is a management concept extending beyond a supply chain's performance metrics of cost, time, and flexibility (Eizaguirre, et al., 2019). Therefore, the efforts to implement environmentally and socially sustainable performance supporting current and future generations greatly expand transparency in supply chain management into moral, economic, legal, social, and technical attributes of performance. Also, Dominic Zimon et al. (2019) argues in a similar vein, realizing that sustainable supply chain management (SSCM) addresses the management of the integration of economic and non-economic issues in a supply chain. In addition, SSCM clearly integrates social and environmental dimensions with economic considerations into a triple bottom line (TBL) and encompasses both forward and backward supply chains.

Therefore; the TBL provides a framework for which companies can measure the performance and success of the company from an economic, social, and environmental

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perspective. Reporting with TBL establishes principles by which a company should operate to focus on the overall impact of its actions (Kaur et al., 2022). This includes both positive and negative actions. Thus, economic performance refers to the topics addressed in a company's annual financial report, whereas environmental performance includes the amount of energy consumed and its origin, resource and material usage, and emissions. Furthermore, the social performance considers interactions between the organization and its community (Khan, et al., 2021). That means, the company boosts social sustainability through diversity and non-discrimination, ensures the quality of life and indigenous rights, promotes community involvement and employee relations, the ratio of wages is fair, and the health and safety of employees are taken care of. On top of that companies can use TBL to highlight the non-market and non-financial areas of their performance and responsibility (Rashidi, et al., 2020). The characteristics of TBL include accepting accountability, being transparent, integrated planning and operations, commitment to stakeholder engagement, and multi-dimensional measurement and reporting (Saarela, 2021).

Additionally, Khan et al. (2018), stated that, in order to create a framework for managing and accessing sustainability, it is necessary to take into account social, environmental, and economic goals and performance indicators. Likewise, developing an assessment system that takes into account every single component of sustainability may be problematic because of the complexity of a supply chain comprising multiple enterprises (Ramirez-Peña et al., 2020). The SCM study also reflects the complex and evolving nature of SCM processes. A large portion of the existing theoretical and empirical literature on supply chain management narrowly examines one or two links in the supply chain or a single aspect of SCM from a particular angle. There has been research conducted on the supplier side on topics such as supplier involvement,

manufacturing performance, supplier selection, and the antecedents and consequences of buyer-supplier relationships (Teodorescu & Korchagina, 2021). Other topics include supplier management orientation and supplier/buyer performance, supplier relationships as a means to improve supplier responsiveness, and the impact of supplier alliances on the organization's success factors.

The relationships between producers and consumers are the subject of research, like those of Nguyen et al. (2018). Upstream and downstream aspects of the supply chain have been studied in synchrony in a few recent studies. For example, Frohlich and Westbrook (2001) investigate the effects of supplier-customer integration on organizational performance, whereas Bui et al. (2021) investigate the relationships between supplier management practices, customer relations practices, and organizational performance. In studying SCM and supplier assessment methods, Tan et al. (2002) establish a connection between the constructs and business performance, as mentioned by Min and Mentzer (2000). In order to quantify supply chain orientation and SCM on a conceptual level, Gligor et al. (2020) created a tool. A suite of supply chain methodologies and tools for analyzing SCM strategies is created by Hofmann et al., (2019). In a recent study, the term "supply chain management practices" refers to the actions done by a company to better manage its supply chain. It is believed that SCM techniques are a multi-faceted idea that includes (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement), which includes the downstream and upstream sides of the supply chain management (Jum'a, Zimon & Ikram, 2021).

Moreover, the study of Quynh and Huy (2018) conceptualized SCP as (a strategic supplier partnership also customer relationship, information sharing and level of information quality) by examining their impact on competitive advantages and firm

performance. This study was carried out in Vietnam's SME sector. The study's findings demonstrate that the four SCMP structures have a major and favorable impact on firm competitive advantages, the three constructs of SCMPs (customer relation, information sharing, and the quality of information sharing) have a significant positive impact on firm performance, and competitive advantage has the strongest impact on firm performance. The findings imply that in order to increase firm competitive advantages, Vietnamese SMEs should manage customer relationships well, be willing to share information with their partners, increase the level of information quality and build partnerships with their suppliers and customers, and through the improvement of competitive advantage they may acquire great performance. Therefore, by examining SCM elements like strategic supplier partnership, customer relationship, information sharing, information quality, and postponement, the recent study seeks to fill a research gap in the context of Jordan's pharmaceutical sector and the relationship between SCM and SSCM.
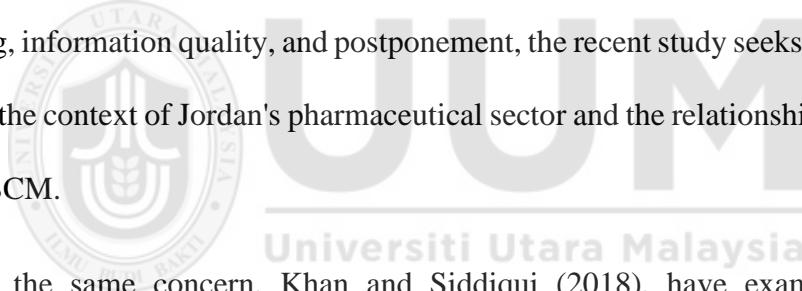
In the same concern, Khan and Siddiqui (2018), have examined the SCM measured (strategic supplier partnership, level of information sharing and quality of information sharing) on the performance of pharmaceutical manufacturing firms in Pakistan, they stated that strategic supplier partnership, level of information sharing and quality of information sharing significantly correlates with the performance of manufacturing pharmaceutical firms. The study explored that all independent variables significantly predicted the performance of the firm. Moreover, they found that strategic supplier partnerships and quality of information sharing have a positive effect on the performance of pharmaceutical companies whereas the level of information sharing has a negative impact on performance. This study recommends further investigation to explore more practices of the SCM, and new regions and industries. Therefore, the

recent study followed this recommendation and examined SCM practices in Jordanian pharmaceutical companies, by adding more two practices of SCM (Customer relationship, Postponement) with another dependent variable SSCM, to explore whether the impact of these practices will be similar or different between Pakistan and Jordan.

Moreover, Rasib et al. (2021) investigated the level and relationship between supply chain management practices (SCMP) and supply chain innovation in the context of SMEs in Malaysia, the respondents were individuals who are in charge of operations of SME businesses in Malaysia. They stated that SCMP dimensions have proven to be effective in encouraging supply chain innovation among Malaysian SMEs, and they recommended future studies to explore the effect of SCM practices in another context and with other issues or dependent variables. For that, the current study tried to fill the recent gaps and follow this recommendation by examining the impact of SCM practices on the SSCM, in the context of Jordan, on the organizational level at the pharmaceutical organizations in Jordan.

On the other hand, the present industrial companies have huge impacts on the environment and social and economic aspects. In this sense, there is increasing attention among stakeholders regarding sustainability. The ICT are contributing to a sustainable society by enhancing the SSCM. In line with this, to improve the efficiency of business activities such as manufacturing, production, and consumption, an innovative research solution has been proposed, information and communication technology as a new tool to support the SCP and SSCM (Uniyal et al., 2021). Based on that, ICT plays a major role in SSCM and it is investigated in the current study.

Furthermore, concerning sustainable impacts on manufacturing processes and energy use, sustainability through ICT has acquired attention in the modern day

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(Murshed, 2020). Morrar, Abdeljawad et al. (2019), stated that information and communication technology (ICT) has enormous potential to aid in sustainable development in an industrial setting through its numerous functions, including data handling, transportation, recovery, storage, representation, and exchange via various sensors, equipment, and administrative tools (Fatorachian, & Kazemi, 2021). By maximizing resources, boosting communication between members, supporting management functions, and improving decision-making capacities, ICT can bring significant benefits to businesses in terms of cost savings, worker satisfaction, and waste reduction. Despite the fact that information and communication technology (ICT) has emerged as a key metric for supply chain management (SCM), there has been relatively little study of ICT innovations and their applications within the framework of supply chain and supply chain management (SSCM). This is due to a deficiency in infrastructure, facilities, knowledge, leadership, and funding.

To summarize, SSCM can be achieved by choosing best practices in information and communication technology (ICT) across the four phases of production, configuration, consumption, and disposal. This will lead to increased growth, improved efficiency, and decreased costs and times (Zeraati et al. 2019). As for Jordan, while some studies have attempted to address sustainability concerns in supply chain management (SCM), the majority of Jordanian studies have focused on increasing KPIs for individual stages of the supply chain (e.g., Alzubi & Akkerman, 2022). Because there has been so little study on sustainability in supply chain management in Jordan, a gap has opened up between academics and SCM practitioners. In light of this, the purpose of this research is to examine SSCM challenges in Jordan, assess the pharmaceutical industry's openness to implementing these practices, and supplement previous research on SCP in developing nations.

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By investigating and evaluating sustainable practices in Jordan's pharmaceutical industry, this study seeks to contribute to the existing body of knowledge. To assess the potential impact of SCP on SSCM is another objective. There has been global competition among nations to improve their economies. Pharmaceutical businesses, retail outlets, and manufacturing facilities are all part of the Jordanian government's plan to improve SCP (Hani, 2022). For developing nations like Jordan, SSCM is still a novel concept, despite research into it dating back to the early 2000s. As far as the authors are aware, there is a lack of study on SSCM within the pharmaceutical sector of Jordan. Since it is one of the earliest studies to assess the pharmaceutical industry in Jordan's present level of sustainable practices, (Hanaysha & Alzoubi, 2022), this research adds to the existing body of knowledge.

Based on the preceding discussion, this study will attempt to provide a model of the impact of SCP on the SSCM conceptualized based on the TBL (economic, social, and environmental) with the mediating role of the ICT in the Jordanian pharmaceutical sector which is a critical sector in Jordan but remains under-explored.

1.2 Jordanian Scenario

Based on the report of GIZ and the Jordanian Ministry of trade and support titled (Value Chain Analysis of the Pharmaceutical Sector in Jordan, 2019), Jordan faces a significant dependence on foreign active pharmaceutical ingredients (APIs) for the sourcing stage. It is increasingly focusing on highly lucrative re-export activity, which trades pharmaceutical products from Western nations (Germany, USA, France, and Switzerland) into neighboring Arab countries. As a result, Private and public stakeholders must understand these market trends/ threats and execute reasonable reforms to ensure the sector's competitiveness, profitability, and increase employment (currently estimated at 26,000 workers). Local manufacturers indicate that their

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operations may benefit greatly from the Jordan Food and Drug Administration's (JFDA) additional assistance during the drug registration process.

According to the literature, slow registration delays for novel pharmaceuticals for both local and export markets have a significant impact on their operations (Altawalbeh et al., 2020). Finally, both private and public stakeholders must realize the importance of modernization of the pharmaceutical industry in order to create new commercial prospects. Export trends have benefited from Middle Eastern economies' recent expansion, which has resulted in greater government spending on healthcare and the establishment of mandated health insurance plans. Jordanian producers and exporters should focus on profiting from these trends. By increasing life expectancy and literacy rates regionally are expected to raise awareness of health-related issues, resulting in increased demand for high-quality, cost-effective pharmaceutical goods (Almomani, 2019). As a result, the quality of Jordan's pharmaceutical products is well-recognized in the Levant, and North African countries; high demand is especially evident for antibiotics and painkillers, followed by drugs for respiratory systems, vitamins, and drugs to treat diabetes and cancer. Availability by fast delivery are substantial requirements from buyers; small pharmaceutical companies mentioned having issues with cash flow to purchase sufficient APIs for the further production of orders for the export market. Also, Pricing is critical in export negotiations; the JFDA provides unified/fixed prices for most pharmaceutical products in the local market and facilitates negotiations, as these prices are the benchmark when setting prices for the export market.

In addition, Jordan's pharmaceutical companies have vast experience in dealing with all sorts of packaging, such as blister packs, bottles, and pouches. Also, companies have advanced in key export markets such as Algeria, Saudi Arabia, Sudan,

and UAE (Al-Serhan, 2019). Based on the above discussion related to the pharmaceutical sector in Jordan, its sector under the administration and monitoring of JFDA, the recent study will examine the SCP on the SSCM with moderating ICT.

1.3 Problem Statement

In response to growing sustainability issues such as climate change and greenhouse gas emissions, as well as increasing social concerns, businesses are expanding their goals beyond economic performance to encompass broader objectives including social, environmental and economic sustainability (Luthar and Mangla 2018), In addition, despite this progress, gaps persist in the literature regarding the measurement of sustainability, and it's integration into sustainability assessment models that incorporate social, economic, and environmental dimensions (Chardine, et, el 2014).

Despite its growing importance for SSCM, there is a notable lack of studies addressing key aspects of SSCM (Taylor & Vachon, 2018). The adoption of sustainable practices at both organizational and supply chain levels is often driven by demands from internal and external stakeholders (Taghikhah, Voinov, & Shukla, 2019). However, in developing nations, market and regulatory pressures to implement SSCM are comparatively weaker than in developed nations, where companies are more inclined to adopt SSCM voluntarily (Galal, 2016). This disparity highlights a gap in the literature concerning the adoption and implementation of SSCM in developing nations (Aslam et al., 2021).

Based on the literature, there is a critical need to balance social, environmental, and economic sustainability across supply chains (Baah et, el., 2021; Sarkis, Kouhizadeh, & Zhu, 2020). However, the direct influence of supply chain orientation on the sustainability performance of supply chains remains underexplored. It remains

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undetermined in the literature if SCO directly influences the sustainability performance of the supply chain. While some studies, such as Akshay Jadhav (2019), discussed The role of supply chain orientation in achieving supply chain sustainability and suggested that the SCO framework for supply chain collaboration and communication has a direct impact on the environmental and social sustainability performance of supply chains, their study findings indicate that internal supply chain coordination within the SCO framework impacted solely the environmental sustainability, leaving gaps in understanding its broader implications. Therefore; this study aims to fill these gaps by investigating the adoption, implementation, and impact of SSCM in developing countries, with a particular emphasis on constructing comprehensive models to assess its sustainability characteristics. By doing so, it hopes to contribute to a better understanding of SCM practice's role in attaining overall supply chain sustainability.

Additionally, they are still required to develop multidimensional models and tools for managing SSCM (Moazzam et al., (2018); Asif, et, el. 2020; Chowdhury, 2021). These studies have asserted that there are numerous challenges in developing multidimensional frameworks and tools to design and manage sustainable supply chain management. As sustainability in the supply chain includes the resolution of economic, environmental, and social concerns to guarantee long-term viability and ethical practices. This can impose financial burdens, particularly on small enterprises, and disrupt relationships with suppliers who prioritize cost reduction. Moreover, the supply chain must lower its carbon footprint, minimize waste, and advocate for renewable resources, necessitating changes in transportation, production, and packaging methods (Grabs & Carodenuto, 2020).

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In addition, a study by Vesal et al. (2021) stated that establishing and maintaining strong relationships with customers is essential for fostering sustainability, and businesses can encourage suppliers to use more environmentally friendly practices by focusing on achieving supply chain goals that fit with customer desires for ethical and environmentally friendly products. From a social perspective, getting customers involved with sustainability helps spread the word about human rights and ethical sourcing, which in turn encourages responsible buying habits. To improve sustainable practices throughout the supply chain, it is necessary to have high levels of information sharing. And, ensuring that suppliers and consumers are kept informed and engaged promptly is crucial for achieving sustainability objectives, such as responsible sourcing, waste reduction, and emissions tracking (Wang et al.,2020). Add to that, optimal use of resources helps save costs and improve environmental outcomes, and better decision-making is made possible by sharing accurate, high-quality data. Companies may reduce waste and its impact on the environment by using real-time data to avoid overproduction or surplus inventories (Alzoubi & Yanamandra, 2020).

Furthermore, postponement helps reduce waste, excess inventory, and resource utilization, which contributes to economic and environmental sustainability (Rau et al., 2021), also it is the practice of delaying specific supply chain processes until customer demand is obvious. Therefore, reducing the company's environmental effect by avoiding overproduction and cutting down on energy and material use by holding off on production until demand is established. Socially, postponement can lead to better working conditions by reducing the need for high-pressure, last-minute labour demands and creating more balanced workloads (Karani, 2022). Together, these supply chain practices create a more flexible, responsive, and responsible system that addresses the economic, social, and environmental challenges associated with sustainability.

Moreover, Jordan's pharmaceutical supply chain faces economic, environmental, and social sustainability challenges (Sharabati, 2021). Due to its reliance on imported raw materials, the sector is exposed to global supply chain disruptions and currency exchange rate volatility. This dependency raises manufacturing costs and may reduce the sector's regional and worldwide competitiveness. Add to that, the high expenditures of meeting international quality and safety requirements put financial pressure on smaller pharmaceutical enterprises. Therefore, this sector must strengthen local raw material partnerships, improve supply chain efficiency, and implement modern manufacturing technologies to cut production costs and increase resilience to improve sustainability (Alzubi & Akkerman, 2022). Sustainability in Jordan's pharmaceutical supply chain is equally important from an environmental and social perspective. Pharmaceutical manufacturing still uses a lot of energy and produces hazardous waste. For that, Jordanian pharmaceutical businesses must reduce emissions and manage waste in compliance with tougher environmental requirements. Another challenge is socially ensuring supply chain workers are treated properly and safely (Ezmigna & Omain,2024). Moreover, these laws and ethical sourcing practices are crucial as the sector grows and becomes more interwoven into global supply chains. Sustainable practices in these areas need to improve the industry's environmental footprint, social responsibility, and global reputation (Alnsour & Moqbel, 2023). Based on the above gaps, obstacles, and challenges, this study developed one model to investigate the impact of these factors on SSCM.

Furthermore, pharmaceutical supply chain postponement lets organizations delay production, packaging, and distribution until customer demand is better understood (Nti, 2022). In a sector where demand is volatile and susceptible to health trends, new laws, and disease outbreaks, this is invaluable. Pharmaceutical firms can meet demand

better and avoid overproduction and inventory by delaying final production and distribution decisions (Ploszczuk & Nolan, 2021). This is crucial since unused drugs squander raw materials, energy, and money on storage, shipping, and disposal. Postponement improves efficiency and cost-effectiveness by delivering the right products in the right amounts at the right time. It can affect the economic, social, and environmental sustainability of the pharmaceutical supply chain (Abdolazimi et al.,2023). As postponement lowers waste and surplus inventory, lowering storage, shipping, and obsolescence expenses. This makes the supply chain nimble and cost-effective. Also, it can reduce energy and resource waste, lowering the manufacturing process's carbon footprint (Vyas et al.,2024). Disposing of unneeded or expired pharmaceuticals causes environmental damage, however less overproduction reduces this. Also, postponement allows pharmaceutical corporations to respond to urgent health demands, such as public health emergencies, ensuring that important treatments are available. It also helps organizations maintain ethical production levels, reducing labour resource strain and guaranteeing fair and controllable working conditions. And, it encourages a sustainable, responsible, and flexible pharmaceutical supply chain (Forehand, 2021). Therefore, postponement is investigated as a factor that has an impact on SSCM.

Similarly, a few studies on how supply chain practices affect Jordan's supply chain sustainability and still too various variables need to be investigated (AlBrakat et al.,2023). In addition, the Jordanian pharmaceutical sector, driven by SMEs, faces unique sustainability challenges because of limited resources, infrastructure, and regulatory frameworks. Academic and corporate efforts to study and implement sustainable practices remain fragmented (Jum'a, 2023; Yosef, Jum'a & Alatoom, 2023). Due to the region's relatively new focus on sustainability, typical economic

incentives like cost reduction and efficiency often trump environmental and social concerns. The lack of national regulatory pressure and comprehensive sustainability regulations slows the implementation of sustainable practices, limiting academic and corporate concentration on the problem (Jum'a, 2023). A substantial part of Jordan's economy is driven by SMEs, who typically lack the means or understanding to implement and analyze sustainable supply chain practices (Zaid et al. 2023). In addition, manufacturing and pharmaceutical industries have limited infrastructure and advanced technology, making it harder to study supply chain practices and sustainability. Finally, academic institutions and enterprises may not collaborate enough to obtain data for in-depth investigations on this subject (Yosef et al. 2023).

Despite the importance of (ICT) in enhancing SCP, limited research on its specific applications in SSCM (Shuhui et al., 2021), So, improving pharmaceutical supply chain practices through the use of ICT is essential for tackling social, environmental, and economic sustainability issues. By forming partnerships with suppliers, ICT allows for real-time communication and data sharing, which promotes collaboration, decreases inefficiencies, and ultimately saves money and resources (Liu et al. 2023). When it comes to customer relationships, information and communication technology (ICT) solutions like CRM systems help businesses match production with customer demand, reducing waste and environmental damage (Bachir, 2021). Through its ability to enable transparency and traceability, ICT also increases the level and quality of information sharing. This, in turn, supports social sustainability by assuring ethical sourcing and fair labour practices (Garcia-Torres et al.,2024). Lastly, information and communication technology (ICT) helps with postponement through the use of advanced analytics to improve demand forecasting. This lets businesses put off manufacturing decisions until they need them, which in turn decreases surplus

inventory, waste, and emissions, hence improving environmental sustainability (Maeng et al. 2020).

Therefore, the study explored the potential mediating role of ICT in the relationship between SCP and SSCM. In light of these discussions, a recent study aims to develop a comprehensive model based on the Triple Bottom Line (TBL) framework to examine the influence of SCP on SSCM in the Jordanian pharmaceutical sector. The model will also explore the mediating role of ICT in this context.

1.4 Research Questions

The main question of the current study is "What is the effect of SCP (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, Postponement) on the SSCM (environmental, social and economic) with the mediating role of ICT in this relationship. Accordingly, the current study is going to answer the following four questions.

RQ1: What is the effect of SCP on the SSCM in the Jordanian pharmaceutical sector in Jordan?

RQ2: What is the effect of SCP on the ICT in the Jordanian pharmaceutical sector in Jordan?

RQ3: What is the effect of ICT on the SSCM in the Jordanian pharmaceutical sector in Jordan?

RQ4: Is there any mediating role of the ICT on the effect of SCP on the SSCM in the Jordanian pharmaceutical sector in Jordan?

1.5 Research Objectives

The main aim of this current study is to examine the effect of SCP (strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, Postponement) on the SSCM (environmental, social and economic) with mediating role of ICT on the relationship between SCP (strategic

supplier partnership, Customer relationship, level of information sharing, quality of information sharing, Postponement) and SSCM (environmental, social and economic). Accordingly, the current study is going to achieve the following four objectives:

RO1: To determine the effect of SCP on the SSCM (environmental, social and economic) in the Jordanian pharmaceutical sector in Jordan.

RO2: To determine the effect of SCP on the ICT in the Jordanian pharmaceutical sector in Jordan.

RO3: To determine the effect of ICT on the SSCM in the Jordanian pharmaceutical sector in Jordan.

RO4: To examine the mediating role of ICT on the effect of the SCP on the SSCM in the Jordanian pharmaceutical sector in Jordan.

1.6 Scope of the Study

To accomplish the research objectives outlined above, questionnaires are distributed to selected sample from the managers in the pharmaceutical companies, factories, stores, and pharmacies in Amman, Jordan, between January 1 and April 30, 2023. The respondents were selected to respond to the questionnaire questions since they possessed the needed data associated with the main topic of the study chain management. The scope of the recent study is limited to the pharmaceutical companies, factories, stores, and pharmacies in Amman, not all pharmaceutical sectors in Jordan. Moreover, the time of the recent study was limited to the period conducted in this study. Also, the main issue of the current study is to examine the mediating role of the ICT which is the (mediator variable) on the impact of the independent variable SCP measured by (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) on the dependent variable SSCM measured by (economic, social, and environmental) and the mediating variable. In addition, the utilized theories in this study are the Resource Based Theory, Institutional Theory, Stakeholders Theory, and Social Network Theory.

Two of many limitations of the study is that this study only employed the quantitative approach to defining the relationships between all variables, and the respondents are the managers who have the right information and experience of the content of SCP practices and how they are applied. The study used the SEM with SMART-PLS as the analysis Method.

1.7 Operation Definition of Key Terms

The key terms that have been used in the present study are defined as follows:

1.7.1 Supply Chain Practices (SCP)

This study is based on research conducted by Li Ragu-Nathan, Ragu-Nathan, and Rao (2006). The authors define supply chain management (SCM) practices as a series of activities carried out by an organization to enhance the efficient management of its supply chain. This study conceptualizes SCM based on the research conducted by Sutduean et al. (2019). It focuses on strategic supplier partnerships, customer relationships, the level and quality of information sharing, and the concept of postponement.

1.7.1.1 Strategic Supplier Partnership (SSP)

The definition used in this study is derived from previous research conducted by Tan, Lyman & Wisner (2002), Li et al. (2006), and Sutduean et al. (2019). It refers to the enduring connection between an organization and its suppliers. It is designed to maximize the strategic and operational capabilities of individual participating organizations, enabling them to achieve substantial and continuous benefits.

1.7.1.2 Customer Relationship (CR)

According to the research conducted by various scholars (Tan et al., 2002; Moberg et al., 2002; Li et al., 2006; Sutduean et al., 2019), the focus of this study encompasses

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a comprehensive range of strategies utilized to handle customer complaints, foster lasting customer relationships, and enhance overall customer satisfaction.

1.7.1.3 Level of Information Sharing (LIS)

Following the studies conducted by Claycomb, Dröge & Germain (1999), Moberg et al. (2002), Li et al. (2006), and Sutduean et al. (2019), this research defines communication effectiveness as the level of sharing critical and proprietary information with supply chain partners.

1.7.1.4 Quality of Information Sharing (QIS)

In line with the studies conducted by Metters (1997), Li et al. (2006), and Sutduean et al. (2019), this study defines quality of information sharing in supply chain management based on factors such as accuracy, timeliness, adequacy, and credibility.

1.7.1.5 Postponement (P)

Defined in this study based on the studies of (Waller, Dabholkar & Gentry, 2000; Li et al., 2006; and Sutduean et al., 2019) the process of delaying the completion of an operation or activities (such as making, sourcing, or delivering) until a later stage of the supply chain.

1.7.2 Sustainable Supply Chain Management (SSCM)

Defined in this study based on the definition by Arora, (2014) as the ability to meet current needs without hindering the ability to meet the needs of future generations in terms of economic, environmental, and social challenges based on this definition and SSCM consists of three major dimensions (Social SSCM, economic SSCM, and Environmental SSCM).

1.7.2.1 Social SSCM

 Is defined based on the study (Saarela, 2021) as a firm's activities incorporating social issues into supply chain management to improve suppliers' and customers' sustainability.

1.7.2.2 Environmental SSCM:

Is defined based on the study of Saarela (2021) as a firm's activities incorporating environmental issues into supply chain management to improve suppliers' and customers' sustainable environment.

1.7.2.3 Economic SSCM:

Is defined based on the study of Saarela (2021) as a firm's activities incorporating economic issues into supply chain management to improve suppliers' and customers' sustainable economy.

1.7.3 Information and Communication Technology (ICT)

Is defined based on the study of Zhang et al., (2011) as a set of interconnected technologies that the general public, as well as institutions and businesses, utilize to collect, organize, and share data in order to carry out various information-related tasks (Salomon & Cohen, 1999).

1.8 Significance of the Study

This section presents the theoretical and practical significance of the current study, which examines one model consisting of different constructs in a developing country context, which has also not been examined before as a whole in a single conceptual framework in a particular context. Besides, it will present practical implications and recommendations for interested and stakeholder parties.

1.8.1 Theoretical Significance

Several researchers have investigated the issue of supply chain management (SCP) and sustainable supply chain management (SSCM) with the role of the ICT to encourage going beyond business financial interests to serve society and secure the environment.

No or limited studies provide a clear answer concerning this issue. The prior studies show a hopeful trend toward tackling this issue, which could illustrate the integration between the upstream and lower steam of the supply chain practices. The recent study integrates the upper stream and lower stream of the supply chain practices with (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) which merges the supplier, customers, and technology and examines their impact on SSCM with three dimensions of sustainability (economic, social and environmental) with the role of ICT in this model. Accordingly, this study is of great importance since it introduces the theoretical gaps by using the empirical examination of the mediating influence of ICT on SCP (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) and SSCM (economic, social and environmental) relationship, in one single model.

The current research proposes a new predictive model for understanding the relationship between SCP (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) and SSCM (economic, social, and environmental) within the pharmaceutical sector. Also, this study provides additional empirical testing of the TBL approach and contingency theory in Middle Eastern countries in one single model. This study also explores the existing literature on the SSCM (economic, social, and environmental), SCP (strategic

supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement), and ICT provide a comprehensive guideline or reference for future research besides enhancing the literature in supply chain management.

1.8.2 Practical Significance

Researchers have tried to examine the relationship between SCP and SSCM in the Western context. However, these studies and efforts are still very confined to the countries of the Middle East, particularly Jordan. Also, the present study is conducted on a ground of great importance in the Jordanian economy, which is the pharmaceutical sector. Furthermore, this sector faces fierce competition related to enhancing its business performance in parallel with the environment and social community. From a practical point of view, this study offers practical benefits to practitioners by establishing a standard to be employed by organizations for optimizing SCP and SSCM to obtain improved performance following ICT. By testing ICT as a mediator, the study provides insight into how technology can be a contextual variable that can assist SCP in enhancing the implementation of the SSCM and lead to effective performance. Also, the findings of the present research study contribute to organizations' management and decision in providing excellent tools to enhance the business, social and environmental performance by enhancing SSCM environmentally and socially hand to hand with financial and operational performance towards competitive advantage.

1.9 Organization of the Thesis

This proposal is organized in a series of five chapters and several sections inside each chapter to provide clear insight into the study topic and to present a better understanding among readers.

Chapter One involved several components starting with the introduction, background of the study, problem statement, research objectives, and question, followed by the definition of key terms and expressions, and finally, the significant scope of the study.

Chapter Two will consist of the related literature of this study, the dependent and independent constructs, and the mediating construct. Also, in this chapter, the researcher reviews the relationships between constructs and hypotheses formulation. The chapter ended by detailing the theoretical framework derived from related prior studies.

Chapter Three, the researcher introduced the study's methodology, population, sampling, and the research approach to collecting and analyzing the data. Also, it involved pre-test and pilot study analysis before the field study, the measurement of the study constructs, and the analysis technique to test the proposed model.

Chapter Four, the findings from data analyses were conducted using PLS path modelling. The field of study's response rate is reported at the beginning of the chapter. Following that, we will go over the basics of data screening and preliminary analysis. Finally, all of the latent variables in this study had their descriptive statistics published using SPSS. Following this, the chapter detailed the evaluation of the measurement model, which included the determination of convergent validity, discriminant validity, internal consistency reliability, and individual item reliability.

Chapter Five, this chapter introduces a discussion concerning the results acquired from the previous chapter regarding the research questions, objectives, and hypotheses of the study, also exhibits theoretical contributions of the study to the literature and provides practical contributions to the practitioners related to the field. Additionally, the study also lays down certain limitations as far as the generalizations are concerned

and proposes useful recommendations for future research in this appropriate area. Lastly, this chapter concludes the whole of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter summarizes some of the previous studies that have reviewed topics related to the subject of this study, which are categorized into sections. The first section is related to this study's dependent variable SSCM with its dimensions (environmental SSCM, social SSCM, and economic SSCM). The second section shows this study's independent variables supply chain practices (SCP) (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement). Also, this chapter illustrates the previous literature on the mediating variable of this study, information and communication technology ICT. Moreover, this chapter will discuss the hypotheses formulation between variables and the study's theoretical framework. Finally, the last research novelty will be discussed.

2.2 Sustainable Supply Chain Management (SSCM)

Sustainable Supply Chain Management (SSCM) has come a long way from its humble beginnings, and that much is clear from its historical context. Sustainability in supply chains is an idea that has been around for a while, but it has only really taken off at a handful of turning points. In the past, supply chain management has mainly sought to streamline processes, cut costs, and increase efficiency. Nevertheless, a more accountable strategy for supply chain management became apparent as the social and environmental consequences of corporate actions were brought to light (Carter et al., 2020).

At the turn of the millennium, firms increasingly prioritized ethical labor standards and environmental responsibilities.

The necessity for sustainable supply chains has been further highlighted by regulatory changes, such as the implementation of environmental legislation and labour norms (Silva et al., 2019). In response, SSCM emerged as a strategy for bringing corporate practices in line with these changing sustainability standards. According to Stroumpoulis et al. (2021), businesses began to see sustainability as more than just a regulatory need; it became a strategic priority.

Sustainability refers to "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Extending this idea to the supply chain management sector, SSCM is defined as either a management philosophy or a collection of management practices that identify environmental, social, and economic components of sustainability. (Roy, Schoenherr & Charan, 2018). One of the main challenges of sustainable development is to put the definition of the World Commission on Environment and Development into practice and guide decision-making with its terms of reference. Another way to define sustainability is to assist in designing human and industrial systems to ensure that using natural resources and human recycling will not reduce the quality of life due to adverse conditions and the loss of future economic opportunities. The impact of social situations on human health and the atmosphere. This definition clearly shows that concert indicators are required to judge the sustainability and success of any decision (Islam et al., 2020). While most SSCM research conceptually recognizes all three dimensions, research remains fragmented and lacks an empirical approach that simultaneously considers the economic, environmental, and social dimensions (Kusrini & Primadasa, 2018). Several streams of research have emerged that integrate supply chain phenomena with the three dimensions of sustainability.

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Therefore, implementing SSCM goes beyond meeting regulatory requirements or satisfying stakeholders; it lays the groundwork for sustained company performance in the future (Paulraj et al., 2017). Such implementation of SSCM can result in significant benefits for firms. These include less waste, increased resource efficiency, and fewer supply chain disruptions, all of which lead to cost savings. Additionally, they have the opportunity to improve their brand's image and appeal to consumers who prioritize social and environmental concerns. In addition, SSCM is vital for reducing potential dangers. Businesses can avoid problems that could damage their reputation or interrupt operations by anticipating and managing social and environmental risks in their supply chains. Given the interwoven nature of supply chains and the far-reaching effects that disruptions can have in today's global marketplace, this aspect of risk management has gained relevance. (Elmsalmi et al., 2021). The multidimensional concept of supply chain sustainability encompasses environmental, social, and economic factors. The reduced environmental effect of supply chain activities is a critical component of this. This can be accomplished by taking efforts such as increasing energy efficiency, reducing waste, and sourcing resources sustainably. Concurrently, it prioritizes social responsibility by guaranteeing fair wages, respect for workers' rights, and ethical labour practices. In addition to these social and environmental factors, businesses must also think about their financial sustainability if they want to adopt sustainable practices. Businesses must improve their supply chains while avoiding negative impacts using SSCM, which is a delicate balancing act. Sustainability becomes a source of competitive advantage rather than an expensive burden when this equilibrium is achieved, since it promotes innovation, decreases risks, and improves reputation. Businesses can better face the sustainability issues of today if they adopt

an SSCM strategy that takes into account the economic, social, and environmental aspects (Kitsis & Chen, 2020).

The three pillars of sustainability in the supply chain (economic, social, and environmental) include a series of strategies that can make the supply chain more sustainable. SSCM has become an essential concern for companies that incorporate the three pillars of sustainability into their strategy. The company is aware of the importance of partners taking responsibility for sustainable development in their expansion, and without SSCM practices, it is impossible to solve the sustainability problems of any organization. (Roy et al., 2020). The definition of SSCM is to manage the materials, information flow, and cooperation between organizations in the supply chain and integrate the triple bottom line (TBL) selection issues, including all three pillars of sustainable change (de Haan-Hoek, et al., 2020). The TBL method suggests that in addition to economic performance, organizations need to participate in activities that positively impact SSCM and business performance (Khokhar et al., 2020). By adopting a TBL approach, organizations assume a responsible position concerning economic, environmental, and social prosperity, quality, and justice, respectively (Khokhar et al., 2022). In this study, the TBL approach conceptualizes SSCM (environmental SSCM, social SSCM, and economic SSCM).

2.2.1 Triple bottom line (TBL) approach

The recent study conceptualized the SSCM based on the Triple Bottom Line (TBL) approach with its three dimensions: environmental, economic, and social. The triple bottom line term was coined in the 1990s by business consultant John Elkington to describe the economic, environmental, and social value of the investment that may accrue outside a firm's financial bottom line (Goh et al., 2020). The TBL approach aims to value assets more accurately and leverage resources so capital is employed as

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efficiently and effectively as possible. The concept is sometimes referred to as the 3Ps (people, planet, profit), triple value-adding, and blended value (Svensson et al., 2018). Triple bottom-line thinking is informed by and relates to the concept of sustainable development, the premise that development should occur in ways that meet the needs of current generations while maintaining conditions and opportunities for future generations to do the same (World Commission on Environment and Development, 1987). Since the shift in societal focus is towards environmental longevity, businesses need to look at the big picture and see their impact on the world around them.

For that, the TBL approach suggests that besides economic performance, organizations must engage in activities that positively impact the environment and society (Khodaiji & Christopoulou, 2020). Consistency in referring to the three lines simultaneously is built into the structure of TBL as the construct is explicitly based on integrating the social, environmental, and economic lines. The TBL provides a framework for organizations to measure their SSCM performance and commercial success along three lines: economic, social, and environmental. TBL reporting provides guidelines by which the organization should function, focusing on the total impact of its actions. This involves both positive and negative activities. (Agrawal & Singh, 2019).

2.2.2 Economic SSCM

Therefore, in analyzing the business elements of the sustainable management of supply chains, the flows, which include the flows of materials, information, and capital, should be considered. To increase the efficiency of the supply chain, members of the chain jointly manage the logistics and storing of these flows. Alternatively, they hand these functions over to other members. Either way, the promptness of supplies is essential within sustainable supply chain management. The adequate flow of products

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within the supply chain can be achieved well concerning the adaptation of the production, logistics, and marketing of the products, as well as other related activities (Sánchez-Flores et al., 2020). Members of the supply chain should develop new products and share specific parts and processes to quickly react to changes in the size and specification of the products on offer. The flow of information is equally essential for business success and includes information concerning the order and the status of delivering the products. For that purpose, information technology (IT) tools are used, creating effective communication between supply chain members. Hence, factors that incorporate IT tools concerning the agreement to exchange relevant information tie management relations in the supply chain with the process of information flow (Malik & Abdallah, 2019). The flow of the resources includes financial aspects, such as payments, credit rules, or the instrument of ownership, as well as non-financial aspects, such as people and equipment, which improve the effectiveness of the functioning of the supply chain, referring to the process of managing relations in the supply chain.
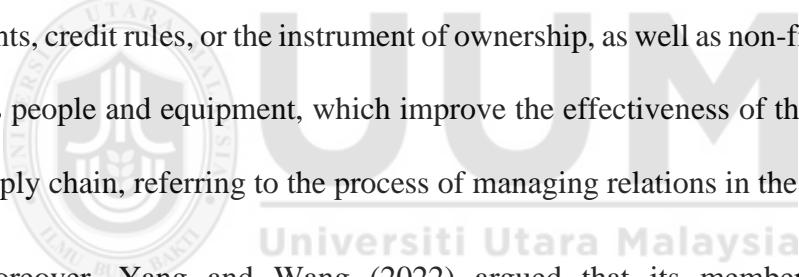
Moreover, Yang and Wang (2022) argued that its members must clearly understand managing the supply chain and building long-standing relations with defined objectives in mind. Support from senior management is also necessary for developing relations between organizations in the supply chain. Finally, supply chain members should establish relations based on trusting one another and fairly divide the benefits of managing the supply chain well (Chavez et al., 2022).

To make improvements to the management and production of permanent resources, supply chain managers need a clear benchmark against which to measure the success of their operations. Next, these visions should be implemented within the supply chain by allocating adequate financial means and supporting senior management. One should implement guaranteed quality programs for both products

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and processes through supply chain management to improve the organization's effectiveness. A flow of resources also happens in the product development and commercialization processes. Allen et al. (2021) have suggested that the supply chain should have guidelines concerning the participation of both suppliers and customers in developing products and their commercialization. These guidelines should be multifunctional and apply to both internal and external procedures. Davis-Sramek, Thomas and Fugate (2018) explained that the effectiveness of the supply chain depends on the conceptual plans related to products, processes, and packages.

2.2.3 Environmental SSCM

The necessity of sustainability is a pressing issue for companies in this age of heightened environmental consciousness and rising worries about unethical labour practices. Not only have regulations changed to make companies more mindful of their effects on society and the environment, although customer expectations have also shifted in response to the global push towards social and environmental responsibility. In this context, SSCM has become an essential strategy, providing a comprehensive answer for businesses that want to balance making a profit with environmental and social responsibilities (Kitsis & Chen, 2020). SSCM reflects an enormous change in supply chain management, not merely a passing trend for environmental awareness. It covers a lot of ground, including ideas and methods that go beyond just making money and cutting costs. The fundamental goal of supply chain performance management (SSCM) is to optimize supply chain operations in a way that promotes responsible sourcing, ethical labour practices, and minimal environmental effect. Furthermore, it represents a shift in perspective, with sustainability viewed as an opportunity for growth rather than an expense.

As a result, sustainable practices can benefit both companies and the environment., which SSCM acknowledges as a driving force for innovation, a hedge against risk, and an asset to any company's reputation (Laosirihongthong et al., 2020). In light of the growing importance of sustainability in an increasingly interdependent world, it is crucial to analyze the game-changing function of SSCM and recognize its value as a link between corporate practices and the worldwide movement to protect the environment and promote social responsibility.

As public knowledge of environmental issues and regulatory obligations grows, businesses are under increasing pressure to improve their environmental performance together with supply chain partners. Big businesses clearly have a disproportionate amount of sway over the suppliers they work with. Furthermore, the possible environmental impact of the goods and services offered to organizations is being more and more acknowledged by both public and commercial organizations, also environmental stewardship is becoming an increasingly important consideration for consumers when choosing a source of raw materials (Esfahbodi, Zhang & Watson, 2016).

According to recent research, there is no need to choose between increasing profits and meeting environmental performance standards (Shao et al., 2020). As a result of the diversity of the trading partners in their supply chain and the complexity of integrating 'environment' with existing management mindset, culture, and systems, many organizations have struggled to address the complex issues related to communicating and implementing environmental policies and practices through their supply network (Manzhynski & Figge, 2020). Companies are facing more pressure to integrate economic SSCM into their operations, but the concern about environmental issues and regulations is rising. In addition, stakeholders assess a company's success

beyond its financial and environmental performance (Zimon et al., 2021). A company's environmental investments were formerly viewed as a financial burden, but there has been a shift in attitude, as becoming environmentally sustainable allows the company to minimize material, production, and warehouse expenses. Furthermore, there is an improvement in product quality, lower transportation and logistics costs, and greater innovativeness (Saarela, 2021).

2.2.4 Social SSCM

According to Alghababsheh and Gallear (2021), Social SSCM is "the buying firm's efforts to induce socially responsible behaviour, such as good working conditions, the avoidance of child labour, appropriate and fair wages, and high safety standards in its operations and those of its suppliers. Furthermore, Köksal et al. (2018) state that socially sustainable SSCM are the practices, mechanisms, methods, and activities that corporations use to influence the actions and capacities of their suppliers in order to achieve social goals.

According to Yadlapalli et al. (2020), CSR is the corporation's overall relationship with all its stakeholders; customers, employees, communities, owners, investors, government, suppliers, and competitors. Therefore, CSR has a significant impact on a company's social sustainability. In addition, socially responsible business practices strengthen corporate accountability, respect ethical values, and are in all stakeholders' interests (Khan et al. 2021). Even though environmental issues are frequently associated with sustainability, social practices are equally important (Gözde & Mathiyazhagan, 2020).

The basic social sustainability supply chain practices include the health and safety of workers in the supply chain, training, ethical development code of conduct with suppliers to ensure human and employee rights and working conditions, non-

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discrimination and diversity, anti-corruption, and social accountability systems such as SA8000 (Alghababsheh & Gallear 2020). These basic social sustainability supply chain practices involve monitoring the suppliers' sustainability compliance. Regulatory social sustainability and corporate social sustainability directives are used to monitor them.

According to recent findings in the field of socially responsible supply chain management, overcoming suppliers' social failures frequently necessitates a degree of supplier-buyer cooperation that is not always easy to establish (e.g., Hohn & Durach, 2023). For that, establishing commitment, which is crucial for social SSCM cooperation but can be difficult owing to cultural differences, ambiguity, and the fear of opportunistic behaviours (Zhang, Venkatesh & Ohana, 2023), as well as the exchange of information and knowledge between the buyer and supplier. Despite these challenges, little study has been conducted to increase the efficacy of socially responsible supply chain management in addressing suppliers' social misconduct.

2.3 Supply Chain Practices (SCP)

Businesses have come to realize, that in order to survive in the face of intensifying global competition, they must enhance their supply chain management practices. Aiming to align technology with the capabilities of both the business and its trading partners, supply chain practices (SCP) provide organizations with the means to connect people and technology, allowing for a rapid reaction to client needs (Zeng & Lu, 2021). Therefore, all aspects of the supply chain can be more efficiently managed with the help of SCM principles. Six aspects of supply chain management were recognized by Li et al. (2005), including strategic supplier partnerships, customer relationships, information exchange, information quality, internal lean practices, and delay.

Other scholars like Kutsikos and Sakas (2014) have linked supply chain methods to operations, customer service, information technology and sharing, and materials and supply management like, and JabborA & Ana Beatriz. (2011) four constructs of supply chain management practices, namely, supply chain (SC) integration for production planning and control (PPC) support, information sharing about products and targeting strategies, strategic relationship with customer and supplier, and support customer order. These linkages among SCM practices, competitive competence, supply chain integration degree, and business performance have been investigated by Kim (2006). Based on his findings, supply chain integration could play a more pivotal role in the beginning. A corporation can shift its attention to supply chain management (SCM) practice and competitive competence once supply chain integration is finished (Aslam et al., 2021).

Therefore, a supply chain encompasses the activities associated with the movement and transformation of products, as well as the flow of information and services, from raw materials to the end user. As supply chain is a complicated network of interconnected businesses and stakeholders, making its management a formidable challenge (Mukhamedjanova, 2020). The adoption of supply chain methods and principles by firms has yielded substantial results. Consequently, the implementation of lean methods throughout the supply chain is referred to as lean supply chain management (Rahimi & Alemtabriz, 2022). The idea of the supply chain as a lean supply chain pertains to the system of interconnected and interdependent units that collaboratively function to achieve the organizational supply chain objectives. This approach becomes increasingly significant for organizations as the focus of rivalry shifts to competitive supply chains. This also encompasses the downstream segment of the supply chain (Kumar Singh & Modgil, 2023).

In accordance with Asif et al. (2020), there is an identifiable pattern extending through the literature regarding supply chain management methods and their aim to boost organizational performance. According to Suryanto et al. (2018) and Cousins, Lawson, Petersen, and Fugate (2019) chose five distinct dimensions for measuring SCP based on a literature review and consolidation: strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement. The five structures address information flows across a supply chain (level and quality of information sharing), as well as upstream (strategic supplier partnership) and downstream (customer relationship). Internal supply chain processes, such as postponement, are also included. Consequently, this research aims to empirically assess the effects of SCP on the SSCM (from an environmental, social, and economic perspective) and presents SCP as a multi-dimensional concept. Keeping with the five pillars of the SCP.

2.3.1 Strategic Supplier Partnership

In this context, "long-term relationship" means the connection between a company and its vendors. Its purpose is to assist participating firms in achieving substantial and lasting advantages by utilizing their strategic and operational skills (Lee et al., 2018). Direct, long-term affiliation, joint planning, and problem-solving are the hallmarks of a strategic relationship. When businesses form strategic alliances, it's usually because they want to increase their influence in a certain industry, develop better products, or increase the amount of money each side can make. Organizations can improve their collaboration with a small number of key suppliers by forming strategic alliances with them (Dubey et al., 2018). By getting involved early on, suppliers may aid with design evaluation, component and technology selection, and cost-effective design options. By coordinating their efforts, companies with similar strategic goals can cut down on

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unnecessary red tape. An innovative supply chain may rely on a strong relationship with its suppliers (O'Brien, 2018; Nimeh, et al., 2018).

In order to maintain a competitive advantage over the long term, buyers are increasingly turning to strategic supplier partnerships in an effort to enhance company operations or product designs in ways that benefit employees and make the workplace safer (Huq & Stevenson, 2020). Purchasing companies can train suppliers' employees in technical, managerial, and technological areas through supplier development and education programs (Yawar and Seuring 2018; Faruquee, et al., 2021). Establishing routines of mutual interaction to share knowledge, allocating investments with a focus on sustainability, holding joint meetings, and providing suppliers with subsidies to help them get third-party certification are all examples of commonly used collaboration practices (Alghababsheh & Gallear, 2021). According to Benton et al. (2020), one of the most significant SCPs is establishing a two-way dialogue and highlighting the need for a long-term cooperative partnership between providers. Therefore, long-term relationships with strategic suppliers are crucial to improving company operations and in turn it will show significant improvement in SSCM.

2.3.2 Customer Relationship

Incorporates all methods used to handle customer complaints, establish lasting connections with clients, and enhance customer happiness. Further, SCM methods cannot be complete without customer relationship management. Because of the inherent impediments to competition, committed partnerships provide the best enduring benefit (Cavalier et al., 2021). Customer relationship management is becoming more important for companies to survive in this era of mass customization and individualized service. In order to successfully execute SCM programs, it is necessary to have good connections with all parts of the supply chain, including

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customers. A company may set itself apart from rivals, keep consumers coming back, and increase the value it offers by cultivating strong relationships with them (Anshari et al. 2019).

Therefore, Customer relationship management is crucial for companies to handle complaints, establish lasting connections, and enhance customer satisfaction. In the era of mass customization and individualized service, strong connections with all parts of the supply chain, including customers, set companies apart, retain customers, increase value, and enhance sustainability.

2.3.3 Level of Information Sharing

Distributing important and confidential information to partners in the supply chain is known as information sharing (IS) (Sundram et al., 2020). Inventory, demand, and order information are the most common forms of data that can be transmitted in a supply chain. The three cases of information sharing as described by Vosooghidizaji et al. (2020) are as follows: first, no information sharing at all; second, retailers share their forecasts of net demand with suppliers; and third, retailers share their forecasts of future demand as well as their current and future order plans with suppliers. In the past ten years, many businesses have been hesitant to divulge information (Sang, 2021).

Despite their investments in technologies that facilitate information gathering, manipulation, and sharing, a significant portion of them continue to struggle with information sharing (Adam & Fazekas, 2021). It is never possible to build bridges to world-class information exchange since the necessary structure and culture are not formed, according to Fawcett et al. (2009). Concerns about data privacy, incentives, dependability, complexity, expense, and the ability to effectively use information are some of the biggest obstacles that businesses face when trying to improve their information-sharing capabilities (Elofsson & Paulsson, 2020). From that, it can be

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clear that information sharing is the distribution of crucial and confidential data in the supply chain, including inventory, demand, and order information. Despite investments in technologies, many businesses struggle with IS due to concerns about data privacy, incentives, dependability, complexity, expense, and effective information use. The fact that these obstacles line up with the primary characteristics of information quality is hardly unexpected.

In addition, quantity and quality are two components of information sharing. Previous SCM research has viewed the two components as separate entities, despite their interdependence and importance to SCM techniques. How much sensitive and important information is shared with a supply chain partner is referred to as the level (quantity aspect) of information sharing. Strategic to tactical, and encompassing anything from logistics-related data to broad market and consumer insights, are all examples of the types of information that can be shared (Liu et al., 2021). According to numerous academics, providing accurate and current marketing data at each stage of the supply chain is crucial for a smooth operation. When companies in the supply chain pool their data and share it with their partners, it might give them a leg up in the competition. One of the five pillars that make up a strong supply chain relationship is information sharing (Lalonde.,2016).

Partners in the supply chain can function as a single cohesive whole if they communicate with one another often (Colicchia et al., 2018). They can adapt more quickly to changes in the market if they work together to better understand the needs of the end user. Another important differentiator and competitive aspect, according to Wan, Huang, and Holtskog (2020), is the efficient utilization of timely and relevant information by all functional elements of the supply chain. The key to a connected and effective supply chain is the work of Treurniet and Wolbers (2021), who found that

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material flow may be streamlined by making all information flow more pronounced and streamlining processes.

Therefore, Effective supply chain partnerships communicate frequently, adapt quickly to market changes, and understand end user needs. Efficient utilization of timely information by all elements is crucial to SCM.

2.3.4 Quality of Information Sharing

Factors that contribute to the quality of information sharing include the veracity, completeness, timeliness, and correctness of the data shared. Sharing information is crucial, but how it affects supply chain management is highly dependent on the type of information provided, the timing of the sharing, and the recipients. Several studies have shown the problematic consequences of erroneous or delayed information as it travels through the supply chain (Lee et al., 2018). Informational asymmetries, competing interests, and opportunistic actions among supply chain partners all contribute to poor data quality. Companies may knowingly mislead their suppliers, consumers, and competitors to gain an advantage (Zhong et al., 2020). Organizations seem hardwired to be reluctant to divulge more than the barest minimum of information for fear of ceding control. Organizations should consider their information a strategic asset and work to minimize delays and distortions in its flow (Vafaei-Zadeh et al., 2020). This is especially true in light of these tendencies, making info quality assurance a vital component of effective SCM.

2.3.5 Postponement

Postponement, according to Beamon (1998) and Jafari et al. (2022), is the act of delaying one or more processes or moving ahead to the next activity in the supply chain, hence delaying the point of product differentiation. From a modern supply chain management perspective, it can also be defined as "a way to change the name, shape,

or location of products and goods at the latest possible point in time and that can work at different stages in a supply chain network." Two primary strategies are necessary for a company in the event of a delay (Beamon, 1998).

To begin, how can a business determine the optimal number of stages to delay? Secondly, it would be wise to make a list of all the tasks that could be delayed. Numerous studies have previously investigated postponement's components and methods (Abdolazimi et al., 2021). Packaging, assembling, labelling, and producing were some of the other methods of postponement. Also, form, place, and delay are the three most common kinds of postponement. When products and goods are delayed until the customer's orders have been scheduled, this is known as postponement based on time. So, postponement is a crucial idea in the supply chain since it aids businesses in designing their products in accordance with the product's demand and response rate, the structure of the manufacturing system, and the logistics system. According to Wong et al. (2011), this becomes even more crucial for companies with extensive product lines, low economies of scale, and lengthy delivery periods.

In addition, postponement is defined based on the study Ramón-Lumbierres, et al. (2021) as the practice of moving forward one or more operations or activities (making, sourcing and delivering) to a much later point in the supply chain. Two primary considerations in developing a postponement strategy are: (1) determining how many steps to postpone and (2) determining which steps to postpone (Carbonara & Pellegrino, 2018). It enables a company to remain adaptable in creating new product iterations to satisfy evolving consumer demand, set itself apart from competitors, or adjust demand functions. A business can better adapt to shifts in consumer demand if its commodities remain undifferentiated for an extended period of time.

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Furthermore, by maintaining undifferentiated stocks, a company can save supply chain expenses. According to Al-Hakimi, Borade, Saleh, and Nasr (2022), postponement must be tailored to specific products, corporate needs, and manufacturing and logistics system structures or constraints. As a rule, the following scenarios might call for the implementation of postponement; innovative products with high monetary density, high specialization, and a wide range, markets characterized by long delivery time, low delivery frequency, and high demand uncertainty and manufacturing or logistics systems with small economies of scale and no need for special knowledge. Thus, postponement is the delay of processes in the supply chain, affecting product differentiation. It's crucial for businesses with extensive product lines, low economies of scale, and long delivery periods. Strategies include determining optimal delays and listing tasks. Tailoring postponement to specific products, corporate needs, and logistics constraints is essential, especially in the drug sector.
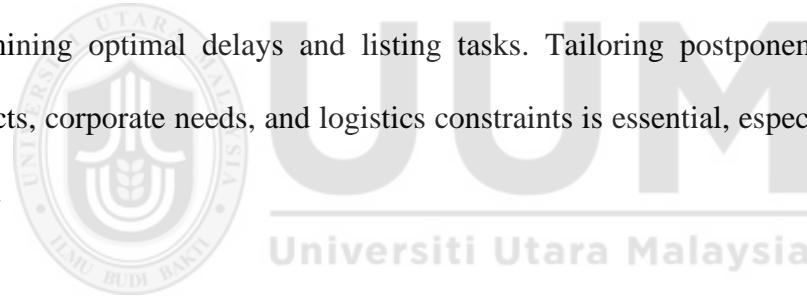
2.4 Information and Communication Technology (ICT)

The development of global products for sale in worldwide marketplaces and the integration of global economies were both greatly aided by ICT. In order to handle data quickly, communicate effectively, and gain insight into the market, businesses depend on ICT. Information and communication technology (ICT) is crucial across all sectors because it allows companies to streamline their operations, save money, increase their profits, and stay ahead of the competition on both the domestic and global stages (Kumar et al., 2020). Based on the study of Singh, Singh and Kumari (2020) there are a number of advantages of ICTs however fewer of them are discussed below:

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A. **Expands Communication:** Because information can be sent and shared considerably more quickly, time and money can be saved. Contacting friends, family, and business associates anywhere in the globe is now easier than ever before thanks to modern means of communication. Communication options are broadened by ICT. Skype and other social media platforms enable users to make and receive instantaneous video conferences. It is possible to send messages to many recipients at different locations. One positive way that ICT has impacted people's lives is by bringing families all across the globe closer together.

B. **Cost effectiveness**: Smartphones and a plethora of telecom offerings have brought prices down significantly. Businesses may save money on business travel and lodging because of ICT. Even though there was formerly no free means to send text messages to a phone, individuals now use social networks like Facebook, Skype, and Viber to communicate for free. People can save time and gas money by buying online instead of leaving their homes.

C. **Greater availability:** At any given moment of the year, websites are accessible for conversation. What this means for consumers is that they can shop from any location at any time, regardless of the time of day or night.

D. **Bridging the cultural gap:** More people can communicate and share ideas thanks to the proliferation of information and communication technologies. Raise consciousness and lessen bias by educating the two ends of the communication bridge.

E. **Creation of jobs:** The most beneficial aspect of information and communication technology is the advent of exciting new career opportunities in the IT industry. As a result of technological development, there are many more job chances for people with skills such as computer programming, web design, etc.

F. **Education:** New avenues for higher learning are opening up in a wide variety of fields. Anyone can earn a degree from the comfort of their own home by taking classes online. You can work and go to school at the same time.

A general phrase for IT that encompasses both information technology and communication technology is ICT. Moreover, ICT relies on wired or wireless connections to transmit data, which in turn increases the efficiency and capacity of related hardware and software. This, in turn, emphasizes the role of storage, audiovisual systems, middleware, and software that facilitates data access, transmission, storage, and manipulation (Park et al., 2020). Online courses and national and international webinars/conferences at all levels, increased productivity and employment, and easier access to better living conditions are only a few examples of the many ways in which information and communication technologies have boosted society and education (Singh et al., 2020). Electronic tools for producing, storing, processing, distributing, and exchanging information are all part of information and communication technology (ICT), everything from personal computers and digital televisions to email and robots falls under the umbrella of information and communication technology (ICT).

The primary objectives of information and communication technology (ICT) in the supply chain are the management of supply chain-related data and activities and the interchange of information amongst all stakeholders at functional and organizational levels. The transport and logistics industry's major participants are linked by supply chains, which are in turn held together by information and communication technology (ICT).

According to research by Bahramimianrood and Bathaei (2021), IT has a positive effect on supply chain performance. Supply chain visibility, theft prevention, delivery quality, and pipeline delay reduction are all enhanced with the use of ICT. Additionally, it enhances product and material security on every level. As stated by Baah et al. (2022), information and communication technology (ICT) aids in investigating company growth, income production, expense reduction, and client outreach. By highlighting the long-term benefits to all stakeholders across chains through collaboration and information sharing, a study conducted by Chiang et al. (2021) discovered that information and communication technology (ICT) and information sharing within supply chain partnerships had numerous advantages. It can be seen as the role of information and communication technology in logistics and supply chain management.

Additionally, according to Okpa et al. (2023), SCM describes the network of companies interconnected by some or other methods of information and communication technologies, while IT stops the analysis and gives information according to necessity. The use of ICT in SCM provides visibility into all operations occurring in the supply chain as they pertain to the customer. According to research by Bagale et al. (2023), businesses can boost their market share, cut costs, provide better customer service, and introduce new products and services with the help of investments in information systems. According to research by Yang et al. (2022), which assessed the direct effect of ICT on SCM, ICT significantly affects supply chain management via improved communication among stakeholders both inside and outside of enterprises.

Furthermore, it was mentioned that ICT aids in decreasing total cycle and process time while simultaneously building a cooperative network to promote equitable

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growth. Not only does information and communication technology (ICT) facilitate better collaboration and CRM operations, but it also aids in the expansion of markets worldwide (Cano et al., 2022). According to research by Alzoubi et al. (2022), improving and effectively controlling complex supply chains is highly dependent on information and communication technology. Yadav and Singh (2020) added that all parties involved in the supply chain stand to gain in the long run from increased communication and collaboration made possible by the incorporation of ICT into SCM. This, in turn, proves the importance of SCM and the credibility of ICT as a whole by automating processes, enhancing transportation, decreasing material and power usage, and recording and sharing information, SCP by ICT is also increasing value chain efficiency (Chen, Das & Ivanov, 2019).

Moreover, Garcia-Alcaraz, (2017) strategically examined strategic cooperation between ICT and sustainability by incorporating certain factors and stated that ICT could promote the SCP of the country. In his study, Luthra and Mangla (2018) examined four socio-culture factors in the development of ICT efforts in Thailand and commented that Thailand's growth depends upon increasing funds and enhancement in innovation and technology. Another study by Higón et al. (2017) examines the relationship between ICT and environmental sustainability in developing countries by conducting a panel regression analysis (MahbubulHye et al., 2020).

In addition, as Majid (2018) points out, ICT has been successful in combating poverty and unsustainable practices, and it may also facilitate the implementation of sustainable production and consumption patterns. In order to investigate the connection between ICT and the environment, Majeed (2018) compares and contrasts 132 rich and emerging economies. He finds that ICT can decide the world's ecological destiny. The term "information and communication technology" (ICT) refers to a

collection of tools that businesses employ to improve their operations through data analysis, storage, and distribution as well as through increased efficiency, decreased costs, and better machine-to- machine interactions (Kumar et al., 2020). Based on prior research, information and communication technology plays a crucial role in supply chain management and has a significant effect on business performance (Sundram et al., 2020).

According to Tsai and Pawar (2018), information and communication technology (ICT) is a key component in improving supply chain management techniques by integrating various activities across functional divisions, including upstream and downstream partners. To gain a competitive advantage for a supply chain in today's digital age, information and communication technology (ICT) must do more than just function as an auxiliary (Shah, 2022. From that, ICT plays a crucial role in supply chain management, enhancing data management and information exchange among stakeholders. It enhances supply chain visibility, prevents theft, improves delivery quality, and reduces pipeline delays. It also enhances product and material security, aids in company growth, income production, expense reduction, and client outreach. Studies show long-term benefits for stakeholders through collaboration and information sharing within supply chain partnerships, with customers, and postponement arrangement.

2.5 Hypothesis Development

2.5.1 SCP and SSCM

To promote corporate and overall efficiency within the framework of sustainable development, which prioritizes environmental, economic, and social concerns, the SCP must be implemented. The CLM defines SCM as "the systematic and strategic association of the conventional business processes and strategies through a single

organization and across businesses to enhance long-term efficiency." This definition applies both to companies within an organization and to other companies. Consequently, SCP or SCM should be used to achieve two goals at once: improving the firm's overall performance and improving the performance of each member of the supply chain in the competitive marketplace. In addition, companies should assist other sustainable enterprises in meeting environmental criteria and take responsibility for social and environmental issues inside the supply chain management (SCM) (Hastig & Sodhi, 2020).

Tseng et al. (2022) found that many companies struggle to execute environmental strategies, even though they know that using suppliers is crucial to achieving sustainable supply chain management goals. This research applies social exchange theory to investigate how companies may improve their supplier collaboration on environmental issues by focusing on environmental issues and using environmental sourcing practices as strategic levers. The results suggest that inter-organizational citizenship behavior is connected with the relational norms inherent in collaboration, which is a relational outcome that looks forward. In addition, the study looks at how environmental regulatory pressure affects the linkages between environmental supplier collaboration's antecedents and consequences. Regulatory pressure is ineffective in encouraging partnerships with suppliers when companies have prioritized environmental sourcing practices. Finally, companies are more likely to engage in inter-organizational citizenship behavior when they have relational standards for environmental supplier collaboration and are subject to regulatory pressure. This study confirms the linkage between strategic supplier partnership and SSCM, but the study focuses on the environmental aspect of the supply chain sustainability, while this study distinguishes the other aspects of the SSCM as the social and economic aspects. In

their 2022 study, Das and Hassan examined how customer relationship (CR), supply chain sustainability, and organizational performance all contribute to a company's competitive advantage. The study's results demonstrate a strong correlation between SSCM and organizational performance via customer relationships. It is more common for enterprises in developing countries to use SSCM and CR to achieve OP. Along with SSCM, this study aims to highlight the impact of CR on the company. Because businesses need to adapt to changes in the market and consumers' expectations for products and services, as well as shift resources to take advantage of new opportunities for technological and managerial efficiency in production, this helps them comprehend the impact of SSCM and CR more generally. The significance of CR in organizations and its beneficial effects on SSCM are examined in this study. This study looked at CR to the SSCM in Jordan as an independent variable.

Furthermore, the study conducted by Kankam et al (2023) delves into the strong correlation between information sharing, information quality, and supply chain performance. According to the results, all the participants in the supply chain work together by providing reliable data that facilitates communication between suppliers and consumers. The quality of information and the efficiency of the supply chain are both mediated by the sharing of data. Twenty manufacturing organizations were found to have acknowledged the information-sharing role of mediation in the study. The information sharing somewhat mediates the relationship between information quality and satisfaction with supply chain performance. That is why the purpose of this research is to examine the relationship between supply chain sustainability and performance via the lens of information sharing and data quality. To improve overall performance, it is essential to use supply chain management concepts that improve the quality and reliability of information communicated by supply chain companies. This

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study will consider the level and quality of sharing information as independent variables and how they relate to the requirement of a sustainable supply chain.

The SSCM and overall company performance can be greatly enhanced by the sharing of relevant information. There is a dearth of research that investigates the connection between information sharing and organizational performance, particularly in the agri-food sector, despite the fact that this practice offers numerous advantages, such as better utilization of resources and equipment, reduced costs, and efficient management of supply chain events (Zhang et al., 2019). Based on the increased transparency made possible by ICT, members of the supply chain may be able to stay up-to-date on their consumers and suppliers through the sharing of information (Attaran, 2020).

Research by Katsaliaki et al. (2020) and others has focused on the specific advantages of sharing information. Information sharing has many potential benefits in manufacturing, including but not limited to lowering costs, reducing inventory, increasing visibility, improving internal services, making better use of resources, and reaching the required level of efficiency (Shamout & Elayan, 2018). Despite the fact that Indian retailers do not see information sharing with supply chain partners as a key characteristic, it does not offer them a competitive advantage (Banerjee and Mishra, 2017). Both the direct and indirect effects of government laws and regulations on inter-organizational information sharing are significant (Iannacci et al., 2022). Decisions on unanticipated events can be made more quickly with accurate and regularly communicated information among supply chain participants. Delivery and operations become more flexible as a result (Doetzer & Pflaum, 2021). When companies are able to share more information with one another, it helps them perform better and gives them an advantage over their rivals (Huo et al., 2021).

Add to that, a study by Prataviera et al. (2020) also found that postponement is a common organizational notion that typically refers to the delay of logistics and/or manufacturing processes. Postponement is becoming more applicable in today's global competitive market. Companies need to (re)think of their delay strategy to tailor their products to each market's specific requirements in light of the various customs taxes and free trade agreements that are now in effect. When developing global postponement plans, it is important to consider both the conventional temporal viewpoint and the spatial perspective. This is because the physical location of operations significantly affects a company's total performance. Because there is a lack of a worldwide framework in the academic literature for dealing with the postponement boundary problem or for understanding the associated postponement strategies and their influence on supply chain sustainability, this research will look at how postponement effects SSCM.

According to Jum'a et al. (2021), traditional business practices and rules imposed by stakeholders and politicians have made sustainability an essential requirement for modern businesses. Environmental, economic, and social considerations are all essential to a sustainable future. The following theories were hypnotized by the latest study based on this argument:

H1: *There is a significant direct impact of the strategic supplier partnership on the SSCM in the pharmaceutical sector in Jordan.*

H2: *There is a significant direct impact of the customer relationship on the SSCM in the pharmaceutical sector in Jordan.*

H3: *There is a significant direct impact of the level of information sharing on the SSCM in the pharmaceutical sector in Jordan.*

H4: *There is a significant direct impact of the quality of information sharing on the SSCM in the pharmaceutical sector in Jordan.*

H5: *There is a significant direct impact of the postponement on the SSCM in the pharmaceutical sector in Jordan.*

2.5.2 SCP and ICT

Earlier research emphasized the need for ICT models for successful businesses. Despite its widespread use in production functions since the 1990s, researchers only started pragmatically measuring the effects of ICT in the first decade of the 21st century (Kraus et al., 2018). All three aspects of sustainability—people, process, and planet—appear to be enhanced by integrating ICT with the internet economy. According to a recent study by Talay et al. (2018), in order to deal with changes or disruptions in the supply chain, the information exchange network needs to be in sync with market trends. Information and communication technology (ICT) enables greater critical leadership and resource optimization, clarifies information, increases accountability, amplifies record precision, enables automation and exercise incorporation, and develops knowledge (Uniyal et al., 2021).

By integrating the many steps of an assignment with automated and simplified correspondence, a study of Khattra, et al., (2021) found that digital and personalized document administration systems could increase profitability. By integrating IT platforms across organizational supply chains in all their aspects, including strategic supplier partnerships, customer relationships, and information quality and sharing, ICT advances information sharing, optimizes material flow, provides operational flexibility, streamlines financial functions, and improves communication among members (Ng et al., 2021; Keller and Heiko, 2014; Lin and Huang, 2019).

A study by Sundram et al. (2020) on the topic of information and communication technology (ICT) in supply chain management reveals that ICT significantly improves supply chain performance and sustainability. By integrating their internal and external value chains, companies that use ICT to manage their supply chain's strategic

partnerships are more likely to improve performance within and across manufacturing enterprises. Based on these findings, supply chain practitioners should advise their companies to use ICT to enhance SSCM in a strategic way. Both the firm's performance and the supply chain network will be enhanced as a result. An increasing number of firms are implementing sustainable supply chain management strategies to improve their economic, environmental, and social performance, according to a study by Yao et al. (2022). Information and communication technology (ICT) bolsters SCP practices by facilitating supply chain partner cooperation.

The importance of ICT-enabled SCP aside, variables influencing its acceptance remain understudied. This research looks at the Australian food sector to see what variables influence the adoption of SCP that is enabled by information and communication technologies. Two additional elements, environmental uncertainties and the information and communication technology resources of supply chain partners, are added to the fifteen factors already identified at the national, industry, and organizational levels. In order to attain SSCM, the study suggested further research into the role of ICT in the SCP from several areas.

An analysis of the effects of supply chain management (SCM) on business performance is shown in the study by Kumar et al. (2020), which delves into the function of ICT in the agri-food supply chain. A strong correlation between information and communication technology (ICT) and supply chain management (SCM) techniques (logistics integration and supplier relationships) was found. Sustainable performance is significantly and positively affected by SCM techniques, which include information sharing, supplier relationship management, and logistical integration. In order to attain SSCM, the study called for additional research in SCPs, such as studying other SCP practices and how they interact with ICT. The effect of

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customer relationships on information and communication technology (ICT) with respect to supply chain sustainability will be examined in this study in the context of Jordan. Based on this argument, the recent study hypothesized the following:

H6: There is a significant direct impact of the strategic supplier partnership on the ICT in the pharmaceutical sector in Jordan.

H7: There is a significant direct impact of the customer relationship on the ICT in the pharmaceutical sector in Jordan.

H8: There is a significant direct impact of the level of information sharing on the ICT in the pharmaceutical sector in Jordan.

H9: There is a significant direct impact of the quality of information sharing on the ICT in the pharmaceutical sector in Jordan.

H10: There is a significant direct impact of the postponement on the ICT in the pharmaceutical sector in Jordan. ICT and SSCM

According to Pohl, Hilty, and Finkbeiner (2019), supply chain practices can collaborate with ICT for the field to promote and enable continuous production and consumption designs, which in turn reduce energy and product consumption throughout their life cycles. By exchanging media, optimizing processes, and controlling externalization, Kiani Mavi et al. (2021) were able to build a model for Iranian building projects and reach the conclusion that ICT may achieve sustainability. Not only had that, but Hardin-Ramanan et al. (2018) found out how knowledgeable the experts were on eco-friendly ICT practices. Also, Klimova and Rondeau (2017) examined the framework for implementing the ongoing development of the ICT curriculum, as well as the current method and trend for extending the academic agenda in education. In addition, following changes in China's energy intensity occurred as a result of the importance of ICT, Zhou et al. (2018) used a three-tier structural decomposition analysis (SDA) method to examine the important elements. Instead of focusing on energy efficiency, Khuntia, et al. (2018) examine how IT contributes to

sustainability. It is crucial for businesses to achieve sustainability, and Luthra et al. (2020) highlighted the drivers of ICT.

According to Meeran and Pazirandeh (2019), information and communication technology (ICT) might help create more sustainable supply chains and perhaps promote groundbreaking innovations that could improve sustainability overall. The implementation of projects based on socio-environmental technology becomes possible due to digitization, which in turn leads to economic sustainability. There has been recognition of the opportunities presented by ICT for promoting sustainability in supply chains (Govindan et al., 2018), even if the use of ICT and digitalization to improve sustainability is still in its early stages (Thöni & Tjoa, 2017). For instance, in order to achieve sustainability objectives, it may be crucial for supply chain participants to collaborate utilizing ICT tools. Beier et al. (2018) also found that supply chain collaborations that integrate and share data amongst enterprises may be more sustainable.

Furthermore, the utilization of ICT can promote the growth of buyer-supplier relationships that are more collaborative and long-lasting. In order to satisfy the increasingly demanding demands of stakeholders, it is essential that product sustainability be openly guaranteed at every point in the supply chain. To do this, it is crucial to have supply chain information and communication technology systems that facilitate transparency and information sharing (Kamble et al., 2020). It is possible to communicate information with suppliers regarding product origin, carbon footprint, raw material composition, responsibility audits, and supplier compliance certificates.

In addition, for the sake of activity monitoring and planning, data on emissions from the supply chain and logistics may be necessary (Jin et al., 2014). Managing sustainability information and documentation that needs to be integrated and shared

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effectively between supply chain players is primarily supported by information and communication technology systems that organizations use for their procurement operations. There has been a dearth of research on the function of information and communication technologies (ICT) in bolstering sustainable practices, despite the fact that information sharing is a key component in attaining sustainability within supply chains. Few studies have addressed this topic thus far, and none of them have used empirical investigations. This comes as a surprise because information and communication technology (ICT) and digitalization can aid in the implementation of sustainable practices, particularly in relation to the sharing and exchange of information, which is crucial for sustainable supplier development programs (Mendoza-Fong et al., 2018).

The purpose of the study conducted by Ramkumar and Jenamani (2015) was to find out what elements and criteria may be utilized to make the supply chain more sustainable by implementing an e-procurement system. In order to manage sustainable purchasing programs through the use of ICT, the authors used a hybrid methodological framework to identify 26 driving elements and six major dimensions. In their 2018 study, Mendoza-Fong et al. examined 284 enterprises from Mexico's manufacturing sector to determine how information and communication technology (ICT) impacted the effective adoption of green supply chain management (SCM) and the associated advantages. They found that GSCM's economic, productivity, and environmental benefits might be realized through the use of ICT.

Taking institutional pressures and resource availability into account as moderators, Bag et al. (2020) examined the impact of organizational culture, green supplier development, supplier relationship management, flexibility, and ICT innovation on supply chain sustainability. Organizational culture has a significant

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impact on worker behaviour, green supplier advancements, and supplier relationships, according to their findings. This, in turn, leads to increased innovation and flexibility. The research undertaken by Hossain et al. (2020) centered on mobile shopping, which is characterized as any exchange of money, whether direct or indirect, that takes place using a cellular telecommunication network. The authors proposed a model for the sustainability of omni-channel purchasing that takes into account the logistical impact and evaluates the environmental consequences of two processes: click and collect and mobile shopping in store. Due to the greater impact of transportation, their findings demonstrated that in-store mobile shopping is less environmentally friendly than click and collect. The customer's profile and the location of their house (urban vs. extra-urban area) can be seen as significant elements in relation to mobile shopping, however, in both options, the distance between their house and the store is the most crucial component.

Additionally, Hassani et al. (2017) examined the significance of both quantitative and non-quantitative effects of technology innovation in the petroleum and petrochemical sectors. Using a dynamic demand model, Magazzino et al. (2021) dug more into the effects of ICT on power consumption in developing nations and found a positive and mathematical relationship between the two. In order to find the innovations and processes relevant to sustainable production, Forster (2015) looked at the German car industry and used innovation insights. Industries in the United States that have embraced ICT practices use less energy than those that have not, say Braccini and Margherita (2018). Furthermore, based on this logic, Takase and Murota (2004) investigated the causes of ICT in terms of energy consumption and CO_2 emissions for Japan and the Essbase, and the most recent study hypnotized the following theories:

H11: There is a significant direct impact of the ICT on the SSCM in the pharmaceutical

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sector in Jordan.

2.5.3 Justifying ICT as Mediator in SCP Context

Information and Communication Technology (ICT) serves as a vital intermediary in the connection between supply chain practices (SCP) and supply chain sustainability by enabling information flow, refining decision-making, and augmenting collaboration among all stakeholders (Le et al., 2024). Economically, ICT facilitates real-time data sharing and analysis, enhancing the precision of demand forecasts, inventory management, and production scheduling. This mitigates inefficiencies such as overproduction and surplus inventory, resulting in cost savings and enhanced supply chain agility (Adeusi et al., 2024). Moreover, ICT platforms facilitate improved collaboration with suppliers and partners to establish common sustainability objectives, fostering innovation in environmentally friendly materials and processes (Wang & Zhang, 2024).

In the social and environmental context, ICT promotes openness and accountability throughout the supply chain, assisting corporations in complying with ethical sourcing practices and mitigating their environmental impact (Ebinger & Omondi, 2020). For example, ICT solutions such as blockchain may identify the provenance of raw materials, assuring adherence to labor regulations and mitigating the risk of human rights infringements, while also enabling stakeholders to monitor the carbon footprint of products (Calvão & Archer, 2021). This degree of transparency fosters social accountability and equitable labour practices across the supply chain. ICT facilitates the optimization of transportation routes and energy use, hence decreasing greenhouse gas emissions and minimizing waste. ICT facilitates data-driven decision-making and enhances communication, serving as a conduit that harmonizes supply chain practices with sustainability efforts, enduring economic

viability, social accountability, and environmental stewardship (Khan et al.,2023). From that, it can be concluded that ICT bridges supply chain sustainability by enhancing decision-making, collaboration, and real-time data sharing, promoting cost savings, transparency, accountability, and ethical sourcing practices.

2.5.4 ICT as mediator between the SCP and SSCM

By including SCM, we can better understand the mechanisms that lead to SSCM advances. A cohesive theoretical framework has not been provided by the literature up to this point. The main methods and choices for specific areas of supply chain management (SCM) have been influenced by several theoretical frameworks. A study by Alshawabkeh, et al. (2022) discussed the models of the impact of the technology in the supply chain management related to sustainability, where SCP mediates the effect of ICT on SSCM performance. Another theoretical point of departure is the resource-based view (RBV) of the firm (Barney, 1986, 1991), resulting in the idea that ICT is a firm's resource (Jahed, Q et al. 2022).

According to Goh and Eldridge (2019), early research by Thompson (1967) and Mintzberg (1979) suggested that the interplay between ICT and SCM improves company performance, which in turn enhances sustainability development. According to this point of view, environmental factors like organizational size and demand unpredictability may determine the efficacy of certain practices like ICT and SCM. This is in line with the core premise of contingency theory. The necessity to define SCP, ICT, and SSCM arises from the preceding brief outline of the theoretical foundation of current research in our field of interest. Based on the importance of technology in the supply chain and sustainability context, the recent study will examine the mediating role of ICT in the impact of SCP on the SSCM in the Jordanian context.

H12: There is a mediating role of the ICT on the impact of the strategic supplier

partnership on the SSCM in the pharmaceutical sector in Jordan.

H13: *There is a mediating role of the ICT on the impact of the customer relationship on the SSCM in the pharmaceutical sector in Jordan.*

H14: *There is a mediating role of the ICT on the impact of the level of information sharing on the SSCM in the pharmaceutical sector in Jordan.*

H15: *There is a mediating role of the ICT on the impact of the quality of the level of information sharing on the SSCM in the pharmaceutical sector in Jordan.*

H16: *There is a mediating role of the ICT on the impact of the postponement on the SSCM in the pharmaceutical sector in Jordan.*

2.6 Underpinning Theories

2.6.1 Resource-Based Theory (RBT)

The RBT proposes that companies can gain a competitive edge by capitalizing on scarce, valuable, and distinctive resources (Barney, 1991). In order to put strategies into action and boost competitiveness, businesses rely on resources, which include assets, competencies, procedures, knowledge, and capabilities. Using the natural resource-based view of companies as an example, Madhani (2021) lays out the potential pitfalls and upsides of sustainability and then moves on to talk about how businesses might become more competitive by engaging in economically and socially responsible practices. Businesses might gain a competitive edge in the long run through sustainability efforts like green manufacturing lines. Research on RBT and supply chain management in general has also made strides in recent times. For instance, there's been a lot of talk about how resources in supply chains should be considered from both the supply and demand sides, and how these resources can help build competitive advantage. This has led to questions about whether resources should only be based on upstream and internal resource development. Some have argued that RBT isn't relevant to purchasing and supply chain management, which has bolstered the case for its use in this context. Strategic factor market theory and RBT

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characteristics are compatible with supply chain management's potential as a competitive weapon, according to Barney (2012).

According to the arguments put out by Feizabadi et al. (2019), RBT applications at the business and supply chain levels can benefit from a systems perspective on resources. In supply chain management, RBT is thus a useful metric for assessing sustainable resources (Sharma et al. 2022). There have been recent initiatives to establish a connection between RBT and environmentally responsible supply chain management. From a resource-based theory (RBT) vantage point, an organization's procedures, knowledge, and capabilities that contribute to a more sustainable supply chain are resources. The supply chain's perception of the company, which is boosted by sustainable practices, and the products and services themselves are more appealing to consumers (Gligor et al., 2020). This is of the utmost importance since, unlike standalone firms, supply chains consist of interconnected organizations that compete with one another. Another potential source of long-term competitive advantage is a supply chain's "culture" that prioritizes social and environmental sustainability. Building a sustainable supply chain is a significant asset that could provide you an edge in the market, according to this line of thinking. According to Barney (1991), the RBT explains how organizations can gain a competitive edge by utilizing valuable, uncommon, and inimitable resources. A company can put its strategies into action and boost its competitiveness by making use of its resources, which include assets, competencies, processes, and knowledge. In their study, in their presentation of the natural resource-based view of firms, Makhloufi et al. (2022) explore the benefits and risks of sustainability and discuss ways in which organizations might become competitive by engaging in economically and socially responsible practices. Businesses can gain a sustainable competitive advantage in the long run by

implementing sustainability measures, such as eco-friendly production lines, say Ahmadi-Gh and Bello- Pintado (2022).

RBT has also made considerable strides in the field of supply chain management as a whole. For instance, Wiedmer et al. (2023) argues that resources should be considered from both the upstream (inner) and downstream (demand) sides of supply chains and how these resources contribute to creating competitive advantage, which raises the question of whether supply chain resources are solely based on upstream and internal resource development. Also, the argument that RBT doesn't work in supply chain management gave rise to the push to use it in this field. Strategic factor market theory and RBT qualities are compatible with supply chain management's role as a competitive weapon, according to Garcia-Buendia et al. (2023). The connection between RBT and environmentally responsible supply chain management has recently come into focus. When seen through the lens of RBT, the procedures, knowledge, and capabilities that make a supply chain more socially and environmentally sustainable can be considered organizational resources. A company's credibility is a valuable asset in the supply chain, and sustainable practices boost both that and the product or service's appeal to consumers (Buer, 2022). This is of the utmost importance since, unlike standalone firms, supply chains consist of interconnected organizations that compete with one another. Being socially and environmentally sustainable as a "culture" within the supply chain may potentially provide a competitive advantage in the long run.

Furthermore, Swazan, Das, and Sherfinski (2023), stated that building a sustainable supply chain is considered a valuable asset that could offer a competitive edge. Recently, efforts have been made to realize the relationship between RBT and sustainable supply chain management. The processes, knowledge, and capabilities that

enable a supply chain to become environmentally and socially sustainable can be viewed as organizational resources from the perspective of RBT. Sustainable practices enhance the organization's image and reputation, a significant resource in the supply chain, and further improve the marketability of products and services (Gligor et al.,2020).

2.6.2 Institutional Theory

The role of pressure in shaping organizational behaviour and decision-making by institutions such as governments, media, and public groups is outlined in the institutional theory (Meyer and Rowan, 1977; Kleszczowski & Raulet-Croset, 2022). Critical institutional norms emerge from normative isomorphic, mimetic, and coercive isomorphic drivers, and organizations adapt to these rules in order to survive and gain legitimacy. The organization's reaction to pressure from powerful individuals (such as the government and regulators) with whom it is affiliated can be explained by coercive isomorphism. When businesses try to alleviate cognitive uncertainty by mimicking the actions of other legitimate and successful businesses, this phenomenon is known as mimicry isomorphism. Normative isomorphism is linked to collective organizational standards and professionalism (Vo, 2021).

Sustainability programs, according to these writers, can do a lot to guarantee the legitimacy and social acceptability of a company. Sustainability measures, whether focused on compliance or proactive methods, should be adopted across the supply chain, regardless of organizational boundaries (Deegan, 2014). Compliance with standards, laws, and social norms protects organizations against the potential penalties,

demonstrations, campaigns, and sanctions that might result from environmental and social wrongdoing, while also increasing the possibility of their strategic survival. When news broke that Wal-upstream Mart's suppliers were employing children as laborers in countries like Uzbekistan and Bangladesh, the retail giant was the target of heavy criticism. Having the right methods and resources to define and assess the organization's performance in the three sustainability areas is crucial for developing institutional norms around sustainability challenges (Beske, Haustein & Lorson, 2019).

Therefore, Governments, media, and public associations are all examples of institutions that can exert pressure on organizational behaviour and decision-making; this pressure can then be used to shape institutional rules, according to institutional theory. Critical institutional norms emerge from coercive, mimicry, and normative isomorphic forces, and organizations adapt to these rules in order to survive and gain legitimacy (Holm, 2020). According to Negri et al. (2021), coercive isomorphism describes how an organization reacts when pushed by powerful individuals, such as regulators and the government. In risky business settings, mimicking the actions of legal and prosperous competitors could help alleviate cognitive uncertainty. And, according to Sodhi et al. (2022), normative isomorphism is linked to professionalism and the shared norms within an organization. From this perspective, several authors contend that sustainability activities can significantly secure an organization's legitimacy and social endorsement. It is well recognized that sustainability activities, whether compliance-based or proactive, must transcend organizational boundaries and be executed throughout the supply chain (Deegan, 2014).

2.6.3 Stakeholder Theory

Sustainability initiatives and the voluntary incorporation of sustainability into corporate operations are two examples of the kinds of things that stakeholders might compel firms to do. There are several types of stakeholders, each with their unique level of importance or impact. One way to classify stakeholders is as either main or secondary. That being said, et al. (2020) note that this categorization could evolve with time. For instance, in comparison to earlier times, environmental groups and authorities now have a far larger impact on how businesses act. When it comes to sustainable supply chain management, stakeholder theory has dominated the literature (Martin, 2018). Stakeholder impact on supply chain adoption of social and environmental practices has been the subject of substantial research (Islam, et al., 2018). As an example, AlQershi et al., (2019) looked into how supply chain stakeholders might influence the adoption of environmental practices.

Furthermore, to study how stakeholder pressure affects the adoption of environmental practices in Spain's automotive industry, Varsei et al. (2014). put out a theoretical framework that combines stakeholder theory with RBT. In this environment, it is typical to see that companies must constantly work to enhance their capabilities and implement plans to satisfy their important stakeholders. This clarifies how stakeholder sustainability commitments can play a pivotal role in driving supply chain sustainability practices.

In addition, sustainability initiatives and the voluntary incorporation of sustainability into corporate operations are two examples of the kinds of things that stakeholders might compel firms to do. Stakeholders can be categorized according to their level of participation or importance. Stakeholders can be categorized as either primary or secondary, according to one theory. That being said, this categorization

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could shift in the future. For instance, according to Hart and Sharma (2004) and Bashir et al. (2022), environmental groups and agencies now have a much larger impact on how businesses act than they did in the past. To better understand stakeholder salience, Kovács (2022) offers a categorization based on the aspects of power, urgency, and legitimacy. On one end of the spectrum, we have definitive stakeholders, and on the other, we have non-stakeholders; this spectrum is based on these three characteristics.

Moreover, Carter and Easton (2011), stated that, among the theories on sustainable supply chain management, stakeholder theory has garnered the greatest attention and citations. Stakeholder impact on supply chain adoption of social and environmental practices has been the subject of much research (Mamat, 2021). By way of illustration, Matniyozov and Matyakubov (2022) looked into how supply chain stakeholders influenced the adoption of environmental measures. Their analysis of 186 case cases led them to the conclusion that environmental behaviours can only be explained by non-governmental pressure. Another study that looked into the connection between stakeholder pressure and environmental practice adoption in the Spanish car sector was Sarkis et al. (2010), who presented a theoretical framework that combined stakeholder theory with RBT. One thing that comes up often in this context is that companies usually have to work hard to develop their capabilities and come up with plans to satisfy their important stakeholders. This elucidates how supply chain sustainability practices can be primarily driven by stakeholder sustainability commitments.

Therefore, Stakeholder theory connects supply chain management (SCM) and sustainability by asserting that firms must account for the requirements and interests of all stakeholders—including suppliers, consumers, employees, communities, regulators, and the environment—in their supply chain decisions. Recognizing that these stakeholders are directly impacted by supply chain operations, corporations are

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urged to implement sustainable practices that reconcile economic objectives with environmental stewardship and social accountability. This method incorporates sustainability into supply chain management by advocating for ethical sourcing, minimizing environmental consequences, and guaranteeing equitable labour practices, so aligning business operations with societal expectations and supporting enduring success.

2.6.4 Social Network Theory

The term "social network" refers to a graphical representation of a group of organizations connected by a web of links represented by nodes and lines. Rowley (1997) used stakeholder research and social network models to look into why organizations are resistant to what stakeholders expect, which led her to discover that there are many interconnected ways in which organizations function. "The principal focus of social network analysis is the interdependence of actors and how their positions in networks influence their opportunities, constraints, and behaviours," explains Rowley (1997).

In the same line view regarding centrality and density, Rowley (1997) and Martin (2018) have stated that centrality (a company's position in a network and its capacity to regulate the information flow) and density (the completeness of the ties between the actors in a network) are the two important parts of this theory. Validating the need for collaborative practices in supply chains and providing a greater description of the need to undertake sustainability initiatives can be achieved through the application of social network theory. Through "hard" material/money flow and "soft" alliances and sharing-of-information types of ties, social networks allow for the effective implementation of sustainability practices, with a central company benefiting from its position to champion and monitor sustainability initiatives (Kurt & Kurt, 2020).

For that, Social Network Theory connects supply chain management (SCM) and sustainability by emphasizing the relationships and interactions among different participants in a supply chain network, including suppliers, manufacturers, distributors, and customers. This idea emphasizes the significance of information, resource movement, and collaboration along the supply chain to attain sustainability objectives. Robust, interconnected networks facilitate enhanced communication and coordination, thereby promoting the exchange of best practices for sustainability, including waste reduction, resource optimization, and the adoption of ethical practices. By utilizing networks, firms can establish more robust and sustainable supply chains that conform to environmental and social sustainability goals.

2.7 Theoretical Framework

Based on the TBL approach of the recent study, SSCM as a multi-dimension construct consisting of (economic SSCM, environmental SSCM, and social SSCM), and it will be examined as the dependent variable in the recent study. Moreover, the independent variable in this study is the SCP, and it is conceptualized based on the study of Li et al., (2006) and Sutduean et al. (2019) as (supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement).
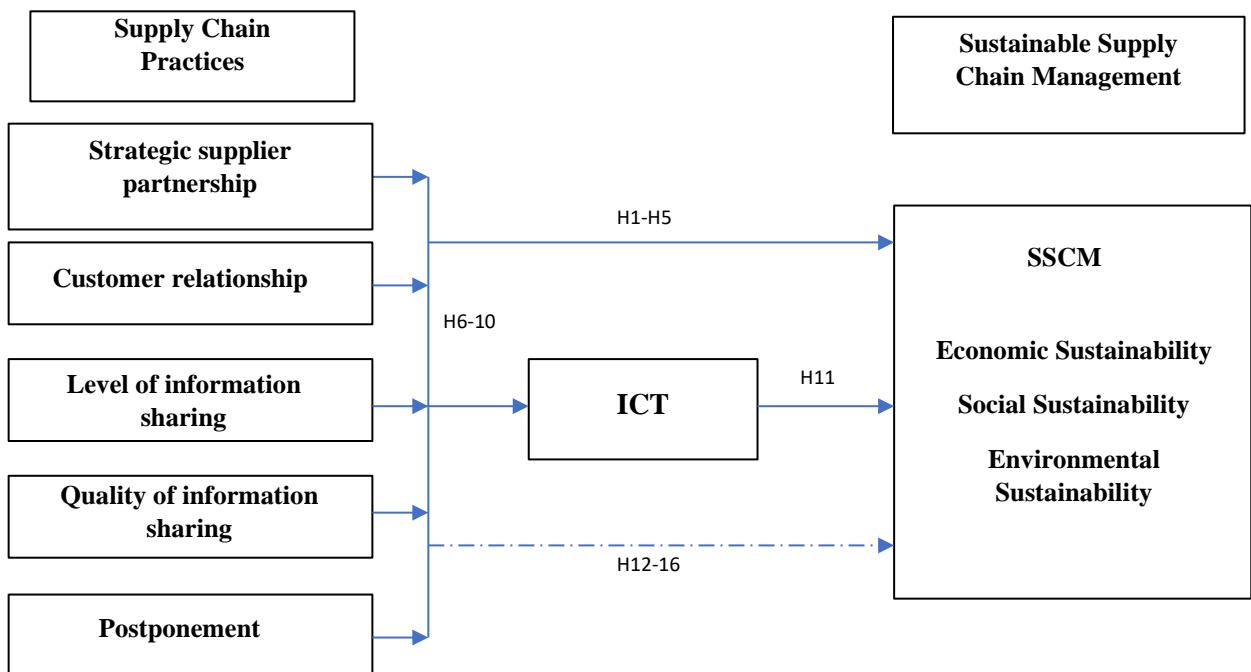
Figure 2.1 *Theoretical Framework*

ICT will be examined in this study as a mediator. The suggested model built based on the studies Saarela (2021), Li et al., (2006), Sutduean et al. (2019), and Zhang et al., (2011) will be empirically examined in the Jordanian context in the pharmaceutical companies.

Several studies have explored models similar to the one the researcher proposed, but with notable gaps that this research could address. For instance, Zhang et al. (2011) examined the relationship between supply chain practices and operational performance, with market competition as a moderating variable. However, the study did not deeply investigate the role of sustainability, particularly in terms of environmental and social outcomes, creating a gap for research that incorporates sustainable supply chain management (SSCM) through a Triple Bottom Line (TBL) approach. Saarela (2021) focused on the role of digitalization and ICT in enhancing supply chain performance, primarily looking at economic outcomes. This presents an

opportunity for this study to expand the scope by integrating environmental and social dimensions of sustainability, which are less emphasized in prior research.

Similarly, Sutduean et al. (2019) investigated the effects of supply chain practices on organizational performance, emphasizing innovation and flexibility. However, they did not fully explore the broader sustainability impacts of these practices. This research could fill this gap by focusing on SSCM as a multi-dimensional construct, specifically in the pharmaceutical industry. Lastly, while Kumar and Rahman (2016) explored green supply chain management (GSCM) in developing countries, their model primarily focused on environmental and economic performance, leaving out social sustainability aspects and the potential mediating role of ICT. By addressing these gaps, this study will offer a more holistic understanding of SSCM by considering the economic, environmental, and social dimensions in a developing country context, such as Jordan.

My proposed model offers several significant contributions to the existing literature. One key contribution is the integration of the Triple Bottom Line (TBL) with supply chain practices (SCP), addressing the frequent gap in prior studies that tend to focus on operational or economic outcomes, often neglecting the comprehensive inclusion of economic, environmental, and social dimensions. By incorporating Sustainable Supply Chain Management (SSCM) as the dependent variable, my study addresses this gap by offering a more balanced view of sustainability. Additionally, while ICT's role in supply chain management has been explored, its mediating role in enhancing sustainability outcomes, especially within the TBL framework remains under examined. My study is investigating how ICT influences SCP and SSCM, and introduces a novel perspective into the literature. Furthermore, much of the research on SSCM and SCP has concentrated on developed

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economies and industries like manufacturing and retail, leaving gaps in understanding how these dynamics play out in developing economies. By focusing on the Jordanian pharmaceutical sector, my study fills a geographical and sectoral gap, offering insights into how these relationships manifest in this specific context. Lastly, while previous studies often focus on one aspect of sustainability, such as environmental sustainability in green supply chain management (GSCM), my research conceptualizes SSCM as a multi-dimensional construct, contributing to a more holistic understanding of sustainability in supply chains.

By positioning my model within the context of previous studies and addressing the gaps related to TBL integration, ICT mediation, and the specific focus on the pharmaceutical sector in Jordan, my study could make a significant contribution to both the SSCM and supply chain management literature. The comprehensive examination **of** SSCM as a multi-dimensional construct and the mediating role of ICT offers a fresh perspective in an area where gaps in sustainability integration and context-specific studies remain.

2.8 Summary of the chapter

In this chapter, the researcher reviewed previous studies on the model of supply chain practices toward sustainable supply chain management for the Jordanian pharmaceutical industry

Moreover, this researcher introduced various concepts linked to the SSCP, including their historical evolution and classifications, as well as measurement techniques and methods for enhancing the SSCP. The relationship between the SCP and SSCP was examined, alongside ICT concepts, offering an in-depth overview of SCPM's development and associated ideas.

The aspects associated with SSCM (Social, Environmental, and Economic) and those related to SCP and ICT were examined. In summary, the literature highlights the significance of SCP and the necessity for organizations to validate SCP regarding strategic supplier relationships, customer relationships, information sharing levels, quality of information sharing, and postponement.

Therefore, to be part of the research framework. Furthermore, the literature review and earlier research suggested a connection among SCP, SSCM, and ICT. Thus, the subsequent third chapter outlines the research methodology employed in this study.

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CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter addresses the essential aspects of the research methodology in detail. These aspects include research design, data collection and sampling procedures, instrument determination for variable measurement, pre-test, pilot study, and data analysis. The current research aims to investigate the impact of SCM Practices (Strategic supplier partnership, Customer relationship, Level of information sharing, Quality of information sharing, and Postponement) on SSCM (economic, environmental, and social) with mediating role of ICT in one integrated model for the pharmaceutical sector in the Jordanian context. Research philosophy, research design, population, sampling, how the sample will be selected, the instrument and measurements, how the data was collected, and then analysis of the data by using different statistical techniques, which included handling of missing data, checking test of normality, non-response biases.

This study used the quantitative method; a questionnaire was used to collect data. In the quantitative approach, the structural equation modelling (SEM) technique is used to analyse this data after collecting the data. SEM is a set of statistical techniques used to examine the relationships between a set of independent variables. SEM is used to observe the hypotheses on the relationship among independent, dependent, and mediation variables. SEM has become increasingly popular; firstly, it provides a direct way to handle multiple relationships simultaneously with high statistical efficiency. Secondly, its ability to examine the relationships comprehensively and provide a change from exploratory to confirmatory analysis (Hair et al., 2014). The software of SPSS Software has been used to analyse descriptive statistics, including frequency,

mean, and standard deviations, while SMART-PLS Software has been used for developing the measurement model and structural model of the study.

3.2 Research Philosophy

The researcher seeks to specify the relations between variables and proper particulate methodologies in his research approach. The selection of appropriate methodology for the study should be based on how it will help answer the research questions (Bryman, 2003). Also, the positivist model confirms that actual events can be interpreted and monitored through logical analysis. The deductive approach is a logical way to test the cause-and-effect relationship between variables where theories and hypotheses are tested to develop a generalization to predict and understand a phenomenon (Creswell et al., 2004). The use of independent variables and dependent variables to test a theory is one of the most crucial features of quantitative studies. The dependent variable is the result of the application of the independent variable, and the measurement of a dependent variable represents the answer or behaviour of the targeted respondents in the study (Singleton & Straits, 2010).

3.3 Research Design

The study design is a framework that researchers use to select the details and type of references used to address the research questions, identify the relationship between variables, and as a guideline starting with the data analysis hypotheses (Cooper & Schindler, 2011). The purpose of this study is to clarify the relationship between SCM practices and SSCM with the mediating role of ICT. The quantitative research design is an effective technique for finalizing results and proving or rejecting a phenomenon. A quantitative method relates to measuring the behavioural and personal characteristics of the participants by focusing on the description and measurement of concepts or variables. Quantitative research methods attempt to find out whether a

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particular hypothesis is true for the sample and therefore for the entire population. Moreover, quantitative research is mostly used for any data collection technique such as questionnaires or data analysis processes such as numerical data generation graphs (Saunders et al., 2016).

3.4 Justification for Employing Quantitative Approach

There are a number of reasons why a quantitative cross-sectional survey methodology is the best choice for this study. To begin, according to Henn et al. (2005), a quantitative strategy that gathers primary data and tests a theoretical model to explain and predict respondents' behaviours would be the most appropriate way to accomplish the key objectives of this study. The ability to explain model variables and lay the groundwork for testable statements that may be tested empirically is a crucial premise of any theory (Davis, 1989).

Theorizing allows scientists to make sense of the world by outlining the relationships between various concepts and the things they study. According to Zikmund et al. (2012), theories serve two purposes: understanding and prediction. Even without a clearer picture of the causes of an event, Gregor (2006) argues that accurate theory prediction is still within reach with the help of well-executed quantitative research methodologies. This study employs quantitative methods, specifically the partial least squares based structural equation modelling (PLS-SEM) approach, to better forecast whether construction companies will embrace sustainable construction practices. The goal is to "obtain values of the latent variables for predictive purpose" (Chin, 1998, p.301). Additionally, with the help of various computer programs, a quantitative approach can process massive amounts of data (data obtained from a structured questionnaire).

3.5 Unit of Analysis

Researchers need to explain the unit of analysis they employed in their study to determine the solution to the problem identified (Sekaran & Bougie, 2016). The unit of analysis is described as the level of data aggregation to be gathered in the phase of data analysis. It is employed by the researcher to measure the variables. The unit of analysis may be at the individual, group, business unit, or organizational level. Because the study was interested in looking into the effect of supply chain management practice (SCMP) on sustainable supply chain management (SSCM) with the mediating role of the ICT, the unit of analysis is an organization, and each organization is represented by managers. To be able to get the perception of "the organization's opinions of general managers of the organization were considered to represent the opinion of the organization.

3.6 Determining Sampling Plan

3.6.1 Target Population

Zikmund and Babin (2010) state that in order for the research to produce useful results, the population must be defined with great precision. The population encompasses all of the individuals, events, or things that the researcher is interested in studying or aiming to identify, as stated by Sekaran and Bougie (2016). SCM practices (Strategic supplier partnership, Customer relationship, Level of information sharing, Quality of information sharing, Postponement), SSCM (economic, environmental, and social), and ICT are the three main constructs that will be evaluated in this study to determine whether the model is accurate. The study population consists of all pharmaceutical factories (15) and pharmacies (1568) and (95) drug stores and 13 pharmaceutical companies that work in the capital of Jordan, Amman. Each factory, drug store, company, and factory will be represented by one of the top managers.

Managers were chosen for this study because they can give their points of view to predict the effect of SCM practices and SSCM and ICT in the pharmaceutical sector in Jordan. Top managers will be representatives of their organizations as they are experts and critical professionals who are aware and familiar with active and practical management principles to promote SCM practices, Top managers will be representatives justified of their experience and they have the information about SCM practices and SSCP, the study of Liu (2019) applied the two management as respondent in SCP literature. The stratified random sampling approach will be applied to choose 313 from 1691 organizations in the pharmaceutical sector in Jordan (factory, drug store, company).

3.6.2 Sample Size

The present research analyzed the data using Structural Equation Modelling (SEM). To determine an appropriate sample size for structural equation modelling (SEM), it is crucial to consider the study approach, model complexity, amount of missing data, and average error variance amongst reflective measures (Hair et al., 2014). Hair et al. (2014) suggested a minimum sample size of 100 for data analysis using the SEM approach. Krejci and Morgan's (1970) method for determining sample size will be followed in this investigation. If there are 1691 people in a population, then a sample size of 313 would be adequate, say Krejci and Morgan (1970).

3.6.3 Sampling Technique

Simple random sampling was utilized for this study as a probability sampling method. According to Hair et al. (2014), the probability sampling characteristic of the target population from which the large samples are obtained is taken. Besides, each element in the population has an equal chance of being elected as a sample (Sekaran & Bougie, 2016). In particular, simple random sampling is applicable where the target

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population is homogeneous in terms of interest in the study (Awang, 2012). The population of this study is all pharmaceutical factories (15) and pharmacies (1568) and (95) drug stores, and (13) pharmaceutical companies working in the capital of Jordan, Amman; at the point of the data collection, there were 1691 factories, pharmacies, drug stores, and pharmaceutical companies work in the capital of Jordan Amman, according to Jordan Food Drugs Association report (JFDA, 2020). 313 questionnaires will be disseminated to the respondents chosen from the population list of 1691 pharmaceutical organizations.

Table 3.1
Number of Population and Sampling Size

No.	Governorate	Population	Sampling calculation	Sampling size
1	pharmaceutical factory	15	18.5%*15	3
2	Pharmacies	1568	18.5%*1568	290
3	drug stores	95	18.5%*95	17
4	Pharmaceutical companies	13	18.5%*13	3
Total		1691		313

Therefore, when selecting the requested respondents from a population (N) size of 1691, a random selection using SPSS will be made by clicking on the "Random Sample of Cases" button. After applying the "Random Sample of Cases" technique, only 313 samples of the sample size were selected in this study. Table 3.1 displays an overview of the sample size for each organization type. Based on the above table, the sample size for every governorate was selected based on 18.5% of the total required sample size out of the size of the population (313/1691*100%=18.5%).

3.7 Data Collection Procedure

Questionnaires have been used in this study to collect data from pharmaceutical sector organizations in Jordan. According to Sekaran and Bougie (2016), a structured questionnaire is a proper method because it takes less time than an interview method. The questionnaire is a beneficial data collection tool, mainly when the researcher

knows what is needed and how the variables introduced in the research framework are calculated. Besides, a questionnaire is moderately easy to analyse, requires low administration cost, is familiar to most people, and can help reduce bias as the researcher's effect on the sample's responses is minimized.

Managers of the pharmaceutical factory, pharmacies, drug stores, and pharmaceutical companies in Jordan are targeted as respondents for this study. They were given the questionnaires personally, as a self-administering questionnaire, to ensure the right level of response. Also, this allowed the researcher to clarify the study's purpose and benefits and to allow the participants to provide honest answers (Sekaran & Bougie, 2016). Moreover, personal surveys are more valid than low-cost interviews since the former have fewer errors than the latter (Creswell, 2012). All in all, 313 questionnaires were personally distributed to the managers of the pharmaceutical organizations (pharmaceutical factories, pharmacies, drug stores, and pharmaceutical companies) in Jordan; the information about the pharmaceutical organizations in Jordan was obtained from the (JFDA, 2020) website.

3.8 Instrumentation

The research instrument is a tool that helps collect the right data for the study. In order to make the instruments work for this particular study, they were adjusted and changed. As a first and essential phase relating to the data collection process, the preparation of the formal statements and main constituents required explaining and representing in a rational method both the dependent construct and independent constructs, as well as the mediator. The process begins with looking up the relevant literature about constructs utilized previously to test and measure independent constructs and also to know how the mediators and dependent constructs were measured in previous studies. The questionnaire is divided into five sections

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(Appendix B). Section A consisted of items measuring the dependent variable SSCM (economic, social, and environmental), and section B consisted of statements related to the independent variable of the study SCM practices. In contrast, section C included a set of questions about the perceptions of the ICT in pharmaceutical organizations, and the last section was section D which included questions concerning demographic information.

Sections A, B, and C used a 10-point scale of intervals in this questionnaire. Using a larger scale, such as a 10-point scale, is more suitable because it provides more variance to determine the variable; gives a higher level of accuracy of measurement; minimizes the leniency problem, and gives independence for data measurement, central tendency associated with the scales; and is also suitable for parametric and advanced statistical analysis techniques. Also, Awang, Afthanorhan, and Asri, (2015) and Awang (2012) proposed a scale range of 1 to 10 for structural equation modelling analysis.

3.9 Measurement

Research instruments are tools that help collect the right data for the investigation. In the most current study, the instruments were adjusted and changed to fit the study environment. Finding relevant literature regarding variables used to test and quantify them in prior research is the first step in developing the instrument to collect data about the study's dependent, independent, and mediator variables. When developing a questionnaire to achieve a high response rate, the questionnaire was translated from English into Arabic based on the expectation that it would be easier for participants to understand the questions written in Arabic because this language is the mother tongue of the Jordanian people in particular and in the Middle East in general. Preparing a

questionnaire in Arabic would also allow the participants to complete the survey. The following section will illustrate the measurements.

3.9.1 SSCM

A. Environmental SSCM

This study's ten-point Likert scale starting from (1) strongly disagrees to (10) strongly agree applied to explore the responses regarding the environmental SSCM in the Jordanian pharmaceutical sector. The items applied to measure environmental SSCM adapted from the study of (Carter et al., 2000; Zhu et al., 2005; Yu et al., 2014; Dang & Chu, 2016; Zailani, et al., 2012; Zsidisin & Hendrick, 1998) demonstrated in Table 3.2.

Table 3.2
Adapted Questionnaires for Environmental SSCM Measurement

Variable	Adapted Items	Study
Environmental SSCM	Our organization uses a life cycle analysis to evaluate the environmental friendliness of products.	"Zhu et al., 2005; Carter et al., 2000; Yu et al., 2014; Zailani et al., 2012; Zhu et al., 2005; Dang & Chu ,2016; Zsidisin & Hendrick, 1998"
	Our organization design the products by choosing the less impact on the environment of raw materials	
	Our organization established the recycle system of waste products.	
	In our organization, the materials are healthy in all probable end-of-life scenarios.	
	Our organization maximizes the use of renewable or recycled source materials.	

B. Social SSCM

In this study, a ten-point Likert scale starting from (1) strongly disagree to (10) strongly agree, is applied to discover the responses regarding the social SSCM in the Jordanian pharmaceutical sector. The items applied to measure social SSCM adapted from the study of Kassinis and Soteriou (2003), and Gimenez et al. (2012) demonstrated in Table 3.3.

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Table 3.3
Adapted Questionnaires for Social SSCM Measurement

Variable	Adapted Items	Study
Social SSCM	Our organization minimizes the effects and threats faced by the public.	Kassinis and Soteriou (2003) and study of Gimenez et al. (2012)
	Our organization increases the standards for health and safety for employees on the job.	
	Our organization increase the number of available community jobs.	
	In our organization there is enhancement in product image.	
	In our organization there is enhancement in the firm's image in the view of customers.	
	Our organization minimize the impacts and risks to the general public.	

C. Economic SSCM

In this study, ten-point Likert scale starting from (1) strongly disagree to (10) strongly agree, is applied to explore the responses regarding the economic SSCM in the Jordanian pharmaceutical sector. The items applied to measure economic SSCM adapted from the study of Wang and Dai (2018) demonstrated in Table 3.4 below.

Table 3.4
Adapted Questionnaires for Economic SSCM Measurement

Variable	Adapted Items	Study
Economic SSCM	In our organization, there is improvement in market share	Wang and Dai (2018)
	In our organization there is improvement in profit	
	Our organization reduce the environmental damage caused by the accident	
	In our organization there is improvement in return on assets	
	In our organization there is improvement in return on sales	

3.9.2 SCM Practices

A. Strategic supplier partnership (SSP)

In this study ten-point Likert scale starting from (1) strongly disagrees to (10) strongly agree, is applied to explore the responses regarding the strategic supplier partnership (SSP) in the Jordanian pharmaceutical sector. The items applied to

measure strategic supplier partnership were adapted from the study of (Tan et al., 2002;

Li et al., 2006; Sutduean et al., 2019) demonstrated in Table 3.5.

Table 3.5

Adapted Questionnaires for Strategic Supplier Partnership Measurement

Variable	Adapted Items	Study
Strategic supplier partnership	Our organization take into consideration quality as number one criterion in selecting suppliers	Tan et al.,2002; Li et al.,2006; Sutduean et al.,2019
	Our organization regularly resolve issues jointly with suppliers	
	Our organization have helped suppliers to enhance their product quality.	
	Our organization ongoing enhancement programs that include our key suppliers.	
	Our organization include key suppliers in planning and goal-setting activities.	

B. Customer relationship

In this study ten-point Likert scale started from (1) strongly disagrees to (10) strongly agree, applied to assess the responses regarding the customer relationship in the Jordanian pharmaceutical sector. The items applied to measure customer relationships were adapted from the study of Tan et al.,2002; Li et al.,2006; Sutduean et al.,2019. demonstrated in Table 3.6.

Table 3.6

Adapted Questionnaires for Customer Relationship Measurement

Variable	Adapted Items	Study
Customer relationship	Our organization interacts with customers to set dependability, promptness, and other standards for us.	Tan et al.,2002; Li et al.,2006; Sutduean et al.,2019)
	Our organization regularly assess and review customer satisfaction.	
	Our organization accurately predict what customers will expect in the future.	
	Our organization make it easier for clients to come to us for help.	
	Our organization periodically assess the significance of our relationship with our customers	

C. Level of Information Sharing

In this study ten-point Likert scale starting from (1) strongly disagrees to (10) strongly agree, is applied to assess the responses regarding the level of information sharing in the Jordanian pharmaceutical sector. The items applied to measure the level of information sharing were adapted from the study of (Moberg et al., 2002; Li et al., 2006; Sutduean et al., 2019) demonstrated in Table 3.7.

Table 3.7
Adapted Questionnaires for level of Information Sharing Measurement

Variable	Adapted Items	Study
Level of information sharing	Our organization notify business associates in advance of changing needs.	Tan et al.,2002; Moberg et al.,2002; Li et al.,2006; Sutduean et al.,2019)
	Our trading partners disclosure of confidential data with us.	
	Our trading partners be sure to keep us updated about issues that affect our business.	
	Our trading partners disseminate corporate expertise of core business processes with us.	
	Our organization share data that's helpful in building a company's strategy.	

D. Quality of the Information Sharing

In this study, a ten-point Likert scale starting from (1) strongly disagree to (10) strongly agree, is used to explore the responses regarding the level of information quality in the Jordanian pharmaceutical sector. The items applied to measure the level of information quality were adapted from the study of (Li et al., 2006; Sutduean et al., 2019) demonstrated in Table 3.8.

Table 3.8
Adapted Questionnaires for Quality of the Information Sharing Measurement

variable	Adapted Items	Study
Quality of the Information Sharing	In our organization the information exchange between us and trading partners is timely.	Li et al. (2006) and Sutduean et al. (2019)
	In our organization the information exchange between us and trading partners is accurate.	
	In our organization the information exchange between us and trading partners is complete.	
	In our organization the information exchange between us and trading partners is adequate.	

E. Postponement

In this study a ten-point Likert scale starting from (1) strongly disagree to (10) strongly agree, is used to explore the responses regarding the postponement in the Jordanian pharmaceutical sector. The items applied to measure the postponement were adapted from the study of (Li et al., 2006; Sutduean et al., 2019) demonstrated in Table 3.9.

Table 3.9
Adapted Questionnaires for Postponement Measurement

variable	Adapted Items	Study
Postponement	Our products are manufactured for modular assembly.	Waller et al. (2000) and Li et al. (2006) and Sutduean et al. (2019)
	Our organization lateness final product assembly tasks until customer orders have been received.	
	Our organization lateness final product assembly tasks until the last possible position in the supply chain.	

3.9.3 Information and Communication Technology (ICT)

In this study a ten-point Likert scale ranging from (1) strongly disagrees to (10) strongly agree, is used to assess the responses regarding the level of ICT in the Jordanian pharmaceutical sector. The items applied to measure the level of information quality were adapted from the study of (Marinagi et al., 2014; Roz, 2021) demonstrated in Table 3.10.

Table 3.10
Adapted Questionnaires for ICT Measurement

Variable	Adapted Items	Study
ICT	The quantity used of Internet in our organization	Marinagi et al. (2014); Roz (2021)
	The quantity used of Intranet in our Organization	
	The quantity used of Extranet in our Organization	
	The provision of online shopping in our Organization	
	The extent of usage of e-invoicing in our Organization	
	Our organization is electronically interconnected with some suppliers	

3.10 Pre-Test

A pre-test is one of the methods field professionals use to verify the questionnaire and make sure the questions are appropriate before moving on (Zikmund et al., 2013). This test is important to assess the suitability of the questions and their understanding and to detect any weaknesses in the instrument used. To guarantee that the research was conducted in accordance with the study's original goals, a pre-test was conducted on a limited number of respondents before the respondents were given the individual questionnaires. The questionnaire was pre-tested in this analysis. To ensure (Content Validity), the questionnaire was validated with the manager of al-Hikma one of the medical product companies. Regarding achieving (Face validity) the questionnaire was also validated by language experts (Dr Tayseer Alqutishat, Language Center at Al-Tafilah University); he suggested some languages corrections, also (Criterion Validity) achieved after an extensive review of the researcher supervisor and PhD holders working in Jordanian universities as lecturers in the field of business administration. The pre-test report is included in Appendix A.

3.11 Pilot Study

The researcher proceeded to the pilot study after finishing the pre-test by making adjustments to the items according to the expert's feedback and then sending them out to respondents. Pilot studies have been carried out for various reasons, including developing and testing research tools' adequacy, gathering preliminary data, estimating the variability in results to help determine the sample size, and identifying logistical problems that may arise during data collection (Van Teijlingen et al., 2001). In this study, the questionnaire was distributed to a sample of respondents who closely resembled the study's target population to increase the result's accuracy (Cavana et al., 2001). Based on the study of Hair et al. (2014), the researcher distributed 100 copies

of the questionnaire to a group of managers in the pharmaceutical sector in Jordan. A simple random sampling approach was used to pick the respondents. Until the actual study is conducted, the data collected from the pilot study was subjected to critical factor analysis to establish the underlying factor structure of the results and check the reliability of the questionnaire.

3.12 Exploratory Factor Analysis

In order to find, reduce, and arrange many questionnaire items into specific constructs, researchers employ Exploratory Factor Analysis (EFA) (Yong & Pearce, 2013). In this study, EFA was conducted instead of CFA because the Exploratory Factor Analysis (EFA) identifies potential underlying factor structures in a dataset without predefined hypotheses, permitting variables to load onto any factors and uncover patterns (Hair et al., 1997). While the Confirmatory Factor Analysis (CFA) is employed to test a specific, theory-based model by assessing the extent to which the data aligns with a proposed factor structure, whereas specified variables are assigned to designated factors (marsh et al.,2009). Exploratory Factor Analysis (EFA) is commonly used in the initial phases of research, this argument justifies using it in the pilot study phase, whereas Confirmatory Factor Analysis (CFA) is utilized to validate models in subsequent stages, frequently incorporating assessments of model fit.

Prior studies have shown that in order to conduct EFA, a sample size of one hundred is sufficient (Hair et al., 2014). The analysis may proceed with confidence because the pilot study included 100 samples. The interval and ratio questions underwent EFA in accordance with the recommendation of Suhr (2006), and all variables utilized in this study underwent EFA analysis. Principal Components Analysis (PCA), Kaiser-Meyer-Olkin (KMO) for sampling adequacy, and Bartlett's Test for construct significance were all utilized in this analysis.

The presence of multicollinearity among the items is what the KMO test is all about. Items are considered suitable for factor analysis if the test value is more than 0.6, as stated by Kaiser (1974). At the same time, the items' correlation is determined using Bartlett's test. The test's acceptability is tied to the significance value. The items can be considered eligible for component analysis if the significance value is close to 0.0 ($p < 0.05$). The items can be kept in an Exploratory Factor Analysis depending on the factor loading; factor loadings of 0.6 or above are recommended. Therefore, the Eigenvalues test is typically employed to keep the component (Yong & Pearce, 2013; Tabachnick & Fidell, 2013). All factors with an eigenvalue greater than one should be kept, according to Kaiser's rule of thumb (Kaiser, 1960).

3.12.1 Data Analysis for Pilot Test (EFA)

According to Hair et al. (2014), for this study, the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy value should be greater than 0.50, and Bartlett's Test of Sphericity should have a statically significant result at $p < 0.05$. Table 3.11 displays that the main and sub-constructs' KMO and Bartlett's Test of Sphericity results were suitable for EFA since they met the minimal threshold proposed by Hair et al. (2014).

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Table 3.11
Results of Examination of Constructs for Exploratory Factor Analysis Suitability

No	Construct	Sub-construct	KMO	Bartlett's Test of Sphericity P value
1	Sustainable Supply Chain Management (SSCM)			
		Environmental SSCM	0.842	0.000
		Social SSCM	0.792	0.000
		Economic SSCM	0.787	0.000
2	Supply Chain Management Practices (SCMP)			
		Strategic supplier partnership	0.803	0.000
		Customer relationship,	0.743	0.000
		level of information sharing	0.803	0.000
		Quality of the Information Sharing	0.776	0.000
		Postponement	0.679	0.000
3	Information and Communication Technology (ICT)		0.891	0.000

Next, the PCA with Varimax Rotation was conducted for all items under each sub-construct that constituted the main construct of the study. All items loading for all constructs and sub-constructs should exceed 0.60. Furthermore, the following section explains the eigenvalue, variance, and factor loading for each sub-construct under each construct of the study, as will be discussed in the following sections.

3.12.1.1 Result of Sustainable Supply Chain Management (SSCM)

Sustainable Supply Chain Management (SSCM) is a second-order construct consisting of three sub-constructs, i.e., environmental SSCM, social SSCM and economic SSCM, the eigenvalue, variance, and factor loading for each of them are discussed in the next sections.

A. Environmental SSCM

The PCA with Varimax Rotation extracted one distinct dimension with an eigenvalue exceeding one, and the total variance explained 78.372%, which exceeds 60% of the acceptable minimum level of Hair et al. (2012) as presented in Table 3.12.

Table 3.12
The Total Variance Explained for Environmental SSCM Items

	Initial Eigenvalues			**Extraction Sums of Squared Loadings**		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.919	78.372	78.372	3.919	78.372	78.372
2	.471	9.420	87.792			
3	.267	5.333	93.125			
4	.206	4.115	97.240			
5	.138	2.760	100.000			

Extraction Method: Principal Component Analysis.

Next, the component matrix of the environmental SSCM shown in Table 3.13 consists of five items loaded on one component, all the items retained because the values of their factor loading are above 0.6 as a general rule of thumb indicated by Tabachnick and Fidell (2013).

Table 3.13
The Component Matrix and Items Retained in Environmental SSCM

No	Items	Factor Loading	Item retained	Item Dropped
1.	Our organization Use a life cycle analysis to evaluate the environmental friendliness of products	.888	Retained	
2.	Our organization design the products by choosing the less impact on the environment of raw materials	.887	Retained	
3.	Our organization establish the recycle system of waste Product	.889	Retained	
4.	In our organization the materials healthy in all probable end-of-life scenarios	.863	Retained	
5.	Our organization maximizes the use of renewable or recycled source materials	.899	Retained	

B. Social SSCM

The PCA with Varimax Rotation extracted one distinct dimension with an eigenvalue exceeding one, and the total variance explained 57.183 %, which is around 60% of the acceptable minimum level of Hair et al. (2012) as presented in Table 3.14

Table 3.14
The Total Variance Explained for Social SSCM Items

Component	Initial Eigenvalues	Extraction Sums of Squared Loadings				
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.366	72.763	72.763	4.366	72.763	72.763
2	.463	7.720	80.483			
3	.415	6.911	87.394			
4	.282	4.706	92.100			
5	.264	4.397	96.497			
6	.210	3.503	100.000			

Extraction Method: Principal Component Analysis.

Next, the component matrix of the Social SSCM shown in Table 3.15 consists of six items loaded on one component, five items retained because the values of their factor loading are above 0.6, and one item removed because its factor loading is less than 0.6, as a general rule of thumb indicated by Tabachnick and Fidell (2013).

Table 3.15
The Component Matrix and Items Retained in Social SSCM

No	Items	Factor Loading	Item retained	Item Dropped
1.	Our organization reduce the impacts and risks to general public.	.826	Retained	
2.	Our organization improve the occupational health and safety of employees.	.888	Retained	
3.	Our organization provide more positions in community	.889	Retained	
4.	In our organization there is improvement in product image.	.845	Retained	
5.	In our organization there is improvement in firm's image in the eyes of customers.	.866	Retained	
6.	Our organization reduce the impacts and risks to general public.	.499	Removed	

C. Economical SSCM

The PCA with Varimax Rotation extracted one distinct dimension with an eigenvalue exceeding one, and the total variance explained 62.728%, which is around 60% of the acceptable minimum level of Hair et al. (2012) as presented in Table 3.16.

Table 3.16
The Total Variance Explained for Economical SSCM Items

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.136	62.728	62.728	3.136	62.728	62.728
2	804	16.079	78.808			
3	.478	9.555	88.362			
4	.321	6.424	94.786			
5	.261	5.214	100.000			

Extraction Method: Principal Component Analysis.

Next, the component matrix of the economical SSCM shown in Table 3.17 consists of five items loaded on one component, all the items retained because the values of their factor loading are above 0.6 as a general rule of thumb indicated by Tabachnick and Fidell (2013).

Table 3.17
The Component Matrix and Items Retained in Economical SSCM

No	Items	Factor Loading	Item retained	Item Dropped
1.	In our organization there is improvement in market share	0.765	Retained	
2.	In our organization there is improvement in profit	0.821	Retained	
3.	Our organization reduce the environmental damage caused by the accident	0.822	Retained	
4.	In our organization there is improvement in return on assets	0.819	Retained	
5.	In our organization there is improvement in return on sales	0.740	Retained	

3.12.1.2 Result of Supply Chain Practices (SCP)

Supply Chain Management Practices is a second-order construct consisting of five sub-constructs, i.e., strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, and Postponement, the eigenvalue, variance, and factor loading for each of them are discussed in the next sections.

A. Strategic Supplier Partnership

The PCA with Varimax Rotation extracted one distinct dimension with an eigenvalue exceeding one, and the total variance explained 61.127 %, which exceeds 60% of the acceptable minimum level of Hair et al. (2012) as presented in Table 3.18.

Table 3.18
The Total Variance Explained for Strategic Supplier Partnership Items

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.006	60.127	60.127	3.006	60.127	60.127
2	.971	19.419	79.546			
3	.507	10.137	89.683			
4	.291	5.824	95.507			
5	.225	4.493	100.000			

Extraction Method: Principal Component Analysis.

Next, the component matrix of the Strategic Supplier Partnership shown in Table 3.19 consists of five items loaded on one component, four items retained because the values of their factor loading are above 0.6 and one item removed because its factor loading is less than 0.6, as a general rule of thumb indicated by Tabachnick and Fidell (2013).

Table 3.19
The Component Matrix and Items Retained in Strategic Supplier Partnership

No	Items	Factor Loading	Item retained	Item Dropped
1.	Our organization consider quality as our number one criterion in selecting suppliers.	.888	Retained	
2.	Our organization regularly solve problems jointly with our Suppliers.	.847	Retained	
3.	Our organization have helped our suppliers to improve their product quality.	.896	Retained	
4	Our organization has continuous improvement programs that include our key suppliers.	.807	Retained	
5.	Our organization includes our key suppliers in our planning and goal-setting activities.	.217	Removed	

B. Customer Relationship

The PCA with Varimax Rotation extracted one distinct dimension with an eigenvalue exceeding one, and the total variance explained 60.778%, which exceeds 60% the acceptable minimum level of Hair et al. (2012) as presented in Table 3.20

Table 3.20
The Total Variance Explained for Customer Relationship Items

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.039	60.778	60.778	3.039	60.778	60.778
2	.996	19.922	80.700			
3	.451	9.014	89.715			
4	.273	5.456	95.171			
5	.241	4.829	100.000			

Extraction Method: Principal Component Analysis.

Next, the component matrix of the customer relationship shown in Table 3.21 consists of five items loaded on one component, all items retained because the values of their factor are loading above 0.6 as a general rule of thumb indicated by Tabachnick and Fidell (2013). Extraction Method: Principal Component Analysis.

Table 3.21
The Component Matrix and Items Retained in Customer Relationship

No	Items	Factor Loading	Item retained	Item Dropped
1.	Our organization frequently interacts with customers to set reliability, responsiveness, and other standards for us.	.691	Retained	
2.	Our organization frequently measure and evaluate customer satisfaction.	.803	Retained	
3.	Our organization frequently determine future customer expectations.	.809	Retained	
4.	Our organization facilitate customers' ability to seek assistance from us.	.818	Retained	
5.	Our organization periodically evaluate the importance of our relationship with our customers	.770	Retained	

C. Level of Information Sharing

The PCA with Varimax Rotation extracted one distinct dimension with an eigenvalue exceeding one, and the total variance explained 61.90 %, which exceeds 60% of the acceptable minimum level of Hair et al. (2012) as presented in Table 3.22

Table 3.22
The Total Variance Explained for Level of Information Sharing Items

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.095	61.900	61.900	3.095	61.900	61.900
2	.648	12.958	74.858			
3	.530	10.608	85.465			
4	.458	9.156	94.622			
5	.269	5.378	100.000			

Extraction Method: Principal Component Analysis.

Next, the component matrix of the level of information sharing shown in Table 3.23 consists of five items loaded on one component, all items retained because the values of their factor loading are above 0.6 as a general rule of thumb indicated by Tabachnick and Fidell (2013).

Table 3.23
The Component Matrix and Items Retained in level of Information Sharing

No	Items	Factor Loading	Item retained	Item Dropped
1.	Our organization informs trading partners in advance of changing needs.	.720	Retained	
2.	Our trading partners share proprietary information with us.	.740	Retained	
3.	Our trading partners keep us fully informed about issues that affect our business.	.831	Retained	
4.	Our trading partners share business knowledge of core business processes with us.	.832	Retained	
5.	Our organization and our trading partner's exchange information that helps establishment of business planning.	.804	Retained	

D. Quality of the Information Sharing

The PCA with Varimax Rotation extracted one distinct dimension with an eigenvalue exceeding one, and the total variance explained 63.593%, which exceeds 60% of the acceptable minimum level of Hair et al. (2012) as presented in Table 3.24.

Table 3.24
The Total Variance Explained for Quality of the Information Sharing Items

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.544	63.593	63.593	2.544	63.593	63.593
2	.630	15.760	79.353			
3	.495	12.386	91.739			
4	.330	8.261	100.000			

Extraction Method: Principal Component Analysis.

Next, the component matrix of the quality of the information sharing shown in Table 3.25 consists of four items loaded on one component, all items retained because the values of their factor are loading above 0.6 as a general rule of thumb indicated by Tabachnick and Fidell (2013).

Table 3.25
The Component Matrix and Items Retained in Quality of the Information Sharing

No	Items	Factor Loading	Item retained	Item Dropped
1.	In our organization the information exchange between our trading partners and us is timely.	.745	Retained	
2.	In our organization the information exchange between our trading partners and us is accurate.	.746	Retained	
3.	In our organization the information exchange between our trading partners and us is complete.	.873	Retained	
4.	In our organization the information exchange between our trading partners and us is adequate.	.818	Retained	

E. Postponement

The PCA with Varimax Rotation extracted one distinct dimension with an eigenvalue exceeding one, and the total variance explained at 80.593%, which exceeds 60% of the acceptable minimum level of Hair et al. (2012) as presented in Table 3.26.

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Table 3.26
The Total Variance Explained for Postponement Items

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.418	80.593	80.593	2.418	80.593	80.593
2	.410	13.666	94.259			
3	.172	5.741	100.000			

Extraction Method: Principal Component Analysis.

Next, the component matrix of the level of Postponement shown in Table 3.27 consists of three items loaded on one component, all items retained because the values of their factor loading are above 0.6 as a general rule of thumb indicated by Tabachnick and Fidell (2013).

Table 3.27
The Component Matrix and Items Retained in level of Postponement

No	Items	Factor Loading	Item Retained	Item Dropped
1.	Our products are designed for modular assembly.	.863	Retained	
2.	Our organization delay final product assembly activities until customer orders have actually been received.	.943	Retained	
3.	Our organization delay final product assembly activities until the last possible position (or nearest to customers) in the supply chain	.886	Retained	

3.12.1.3 Information and Communication Technology (ICT)

The PCA with Varimax Rotation extracted one distinct dimension with an eigenvalue exceeding one, and the total variance explained 74.881%, which exceeds 60% of the acceptable minimum level of Hair et al. (2012) as presented in Table 3.28.

Table 3.28
The Total Variance Explained for Information and Communication Technology (ICT) Items

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.493	74.881	74.881	4.493	74.881	74.881
2	.465	7.752	82.632			
3	.390	6.504	89.136			
4	.273	4.553	93.689			
5	.222	3.705	97.394			
6	.156	2.606	100.000			

Extraction Method: Principal Component Analysis.

Next, the component matrix of the level of Information and Communication Technology (ICT) shown in Table 3.29 consists of six items loaded on one component, all items retained because the values of their factor loading are above 0.6 as a general rule of thumb indicated by Tabachnick and Fidell (2013).

Table 3.29
The Component Matrix and Items Retained in Level of Information and Communication Technology (ICT)

No	Items	Factor Loading	Item retained	Item Dropped
1.	The extent of usage of Internet in our organization	.884	Retained	
2.	The extent of usage of Intranet in our organization	.863	Retained	
3.	The extent of usage of Extranet in our organization	.837	Retained	
4.	The provision of online shopping in our organization	.816	Retained	
5.	The extent of usage of e-invoicing in our organization	.906	Retained	
6.	Our organization is electronically interconnected with some suppliers	.882	Retained	

3.13 Reliability

Researchers utilize a variety of reliability tests; however, "the internal consistency reliability test" is by far the most used (Litwin, 1995). The homogeneity of measuring items that tap a certain construct is explained by the internal consistency of measurements. It is the degree to which items of a construct measure that construct both independently and in conjunction with one another, with items also being correlated among themselves so that respondents give equal weight to each item.

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Additionally, Cronbach's coefficient alpha is the most often used internal consistency test. With that in mind, Sekaran and Bougie (2013) found that instruments with larger coefficients were superior. Reliability coefficients ranging from.791 to .982 were seen in all the data, as shown in Table 3.30. (Sekaran & Bougie, 2013; Hair et al., 2006; Nunnally, 1967) According to research specialists, Cronbach's coefficient alpha tests with values between 0.60 and 0.70 are deemed to have average reliability.

Table 3.30
Results of the reliability of the main constructs and sub-constructs of the study

No	Construct	Sub-construct	No. of items	Cronbach's Alpha
1	Sustainable Supply Chain Management (SSCM)			
		Environmental SSCM	5	0.931
		Social SSCM	5	0.801
		Economic SSCM	5	0.848
2	Supply Chain Management Practices (SCMP)			
		strategic supplier partnership	4	0.881
		Customer relationship,	5	0.827
		level of information sharing	5	0.832
		quality of information sharing	4	0.791
		Postponement	3	0.877
3	Information and Communication Technology (ICT)		6	0.982

3.14 Data Analysis

To accomplish the goals of this study, data was analyzed using a mix of descriptive and inferential statistics. Descriptive statistics, as mentioned before in the research design, focus on identifying objects, individuals, groups, organizations, or environmental characteristics and explain the relationships between variables. Researchers can use inferential statistics to extrapolate results from a small data set. In this study, however, Smart-PLS (Ringle, Wende & Will, 2005) and PLS-Graph (Chin, Marcolin, & Newsted, 2003) were used in conjunction with each other to conduct the analysis and display the results.

3.14.1 Structural Equation Modeling (SEM) with Partial Least Squares (PLS) Technique

Researchers employ PLS-SEM, also known as PLS path modeling, as a second-generation structural equation model to address the shortcomings of first-generation approaches. Researchers can incorporate an unobservable variable that is indirectly quantified by an indicator variable using PLS-SEM, a relatively new technique (Hair et al., 2013). This study used the PLS-SEM method to evaluate the data. In recent times, PLS-SEM has gained interest from researchers as a promising method. Once again, in a PLS setting, it is simple to establish the relationships between the relevant variables and the measures of each individual construct. This enables the simultaneous analysis of two things: 1) the strength of the relationship between indicators and the construct under measurement, and 2) the empirical significance of the theoretically formulated hypotheses. Other methods, such as regression, are naturally skewed lower by measurement error; however, when each model variable can have multiple measures, the paths among the latent variables can be more robustly and accurately estimated (Limayem et al., 2001).

In addition, practical applications are better served by PLS path modelling. The soft modelling assumptions make it possible to estimate huge and complicated models, which makes it an invaluable tool for dealing with complex models (Fornell and Bookstein, 1982; Hulland, 1999). However, in this study, the relationships between the constructs, i.e., the independent variable SCMP conceptualized by (Independent Supplier Partnership, Customer Relationship, Level of Information Sharing, Quality of Information Sharing, Postponement), and the dependent variable SSCM measured by (Environmental, Social, and Economic), as well as the mediating variable ICT, were examined using PLS-SEM techniques for better prediction.

Since PLS path modelling can model latent variables under non-normality conditions, data normality is no longer an issue in a PLS environment, which is a relief for social science and management researchers who often face this challenge with their data (Chin, 1998). This study uses PLS path modelling to circumvent the normalcy problem that could arise from data analysis. While other methods of analysis frequently produce unclear results and may necessitate more analyses, Rönkkö, McIntosh, and Antonakis (2015) contend that PLS-SEM provides valid and more significant outcomes. As a result, it is considered a top statistical tool for social scientists to use when testing several correlations at once.

In order to create measurement and structural models, this study uses PLS path modelling. To explain or evaluate the validity and reliability of a concept, one uses a measurement model; to perform bivariate correlation analysis, one uses a structural model. Researchers have utilized simultaneous regression analysis to find out how the many constructs we're studying are related to one another. Furthermore, the mediating effects of ICT on the relationship between Supply Chain Practices Strategic SCP (Strategic Supplier Partnership, Customer Relationship, Level of Information Sharing, Quality of Information Sharing, Postponement), SSCM, and Supply Chain Management were examined using the PLS algorithm and bootstrapping. According to Baron and Kenny (1986), statistical analysis must measure and test the differential effect of mediation on the initial independent-dependent variable relationship since the mediating variable altered the causal relationship between the two variables. This further supports the use of the PLS-SEM method for analyzing the data in this study.

3.15 Summary of Chapter

Chapter three of this thesis comprehensively explores the research methodology, including various key aspect. It is thoroughly outlined numerous essential elements,

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including the theoretical framework, research hypotheses, study design, operational definitions, demographic and sample characteristics, unit of analysis, data collection

method and procedure, questionnaire design, variable measurement, pilot test, and data analysis procedures. Each of these elements was detailed extensively. developing a solid methodological framework is a basis for the next chapter, concentrating on outlining and evaluating the study's results. The empirical findings will be examined in the upcoming chapter, analyzing how the collected data align with the research objectives and hypotheses. The analysis includes statistical methods, taking into account the chosen data analysis techniques—PLS-SEM—explained in Chapter Three, in order to provide a comprehensive analysis of the study's implications and potential contributions to the field, the discussion of the findings will entail looking at the existing body of literature and theoretical framework.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the data analysis performed using PLS rout e modeling. The field of study's response rate is reported at the beginning of the chapter. The researcher goes on to talk about the first data screening and preliminary analysis. Then, all of the latent variables in this study's descriptive statistics are provided using SPSS. The chapter then moves on to evaluate the measurement model, which found convergent and discriminant validity as well as individual item reliability and internal consistency reliability. After that, we analyzed the structural model to find out how the endogenous latent variable related to the exogenous latent variables. The findings of the information and communication technology (ICT) mediating impacts on the structural model are finally given.

4.2 Response Rate

The respondent rate is the percentage of respondents who participated in the survey of the sample size calculated for the study (Sekaran & Cougie, 2016). The respondent rate is vital to ensure that the questionnaires obtained are appropriate for data analysis (Hair et al., 2014). Therefore, a total of 313 questionnaires have been allocated to the managers in the pharmaceutical sector in Jordan. Out of 313 questionnaires, 300 were returned, which is equal to 95.8 % of the respondent's scores. The unreturned questionnaire related to some reasons including lack of interest or motivation from participants, poor timing or convenience, and privacy concerns. According to Sekaran and Bougie (2016), survey research typically requires a minimum response rate of 30%. Thus, the response rate of the sample is highly appropriate for further investigation.

4.3 Data Editing, and Coding

The next step was the entering of the data, data analysis, and cleaning through SPSS software, once all the questionnaires were collected. Next, data coding involves assigning a number to the response of the respondent so that information can be inserted into the database (Sekaran & Bougies, 2016). There are two main methods for applying this technique, the pre-coding system, whereby numerical values were pre-coded for all questionnaire items.

In fact, after SPSS has accessed the questionnaires submitted by the respondents, data processing protocols have been applied to detect any data entry errors. The double-check procedure was carried out to increase the precision of data entry processes, as Zikmund, Carr, Babe and Griffin (2013) had recommended. The first test is for all entries to be verified on a case-by-case basis and the second check is to have descriptive information for continuous data, including frequency distribution, maximum and minimum values and verifications (Sekaran & Bougies, 2016). The frequency distribution statistics arising from data input errors and assured sample precision is 100%.

4.4 Data Screening

Data screening was conducted prior to running SEM (Cummins, 2014). According to Kline (2011), data were examined for missing data and assessment of normality, as discussed in the following sections.

4.5 Missing Data

The descriptive study defined any missing value to all variables after entering data from 300 questionnaires into SPSS version 24 and checking for missing value frequency. If the number of missing values per object is less than 5%, the mean should be used to substitute them, according to Hair et al. (2014). Nevertheless, there are

missing values of over 60 % in this study. Hair et al. (2014) proposed that researchers

could remove the data of the respondent if the missing data is more than 50% without

any sample size problem of the study. Among the 300 questionnaires returned, the data

set of 16 respondents has been removed as outlined in Table 4.1.

Table 4.1
Summary of Data for Analysis

Descriptive	Total
Population	1691
Sample Size	313
Unreturned Questionnaire	13
Returned Questionnaire (313-13)	300
Missing Data	16
Usable Sample Size (300-16)	284

4.6 Test of Normality

Before building the structural model and running SEM, the study must first check

for the normality distribution of all items measuring the construct. A normality test of

all items measuring the constructs in the study is necessary since structural equation

modeling (SEM) uses a parametric statistical technique. Thus, the skewness and

Kurtosis values should fall within the range of -2 to 2 is acceptable. The assessment of

normality distribution for all items is presented in Table 4.2.

Table 4.2
The Assessment of Normality for all Components (sub-constructs)

Variable	Skewness	Kurtosis
Strategic supplier partnership	-.105	-.606
Customer relationship,	-.799	1.172
Quality of information sharing	-.696	.660
Postponement	-.967	2.001
level of information sharing	-.467	.084
Information and Communication Technology (ICT)	-.536	.724
Environmental SSCM	-.771	1.982
Economical SSCM	-.775	2.078
Social SSCM	-.637	.651

4.7 Multicollinearity Test

Multicollinearity is a condition in which independent variables become highly correlated (Henseler, et al., 2014). The occurrence of multicollinearity among the independent variables can significantly misrepresent the estimates of regression coefficients and their statistical significance tests (Hair et al., 2006). According to Tabachnick and Fidell (2013), multicollinearity could result in an increase in the standard error coefficients, which could render the coefficients statistically non-significant.

Secondly, following the examination of the correlation matrix for the independent variables of the variance inflation factor (VIF) and tolerance value were examined to detect multicollinearity problems. Again, Hair et al. (2011) suggested that multicollinearity is a worry if VIF value is higher than 5 and the tolerance value is less than .20. Table 4.3 shows the VIF values, tolerance values, and condition indices for the independent variables.

Table 4.3
Tolerance and Variance Inflation Factors (VIF) Latent Constructs

Independent variables	Tolerance	VIF
Strategic supplier partnership	.512	1.954
Customer relationship,	.495	2.022
Level of information sharing	.460	2.176
Quality of information sharing	.378	2.647
Postponement	.538	1.858

The data in Table 4.3 indicates that multicollinearity did not exist among the exogenous latent variables as all VIF values were less than 5, and tolerance values exceeded .20 (see Hair, Ringle & Sarstedt, 2011). Thus, multicollinearity is not an issue in this study. Furthermore, the value of Durbin-Watson d = 2.037 suggested that there is no first order of linear autocorrelation in the data. (Field, 2009 suggests a value less than 1 and greater 3 is a cause for concern).

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4.8 Common Method Variance

Test Common method variance (CMV) denotes the variance that relates to the measurement method rather than to the variable of interest (Podsakoff et al., 2003). Studies have mostly suggested that common method variance is a major worry for scholars using self-report surveys (Spector, 2006). For example, Conway and Lance (2010) believe that common method bias bloats the relationships among constructs measured by self-reports. This study adopted several procedural remedies to minimize the effects of common method variance as recommended by MacKenzie and Podsakoff (2012) and Podsakoff, et al., (2003). First, to reduce evaluation anxiety, the respondents were made to understand no right or wrong answer to the items in the questionnaire and they were assured of confidentiality throughout the research process. Second, vague questions are avoided in the questionnaire and all questions were written using simple, specific and concise language to further improve scale items.

Additionally, the result implies that no single factor accounted for most of the covariance in the exogenous and endogenous variables. Therefore, this is proven in the present study, that common method bias is not a major concern and is unlikely to inflate relationships between variables measured.

4.9 Profile of Respondents

This section provides information about the demographic profile of the organizations' pharmaceutical sector managers in Jordan as the respondents of this study, while each manager represents one organization. Also, it provides information related to the organizations in the pharmaceutical sector understudy (factory, drugstore, company). Firstly, the respondent's (managers) characteristics consist of four items; gender, age, qualification/education level, and length of services. Firstly, the majority of respondents were males with 67.1% while the females' percentage was

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32.9 %. Secondly, the dominant age group of the respondents was 31-40 years old representing 42.7%; additionally, 23.1% of respondents were between 20-30 years old, while 41-50 years old occupied 25.3% of all respondents, the least number of respondents was the age above 51 years old with 8.9%.

Third, the majority of respondents were highly educated with 48.4% Bachelor's degree respondents and 50% Master's and Ph.D. degree, while those holding diplomas were only five respondents with 1.6%. Fourth, the percentage of 35.4% of respondents who spent in their jobs between 1-3 years, while those who consumed between 3-6 years were 95 with (33.5), Furthermore 25.9% of respondents were in their jobs for more than six years. The respondents with the lowest percentage are those who've been in the organization for less than one year with 5.1%.

Secondly, regarding the pharmaceutical sector organizations' information, in this study, the number of pharmaceutical factories (10), pharmacies (252), and (22) drug stores. Organizations that were established before 1980 were 14 with 4.8%, while the greatest number of organizations established in the period between 1980 and 2000 with 170 formulated 59.8%.

Table 4.4
Summary of Profile Respondents

	Respondent Profile	Frequency (N=284)	%
1	Gender of the Manager		
	Male	191	67.1
	Female	93	32.9
	Total	284	100
2	Manager Age		
	20 – 30 years old	66	23.1
	31 – 40 years old	121	42.7
	41 – 50 years old	72	25.3
	Above 50 years old	25	8.9
	Total	284	100
3	Manager Qualification/ Education Level		
	Diploma	5	1.6
	Bachelors	137	48.4
	Masters	121	42.7
	PhD/DBA	21	7.3
	Total	284	100
4	Manager Length of Services		
	Below 1 year	14	5.1
	1 – 3 years	101	35.4
	3 – 6 years	95	33.5
	Above 6 years	74	25.9
	Total	284	100
	Organization Type		
5	Pharmaceutical factories	10	3.5
	Pharmacies	252	88.7
	Drug stores	22	7.7
	Total	284	100
6	Organization Year of Establishment		
	Before 1980	14	4.8
	1980-2000	170	59.8
	After 2000	101	35.4
	Total	284	100

4.10 Descriptive Analysis of the Latent Constructs

The descriptive analysis of this study for the general statistical description of the variables being used is examined using the statistical values of mean and standard deviations. These values were calculated for the independent, moderator and dependent variables. Results displayed below in Table 4.5.

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Table 4.5
Descriptive analysis of the study constructs

No	Construct	Sub-construct	Min	Max	Mean	Standard deviation
1	Sustainable Supply Chain Management (SSCM)		1	10	7.84	1.32
		Environmental SSCM	1	10	7.92	1.34
		Social SSCM	1	10	7.66	1.55
		Economic SSCM	1	10	7.93	1.32
2	Supply Chain Management Practices (SCMP)		4	10	7.91	1.05
		Strategic supplier Partnership	5	10	8.01	1.12
		Customer relationship,	3	10	7.79	1.31
		Level of information sharing	4	10	7.96	1.23
		Quality of information sharing	1	10	7.65	1.64
		Postponement	1	10	8.11	1.34
3	ICT		3	10	7.92	1.23

4.11 Assessment of PLS-SEM Path Model

Based on Henseler and Sarstedt (2013), a nonparametric evaluation criterion depending on bootstrapping and blindfolding should be considered for the PLS-SEM overall model, rather than the goodness-of-fit (GoF) index (Hair et al., 2014 p. 101). Given this new information, we evaluate PLS-SEM route model outcomes using a two-stage procedure. According to Henseler, Ringle and Sinkovics (2009), there should be a two-step process. The first step is to evaluate the measurement model, which involves checking the validity and reliability of the items. The second step is to evaluate the structural model, which involves testing the significance of the path coefficients and determining the coefficient of determination (R2 value).

4.12 Measurement Model Evaluation

The research model is evaluated by utilizing two main methodological elements namely the evaluation of the measurement model and the evaluation of the structural

model (Ramayah et al., 2018). Hence, this study utilized the structural equation model (SEM), to evaluate the research model. The SEM is a group of statistical models that looks to clarify the relationship among various variables (Hair, et al., 2017). The measurement model was assessed to ensure that the tools used in the model were reliable and valid. In the current study, Smart-PLS path modelling was utilized to build the inner and outer models as shown in Figure 4.1. As part of evaluating a measurement model, one must ascertain the following: content validity, discriminant validity, convergent validity, internal consistency of dependability, and reliability of individual items (Hair et al., 2014).

In the measurement model, the retained items after conducting the pilot study will be used to measure the constructs. For the dependent variable SSCM dimensions; the environmental SSCM measured by (5 items) all items retained in the measurement model, the economical SSCM measured by (5 items) all items retained in the measurement model, while the social SSCM measured by (6) one item was deleted and (5) items used in the measurement model. The independent variables items were; strategic supplier partnership measured by (5) one item removed and (4) retained in the measurement model, customer relationship measured by (5) items all retained in the measurement model, level of information sharing measured by (5) items all retained in the measurement model, quality of information sharing measured by (4) items all retained in the measurement model and postponement measured by (4) items all retained in the measurement model. Also, the mediating variable ICT was measured by (6) items all retained in the measurement model.
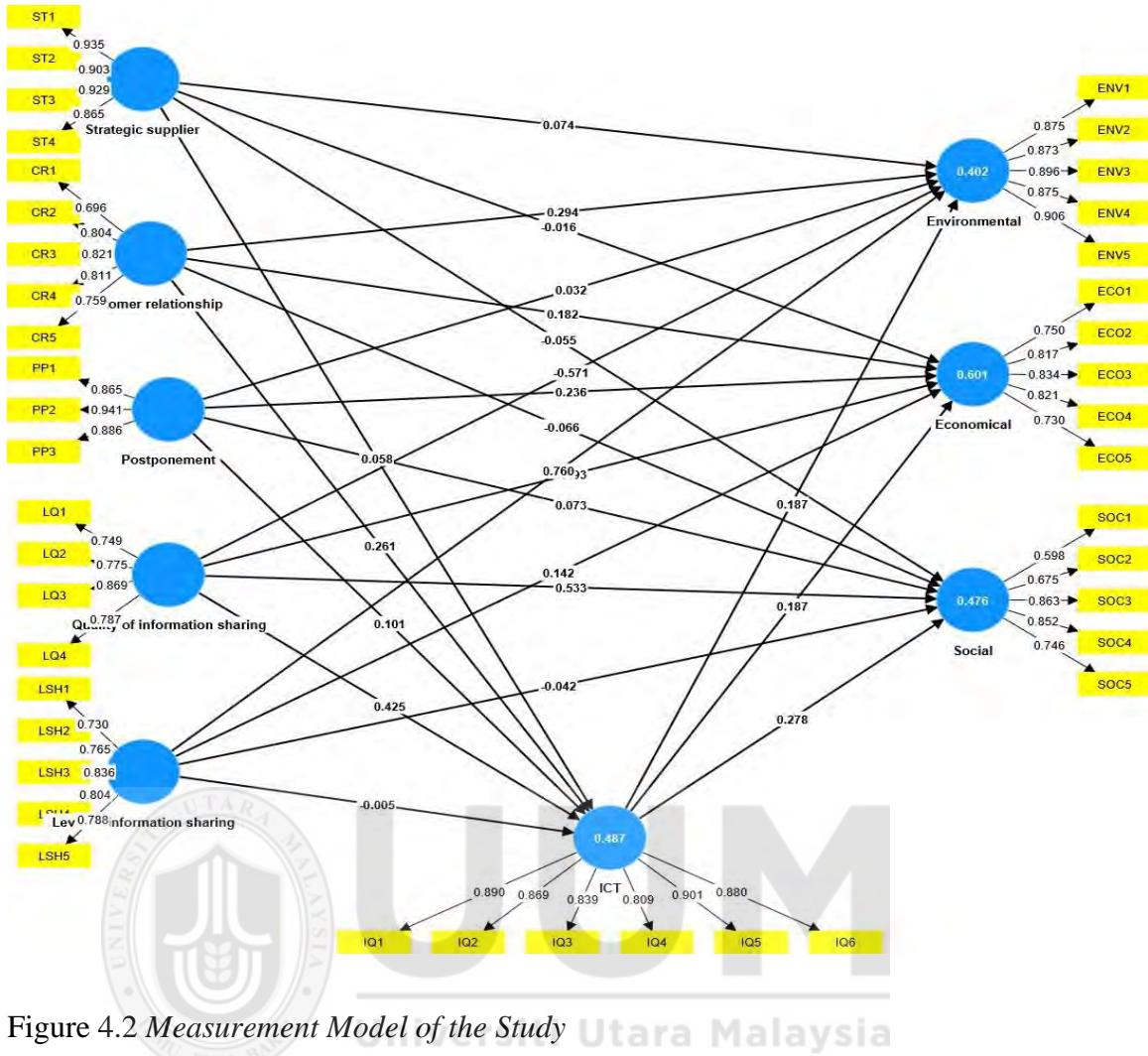
Figure 4.2 *Measurement Model of the Study*

4.12.1 Indicator Reliability of Research Variables

According to Hair et al. (2014), the study assessed the reliability of individual items by looking at the outer loadings of the latent variables. Always keep items with loadings between.40 and.70, as specified in the rule of thumb. For the economical SSCM sub-construct the loading of the items ranged between (0.730 - 0.834), For the environmental SSCM subconstruct the loading of the items ranged between (0.873 – 0.966), and for the social SSCM sub-construct the loading of the items ranged between (0.598 - 0.863). Moreover, for the independent variables; the strategic supplier partnership loading of the items ranged between (0.865 – 0.935), the customer relationship loading of the items ranged between (0.696 – 0.821), the level of the

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information sharing loading of the items ranged between (0.730 – 0.836), the quality of the information sharing loading of the items ranged between (0.749 -0.869) and the postponement items loading ranged between (0.865 – 0.941). For the mediating variable ICT items loading ranged between (0.809 – 0.890).

4.12.2 Internal Consistency of Reliability

The degree to which all components of a certain scale measure a concept is known as internal consistency of reliability. When assessing the internal consistency and reliability of a scale, particularly one with several items, Cronbach's alpha and composite reliability coefficient are commonly utilized indices in organizational research (McCrae, Kurtz, Yamagata, & Terracciano, 2011; Peterson & Kim, 2013). To determine the internal consistency of the adjusted measures in this study, the composite reliability coefficient was used over Cronbach's alpha coefficient for a number of reasons.

According to research scholars (Gotz et al., 2010), Cronbach's alpha coefficient assumes that all indicators contribute to their mother construct simultaneously, instead of considering the individual contributions of each item. In contrast, the composite reliability coefficient provides a significantly more accurate estimate of reliability.

Additionally, Cronbach's alpha may underestimate or overestimate scale reliability, in contrast to composite reliability, which accounts for variations in item loadings in a model; both measures are interpretable in the same way.

Table 4.6
Assessment for Measurement Model

Construct	Items (Indicators)	Indicators Reliability loading >0.70	Reliability Cronbach's Alpha >0.70	Internal Consistency CR >0.70	Convergent validity AVE >0.50
strategic supplier partnership	SP1	0.935	0.93	0.95	0.825
	SP2	0.903			
	SP3	0.929			
	SP4	0.865			
Customer Relationship	CR1	0.696	0.837	0.885	0.607
	CR2	0.804			
	CR3	0.821			
	CR4	0.811			
Level of information	LSH1	0.73	0.845	0.889	0.617
	LSH2	0.765			
	LSH3	0.836			
	LSH4	0.804			
	LSH5	0.788			
Quality of the information	LQ1	0.749	0.807	0.874	0.634
	LQ2	0.775			
	LQ3	0.869			
	LQ4	0.787			
Postponement	PP1	0.865	0.879	0.926	0.806
	PP2	0.941			
	PP3	0.886			
ICT	IQ1	0.89	0.933	0.947	0.749
	IQ2	0.869			
	IQ3	0.839			
	IQ4	0.809			
	IQ5	0.901			
	IQ6	0.88			
Environmental	ENV1	0.875	0.931	0.947	0.783
	ENV2	0.873			
	ENV3	0.896			
	ENV4	0.875			
	ENV5	0.906			
Social	SOC1	0.598	0.804	0.866	0.568
	SOC2	0.675			
	SOC3	0.863			
	SOC4	0.852			
	SOC5	0.746			
Economical	ECO1	0.75	0.85	0.893	0.626
	ECO2	0.817			
	ECO3	0.834			
	ECO4	0.821			
	ECO5	0.73			

The pair of Bagozzi and Yi (1988) and Hair et al. (2011) both proposed that a composite reliability coefficient should not be less than.70 when assessing internal consistency of reliability. Table 4.6, the Internal Consistency indicator, shows that all

of the latent variables in this study have sufficient internal consistency since their composite reliability coefficients (CR) are greater than the minimally acceptable threshold of.70. For the study constructs, composite reliability coefficients (CR) ranged between (0.866 and 0.950), and for the study reliability indicator (Cronbach's Alpha) ranged between (0.804- 0.933).

4.12.3 Convergent Validity

Hair et al. (2014) state that convergent validity explains how well indicators of the latent construct match the construct they are intended to measure and as well as the degree of correlation. Between them. This is demonstrated by looking at the Average Variance Extracted (AVE), which is the average variance shared by a construct and its measures. The variance that a construct shares with other constructs in the same model should be less than this AVE value for a construct. On the other hand, according to Barclay et al. (1995), an AVE value of 0.5 or higher is often deemed acceptable. The results of the Average Variance Extracted (AVE) are presented in Table 4.7. The resultant coefficients show that all the constructs in this study have convergent validity, ranging from (0.568) to (0.825). This indicates that all the items/indicators accurately represent the latent constructs.

4.12.4 Discriminant Validity

Discriminant validity is the type of validity that indicates the measurement model of a construct is free from redundant items in which a construct is truly distinct from other constructs by empirical standards (Fornell & Larcker, 1981). For that measurement purpose, there are types of criteria that were applied in Smart-PLS to evaluate the discriminant validity of the measurement model, which are three measures named Cross loading, Fornell and Larcker, and Heterotrait-Monotrait Ratio (HTMT). They are discussed as follows in more detail in relation to the current study.

4.12.4.1 Cross loadings

For each item, the value of the factor loading on the associated construct must be greater than the value of the correlation with the other constructs (cross-loading) (Chin, 2010). Therefore, discriminant validity can be explained by a cross-loading. Table 4.7 presents the results of the cross-loading analysis of the variables in the measurement model.

Table 4.7
Cross-loadings for Overall Measurement Model

	Customer relationship	Economical	Environmental	ICT	Level of information sharing	Postponement	Quality of information sharing	Social	Strategic supplier
CR1	**0.696**	0.444	0.419	0.416	0.445	0.352	0.447	0.267	0.412
CR2	**0.804**	0.478	0.488	0.422	0.462	0.466	0.465	0.311	0.28
CR3	**0.821**	0.572	0.49	0.555	0.436	0.575	0.427	0.326	0.218
CR4	**0.811**	0.491	0.405	0.477	0.411	0.612	0.415	0.345	0.243
CR5	**0.759**	0.486	0.351	0.401	0.44	0.661	0.462	0.336	0.214
ECO1	0.595	**0.75**	0.759	0.578	0.594	0.46	0.579	0.449	0.299
ECO2	0.541	**0.817**	0.516	0.476	0.554	0.522	0.555	0.425	0.235
ECO3	0.434	**0.834**	0.45	0.506	0.588	0.487	0.579	0.505	0.168
ECO4	0.491	**0.821**	0.464	0.47	0.472	0.513	0.488	0.509	0.092
ECO5	0.442	**0.73**	0.318	0.407	0.418	0.495	0.436	0.546	0.125
ENV1	0.441	0.53	**0.875**	0.402	0.41	0.356	0.413	0.423	0.221
ENV2	0.449	0.503	**0.873**	0.39	0.368	0.34	0.363	0.368	0.217
ENV3	0.523	0.605	**0.896**	0.498	0.477	0.451	0.449	0.386	0.224
ENV4	0.49	0.56	**0.875**	0.494	0.466	0.428	0.442	0.353	0.288
ENV5	0.536	0.639	**0.906**	0.458	0.537	0.381	0.517	0.423	0.275
IQ1	0.521	0.614	0.504	**0.89**	0.561	0.406	0.58	0.511	0.292
IQ2	0.521	0.588	0.54	**0.869**	0.568	0.376	0.565	0.526	0.259
IQ3	0.47	0.562	0.357	**0.839**	0.486	0.452	0.494	0.579	0.191
IQ4	0.471	0.426	0.333	**0.809**	0.471	0.452	0.485	0.479	0.191
IQ5	0.542	0.498	0.431	**0.901**	0.586	0.494	0.585	0.458	0.267
IQ6	0.522	0.512	0.462	**0.88**	0.572	0.471	0.576	0.42	0.252
LQ1	0.364	0.463	0.375	0.474	0.73	0.25	**0.749**	0.569	0.238
LQ2	0.559	0.632	0.415	0.594	0.765	0.524	**0.775**	0.505	0.245
LQ3	0.483	0.58	0.411	0.54	0.836	0.437	**0.869**	0.578	0.215
LQ4	0.366	0.429	0.381	0.377	0.804	0.407	**0.787**	0.411	0.131
LSH1	0.364	0.463	0.375	0.474	**0.73**	0.25	0.749	0.569	0.238
LSH2	0.559	0.632	0.415	0.594	**0.765**	0.524	0.775	0.505	0.245
LSH3	0.483	0.58	0.411	0.54	**0.836**	0.437	0.869	0.578	0.215
LSH4	0.366	0.429	0.381	0.377	**0.804**	0.407	0.787	0.411	0.131
LSH5	0.395	0.485	0.44	0.431	**0.788**	0.399	0.666	0.437	0.157
PP1	0.565	0.575	0.405	0.41	0.454	**0.865**	0.445	0.358	0.252
PP2	0.655	0.579	0.412	0.48	0.499	**0.941**	0.495	0.343	0.18
PP3	0.626	0.53	0.383	0.477	0.445	**0.886**	0.443	0.402	0.15
SOC1	0.388	0.651	0.286	0.432	0.38	0.431	0.402	**0.598**	0.116
SOC2	0.269	0.343	0.393	0.324	0.475	0.227	0.461	**0.675**	0.116
SOC3	0.255	0.395	0.355	0.432	0.429	0.291	0.437	**0.863**	0.093
SOC4	0.23	0.382	0.294	0.468	0.439	0.265	0.462	**0.852**	0.051
SOC5	0.373	0.515	0.332	0.473	0.644	0.322	0.643	**0.746**	0.166
ST1	0.321	0.273	0.266	0.313	0.293	0.201	0.308	0.197	**0.935**
ST2	0.315	0.225	0.276	0.236	0.213	0.223	0.224	0.128	**0.903**
ST3	0.319	0.206	0.258	0.26	0.216	0.198	0.217	0.133	**0.929**
ST4	0.304	0.123	0.198	0.184	0.187	0.148	0.19	0.035	**0.865**

From the cross-loadings in Table 4.7 it can be observed that, for each item, the value of the factor loading (in bold) on its associated construct was greater than the value of the correlation with the other constructs. For the environmental SSCM, the factor loading ranged between (0.873 – 0.906) which is greater than all values of the correlations with the all constructs factor loadings, the factor loading of the economical SSCM ranged between (0.730 – 0.834) which is greater than all values of the correlations with the all constructs factor loadings, the factor loading of social SSCM ranged between (0.749 – 0.869) which is greater than all values of the correlations with the all constructs factor loadings, the factor loading of strategic supplier partnership ranged between (0.865 – 0.929) which is greater than all values of the correlations with the all constructs factor loadings, the factor loading of customer relations ranged between (0.696 – 0.821) which is greater than all values of the correlations with the all constructs factor loadings, the factor loading of level of information sharing ranged between (0.730 – 0.836) which is greater than all values of the correlations with the all constructs factor loadings, the factor loading of quality of information sharing ranged between (0.749 – 0.869) which is greater than all values of the correlations with the all constructs factor loadings, the factor loading of postponement ranged between (0.865 – 0.941) which is greater than all values of the correlations with the all constructs factor loadings and the factor loading of ICT ranged between (0.809 – 0.901) which is greater than all values of the correlations with the all constructs factor loadings. Therefore, the dataset is free of any discriminant validity problems and can proceed to the next statistical examinations.

4.12.4.2 Variable correlation using the Fornell–Larcker criterion

Table 4.8 represents the results of variable correlation using the Fornell-Larcker approach to assess the discriminant validity of the measurement model.

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Table 4.8
Variable Correlation-Root Square of AVE

	Customer relationship	Economical	Environmental	ICT	Level of information sharing	Postponement	Quality of information sharing	Social	Strategic supplier
Customer Relationship	**0.779**								
Economical	0.637	**0.791**							
Environmental	0.555	0.646	**0.885**						
ICT	0.588	0.621	0.511	**0.865**					
Level of information sharing	0.561	0.67	0.516	0.626	**0.786**				
Postponement	0.686	0.625	0.446	0.508	0.519	**0.898**			
Quality of information sharing	0.566	0.672	0.498	0.634	0.684	0.514	**0.796**		
Social	0.407	0.612	0.441	0.573	0.644	0.409	0.654	**0.754**	
Strategic supplier	0.346	0.238	0.279	0.282	0.256	0.216	0.266	0.147	**0.908**

According to Fornell & Bookstein (1982), in the variable's correlation method, the discriminant validity occurs when the calculation of the square root of AVE is greater than the correlation between the factors making for each pair. In other words, the value should be higher than the other off-diagonal elements in the rows and columns, which was the case in the correlation matrix of this study. This demonstrated the discriminant validity of the measurements used. Heterotrait-Monotrait Ratio of Correlations as per Table 4.9 represents the results of HTMT discriminant criteria to assess the discriminant validity of the measurement model.

Table 4.9
Heterotrait-Monotrait Ratio

	Customer relationship	Economical	Environmental	ICT	Level of information sharing	Postponement	Quality of information sharing	Social	Strategic supplier
Customer relationship									
Economical	0.748								
Environmental	0.622	0.708							
ICT	0.66	0.688	0.538						
Level of information sharing	0.659	0.771	0.574	0.691					
Postponement	0.798	0.725	0.489	0.564	0.596				
Quality of information sharing	0.681	0.792	0.568	0.717	0.291	0.603			
Social	0.494	0.744	0.514	0.657	0.758	0.489	0.79		
Strategic supplier	0.398	0.25	0.292	0.291	0.276	0.235	0.292	0.165	

As shown in Table 4.9, method of assessing discriminant validity is by using Heterotrait- Monotrait Ratio (HTMT) developed by Henseler, Ringle, and Sarstedt (2015). The resulting values of HTMT should be less than the required threshold value of HTMT 0.85 by Kline (2011) or HTMT 0.90 by Gold and Malhotra (2001). Besides that, even if two constructs are highly, but not perfectly, correlated with values close to 1.0, the criterion is insufficient to indicate a lack of discriminant validity (Henseler, et al., 2015). Hence, all the values which are less than 1.0 are considered acceptable values.

4.13 Assessment of Structural Measurement Model

Having assessed the validity and reliability of the measurement model, the next phase involved evaluating the SEM, which is the second major process in PLS-SEM analysis. So, having validated the measurement model, it was time to represent the structural model by stipulating the correlation between the constructs. The structural

model depicts the connections between the variables and the specific details of the link between the dependent and each independent. variable (Ho, 2006). A structural model evaluation focuses primarily on the overall model fit before considering the size and significance of the hypothesized parameter estimates as depicted in the path diagrams by one-headed arrow (Hair et al., 2011). The last phase in this assessment is to confirm the accuracy of the structural model based on the hypothesized relationships between the identified and assessed variables. In the current study, the PLS technique and bootstrapping were used to estimate the structural model with 5000 replications in order to investigate the study hypotheses. This involved five sets of tests to evaluate the R^2, F^2, Q^2, VIF, and p-value of the inner model (Chin, 2010; Hair et al., 2014; Ramayah, 2018; Valerie, 2012). Finally, Figure 4.4 below shows the direct and indirect effects.

4.14 Assessment of Significance of the Structural Model

Following confirmation of the study's outer model's validity, this section will evaluate the structural model, which is responsible for establishing the links between the study's latent variables (constructs). Because of this, the significance of the path coefficients was evaluated using the nonparametric assessment criteria based on the bootstrapping process. The study included 284 cases and 5000 bootstrap samples (Hair et al., 2014).
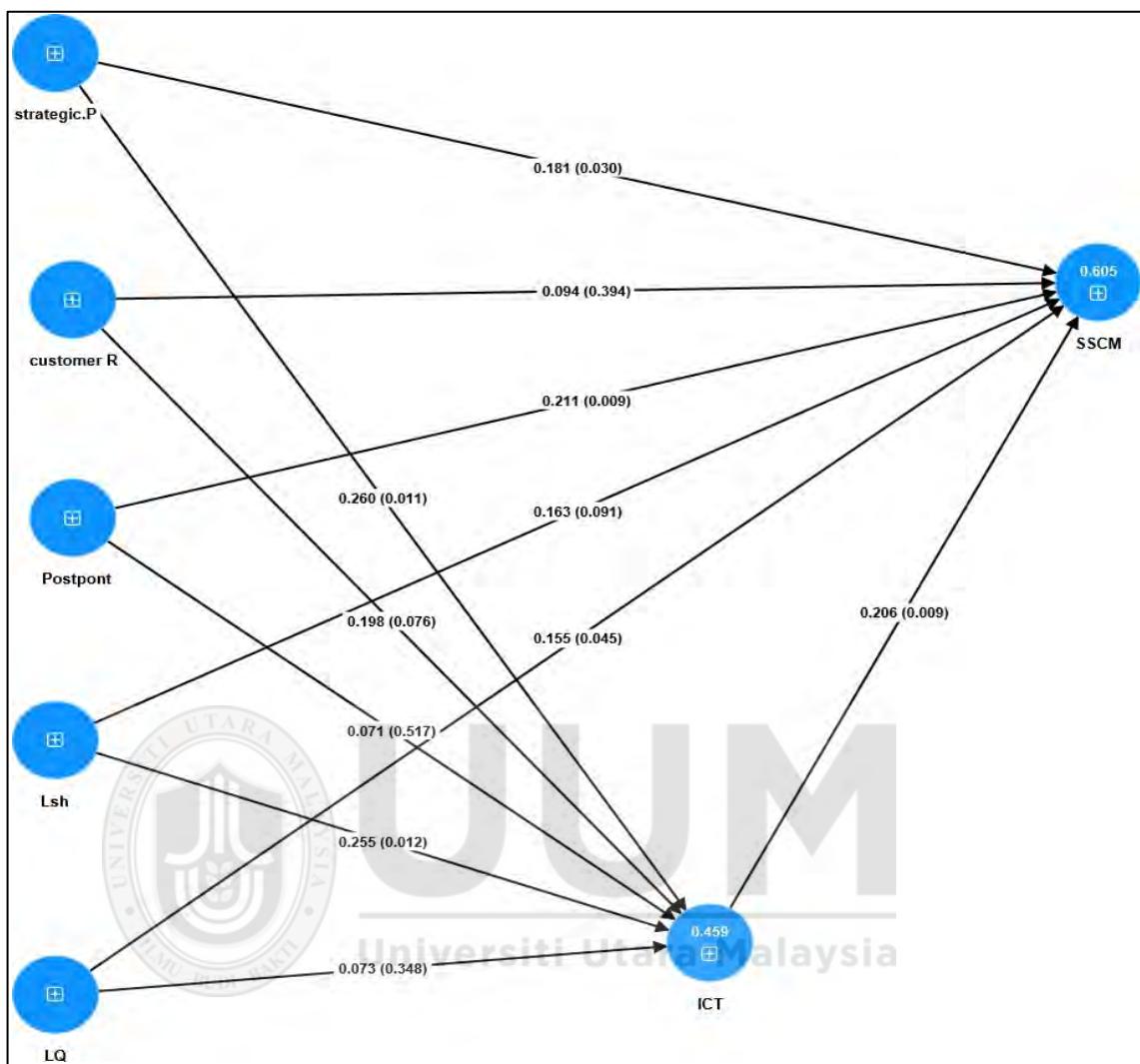
Figure 4.3 *Structural Model of the Direct and Mediation Effects of the Variables (P value) (Inner Model)*

4.14.1 Coefficient of Determination (Predictive Power R2)

According to Hair (2014), the rule of thumbs for evaluating the value of Predictive Power R^2 can be excellent (more than 0.75), adequate (between 0.5 and 0.75), or moderate (between 0.2 and 0.5). Calculating Predictive Power R^2 is done when the changes between two variables in the correlation exist. In this study, the Smart-PLS algorithm function is used to obtain R^2 the values as indicated in Table 4.10.

Table 4.10
R-Square of the Endogenous Latent Variables

Latent Construct Relation	Predictive Power (R²)	Status
SSCM	0.605	adequate
ICT	0.459	moderate

The results of the structural model with R^2 values and path coefficients depicted strategic supplier partnership, Customer Relationship, level of information sharing, level of information Quality, Postponement and ICT are capable of explaining 60.5% of the variance of SSCM in the Jordanian pharmaceutical sector. In addition, strategic supplier partnerships, customer relationship, level of information sharing, level of information quality, postponement is capable of explaining 45.9% of the variance of ICT in the Jordanian pharmaceutical sector.

4.14.2 Assessing variables Effect Size (F²)

After proving the significance of the relationships between constructs, the relevance of significant relationships must be conducted (Hair et al., 2014). Thus, the effect size analysis is measured by the guideline provided by Cohen (1988). The effect size F^2 is a measure used to assess the relevant impact of a predictor construct on an endogenous construct. The F^2 assesses how strongly one exogenous construct contributes to explaining a certain endogenous construct in terms of F^2. According to Cohen (1988), the acceptable effect sizes F^2 of values of 0.35, 0.15 and 0.02 are considered substantial, medium and small effect sizes respectively. Table 4.11 presents the assessments of the coefficient of effect size F^2.

Table 4.11
Effect Size of the Exogenous Constructs

Latent Construct Relation	F²	Effect Size
Strategic supplier -> SSCM	0.037	Small
Customer Relationship -> SSCM	0.007	Small
level of information sharing -> SSCM	0.034	Small
level of information Quality -> SSCM	0.038	Small
Postponement ->SSCM	0.047	Small
Strategic supplier -> ICT	0.060	Small
Customer Relationship ->ICT	0.025	Small
level of information sharing ->ICT	0.065	Small
level of information Quality ->CT	0.006	Small
ICT-> SSCM	0.004	Small

As described in Table 4.11, all the effect size of the exogenous constructs on the endogenous was small based on the study of Cohen (1988).

4.14.3 Predictive Relevance and Blindfolding (QRR) Value

According to Hair (2014), the rule of thumb for evaluating the values is as follows: The value of Q square (Q2) can be considered high if it is greater than 0.35, medium if it is between 0.15 and 0.35, or small if it is less than 0.15 (Between 0.02 and 0.15).

The predictive relevance of the model is examined using the blindfolding procedure. The blindfolding procedure is a resampling technique that systematically deletes and predicts every data point of the indicators in the reflective measurement model of the endogenous construct. The blindfolding procedure should only be applied to endogenous constructs that have a reflective measurement (Hair Jr et al., 2016). If the Q2 values are greater than 0 it is assured that model has predictive relevance for a certain endogenous construct (Cohen, 1988; Hair et al., 2016). Table 4.12 indicates the results of QQ2 for endogenous constructs.

Table 4.12
Predictive Relevance of the Endogenous Latent Variables

Exogenous Constructs	Q² predict	Status
SSCM	0.397	High
ICT	0.533	High

As shown in Table 4.12, the values of SSCM of 0.397 and HRM of 0.533 are greater than 0, indicating that the model has sufficient predictive relevance.

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4.15 Path Coefficient of Research Model Relations

It is vital for the study to test its hypotheses, and the only way to obtain this information is to estimate the route coefficient values of the various relationships contained inside the model. P-values and T-statistics are two strategies that are frequently utilized in order to assess the significance of a relation. T-statistics are used to determine the significance of a route coefficient, whilst a P-value is either a significant level or a probability estimate value. In addition, the route coefficient is computed to provide insight into the nature of the relationship's scope. According to Hair et al. (2016), the following is a rule of thumb for evaluating the values: When calculating the P-value, also known as the probability estimate value, the threshold that is most frequently employed in psychological research is 0.05 (5%). On the other hand, other research might employ a level of 0.01 percent (1%) or 0.1 percent (10%). For T statistics, any value above 1.96 is significant with a two-tailed test or any value above 0.1.65 is significant with a one-tailed test.

Table 4.13 shows the path coefficient assessment along with the values of T statistics and P values. The table revealed the results of the 11 hypotheses with direct effects between the variables. The results show that 6 hypotheses are significant but 5 are non-significant. The rejected hypotheses are for hypothesis 2 (CR-> SSCM) with a path coefficient of 0.094 and P value of 0.340, hypothesis 3 (LSH-> SSCM) with a path coefficient of 0.163 and P value of 0.091, hypothesis 7 (CR-> ICT) with a path coefficient of 0.198 and P value of 0.076, hypothesis 9 (LQ-> ICT) with a path coefficient of 0.073 and P value of 0.340 and hypothesis 10 (PP-> ICT) with a path coefficient of 0.071 and P value of 0.517. These hypotheses are rejected because the P values are above the threshold of 0.05 or 5% significance level. The other six hypotheses are accepted because the P values are less than 0.05. The discussion of the

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results of every hypothesis is illustrated in the next sections. Figure 4.3 the model with

the t statistic values. For the predictors of the SSCM the precedence of the impacts

based on the path coefficient is ICT (0.206), postponement (0.211), strategic supplier

partnership (0.181) the quality of information sharing (0.155). For the predictors of the

ICT; the precedence of the impacts based on the path coefficient is strategic supplier

partnership (0.260), then level of information sharing (0.255).
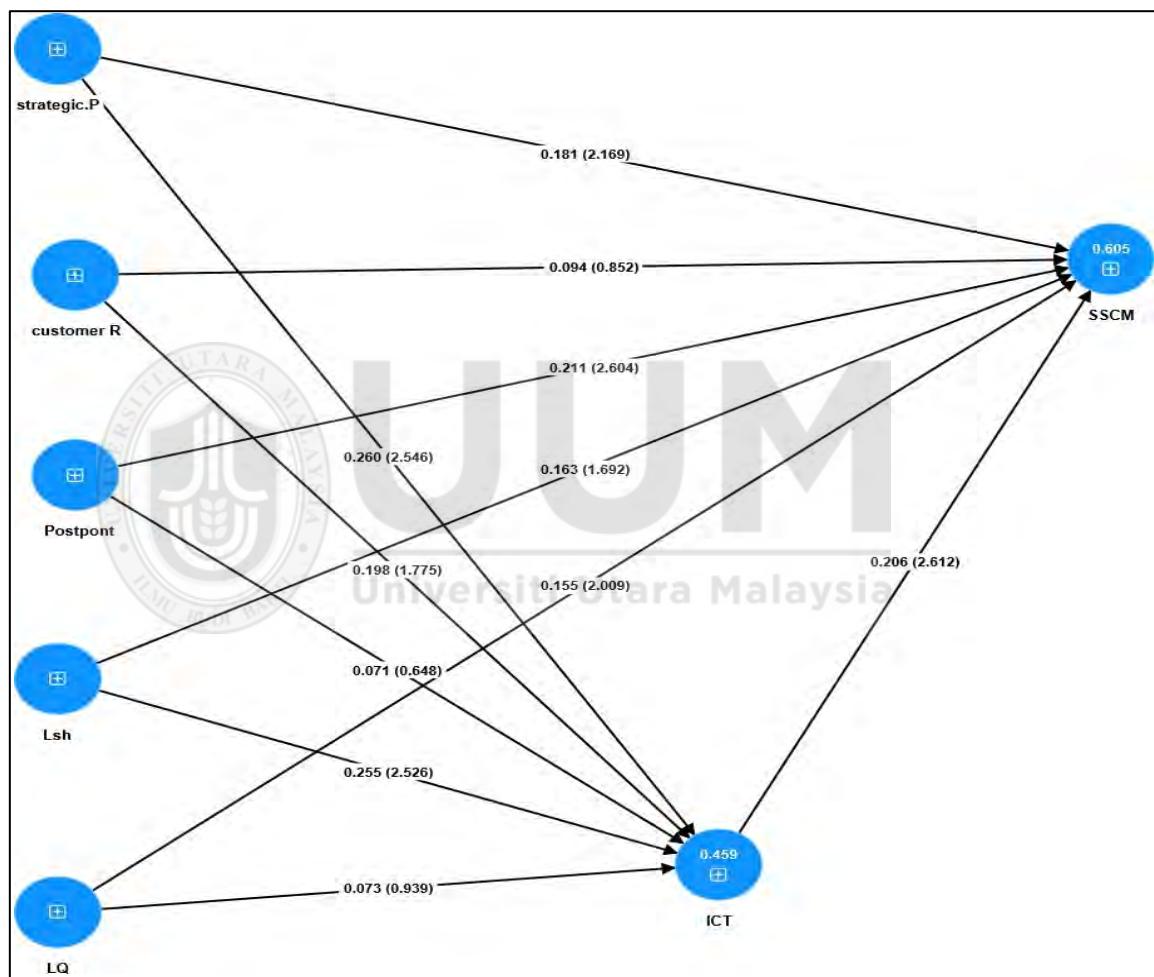
Figure 4.3 *Structural Model of the Direct and Mediation Effects of the Variables (t value)*
(Inner Model)

Figure 4.3 above presents the structural model of the direct, indirect and mediating

variables. The figures are brackets representing the T-Statistics, and the values next to

the bracket represent the co-efficient value (beta value).

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Table 4.13
Structural Model Assessment and direct hypotheses results

	Relationship	Path Coefficient	Standard Error	T Statistics	P-Value	Status
H1	Strategic supplier -> SSCM	0.181	0.083	2.169	0.03	Significant
H2	Customer Relationship -> SSCM	0.094	0.11	0.852	0.394	Not Significant
H3	level of information sharing -> SSCM	0.163	0.096	1.692	0.091	Not Significant
H4	level of information Quality -> SSCM	0.155	0.077	2.009	0.045	Significant
H5	Postponement -> SSCM	0.211	0.081	2.604	0.009	Significant
H6	Strategic supplier -> ICT	0.26	0.102	2.546	0.011	Significant
H7	Customer Relationship->ICT	0.198	0.111	1.775	0.076	Not Significant
H8	level of information sharing-> ICT	0.255	0.101	2.526	0.012	Significant
H9	level of information Quality ->ICT	0.073	0.078	0.939	0.348	Not Significant
H10	Postponement->ICT	0.071	0.11	0.648	0.517	Not Significant
H11	ICT ->SSCM	0.206	0.079	2.612	0.009	Significant

Notes: Significant level at ** = p < 0.05,

4.16 Hypotheses Discussions

The current study has sixteen hypotheses; eleven direct effect hypotheses and five indirect effect hypotheses, the tables below cover all hypotheses testing and statistics related to them.

4.16.1 Discussions of Indirect effect Hypotheses

H1: There is a significant direct impact of the strategic supplier partnership on the SSCM in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the strategic supplier partnership on the SSCM According to the analysis in Table 4.14, the path coefficient is 0.00, T- statistics score is 2.169 (above 1.98), and the P-value is 0.030 (less than 0.05). The relationship is significant at level 5%, the increment of one unit of strategic supplier partnership can increase the variance of SSCM by 0.181. Based on the statistical results, hypothesis 1 (SP-> SSCM) is significant and accepted. This shows

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that when pharmaceutical companies work closely with their suppliers—
communication, trust, and mutual sustainability, goals improve.

Table 4.14
Findings of the impact of the strategic supplier partnership (SP) on the SSCM

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value (one tailed	Status
H1	Strategic supplier -> SSCM	0.181	0.083	2.169	0.03	Significant

H2: There is significant direct impact of the customer relationship on the SSCM in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the customer relationship on the SSCM According to the analysis in Table 4.15, the path coefficient is 0.094, T-statistics score is 0.852 (less than 1.98), and the P-value is 0.394 (above than 0.05). The relationship is insignificant at level 5%. Based on the statistical results, hypothesis 2 (CR-> SSCM) is insignificant and not accepted. This shows that strong interactions and partnerships with customers may not have a direct impact on the implementation of sustainable practices within the supply chain.

Table 4.15
Findings of the impact of the Customer Relationship (CR) on the SSCM

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value (one tailed)	Status
H2	Customer Relationship -> SSCM	0.094	0.11	0.852	0.394	Not Significant

H3: There is a significant direct impact of the level of information sharing on the SSCM in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the **level** of information sharing on the SSCM According to the analysis in Table 4.16, the path coefficient is 0.163, T- statistics score is 1.692 (less than 1.98), and the P-value is 0.091 (above than 0.05). The relationship is insignificant at level 5%. Based on the statistical results, hypothesis 3 (LSH-> SSCM) is insignificant and not accepted.

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Table 4.16
Findings of the impact of the level of information sharing (LSH) on the SSCM

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value (one tailed)	Status
H3	level of information sharing -> SSCM	0.163	0.096	1.692	0.091	Not Significant

H4: There is a significant direct impact of the quality of information sharing on the SSCM in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the quality of information sharing on the SSCM According to the analysis in Table 4.17, the path coefficient is 0.155, T- statistics score is 2.009 (above 1.98), and the P-value is 0.045 (less than 0.05). The relationship is significant at level 5%, the increment of one unit of quality of information sharing can increase the variance of SSCM by 0.155. Based on the statistical results, hypothesis 4 (LQ-> SSCM) is significant and accepted. This shows the precision, timeliness, and relevance of the information disseminated are essential to achieve sustainability objectives.

Table 4.17
Findings of the impact of the quality of information sharing (LQ) on the SSCM

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value one tailed	Status
H4	Quality of information sharing -> SSCM	0.155	0.077	2.009	0.045	Significant

H5: There is a significant direct impact of the postponement on the SSCM in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the postponement on the SSCM. According to the analysis in Table 4.18, the path coefficient is 0.211, T-statistics score is 2.604 (above 1.98), and the P-value is 0.009 (less than 0.05). The relationship is significant at level 5%, the increment of one unit of postponement can increase the variance of SSCM by 0.211. Based on the statistical results, hypothesis 5 (PP-> SSCM) is significant and accepted.

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Table 4.18
Findings of the impact of the Postponement on the SSCM

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value one tailed	Status
H5	Postponement -> SSCM	0.211	0.081	2.604	0.009	Significant

H6: There is a significant direct impact of the strategic supplier partnership on the ICT in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the strategic supplier partnership on the ICT. According to the analysis in Table 4.19, the path coefficient is 0.260, T- statistics score is 2.546 (above 1.98), and the P-value is 0.011 (less than 0.05). The relationship is significant at level 5%, the increment of one unit of strategic supplier partnership can increase the variance of ICT by 0.260. Based on the statistical results, hypothesis 6 (SP-> ICT) is significant and accepted. It shows that closer collaborations with suppliers contribute to more effective adoption and use of ICT.

Table 4.19
Findings of the impact of the Strategic supplier on the ICT

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value one tailed	Status
H6	Strategic supplier -> ICT	0.26	0.102	2.546	0.011	Significant

H7: There is a significant direct impact of the customer relationship on the ICT in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the Customer Relationship on the ICT. According to the analysis in Table 4.20, the path coefficient is 0.198, T-statistics score is 1.775 (less than 1.98), and the P-value is 0.076 (above 0.05). The relationship is significant at level 5%, based on the statistical results, hypothesis 7 (CR-> ICT) is insignificant and not accepted. it shows that customer relationships may not directly affect the adoption or effectiveness of ICT solutions.

Table 4.20
Findings of the impact of the Customer Relationship on the ICT

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value one tailed	Status
H7	Customer Relationship->ICT	0.198	0.111	1.775	0.076	Not Significant

H8: There is a significant direct impact of the level of information sharing on the ICT in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the level of information sharing on the ICT. According to the analysis in Table 4.21, the path coefficient is 0.255, T- statistics score is 2.526 (above 1.98), and the P-value is 0.012 (less than 0.05). The relationship is significant at level 5%, the increment of one unit of the level of information sharing can increase the variance of ICT by 0.255. Based on the statistical results, hypothesis 8 (LSH-> ICT) is significant and accepted. This shows that the adoption of modern ICT solutions is possible if organizations focus on providing accurate and timely data.

Table 4.21
Findings of the impact of the level of information sharing on ICT

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value one tailed	Status
H8	level of information sharing-> ICT	0.255	0.101	2.526	0.012	Significant

H9: There is a significant direct impact of the quality of information sharing on the ICT in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the quality of information sharing on the ICT. According to the analysis in Table 4.22, the path coefficient is 0.073, T- statistics score is 0.939 (less than 1.98), and the P-value is 0.348 (above 0.05). The relationship is significant at level 5%, based on the statistical results, hypothesis 9 (LQ-> ICT) is insignificant and not accepted. Shows that the quality of the information sharing has no significant impact on the adoption or effectiveness of ICT tools.

Table 4.22
Findings of the impact of the level of information Quality on the ICT

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value one tailed	Status
H9	level of information Quality ->ICT	0.073	0.078	0.939	0.348	Not Significant

H10: There is a significant direct impact of the postponement on the ICT in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the Postponement on the ICT. According to the analysis in Table 4.23, the path coefficient is 0.073, T- statistics score is 0.648 (less than 1.98), and the P-value is 0.517 (above 0.05). The relationship is significant at level 5%, Based on the statistical results, hypothesis 10 (PP-> ICT) is insignificant and not accepted. This suggests that the timing of decisions and changes that the timing of supply chain decisions or changes in the supply chain may not be the determining factor in determining how ICT tools are adopted or used within this sector.

Table 4.23
Findings of the impact of the Postponement on the ICT

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value one tailed	Status
H10	Postponement->ICT	0.073	0.11	0.648	0.517	Not Significant

H11: There is a significant direct impact of ICT on the SSCM in the pharmaceutical sector in Jordan.

This hypothesis states that there is a direct impact of the level of ICT on the SSCM. According to the analysis in Table 4.24, the path coefficient is 0.206, the T- statistics score is 2.612 (above 1.98), and the P-value is 0.009 (less than 0.05). The relationship is significant at level 5%, the increment of one unit of ICT can increase the variance of SSCM by 0.206. Based on the statistical results, hypothesis 11 (ICT-> SSCM) is significant and accepted. indicates that the effective utilization of ICT tools and systems is essential for improving sustainability.

Table 4.24
Findings of the impact of the ICT on SSCM

H	Relation	Path Coefficient	Standard Error	T Statistics	P Value one tailed	Status
H11	ICT ->SSCM	0.206	0.079	2.612	0.009	Significant

4.16.2 Discussions of Indirect effect (Mediation Effect Assessment) of the ICT

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The mediation analysis was used to determine the mediation effects of ICT as a mediating variable on the effects of the (strategic supplier partnership, Customer relationship, level of information sharing quality of information sharing Postponement) as independent variables on SSCM as the dependent variable. Next each mediating hypothesis result will be discussed.

H12: There is a mediating role of the ICT on the impact of the strategic supplier partnership on the SSCM in the pharmaceutical sector in Jordan.

The first mediating hypothesis states that; there is a mediating role of the ICT on the impact of the strategic supplier partnership on the SSCM in the pharmaceutical sector in Jordan. The results in Table 4.25 show the direct effect, indirect effect, and total effect. The direct relationship (SP-SSCM) is significant with P-value of 0.030 (less than 0.05) and path coefficient of 0.181; the indirect relationship (SP->ICT->SSCM) is significant with P-value of 0.033 (less than 0.05) and path coefficient of 0.016; and the total effect is significant with P value of 0.019 (less than 0.05) and path coefficient of 0.197. The mediating effect of ICT on the relationship between SP and SSCM is partial because both the direct and indirect effects are significant. Therefore, hypothesis 12 is accepted and the mediation effect is partial.

Table 4.25
Findings of ICT as Mediator on SP and SSCM Relationship

H	Relation	Direct Effect Path Coefficient	P-Value	Indirect Effect Path Coefficient	P-Value	Total Effect Path Coefficient	P-Value	Status Mediation
H12	SP->ICT->SSCM	0.181	0.030	0.016	0.033	0.197	0.046	Partial mediation

H13: There is a mediating role of the ICT on the impact of the customer relationship on the SSCM in the pharmaceutical sector in Jordan.

The second mediating hypothesis states that; there is a mediating role of ICT on the impact of the customer relationship on the SSCM in the pharmaceutical sector in Jordan. The results in Table 4.26 show the direct effect, indirect effect, and total effect.

The direct relationship (CR-SSCM) is not significant with P-value of 0.394 (more than 0.05) and path coefficient of 0.094; the indirect relationship (CR->ICT->SSCM) is also not significant with P-value of 0.183 (more than 0.05) and path coefficient of 0.041; and the total effect is not significant with P-value of 0.217 (more than 0.05) and path coefficient of 0.135. This result shows that there is no mediating effect of ICT on the relationship between CR and SSCM because both the direct and indirect effects are not significant. Therefore, hypothesis 13 is rejected. This suggests that, unlike with supplier partnerships, it is not only the quality of customer relationships that is significantly influenced by ICT to promote sustainable practices within the supply chain.

Table 4.26
Findings of ICT as a Mediator on CR and SSCM relationship

H	Relation	Direct Effect		Indirect Effect		Total Effect		Status Mediation
		Path Coefficient	P-Value	Path Coefficient	P-Value	Path Coefficient	P-Value	
H13	CR->ICT->SSCM	0.094	0.394	0.041	0.183	0.135	0.217	No mediation

H14: There is a mediating role of the ICT on the impact of the level of information sharing on the SSCM in the pharmaceutical sector in Jordan.

The third mediating hypothesis states that; there is a mediating role of the ICT on the impact of the level of information sharing on the SSCM in the pharmaceutical sector in Jordan. The results in Table 4.27 show the direct effect, indirect effect, and total effect. The direct relationship (LSH-SSCM) is not significant with P value of 0.091 (more than 0.05) and path coefficient of 0.163; the indirect relationship (LSH->ICT->SSCM) is significant with P value of 0.011 (less than 0.05) and path coefficient of 0.053; and the total effect is significant with P value of 0.016 (less than 0.05) and path coefficient of 0.216. The mediating effect of ICT on the relationship between LSH and SSCM is full mediation because both the direct effects are not significant and the

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indirect effects are significant. Therefore, hypothesis 14 is accepted and the mediation

effect is full.

Table 4.27
Findings of ICT as a Mediator on LSH and SSCM Relationship

H	Relation	Direct Effect		Indirect Effect		Total Effect		Status Mediation
		Path Coefficient	P-Value	Path Coefficient	P-Value	Path Coefficient	P-Value	
H14	LSH->ICT->SSCM	0.163	0.091	0.053	0.011	0.216	0.016	Full mediation

H15: There is a mediating role of the ICT on the impact of the level of the information quality on the SSCM in the pharmaceutical sector in Jordan.

The fourth mediating hypothesis states that; there is a mediating role of the ICT on the impact of the level of the information quality on the SSCM in the pharmaceutical sector in Jordan. The results in Table 4.28 show the direct effect, indirect effect, and total effect. The direct relationship (LQ-SSCM) is significant with P value of 0.045 (less than 0.05) and path coefficient of 0.155; the indirect relationship (LQ->ICT->SSCM) is significant with P value of 0.037 (less than 0.05) and path coefficient of 0.017; and the total effect is significant with P value of 0.036 (less than 0.05) and path coefficient of 0.172. The mediating effect of ICT on the relationship between LQ and SSCM is partial because both the direct and indirect effects are significant. Therefore, hypothesis 15 is accepted and the mediation effect is partial. This means that ICT systems will increase their effectiveness if the information transferred between supply chain actors is accurate and timely, thereby increasing efficiency and adoption of sustainable practices within the supply chain.

Table 4.28
Findings of ICT as a Mediator on LQ and SSCM relationship

H	Relation	Direct Effect		Indirect Effect		Total Effect		Status Mediation
		Path Coefficient	P-Value	Path Coefficient	P-Value	Path Coefficient	P-Value	
H15	LQ->ICT->SSCM	0.155	0.045	0.017	0.037	0.172	0.036	Partial mediation

H16: There is mediating role of the ICT on the impact of the postponement on the SSCM in the pharmaceutical sector in Jordan.

The fifth mediating hypothesis states that; there is a mediating role of the ICT on the impact of the postponement on the SSCM in the pharmaceutical sector in Jordan. The results in Table 4.29 show the direct effect, indirect effect, and total effect. The direct relationship (PP-SSCM) is significant with P value of 0.009 (less than 0.05) and path coefficient of 0.211; the indirect relationship (PP->ICT->SSCM) is significant with P value of 0.031 (less than 0.05) and path coefficient of 0.015; and the total effect is significant with P value of 0.021 (less than 0.05) and path coefficient of 0.226. The mediating effect of ICT on the relationship between postponement and SSCM is partial because both the direct and indirect effects are significant. Therefore, hypothesis 16 is accepted and the mediation effect is partial. This means that efficient ICT systems can manage and mitigate the negative effects of postponement, and improve collaboration and decision-making, thus aiding the attainment of sustainability objectives despite delays.

Table 4.29

Findings of ICT as a Mediator on postponement and SSCM relationship

H	Relation	Direct Effect		Indirect Effect		Total Effect		Status Mediation
		Path Coefficient	P-Value	Path Coefficient	P-Value	Path Coefficient	P-Value	
H16	PP->ICT->SSCM	0.211	0.009	0.015	0.031	0.226	0.021	Partial mediation

4.17 Summary of the Hypotheses Status

The total hypotheses of this particular study are 16 different hypotheses, six hypotheses are rejected, but ten hypotheses are accepted. Table 4.30 shows a list of all hypotheses along with their status.

Table 4.30
Summary of Hypothesis Acceptance Status

Argument	Status
H1: There is a significant direct impact of the strategic supplier partnership on the SSCM in the pharmaceutical sector in Jordan.	Accepted
H2: There is a significant direct impact of the customer relationship on the SSCM in the pharmaceutical sector in Jordan.	Rejected
H3: There is a significant direct impact of the level of information sharing on the SSCM in the pharmaceutical sector in Jordan.	Rejected
H4: There is a significant direct impact of the quality of information sharing on the SSCM in the pharmaceutical sector in Jordan.	Accepted
H5: There is a significant direct impact of the postponement on the SSCM in the pharmaceutical sector in Jordan.	Accepted
H6: There is a significant direct impact of the strategic supplier partnership on the ICT in the pharmaceutical sector in Jordan.	Accepted
H7: There is a significant direct impact of the customer relationship on the ICT in the pharmaceutical sector in Jordan.	Rejected
H8: There is a significant direct impact of the level of information sharing on the ICT in the pharmaceutical sector in Jordan.	Accepted
H9: There is significant direct impact of the quality of information sharing on the ICT in the pharmaceutical sector in Jordan.	Rejected
H10: There is significant direct impact of the postponement on the ICT in the pharmaceutical sector in Jordan.	Rejected
H11: There is a significant direct impact of the ICT on the SSCM in the pharmaceutical sector in Jordan.	Accepted
H12: There is a mediating role of the ICT on the impact of the strategic supplier partnership on the SSCM in the pharmaceutical sector in Jordan.	Accepted
H13: There is a mediating role of the ICT on the impact of the customer relationship on the SSCM in the pharmaceutical sector in Jordan.	Rejected
H14: There is a mediating role of the ICT on the impact of the information sharing on the SSCM in the pharmaceutical sector in Jordan.	Accepted
H15: There is a mediating role of the ICT on the impact of the quality of information sharing on the SSCM in the pharmaceutical sector in Jordan.	Accepted
H16: There is a mediating role of the ICT on the impact of the postponement on the SSCM in the pharmaceutical sector in Jordan.	Accepted

4.18 Summary of the chapter

The results of the PLS route modeling data analysis is covered in Chapter 4 of this dissertation. Response rates from field surveys began the chapter. After that, the preliminary data analyses were presented. This chapter then uses SPSS to provide descriptive statistics for each of the study's latent variables. The measurement model evaluation was introduced in this chapter. Here, we examined discriminant validity, convergent validity, internal consistency reliability, and individual item reliability. The structural model analysis followed this analysis, which guaranteed the robustness of the research measurement tool. In order to reveal the causal relationships within the study framework, this pivotal step established and measured the relationships between exogenous and endogenous latent variables. The chapter concluded with results related to the ICT mediating impact on the structural model, which concentrated how ICT affects and refines the studies.
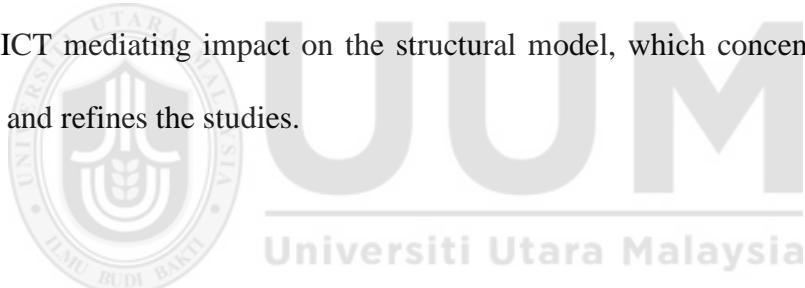
CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter introduces a discussion concerning the results acquired from the previous chapter regarding the research questions, objectives, and hypotheses of the study. This final chapter also exhibits the theoretical contributions of the study to the literature and provides practical contributions to the practitioners related to the field. Additionally, the study also lays down certain limitations as far as the generalizations are concerned and proposes useful recommendations for future research in this appropriate area. Lastly, this chapter concludes the whole of the study.

5.2 Overview of the Study

The improvement of the SSCM issues is essential in the pharmaceutical sector by adopting SCP practices in Jordan as a developing country. This study aims to enrich the literature by studying and assessing sustainable practices in the Jordanian pharmaceutical sector. Also, to evaluate how SSCM performance and competitiveness will be affected by adopting SCP. Countries worldwide have competed to develop their economies through different methods. The Jordanian government aims to enhance SCP by establishing pharmaceutical companies, stores, and factories to develop services within this sector. In this study, the SCP was conceptualized as; a strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, and Postponement. Also, the SSCM is measured as; environmental SSCM, social SSCM, and economic SSCM. Also, Sustainability through information and communication technology has received recognition in the new era regarding sustainable effects on production processes and energy use. From an industrial context, there is an immense potential for ICT to support sustainable

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development in its various activities such as handling, transport, recovery, stockpiling, data representation, and exchange of information through different equipment, sensors, and data administration instruments. Also, ICT can provide considerable advantages to businesses in terms of cost savings, workers' satisfaction, and waste reduction by optimizing resources, enhancing communication between members, supporting management functions, and improving decision-making capabilities. Based on this argument, this study will examine the mediating role of the ICT on the impact of the SCP and SSCM in the Jordanian pharmaceutical sector. The current study reveals the role of the SCP (strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, and Postponement) on the SSCM (environmental SSCM, social SSCM, and economic SSCM) in the Jordanian pharmaceutical sector, besides to the mediating role of ICT. Moreover, it may have wide-ranging implications for a variety of sectors across different fields, affecting practitioners, owners, decision-makers, researchers, and academicians alike. The purpose of the current study is to contribute to the development of a carefully understood concept of SSCM based on the Triple Bottom line (TBL) and previous studies. The study aim is to develop a conceptual framework based on multiple theories as; Resource-Based Theory (RBT), Institutional Theory, Stakeholder Theory and Social Network Theory to examine the impact of the SCP (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement on the SSCM (environmental, social and economic) with the mediating role of ICT the in the Jordanian pharmaceutical sector. The study is scientific in which the research is organized in systematic steps from identifying the problem to illustrating the conclusion. The study used quantitative methods and the data used is primary data that was collected by using a structured questionnaire. All

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pharmaceutical factories (15) and pharmacies (1568) and (95) drug stores, and (13) pharmaceutical companies working in the capital of Jordan, Amman; at the point of the data collection, there were 1691 factories, pharmacies, drug stores, and pharmaceutical companies work in the capital of Jordan Amman. The sample size of 313 was chosen randomly from the study population list of 1691 pharmaceutical organizations. Data has been verified for reliability, normality analysis, iterative and descriptive analyses using SPSS, and SEM-PLS structural equation modelling software is used to validate the final data validity and reliability and to check relationships and model strength in general. The overall distributed surveys are 313 cases, the collected is 300 cases, and the final valid dataset after data screening is 284 respondents. The male category of gender contains only 191 respondents, which represents 67.1% of the total respondents, while the female category of gender contains 93 respondents with 32.9%. The 31– 40 years old years category contains 121 respondents, which represents 42.7% of the total respondents. The bachelor category of qualification contains 137 respondents, which represents 48.4% of the total respondents. The 1-3 years category of experience contains 101 respondents, which represents 35.4% of the total respondents. Moreover, the tests of reliability and validity in the Smart-PLS system include indicator reliability (outer loading and cross loading), internal consistency (composite reliability), convergent validity (AVE value), discriminant validity (latent variable correlations) and collinearity analysis, and other complementary tests. All the tests are done and the collected dataset shows an adequate level of reliability and validity in all the required tests. The findings of Sustainable Supply Chain Management (SSCM) show that the associated R square value is 0.605, which corresponds to an explanation power of 60.5 %, and the associated Q square value is 0.397, which corresponds to an explanation relevance of 39.7 %. There is a

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60.5 percentage point of Sustainable Supply Chain Management SSCM variance that may be explained by the five variables of strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement. Also, the findings of the ICT show that the associated R square value is 0.459, which corresponds to an explanation power of 45.9%, and the associated Q square value is 0.533, which corresponds to an explanation relevance of 53.3%. The amount of variance in the ICT that can be explained by the five variables strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement is 45.9%. Finally, the total hypotheses of this particular study are 16 different hypotheses that are allocated into four categorical sets of hypotheses. Ten hypotheses are accepted, while six hypotheses are rejected.

5.3 Discussion of the Research Objectives

This study examines the direct effect of SCP on SSCM. SCP consists of five constructs; strategic supplier partnership, customer relationship, level of information sharing, level of information quality, and postponement. The dependent variable of the recent study is SSCM and the mediation is ICT. Before analyzing the data, sixteen hypotheses were proposed to achieve the study hypotheses.

The study has four objectives. First, to determine the effect of SCP (strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, Postponement) on the SSCM (environmental, social and economic) in the Jordanian pharmaceutical sector in Jordan. Second, to determine the effect of SCP (strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, and Postponement) on the ICT in the Jordanian pharmaceutical sector in Jordan. Third, to determine the effect of ICT on the SSCM (environmental, social and economic) in the Jordanian pharmaceutical

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sector in Jordan. Fourth, to examine the mediating role of the ICT on the effect of the SCP (strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, Postponement) on the SSCM (environmental, social and economic) in the Jordanian pharmaceutical sector in Jordan. The following sections will discuss the result of the hypothesis of each objective and studies that support the results of this study.

5.3.1 Research Objective One

To determine the effect of SCP (strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, Postponement) on the SSCM (environmental, social and economic) in the Jordanian pharmaceutical sector in Jordan. Based on reviewing the previously published literature and the related theories, the current study identified the supply chain practices (strategic supplier partnership, customer relationship, level of information sharing, level of information quality and postponement) that suggested enhancing the sustainable supply chain management (SSCM) in the Jordanian pharmaceutical sector. To achieve the first research objective of this study, the findings of the hypotheses (H1, H2, H3, H4 and H5) were reviewed and compared with prior studies.

Firstly, to examine the impact of the strategic supplier partnership on the SSCM, H1 was formulated and examined in the context of the Jordanian pharmaceutical sector. The result of the data analysis reveals a statistically significant impact of the strategic supplier partnership on the SSCM in the Jordanian pharmaceutical sector. The result of the study is supported by the previous literature as the studies of Madhani (2022) and Baah and Jin (2019) which support the significant impact of the strategic supplier partnership on the SSCM in the Jordanian pharmaceutical sector. The statistically significant influence of strategic supplier partnerships on sustainable

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supply chain management (SSCM) within the Jordanian pharmaceutical sector indicates that robust, collaborative relationships with suppliers directly facilitate the attainment of sustainability objectives. This indicates that when pharmaceutical companies collaborate closely with their suppliers—enhancing communication, trust, and mutual sustainability goals—they are more inclined to adopt sustainable practices across the supply chain, including waste reduction, resource efficiency improvement, and compliance with regulatory standards. These collaborations are essential for improving both ecological and operational efficacy in the industry.

Secondly, to examine the impact of the customer relationship on the SSCM, the hypothesis H2 was formulated and examined in the context of the Jordanian pharmaceutical sector. The result of the data analysis reveals there is no statistical significance of the impact of the customer relationship on the SSCM in the Jordanian pharmaceutical sector. The relationship between customer relationship and SSCM is supported by many studies in the literature as studies of Saad, Elgazzar and Kac (2022) and study of Das and Hassan (2022), also study of Attia, A. (2023) and study of Asha, Dulal and Habib (2023). The absence of a statistically significant effect of customer relationships on sustainable supply chain management (SSCM) in the Jordanian pharmaceutical sector indicates that robust customer interactions or partnerships may not directly affect the implementation of sustainable practices within the supply chain. This suggests that, in this industry, other elements—such as supplier collaborations, regulatory adherence, or internal processes—are more pivotal in promoting sustainability, whereas customer interactions may exert a minimal or indirect influence on SSCM results.

Thirdly, to examine the impact of the level of information sharing on the SSCM, H3 was formulated and examined in the context of the Jordanian pharmaceutical

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sector. The result reveals there is no statistical significance of the impact of the level of information sharing on the SSCM in the Jordanian pharmaceutical sector, the result of the study supported by the study of Khan and Abonyi (2022) and the study of Mehdikhani and Valmohammadi (2019). The statistically significant influence of information sharing on sustainable supply chain management (SSCM) within the Jordanian pharmaceutical sector demonstrates that good communication and the exchange of pertinent data among supply chain stakeholders are essential catalysts for sustainability. When organizations transparently disclose information about inventory, demand projections, and production methodologies, they can enhance coordination, minimize waste, and optimize resources. This cooperative method increases openness and aligns all stakeholders in pursuit of sustainability objectives, hence enhancing the environmental and operational efficacy of the supply chain.

Fourthly, to examine the impact of the level of information Quality on the SSCM, H4 was formulated and examined in the context of the Jordanian pharmaceutical sector. The result of the data analysis shows that there is statistical significance of the impact of the level of information quality on the SSCM in the Jordanian pharmaceutical sector. In the same vein the relationship between the quality of the information sharing and the SSCM is supported by many studies such as Khan and Abonyi (2022), and Ozkan-Ozen et al. (2023). The statistically significant influence of information quality on sustainable supply chain management (SSCM) within the Jordanian pharmaceutical sector indicates that the precision, timeliness, and pertinence of disseminated information are essential for attaining sustainability objectives. Superior information facilitates enhanced decision-making, resulting in more efficient resource utilization, diminished waste, and heightened adherence to environmental regulations. This outcome underscores that, in the pharmaceutical industry, possessing

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accurate and dependable data is crucial for orchestrating sustainable practices throughout the supply chain, thereby improving both environmental and operational efficacy.

Fifthly, to examine the impact of the Postponement on the SSCM, H5 was formulated and examined in the context of the Jordanian pharmaceutical sector. The result reveals there is statistical significance of the impact of the Postponement on the SSCM in the Jordanian pharmaceutical sector, this result supported by the study of Roy, Schoenherr and Charan (2020) and study of Al-Rawashdeh, Jawabreh and Ali (2023). Based on this discussion it is seen that the result of the study is inconsistent with some studies and supported by others regarding the relationship between the supply chain practices (strategic supplier partnership, customer relationship, level of information sharing, level of the information quality and postponement) and SSCM in the Jordanian pharmaceutical sector. As, the result of this study does not support H2 and H3, which result was no significant direct effect of customer relationship and level of information sharing on the SSCM, while the result of this study support H1, which is related to the impact of the strategic partnership on the SSCM, and support H4 which is related to the impact of the level of the information quality on the SSCM, also the result of the study supports the H5 which is related to the impact of the postponement on the SSCM.

5.3.2 Research Objective Two

To determine the effect of SCP (strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, Postponement) on the ICT in the Jordanian pharmaceutical sector in Jordan. Based on reviewing the previously published literature and the related theories, the current study identified the supply chain practices (strategic supplier partnership, customer

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relationship, level of information sharing, level of the information quality and postponement) that suggested enhancing the Information and Communication Technology (ICT) in the Jordanian pharmaceutical sector. To achieve the first research objective of this study, the findings of the hypotheses (H6, H7, H8, H9 and H10) were reviewed and compared with prior studies. The second research objective of this study is to ascertain the effect of supply chain practices SCP (strategic supplier partnership, customer relationship, level of information sharing, level of the information quality and postponement) on the ICT in the Jordanian pharmaceutical sector. In order to achieve the second research objective, the findings of the hypotheses (H6, H7, H8, H9 and H10) were reviewed and compared with prior studies.

Firstly, to examine the impact of the strategic supplier partnership on the ICT, H6 was formulated and examined in the context of the Jordanian pharmaceutical sector. The result of the data analysis shows that the statistical significance of the impact of the strategic supplier partnership on the ICT in the Jordanian pharmaceutical sector. The result of the study is supported by the previous literature as studies of Celikyay et al. (2023) and Sundram et al. (2020). The statistically significant impact of strategic supplier partnerships on Information and Communication Technology (ICT) in the Jordanian pharmaceutical sector indicates that strong collaborations with suppliers promote better adoption and utilization of ICT. When pharmaceutical companies build close, cooperative relationships with their suppliers, they are more likely to invest in and integrate ICT tools that enhance communication, data sharing, and process coordination. This fosters greater efficiency, transparency, and innovation within the supply chain, suggesting that strategic supplier partnerships are key to leveraging ICT for improved operational performance in the sector.

Secondly, to examine the impact of the customer relationship on the ICT, H7 was formularized and examined in the context of the Jordanian pharmaceutical sector. The result of the data analysis reveals there is no statistical significance of the impact of the customer relationship on the ICT in the Jordanian pharmaceutical sector. The relationship between customer relationship and ICT is supported by many studies in the literature as studies of Hassan et al. (2019) and Kumar, et al. (2022). The absence of a statistically significant effect of customer partnerships on Information and Communication Technology (ICT) within the Jordanian pharmaceutical sector indicates that customer relationships may not directly affect the adoption or efficacy of ICT solutions. This suggests that, in this context, prioritizing customer interactions does not substantially enhance or influence investments in ICT, indicating that alternative factors, such as supplier relationships or internal strategic priorities, maybe more pivotal in determining ICT practices and capabilities within the sector.

Thirdly, to examine the impact of the level of information sharing on the ICT, H8 was formulated and examined in the context of the Jordanian pharmaceutical sector. The result of the data analysis shows that there is a statistical significance of the impact of the level of information sharing on the ICT in the Jordanian pharmaceutical sector, the result of the study supported by the study of Pérez-López et al. (2019), and study of Tchamyou (2019). The statistically significant effect of information sharing on Information and Communication Technology (ICT) within the Jordanian pharmaceutical sector demonstrates that effective and transparent information exchange among supply chain participants promotes the adoption and use of ICT tools. This indicates that when organizations emphasize the dissemination of precise and timely data, it enables the adoption of modern ICT solutions, resulting in enhanced

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communication, coordination, and overall operational efficiency within the supply chain.

Fourthly, to examine the impact of the level of information Quality on the ICT, H9 was formulated and examined in the context of the Jordanian pharmaceutical sector. The result reveals there is no statistical significance of the impact of the level of information Quality on the ICT in the Jordanian pharmaceutical sector. This result is supported by many studies such as Tchamyou (2019) and the study of Chhetri and Bahrin (2020). The lack of a statistically significant impact of information quality on Information and Communication Technology (ICT) in the Jordanian pharmaceutical sector suggests that the quality of information being shared does not significantly influence the adoption or effectiveness of ICT tools. This implies that, in this context, factors other than the precision or reliability of information may be more critical in determining how ICT is implemented or used within the sector.

Fifthly, to examine the impact of the Postponement on the ICT, H10 was formulated and examined in the context of the Jordanian pharmaceutical sector. The result reveals there is no statistical significance impact of the Postponement on the ICT in the Jordanian pharmaceutical sector, this result is supported by the study of Wong (2021) and study of Adel (2020). The lack of a statistically significant impact of postponement on Information and Communication Technology (ICT) in the Jordanian pharmaceutical sector suggests that delays or deferrals in supply chain activities do not significantly affect the adoption or effectiveness of ICT solutions. This indicates that the timing of supply chain decisions or changes may not be a critical factor in determining how ICT tools are implemented or utilized within the sector.

Based on this discussion it is seen that the result of the study supported by studies in the literature related to the relationship between the supply chain practices (strategic

supplier partnership, customer relationship, level of information sharing, level of the information quality and postponement) and ICT in the Jordanian pharmaceutical sector. The result of this study does not support H7 which is related to the impact of the customer relationship on the ICT also the result of the study doesn't support H9 which is related to the significant impact of the level of the information quality on the ICT, and H10 which result was no significant direct effect of postponement on the SSCM. While the results of the study support H6 which is related to the direct effect of the strategic supplier on the ICT and support H8 which hypothesized the impact of the level of the information sharing on the ICT in the Jordanian pharmaceutical sector.

5.3.3 Research Objective Three

To determine the effect of the ICT on the SSCM (environmental, social and economic) in the Jordanian pharmaceutical sector in Jordan. The third research objective of this study was to ascertain the effect of ICT on the SSCM in the Jordanian pharmaceutical sector. In order to achieve the third research objective, the hypothesis H11 was examined and the result of the study, the result reveals there is a statistical significance impact of the ICT on the SSCM, the result of the recent study supported by the study of Yao et al. (2022), this study investigates factors affecting the adoption of ICT to enable the SSCM, in the Australian food industry. This study offers several implications for research and practice in SSCM, also the result of this study shows the significant impact of the ICT on the SSCM in the Australian food industry Also the impact of the ICT on the SSCM supported in the study of Obeidat (2015) conducted in the Jordanian context and support the result of the recent study, also this study provides recommendation for more studies in the field of the ICT and its applications in supply chain management in Jordan.

The statistically significant influence of Information and Communication Technology (ICT) on sustainable supply chain management (SSCM) in the Jordanian pharmaceutical sector indicates that the effective utilization of ICT tools and systems is essential for improving sustainability initiatives within the supply chain. This signifies that ICT enhances data management, real-time monitoring, and communication, which are crucial for the implementation and attainment of sustainable practices. Consequently, the integration of advanced ICT solutions can enhance the efficiency, transparency, and environmental sustainability of supply chain activities.

5.3.4 Research Objective Four

To examine the mediating role of the ICT on the effect of the SCP (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing, postponement) on the SSCM (environmental, social and economic) in the Jordanian pharmaceutical sector in Jordan.

To achieve this objective the researcher analyzed the mediating role of ICT in the relationship between the independent variables' strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, Postponement, and the dependent variable SSCM. In the Jordanian pharmaceutical sector, this objective is achieved by conducting suitable statistical analysis examinations and for the current study different PLS-SEM techniques are applied to identify the model relationships between the variables using covariance based multiple regression analysis. For the mediation analysis, the role of mediation is based on the direct and indirect effects of the variables.

The significant mediating role of Information and Communication Technology (ICT) in the impact of postponement on sustainable supply chain management (SSCM)

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within the Jordanian pharmaceutical sector indicates that ICT is critical in determining how delays in the supply chain impact sustainability outcomes. This indicates that efficient ICT systems can assist in managing and alleviating the negative impacts of postponement, enhancing collaboration and decision-making, allowing for the achievement of sustainability objectives despite delays.

The above finding implies that organizations need to effectively and efficiently manage their ICT through the implementation of supply chain practices in the anticipation of enhancing the sustainability of supply chain management environmentally, socially and economically. This finding is consistent with Allaoui, Guo and Sarkis (2019), the result of this study implies that a new information and communication technology (ICT) system platform supports supply chain sustainability requirements, this result confirms the mediating role of the ICT between the supply chain management practices and supply chain management sustainability.

The result of this study means that ICT has been recognized as a crucial factor in gaining and maintaining sustainability of the supply chain management (Zhou, Govindan and Xie, 2020). The result of this study supported by many prior researchers, for example, Kumar, Singh and Modgil (2020) and the study of Kumar et al. (2020) confirms the role played by ICT in enhancing the relationship between strategic supplier partnership and SSCM. Also, the results of the study of Agrawal et al. (2021) and study of Nu'man et al. (2020) confirm the result of the recent study regarding the role of ICT in the impact of the level of information sharing and SSCM. Also, the study of Dwivedi, Amin and Vollala, (2020) supports the role of the ICT regarding the quality of the information sharing and postponement on the supply chain sustainability, which supports the result of the recent study in the Jordanian context. In contrast, the

result of the study Ganbold, Matsui and Rotaru (2021) doesn't find any role of the ICT on the customer relationship and SSCM.

Based on the study findings, postponement has the greatest influence on sustainable supply chain management (SSCM) in the Jordanian pharmaceutical industry, followed by strategic supplier partnerships and quality of information sharing. Each of these factors plays a significant role in enhancing SSCM in this context. Conversely, customer relationships and the level of information sharing show no significant direct impact on SSCM. When ICT is introduced as a mediator, postponement, strategic supplier partnership, and quality of information sharing maintain their positive influence, exhibiting both direct and indirect effects on SSCM, thus demonstrating partial mediation. However, customer relationship lacks any mediation effect, with neither direct nor indirect effects proving significance. In contrast, the level of information sharing demonstrates a full mediation effect, where its direct impact on SSCM is not significant, but the indirect effect through ICT is significant. These findings underscore the critical importance of postponement, strategic supplier partnership, quality of information sharing, and ICT's role as a mediator in optimizing SSCM.

The final model for this study concluded that postponement, strategic supplier partnerships, and information sharing quality all contribute significantly to sustainable supply chain management (SSCM) in the Jordanian pharmaceutical industry, whereas customer relationships have no significant effect on SSCM.

In addition, information and communication technology (ICT) acts as a mediator, increasing SSCM through partial mediation of postponement, strategic supplier partnership, and information sharing quality, as well as full mediation of information sharing level. However, ICT does not mediate the relationship between customer

relationship and SSCM. This model emphasizes the importance of specific supply chain practices such as postponement, strategic supplier partnership, quality of information sharing, and level of information sharing, as well as ICT's mediation role in producing SSCM outcomes.

5.4 Contributions

Studies on supply chain management and its effect on the sustainability of the supply chain environmentally, economically, and socially have been identified as an area of compelling future, both from an academic and practitioner perspective. Therefore, the findings of this research are presented in two headings, namely: theoretical and managerial contributions. The details of theoretical and managerial contributions are described as follows.

5.4.1 Theoretical Contributions

The current study contributes significantly to the body of knowledge by extending the findings of previous studies and also contributing some new results to the body of knowledge, especially in the area of supply chain management, information and communication technology, and sustainability by developing a new model of the impact of the SCP on the SSCM with the mediating role of the ICT. Moreover, this study contributes to the theoretical literature by conceptualizing the SCP into five constructs (supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement). Based on the study of Li et al. (2006), these five constructs cover the upstream of the supply chain management (strategic supplier partnership) and downstream (customer relationship) sides of the supply chain, information flow across a supply chain (level of information sharing and quality of information sharing), and internal supply chain process (postponement).

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The essential novel contribution of the study is the development of a new theoretical framework of the SCP conceptualized by supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement on the SSCM, which is also conceptualized by environmental, economic, and social with the mediating role of the ICT. The importance of developing this model which is based on the researcher's review of the first model with these constructs examined separately in the context of Jordan, is to enhance the literature on SSCM in the organization filling gaps in supply chain literature by offering an integrated approach to examine interactions amongst environmental, economic, and social dimensions which is better than separate investigation as suggested by a study of (Matos and Hall, 2007). The theoretical framework aims to incorporate the primary aspects of supply chain sustainability in line with the triple bottom line approach, as well as give empirical support for this approach in Jordan as a novel setting.

In addition, the study made a theoretical contribution by examining a model that combines four main theories into one: Resource-Based Theory (RBT), Institutional Theory, Stakeholder Theory, and Social Network Theory. The study provided support for a multidimensional, strategic perspective on sustainable supply chain management through the overlapping and complementary characteristics of these four theories. In response to many internal and external stakeholders, institutional theory proposes several competitive pressures; RBT advocates for the pooling of resources between businesses to alleviate these pressures. To attain long-term results and a competitive edge, these resources rely on interconnections, partnerships, and trade relationships among businesses (social network theory). Because of the overlap and complementarity of these four frameworks of theory, a better understanding of the necessity and use of multidimensional performance evaluation in sustainable supply

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chain management may be gained through their integration. These four ideas will be empirically supported in the context of Jordan by this investigation.

The uniqueness of the current model stems from the incorporation of several theories, such as the resource - based theory, which offers a solid starting point for assessing trends in supply chain management and information technology (Sharma, Kamble Mani & Belhadi, 2022). The TPL model conceptualizes sustainable supply chain management into (economical, environmental, and social) sources of sustainability in the supply chain that can be attained through supply chain management methods. Beske, Haustein, and Lorson (2019) cite institutional theory as saying that getting the right tools and methodologies to create and measure an organization's performance in the three domains of sustainability is essential for building institutional norms about sustainability challenges. Also, there's the Stakeholder Theory, which states that stakeholders have the power to compel firms to do certain things, such as launch sustainability programs or voluntarily incorporate sustainability into their daily operations. Additionally, social network theory can be utilized to support the importance of supply chain collaboration and to elucidate the necessity of implementing sustainability programs.

The study contributed to the literature by providing clarity regarding "what exactly leads to what" in the supply chain field, by recognizing the mechanism through which supply chain practices are linked to supply chain sustainability management (SSCM) by constructing, verifying, and putting into practice the mediating variables-based conceptual model of the SCP-SSCM interaction. According to (Govindan, Shaw & Majumdar, 2021), a more thorough framework and model were necessary to fill in the gaps and comprehend this connection.

Moreover, the study contributes to the existing literature, by validating this model with the mediating role of information and communication technology (ICT) in the relationship between strategic supplier partnerships (SCPs), customer relationships, levels and quality of information sharing, and postponement, and the environmental, social, and economic (SSCM) factors in Jordan's pharmaceutical sector. based on the researcher knowledge, no previous study has investigated at the role of information and communication technology (ICT) in the effects of SCP (supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) and SSCM (environmental, social, and economic) in a Jordanian setting.

Finally, the main theoretical contribution of this study can be summaries as; this study conceptualizes the SCP into five constructs (supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) that cover upstream and downstream supply chain management (strategic supplier partnership and customer relationship), information flow across a supply chain. Moreover, the recent study also, creates a unique model of the impact of SCP (supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) on the SSCM (environmental, economic, and social) to provide a multidimensional integrated approach and examine it in new context and new industry. The study model incorporates the main features of sustainable supply chain management (environmental, economic, and social) in line with the triple bottom line (TBL), which provides testing this model in the context of Jordan. Moreover, the study provides model with overlap and complementarity theories as; Resource-Based Theory (RBT), Institutional Theory, Stakeholder Theory, and Social Network Theory and supports these theories in the field of sustainable

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supply chain management. This study also experimentally supports the role of ICT in the context of SCP and SSCM by examining the ICT as a mediator in the impact pf SCP and SSCM in Jordan.

5.4.2 Managerial Contributions

The result of this study provided several important implications for managers and decision- makers of the Jordanian pharmaceutical sector. The findings generally confirm most of the hypotheses, that there is a significant impact of SCP (strategic supplier partnership, customer relationship, level of information sharing, level of the information quality and postponement) on SSCM (environmental, social and economic) through ICT. The model in this study identifies SCP (strategic supplier partnership, customer relationship, level of information sharing, level of the information quality and postponement) as a strong determinant of ICT on SSCM in the Jordanian pharmaceutical sector. Therefore, the managerial contribution of this study is discussed next.
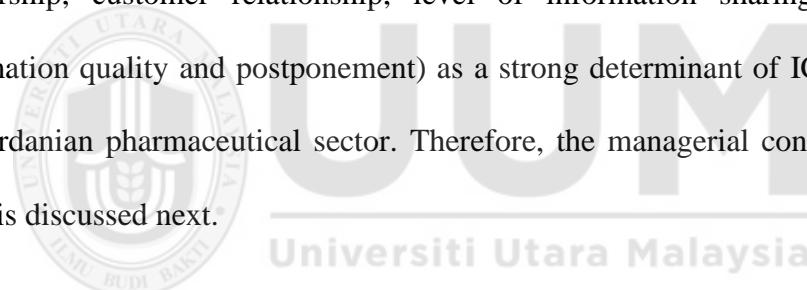
This study provides policy makers and managers with a tool that highlights the need for the Jordanian pharmaceutical sector to improve their supply chain practices (strategic supplier partnership, customer relationship, level of information sharing, level of the information quality and postponement) to enhance their supply chain sustainability. The study provides managerial contributions by providing a practical model to help managers and policy makers fully understand the manner which supply chain practices enhance pharmaceutical sector supply chain sustainability and the factors that enhance the environmental, social and economic supply chain sustainability performance. In order to improve the organizations' competitiveness, the study provides empirical evidence to the decision makers in the pharmaceutical sector

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in Jordan with an extensive investigation of the relationships between SCP, ICT and SSCM in the Jordanian pharmaceutical sector.

Moreover, the study contributes to the Jordanian pharmaceutical sector decision makers to revise their supply chain practices in order to enhance their supply chain sustainability. Also, it provides a tool and broad view to supply chain specialists to current supply chain practices to integrate them in a way that contributes realization of organizational objectives. In line with this study, it should also be aware that in the current dynamic business environment, a changed paradigm of supply chain management is required. The new approach should concentrate on managing the supply chain management in a way that focuses on ICT to achieve the sustainable development in the areas of environment, social and economic so that the organization can achieve a sustained competitive advantage by enhancing sustainability. Also, the current study contributes to policy makers understanding the importance of these factors and the need to consider them in developing policies that seek to achieve the sustainability of SCM in the pharmaceutical sector in Jordan. Then follow elaborations reeded to support this contribution. To enhance the role of SCP to have a significant bearing on SSCM, the attention towards ICT as a facilitator and influential component in the SCP and SSCM relationship should bear in mind the decision-makers and policy inventors of the pharmaceutical sector. Effective ICT within the supply chain of the organizations and the stakeholders will benefit the organization as it will enable the information sharing and enhance the quality of the information sharing and the customer relations within the supply chain to improve the supply chain sustainability. In other words, SCP are the primary enablers for the pharmaceutical sector to increase their capacity by using ICT. The present study contributed to a good understanding of

the relationship between SSCM and ICT. Therefore, it may be viewed as of great importance to the organizations under study.

The study contributes managerially by providing tools conducted in an emerging market setting in the Middle East. The findings have implications for practice both within the country context in which the current work was sustained and more broadly. Jordan is a relatively developed and stable Middle Eastern country with a significant industrial and commercial base. Importantly, if such strategic SCM aspects derived in the West are unable to generate meaningful performance improvements in the Jordan context, this would cast doubt on the broader relevance of such aspects across much of the developing world.

Also, the study found that SC practices are considered critical factors dealing with ICT. This finding suggests that managers and decision-makers may put their efforts into effectively managing and leveraging their ICT and attain a preferred competitive advantage. Organizational members need to be knowledgeable of the need to manage ICT and to understand, which may be viewed as an essential investment for future success. Technological workers should have free time to work on ICT-knowledge-building projects, join related conferences, or spend time on exciting projects in the field of SCM to improve related skills. Finally, managers should provide feedback to overcome SCM performance and sustainability problems and foster ongoing learning from the development and assessment of new solutions. Finally, the findings of this study provide practical contributions for both top managers and SCM managers because it shows that the use of ICT in the implementation of SCP (strategic supplier partnership, customer relationship, level of information sharing, level of the information quality and postponement) enables the SCM manager's role as a strategic partner.

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For that, he developed a model analyzing the influence of supply chain practices on sustainable supply chain management (SSCM), with Information and Communication Technology (ICT) serving as a mediator in the pharmaceutical sector in Jordan, presenting some important managerial insights. It underlines the importance of implementing sustainable practices throughout the supply chain. Pharmaceutical managers can reduce their environmental effect while maintaining operational efficiency by implementing sustainable sourcing, production, and distribution strategies. The model establishes a framework for supply chain managers to align their operations with sustainability goals, which is becoming increasingly important in industries with rigorous legal and environmental requirements, such as pharmaceuticals.

The approach underscores the significance of ICT as a vital facilitator in attaining sustainability. Information and Communication Technology (ICT) improves data management, promotes real-time communication, and enables the monitoring of diverse supply chain operations, hence increasing transparency and traceability. For managers, this means that investing in ICT solutions can help reconcile operational efficiency and sustainability by maximizing resource use, reducing waste, and improving communication with suppliers. In the pharmaceutical business, where accuracy and control are critical, ICT can help meet sustainability goals while maintaining product quality and safety.

Furthermore, the model is focused on the Jordanian pharmaceutical industry and provides region-specific insights, particularly in dealing with local challenges such as resource constraints and regulatory compliance. Managers in Jordan can use these insights to make more informed decisions about supply chain investments, particularly in ICT, in order to achieve sustainability and competitive advantage. The notion calls

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for a proactive approach, encouraging managers to see sustainability as more than just a regulatory responsibility, but as a fuel for innovation and growth in a sector facing global competition and rising ethical demands.

The present study has presented some penetration into the importance of SCP and ICT on SSCM. However, the present study has numerous essential limitations. Firstly, this study employed a cross-sectional design of the data collection method, i.e., the survey method - this method obtains the participant's perceptions at a single point in time. Because of this, current study is not suitable to prove causal relationships on a longitudinal basis, and hence, the explanation of factors influencing OP is limited. In order to succeed in such a limitation, path analysis via SEM was used to evaluate whether the correlations between the variables reflect the causal hypotheses. According to Lieras (2004), path analysis techniques can help the researcher to determine complex relationships and specify the most significant cause and effect relationships. Consequently, future research may hold the advantage of recognizing longitudinal research designs in order to indicate more accurate cause-and-effect relationships.

Secondly, the findings may not be generalized in a broader context across cultures of other industries because the data collected from the current study were restricted to the Jordanian pharmaceutical sector. Different industries and business environments may differentially influence SCP and ICT on SSCM so that other studies can explore their relationships in different contexts. To overcome this issue, it would be desirable to test the cross-level model in other cultures or countries. Therefore, it would be interesting both to examine whether the relative predictive power in this study applies to other countries and to compare any difference in results stemming from the national background or cultural differences.

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Thirdly, concerning the study approach, the present study only employed the quantitative approach to defining the relationships between all variables; Researches in the field of SCM in the pharmaceutical sector should be focused on "depth" rather than "quantitative width" same this study. Because this study applied quantitative methods in both design and analysis, the collected information is limited to the responses in the questionnaire. On the other hand, a qualitative method could add to further insights and understanding of the problem set. In addition to this, a more meaningful determination could be brought about by combining the use of both qualitative and quantitative methods as they are complementary to each other.

A methodological issue that extends to be argued concerns who should present information about SCP, there have been determined calls for multiple informants regarding the presence of practices. SCM managers in most studies were the respondents and information providers about SCP practices and systems. For this study, managers were the respondents. Managers have the right information and experience of the content of SCP practices and how they are applied. However, reliable informants and that it is more sensible to seek information from those experiencing the practices, namely employees. For future studies, it would be valuable to examine SCP-SSCM from the view or perception of employees.

5.5 Novelty of the Study

Based on the study of Luthra and Mangla (2018), many studies have been undertaken in the field of SSCM, but it is still challenging to assess the scale of managing the supply chain sustainably. It seems to be a crucial issue for organizations. They need to know the minimum guidelines and requirements in which their supply chain can be classified as sustainable and what actions can be taken to improve it. There is no consensus between studies on the number or type of supply chain practices.

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This study conceptualizes the SCP into five constructs (supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) based on the study of Li et al. (2006), these five constructs cover the upstream of the supply chain management (strategic supplier partnership) and downstream (customer relationship) sides of the supply chain, information flow across a supply chain (level of information sharing and quality of information sharing), and internal supply chain process (postponement).

Moreover, the recent study will try to build a model of the impact of SCP on the SSCM in order to enhance the literature on SSCM in the organization and try to fill this gap by providing an integrated approach to examine interactions amongst environmental, economic, and social dimensions which is better than independent research as suggested by a study of (Matos and Hall, 2007). Add to that, the recent study will provide a framework that aims to incorporate the primary aspects of supply chain sustainability in line with the triple bottom line and provide the empirical analysis to support this approach in Jordan as one of the non- western countries. Additionally, the study model is constructed using four main theories: Resource-Based Theory (RBT), Institutional Theory, Stakeholder Theory, and Social Network Theory. The study's four theories support a multidimensional, strategic perspective on sustainable supply chain management through their overlapping and complementary characteristics. While institutional theory proposes various competitive pressures and the response to various internal and external stakeholders (stakeholder theory), RBT advocates for enterprises to combine their resources in order to handle these pressures.

In order to obtain sustainable results and competitive advantage, these resources rely on interdependencies, linkages, and exchange interactions between enterprises (social network theory). The requirement for and use of multidimensional performance evaluation for sustainable supply chain management can thus be better understood by

connecting these four theoretical frameworks with their complementary and overlapping views. These four ideas will be empirically supported in the context of Jordan by this investigation. Moreover, the recent study will examine ICT as a mediator in the impact of SCP and SSCM, and based on the researcher's knowledge, there is a lack of studies that examine ICT in the impact of SCP (supplier partnership, customer relationship, level of information sharing, quality of information sharing, and postponement) and SSCM (environmental, social, and economic) in the Jordanian context, this study will try to fill this gap.

5.6 Conclusions

The pharmaceutical sector in Jordan is regarded as one of the most crucial areas that contribute to the national economy. The study emphasizes the importance of developing SSCM in these pharmaceutical companies in light of evolving global conditions and standards Ensuring the success of this sector always requires more attention to sustainable supply chain management. There are still gaps in the literature on measuring sustainability, and integrating it into sustainability assessment models, with social, economic, and environmental dimensions.

Accordingly, the focal point of this study is enhancing pharmaceutical sector competitiveness in providing sustainable, high-quality supply chain management and then achieving superior economic, social and environmental revenues by investing in SCP and ICT for enhancing their role in fluffing high sustainable supply chain management. To achieve this, this study has developed the SCP-SSCM model by examining the relationship among the constructs, namely strategic supplier partnership, customer relationship, level of information sharing, level of the information quality and postponement, ICT to improve SSCM (economic, social and environmental) in Jordanian pharmaceutical sector Based on the literature review and

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related theories (Recourse Based Theory, Institutional Theory, Social Network Theory and Stakeholder theory). Overall, the present study found evidence to support the link of SCP on SSCM; the same result was shown between SCP on ICT, and ICT on SSCM. The findings generally confirm most of the hypotheses OF THE STUDY. Therefore, information and communication technology is critical in influencing SSCM and assisting SCP to improve SSCM in the Jordanian pharmaceutical sector by mediating the SCP-SSCM relationship

This implies that factors such as selecting strategic supplier partnership, customer relationship, level of information sharing, level of the information quality and postponement all contribute to enhancing SSCM in the pharmaceutical sector. High ICT accurate, up to date information, and efficient communication processes within pharmaceutical sector have a positive impact on SSCM.

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Appendix A (Pre-tested questionnaire)

The Mediating effect of the Information and Communication Technology in the relationship between Supply Chain Practices and Sustainability of Supply Chain Management in the Jordanian Pharmaceutical Sector

EXPERT'S VALIDATION OF ITEMS

Dear Prof / Assoc.Prof/Dr,

I am Hassan Olayan Muhammad Shtawi, Ph.D. student at the School of Technology Management and Logistics, Universiti Utara Malaysia (UUM). Currently, I am studying of the Mediating effect of the Information and Communication Technology in the relationship between Supply Chain Practices and the Sustainability of Supply Chain Management in the Jordanian Pharmaceutical Sector, under the supervision of Dr. Hussein and AP Dr. Kamarul ed. This study aims to *investigate the mediating role of the Information and Communication Technology (ICT) in the relationship between Supply Chain Practices (SCMP) and Sustainability of Supply Chain Management (SSCM)in the Jordanian Pharmaceutical Sector.* The study needs to provide a questionnaire with the items reflecting the factors adapted from the literature. Moreover, those items are required to be validated by certain Experts before distributing the questionnaire to the respondents.

I have chosen you as one of the experts to validate the attached list of items that are grouped according to their respective factors. Your kind cooperation is highly appreciated, and I ensure that your response will be kept confidential for this study.
Kindly refer to the attached file that is categorized into two sections, Section A is the general information of the Expert, Section B is the factors that need to be confirmed and Section C is the comment and advice. In addition, the operational definitions of the factors are provided in case it's needed.
Thank You and Best Regards,

Hassan Olayan Muhammad Shtawi,
School of Technology Management& Logistics, Universiti Utara Malaysia (UUM).
Email: hassankaabnah@yahoo.com

The following are the items with their factors of the independent variable SCMP conceptualized by (strategic supplier partnership, Customer relationship, level of information sharing, quality of information sharing, Postponement); and the dependent variable SSCM (environmental, social and economic), and factors of the mediating variable ICT. Respondents will be asked to indicate the extent to which they agreed or disagreed with each statement using 10 Likert scale, started from 1 (strongly disagree) to 10 (strongly agree).

The items below need to be rated for their relevancy and clarity from 1 to 3 rating scale based on the following descriptions:

1 = Not Relevance; 2 = Relevance but need revision; 3 = Very Relevance.
1 = Not Clear; 2 = Clear but need revision; 3 = Very Clear.

Please circle the rate as indicated.

No	FACTORS/ Variable	ITEMS	Relevancy			Clarity		
1	**Environmental SSCM**	Our organization Use a life cycle analysis to evaluate the environmental friendliness of products.	1	2	3	1	2	3
		Our organization design the products by choosing the less impact on the environment of raw materials	1	2	3	1	2	3
		Our organization establish the recycle system of waste Product	1	2	3	1	2	3
		In our organization the materials healthy in all probable end-of-life scenarios	1	2	3	1	2	3
		Our organization maximizes the use of renewable or recycled source materials	1	2	3	1	2	3
		In our organization there is environmental laws and regulations for staff education and publicity to raise environmental awareness	1	2	3	1	2	3
		Our organization use a life cycle analysis to evaluate the environmental friendliness of products	1	2	3	1	2	3
Correction: only five items retained								
2	**Social SSCM**	Our organization reduce the impacts and risks to general public	1	2	3	1	2	3
		Our organization improve the occupational health and safety of employees.	1	2	3	1	2	3
		Our organization provide more positions in Community	1	2	3	1	2	3
		In our organization there is improvement in product image	1	2	3	1	2	3
		In our organization there is improvement in firm's image in the eyes of customers	1	2	3	1	2	3

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No	FACTORS/ Variable	ITEMS	Relevancy			Clarity		
Correction : No correction								
3	Economic SSCM	In our organization there is improvement in market share	1	2	3	1	2	3
		In our organization there is improvement in profit	1	2	3	1	2	3
		Our organization reduce the environmental damage caused by the accident	1	2	3	1	2	3
		In our organization there is improvement in return on assets	1	2	3	1	2	3
		In our organization there is improvement in return on sales	1	2	3	1	2	3
		In our organization there is improvement in return on investment	1	2	3	1	2	3
Correction : No correction								
4	Strategic supplier partnership	Our organization consider quality as our number one criterion in selecting suppliers	1	2	3	1	2	3
		Our organization regularly solve problems jointly with our suppliers	1	2	3	1	2	3
		Our organization have continuous improvement programs that include our key suppliers.	1	2	3	1	2	3
		Our organization include our key suppliers in our planning and goal-setting activities.	1	2	3	1	2	3
Correction : item number 3 was changed								
5	Customer relationship	Our organization frequently interact with customers to set reliability, Responsiveness, and other standards for us.	1	2	3	1	2	3
		Our organization frequently measure and evaluate customer satisfaction.	1	2	3	1	2	3
		Our organization frequently determine future customer expectations.	1	2	3	1	2	3
		Our organization facilitate customers' ability to seek assistance from us.	1	2	3	1	2	3
		Our organization periodically evaluate the importance of our relationship with our customers	1	2	3	1	2	3

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No	FACTORS/ Variable	ITEMS	Relevancy			Clarity		
Correction : No correction								
6	**Level of information sharing**	Our organization inform trading partners in advance of changing needs.	1	2	3	1	2	3
		Our trading customers keep us fully informed about issues that affect our business.	1	2	3	1	2	3
		Our trading partners share business knowledge of core business processes with us.	1	2	3	1	2	3
		In our organization, there is an exchange of information, which helps to create business planning.	1	2	3	1	2	3
		Our organization contains information about or changes and developments that may affect other partners	1	2	3	1	2	3
Correction : item number 2 was changed, last two items rephrased								
7	**Quality of information quality**	In our organization the information exchange is timely.	1	2	3	1	2	3
		In our organization the information exchange is accurate.	1	2	3	1	2	3
		In our organization the information exchange is complete.	1	2	3	1	2	3
		In our organization the information exchange is adequate.	1	2	3	1	2	3
		In our organization the information exchange is reliable	1	2	3	1	2	3
Correction : items rephrazed								
8	**Postponement**	Our products are designed for modular assembly.	1	2	3	1	2	3
		Our organization delay final product assembly activities until customer orders have actually been received.	1	2	3	1	2	3

No	FACTORS/ Variable	ITEMS	Relevancy			Clarity		
		Our organization delay final product assembly activities until the last possible position (or nearest to customers) in the supply chain.	1	2	3	1	2	3
Correction : No correction								
	ICT	Our organization is electronically interconnected with some suppliers	1	2	3	1	2	3
		The extent of usage of ERP in our organization	1	2	3	1	2	3
		The extent of usage of barcodes in our organization	1	2	3	1	2	3
		The extent of usage of mobile devices in our organization for e-ordering	1	2	3	1	2	3
		The extent of usage of mobile devices in our organization for inventory	1	2	3	1	2	3
Correction: items summarized and rephrased to be 5								

Section C: Comments and Advice

Please, write any comments you wish to make.

Follow the notes written under each section

Expert's Signature & Official Stamp

Date

Mr. Ibrahim Saleh (Alhikmah Pharmaceutical company)
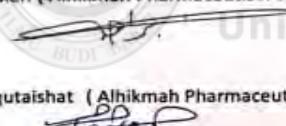
6/9/2023

Dr.Tayseer Alqutaishat (Alhikmah Pharmaceutical company)
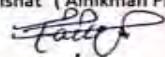
2/10/2023

Thank you for your time. Your cooperation is highly appreciated

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Operational Definition

Factor	Operational Definition
Social SSCM	is defined based on the study (Saarela, 2021) as a firm's activities incorporating social issues into supply chain management to improve suppliers' and customers' sustainability.
Environmental SSCM	is defined based on the study (Saarela, 2021) as a firm's activities incorporating environmental issues into supply chain management to improve suppliers' and customers' sustainable environment.

Economic SSCM	is defined based on the study (Saarela, 2021) as a firm's activities incorporating economic issues into supply chain management to improve suppliers' and customers' sustainable economy.
Strategic supplier partnership	is defined in this study based on the studies of (Tan, Lyman & Wisner, 2002; Li et al.,2006; Sutduean et al.,2019) as the long-term relationship between the organization and its suppliers. It is designed to leverage individual participating organizations' strategic and operational capabilities to help them achieve significant ongoing benefits
Customer relationship	defined in this study based on the studies of (Tan et al.,2002; Moberg, Cutler, Gross & Speh, 2002; Li et al.,2006; Sutduean et al.,2019) as the entire array of practices that are employed to manage customer complaints, building long-term relationships with customers, and improving customer satisfaction.
Level of information sharing	defined in this study based on the studies of (Claycomb, Dröge & Germain, 1999; Moberg et al.,2002; Li et al.,2006; Sutduean et al.,2019) as the extent to which critical and proprietary information is communicated to one's supply chain partner.
Quality of information sharing	defined in this study based on the studies of (Metters 1997; Li et al.,2006; Sutduean et al.,2019) as the accuracy, timeliness, adequacy, and credibility of information exchanged in the supply chain management
Postponement	defined in this study based on the studies of (Waller, Dabholkar & Gentry, 2000; Li et al.,2006; Sutduean et al.,2019) as the practice of moving forward one or more operations or activities (making, sourcing, and delivering) to a much later point in the supply chain.
ICT	is defined based on the study of (Zhang, van Donk and van Der Vaart (2011) as a family of technologies used to process, store and disseminate information, facilitating the performance of information-related human activities, provided by, and serving both the public-at-large as well as the institutional and business sectors

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The Mediating Effect of the Information and Communication Technology in the Relationship between Supply Chain Practices and Sustainability of Supply Chain Management in the Jordanian Pharmaceutical Sector

Dear participant,

My name is Hassan Olayan Muhammad Shtawi, a Ph.D. student at the School of Technology Management and Logistics, Universiti Utara Malaysia (UUM). Currently, I am conducting a study of the Mediating effect of the Information and Communication Technology in the relationship between Supply Chain Practices and Sustainability of Supply Chain Management in the Jordanian Pharmaceutical Sector.

All answers provided will be treated with a strict secret and used for research purposes only. Your kind cooperation to fill in the questionnaire is highly appreciated.

Thank You

Conducted by:

Hassan Olayan Muhammad Shtawi

Ph.D. candidate (Business Administration), School of Technology Management& Logistics, Universiti Utara Malaysia (UUM), Malaysia

Supervisor:

Dr. Hussein aburejal AP Dr. Mohd Kamarul

PART A – Sustainable Supply Chain Management (SSCM)

Directions: Please indicate the level of agreement or disagreement by circling your answer using the scale below:
1 = Strongly Disagree (SD) <   > 10 = Strongly Agree (SA)

No.	Statements	SD< > SA									
	Environmental SSCM										
1.	Our organization Uses a life cycle analysis to evaluate the environmental friendliness of products	1	2	3	4	5	6	7	8	9	10
2.	Our organization designs the products by choosing the less impact on the environment of raw materials	1	2	3	4	5	6	7	8	9	10
3.	Our organization establishes the recycle system of waste product	1	2	3	4	5	6	7	8	9	10
4.	In our organization the materials healthy in all probable end-of-life scenarios	1	2	3	4	5	6	7	8	9	10
5.	Our organization maximizes the use of renewable or recycled source materials	1	2	3	4	5	6	7	8	9	10
	Social SSCM										
6.	Our organization reduces the impacts and risks to general public	1	2	3	4	5	6	7	8	9	10
7.	Our organization improves the occupational health and safety of employees	1	2	3	4	5	6	7	8	9	10
8.	Our organization provides more positions in community	1	2	3	4	5	6	7	8	9	10
9.	In our organization there is improvement in product image	1	2	3	4	5	6	7	8	9	10
10.	In our organization there is improvement in firm's image in the eyes of customers	1	2	3	4	5	6	7	8	9	10
	Economical SSCM										
12.	In our organization there is improvement in market share	1	2	3	4	5	6	7	8	9	10
13.	In our organization there is improvement in profit	1	2	3	4	5	6	7	8	9	10
14.	Our organization reduces the environmental damage caused by the accident	1	2	3	4	5	6	7	8	9	10
15.	In our organization there is improvement in return on assets	1	2	3	4	5	6	7	8	9	10
16.	In our organization there is improvement in return on sales	1	2	3	4	5	6	7	8	9	10

PART B – Supply Chain Practices (SCP)

Directions: Please indicate the level of agreement or disagreement by circling your answer using the scale below:
1 = Strongly Disagree (SD) < >10 = Strongly Agree (SA)

No.	Statements	SD< > SA									
	Strategic supplier partnership										
1.	Our organization considers quality as our number one criterion in selecting suppliers	1	2	3	4	5	6	7	8	9	10
2.	Our organization regularly solves problems jointly with our suppliers	1	2	3	4	5	6	7	8	9	10
3.	Our organization have helped our suppliers to improve their product quality.	1	2	3	4	5	6	7	8	9	10
4.	Our organization have continuous improvement programs that include our key suppliers.	1	2	3	4	5	6	7	8	9	10
	Customer relationship										
6.	Our organization frequently interacts with customers to set reliability, responsiveness, and other standards for us.	1	2	3	4	5	6	7	8	9	10
7.	Our organization frequently measures and evaluate customer satisfaction.	1	2	3	4	5	6	7	8	9	10
8.	Our organization frequently determines future customer expectations.	1	2	3	4	5	6	7	8	9	10
9.	Our organization facilitates customers' ability to seek assistance from us.	1	2	3	4	5	6	7	8	9	10
10.	Our organization periodically evaluates the importance of our relationship with our customers	1	2	3	4	5	6	7	8	9	10
	Level of Information Sharing										
11	Our organization informes trading partners in advance of changing needs.	1	2	3	4	5	6	7	8	9	10
12	Our trading partners share proprietary information with us.	1	2	3	4	5	6	7	8	9	10

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13	Our trading partners keep us fully informed about issues that affect our business.	1	2	3	4	5	6	7	8	9	10
14	Our trading partners share business knowledge of core business processes with us.	1	2	3	4	5	6	7	8	9	10
15	Our organization and our trading partner's exchange information that helps establishment of business planning.	1	2	3	4	5	6	7	8	9	10
	Quality of information quality										
16	In our organization the information exchange between our trading partners and us is timely.	1	2	3	4	5	6	7	8	9	10
17	In our organization the information exchange between our trading partners and us is accurate.	1	2	3	4	5	6	7	8	9	10
18	In our organization the information exchange between our trading partners and us is complete.	1	2	3	4	5	6	7	8	9	10
19	In our organization the information exchange between our trading partners and us is adequate.	1	2	3	4	5	6	7	8	9	10
	Postponement										
20	Our products are designed for modular assembly.	1	2	3	4	5	6	7	8	9	10
21	Our organization delays final product assembly activities until customer orders have actually been received.	1	2	3	4	5	6	7	8	9	10
22	Our organization delays final product assembly activities until the last possible position (or nearest to customers) in the supply chain.	1	2	3	4	5	6	7	8	9	10

PART C – Information and Communication Technology (ICT)

Directions: Please indicate the level of agreement or disagreement by
circling your answer using the scale below:

1 = Strongly Disagree (SD) <   >10 = Strongly Agree (SA)

No.	Statements	SD<									> SA
1	The extent of usage of Internet in our organization	1	2	3	4	5	6	7	8	9	10
2	The extent of usage of Intranet in our organization	1	2	3	4	5	6	7	8	9	10
3	The extent of usage of Extranet in our organization	1	2	3	4	5	6	7	8	9	10
4	The provision of online shopping in our organization	1	2	3	4	5	6	7	8	9	10
5	The extent of usage of e-invoicing in our organization	1	2	3	4	5	6	7	8	9	10
6	Our organization is electronically interconnected with some suppliers	1	2	3	4	5	6	7	8	9	10

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PART D - DEMOGRAPHIC CHARACTERISTICS

Directions: Please tick (/) on the appropriate answer below

1. Gender of the Manager:

☐ Male.
☐ Female.

2. Manager Age:

☐ 20 – 30 years old.
☐ 31 – 40 years old.
☐ 41 – 50 years old.
☐ Above 50 years old.

3. Manager Qualification/ Education Level:

☐ Diploma.
☐ Bachelors.
☐ Masters.
☐ DBA/PHD.

4. Manager Length of Services:

☐ Below 1 year.
☐ 1 – 3 years.
☐ 3 – 6 years.
☐ Above 6 years.

5. Organization Type

☐ Pharmaceutical factories.
☐ Pharmacies.
☐ Drug stores.

6. Organization Year of Establishment:

☐ Before 1980.
☐ 1980-2000.
☐ After 2000.

Thank you very much for your kindness in completing this questionnaire.