جـــامـعـــة الـــشـرق الأوسـط
MIDDLE EAST UNIVERSITY
Amman - Jordan

The Impact of Enterprise Resource Planning (ERP) System Usage on Supply Chain Integration at Jordanian Pharmaceutical Manufacturing Organizations in Amman

أثر استخدام نظام تخطيط موارد المؤسسات على تكامل سلسلة التوريد في شركات صناعة الأدوية الأردنية في عمان

Prepared by:
Samar Ahmad Salameh Sandouqa

Supervised by:
Dr. Abdel-Aziz Ahmad Sharabati

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER BUSINESS ADMINISTRATION

Department of Business Administration
Faculty of Business
Middle East University
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Authorization

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Date: 15 _ 02 _ 2020.

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Discussion Committee Decision

This thesis was discussed under the title: "**The Impact of (ERP) System Usage on Supply Chain Integration: Field Study at Jordanian Pharmaceutical Manufacturing Organizations in Amman" has been defined, accepted and approved on 08/02/2020.**

Committee Members:

No.	Name	Title	University	Signature
1	Dr. Abdel-Aziz Ahmad Sharabati	Supervisor	MEU	
2	Dr. Sameer Al-Jabali	Internal Member	MEU	
3	Prof. Mohammed Khair Abu Zaid	External Member	Balqa University	

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Samar Ahmad Sandouqa

Dedication

I would like to dedicate this work to my beloved family; to my father, my mother, and my brothers and sisters for their constant support. I also dedicate this work to my close friends for their continued encouragement and support.

No words can express my gratitude, so I present my deepest appreciation to them.

Samar Ahmad Sandouqa

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Abstract

The Impact of (ERP) System Usage on Supply Chain Integration at Jordanian Pharmaceutical Manufacturing Organizations in Amman.

Prepared by: Samar Ahmad Salameh Sandouqa
Supervised by: Dr. Abdel-Aziz Ahmad Sharabati

Purpose: This study aims to investigate the impact of (ERP) system usage on supply chain integration at Jordanian pharmaceutical manufacturing organizations in Amman.

Methodology: To realize the purpose, this study has used the descriptive and cause-effect method. The study population consisted of managers who are working at the three levels of management at Jordanian pharmaceutical manufacturing organizations (JPMOs) totaling (350) managers. Participants in the study were chosen randomly to form a sample size of (183) managers who are working at the different JPMOs' functions, which including the human resource dept., customer relationships dept., financial dept., inventory dept., production dept., operations and quality dept., also supply chain dept. After confirming the normality, validity, and reliability of the study tool, then a descriptive analysis carried out, and the correlation between variables checked. Finally, the impact of ERP system has tested by multiple regressions.

Findings: The most important results that were reached in this study were: ERP system affects supply chain integration in JPMOs. ERP system affects integration with suppliers in JPMOs. ERP system affects internal processes integration in (JPMOs). ERP system affects integration with customer in (JPMOs).

Recommendations: The results of the study lead to the recommendation that JPMOs must invest in consolidating their relations with suppliers through a comprehensive integration and partnership. In addition, JPMOs' management is recommended to pay higher attention to the development processes of supply chain integration skills, which will be reflected in maximizing the supply chain management performance.

Keywords: ERP System, Supply Chain Integration, Jordanian Pharmaceutical Manufacturing Organizations (JPMOs).

الملخص

أثر استخدام نظام تخطيط الموارد المؤسسية على تكامل سلسلة التوريد في شركات صناعة الأدوية الأردنية في عمان.

إعداد الطالبة:
سمر أحمد سلامة صندوقة
إشراف الدكتور:
عبد العزيز أحمد الشرباتي

الهدف: هدفت هذه الدراسة إلى بيان أثر استخدام نظام تخطيط الموارد المؤسسية على تكامل سلسلة التوريد في الشركات الأردنية للصناعات الدوائية في عمان.

المنهجية: ولتحقيق أهداف الدراسة تم استخدام المنهج الوصفي التحليلي والسبب-الأثر من خلال العديد من الأساليب الإحصائية أبرزها صدق وثبات الأداة وتوزيعها الطبيعي، الارتباط بين المتغيرات، وتحليل الانحدار المتعدد لاختبار الأثر. تكون مجتمع الدراسة من كافة المدراء العاملين في المستويات الإدارية الثلاث في الشركات الأردنية للصناعات الدوائية من والبالغ عددهم (350) مديراً. أما عينة الدراسة فقد تكونت من (183) مديراً في الشركات الأردنية للصناعات الدوائية الذين يعملون في الوظائف/الأقسام المختلفة والتي تشتمل على (إدارة الموارد البشرية، الإدارة المالية، إدارة الإنتاج، إدارة العمليات والجودة، وإدارة سلسلة التوريد) والذين تم اختيارهم بالطريقة العشوائية.

النتائج: وقد توصلت الدراسة إلى عدد من النتائج أبرزها أن نظام تخطيط الموارد المؤسسية يؤثر على تكامل سلسلة التوريد للمنظمات الأردنية للصناعات الدوائية في عمان. وأن نظام تخطيط الموارد المؤسسية يؤثر على التكامل مع الموردين في المنظمات الأردنية للصناعات الدوائية في عمان. وأن نظام تخطيط الموارد المؤسسية يؤثر على تكامل العمليات الداخلية في المنظمات الأردنية للصناعات الدوائية في عمان. أخيراً، فإن نظام تخطيط الموارد المؤسسية يؤثر على التكامل مع الزبائن في المنظمات الأردنية للصناعات الدوائية في عمان.

التوصيات: وفي ضوء النتائج أوصت الدراسة بأنه على شركات تصنيع الأدوية الأردنية الاهتمام بتوطيد العلاقات بينها وبين الموردين على أساس التكامل والشراكة. ويجب أن تولي إدارة شركات تصنيع الأدوية الأردنية أهمية لرعاية عمليات تطوير مهارات تكامل سلسلة التوريد؛ بحيث تنعكس هذه المهارات في تعظيم أداء إدارة سلسلة التوريد.

الكلمات الدالة: نظام تخطيط الموارد المؤسسية، تكامل سلسلة التوريد، وشركات صناعة الأدوية الأردنية في عمان.

Chapter One: Introduction

Background:

The world is facing constant changes in the business requirements for maintaining a competitive environment, meeting customer needs, overcoming the business challenges stimulated by the rise of digital technology, and integrating the new innovations in the business environment across its various sectors, in a way that improves its operations, achieves customer satisfaction and business objectives, and gains a greater market share.

Accordingly, the pharmaceutical manufacturing organizations have been moving towards the adoption of enterprises' resources planning (ERP) systems, which in order to optimally capitalize on the available resources thereby increasing the efficiency and effectiveness of the implementation of business plans, reducing the response time due to the effective transfer of information, and in turn, easing the decision making process in real-time through a set of integrated programs that contribute to sharing of accurate information among all of business units.

Furthermore, nowadays the competition is no longer between companies, but it has become between the supply chain and other supply chain, which requires more improvement of communication and cooperation between the internal processes and external partners, such as the relationships with suppliers, distributors, and customers through supply chain integration, which supports coordination between supply chain members who manage inter- and intra-organization activities starting from receiving of customer order, providing raw material, manufacturing, distribution, ending with delivery of the product to the end consumer to achieve more efficiency in the flow of products, services, and information that provide customers with higher value at the right time, in the right place, suitable price, and high quality. On the other hand, the success of the supply chain integration reflects into the value-added towards the customers, organizations' quality reputation, timely delivery, and ensuring continuity and survival locally and globally.

Tseng, et. al., (2011) stated that customer satisfaction is a primary cause that leads organizations to use information technology tools to access information and relationships with customers, in order to make the core processes of business more flexible and efficient. Moreover, Ince, et. al., (2013) said that organizations need efficient and effective

information systems like an ERP system to obtain accurate data at the right time to compete at the global complex marketplace. Gollner, et. al., (2016) mentioned that organizations noticed that the competitiveness of business found in the effective distribution of resources and improvement of business processes that are integrated and seek to accomplish the high quality of the product, low cost, and delivery in the right time.

Venkatraman, et. al., (2016) noticed that inventory cost reduction is one of the main reasons to integrate ERP with web applications. Gollner, et. al., (2016) stated that the implementation of ERP's has deployed rapidly over the last years to serve the various and complex activities, which in turn, affects the main internal and external operations of institutions. Madanhire and Mbohwa (2016) explained that the use of ERP systems provides support for all of the important activities such as manufacturing and logistics, finance, sales, CRM, SCM, and HR through the integration of data and shared knowledge among all business units.

Moreover, according to Ngai, et. al., (2011) supply chain integration is one of the most important elements of SCI requirements to design a network in which the supply chain partners cooperate with internal business processes to reach optimum practices. Ram, et. al., (2013) discussed that SCI seeks to link internal processes with external processes (outside partners) such as suppliers and customers through the ERP system to achieve rapid response to customers' needs. Marinagi, et. al., (2015) mentioned that supply chain management integration works on the controlling of information, materials, services, and money to enhance the quality of business operations. Gollner, et. al., (2016) reported that ERP evaluation has to be considered through the stakeholders' involvement.

Therefore, this study aims to discuss the impact of ERP system usage on supply chain integration in JPMOs.

Study Purpose and Objectives:

The general purpose of the current study is to investigate the impact of ERP system usage on supply chain integration at JPMOs, by achieving the following objectives:

1. Recognize an actual use of the ERP system at JPMOs.
2. Determine the implementation level of supply chain integration at JPMOs.
3. Identify the impact of ERP system dimensions on supply chain integration dimensions at JPMOs.

4. Determine the impact of ERP system dimensions on the integration with suppliers at JPMOs.

5. Identify the impact of ERP system dimensions on internal processes integration at JPMOs.

6. Determine the impact of ERP system dimensions on the integration with customers at JPMOs.

Study Significance and Importance:

The study may be considered as one of the few studies that investigated the impact of an ERP system on supply chain integration. The available literature on ERP system usage in Arab countries is limited.

In addition, there are a few studies addressing the direct impact of ERP system usage on supply chain integration at JPMOs. Therefore, this study seeks to contribute to building further evidence pertaining to this topic, which could be further expanded to carrying out different sample, also applying the survey to verify of aspects that have a positive or negative effect at pharmaceutical manufacturing organizations.

The existing study can be considered as one of the studies that combine both variables (ERP and SCI) together to examine their impact on business processes and relationships with abroad partners, and the level of alignment with ERP system. Additionally, the study can provide managers with recommendations in some of pharmaceutical manufacturing organizations in regard to reassessing the usage of ERP system as an information system to develop their business, retain the market share to achieve a competitive advantage. Therefore, this study will discuss the extent of ERP system usage in pharmaceutical manufacturing organizations by looking into its benefits on business operations. Simultaneously, the study will investigate the lost opportunity that pharmaceutical manufacturing organizations witness when they do not apply such technologies to accomplish their business processes?

As a result, this study can be used to give a recent recommendation for decision-makers and other managers on the importance of ERP and the effect of using the technology on business partnerships with suppliers, and customers to help reach the right decisions in real-time. In general, the study seeks to clarify the benefits of ERP system usage for all processes and provide a theoretical and academic framework for studying

the impact of ERP system usage on supply chain integration to support existing literature on the benefits of ERP systems.

Study Problem Statement:

In light of global competition, organizations sought to adjust their strategies have come to see customer satisfaction as the secret to their survival and continuity, which requires the improvement of product and service delivery toward customers. Therefore, good implementation of a supply chain is a key factor in the organization's success and achievement of its goals, especially at the profit level, as effective supply chain integration improves the organization's performance and creates a competitive advantage. Indeed, substantial scholarly evidence on the positive role of using the ERP system in supply chain integration has motivated the conduction of the current study.

Therefore, the researcher has conducted interviews with (4) managers at different JPMOs and asked them about the reality of using the ERP system in their organizations, their view on the importance of ERP systems to the supply chain integration in their organizations, as well the potential impact role of ERP system usage on supply chain integration. According to the interviews that were conducted with managers, the researcher reached for the following issues as shown below:

- Internal miscommunication and unavailability of data to help decision-makers: There was poor communication among employees within the organization and between the different departments (cross-functional) in real-time.

- Lack of timely employee data availability: There was no Human Resource Management System (module) that helps an organization manage and track all processes related to employees' records, payroll, contracts…etc. when managers need it. *Because* some of pharmaceutical manufacturing organizations have mentioned that the value of human resources will be achieved when employees completing their tasks and operations, so that maximize overall performance of organization and its competitiveness, and not through the availability of employees' records and their information.

- Misconnection and lack of information along the supply chain: The lack of efficient connection and information transmission along the supply chain affects customer service and product.

Accordingly, Purohit, et. al., (2012) noticed that the integration of internal and external processes by ERP systems offers opportunities to improve decision making in real-time within a common database to provide support to supply chain partners and business stakeholders. Sundtoft, et. al., (2013) said that competitiveness is affected by ERP systems in firms. Marinagi, et. al.,(2014) stated that companies ought to use IT software such as ERP, which leads to the improvement of business processes and supply chains for the establishment of sustainable advantages through internal and external integration in supply chains. Among these, Yan, et. al., (2014) mentioned that organizations need novel frameworks and tools to enhance the desired performance. Ram, et. al., (2014) explained that the efficient integration of an ERP system within internal and external processes is leading to the maximization of the system's benefits, as well as, providing the real benefits and values for businesses including information, activities, and resources.

It became clear to the researcher through interviews that JPMOs are using an ERP system on an average level. In addition, JPMOs are constantly seeking to integrate their supply chain, and the impact of the ERP system on the supply chain integration requires further research and study. Consistent with the above, the current study aims to answer the following main questions: Does the ERP system affects supply chain integration dimensions (integration with suppliers, internal processes integration, integration with customer) at JMPOs? Do ERP dimensions (human resource management system, customer relationships management system, inventory management system, financial management system, and production and operations management system) affect supply chain integration?

Study Questions:

According to the problem of the study, the following questions have been formulated the following questions:

1st Question: What is the level of implementation/using ERP systems at JPMOs?

2nd Question: What is the level of implementation of supply chain integration for JPMOs?

3rd Question: Is there a correlation between the variables of study (ERP System and Supply Chain Integration) at JPMOs?

4th Question: Does the ERP system affect supply chain integration (integration with suppliers, internal processes integration, and integration with customer) at JPMOs?

Based on the dimensions of supply chain integration variable, the following sub-questions have been derived:

(4.1): Does the ERP system affects the integration with suppliers at JPMOs?

(4.2): Does the ERP system affects internal processes integration at JPMOs?

(4.3): Does the ERP system affects the integration with customers at JPMOs?

5th Question: Do ERP dimensions (human resource management system, customer relationships management system, inventory management system, financial management system, and production and operations management system) affect supply chain integration?

The first and second questions are answered by descriptive analysis, while the third question is answered by Bivariate Correlation Test analysis; finally, the fourth and fifth questions are answered by testing the following hypotheses.

Study Hypotheses:

According to the problem statement and its questions, the mentioned above fourth and fifth questions are answered by the following hypotheses has been formulated:

H_{01}: ERP system dimensions do not affect supply chain integration dimensions (Integration with Suppliers, Internal processes Integration, Integration with Customers) at JPMOs, at ($\alpha \leq 0.05$).

Based on supply chain integration dimensions the following sub-hypotheses are derived:

$H_{01.1}$: The ERP system does not affects integration with suppliers at JPMOs, at ($\alpha \leq 0.05$).

$H_{01.2}$: The ERP system does not affects internal processes integration at JPMOs, at ($\alpha \leq 0.05$).

$H_{01.3}$: The ERP system does not affects integration with customers at JPMOs, at ($\alpha \leq 0.05$).

H_{02}: ERP system dimensions (Human Resource Management System, Customer Relationships Management System, Inventory Management System, Financial Management System, and Production and Operations Management System) do not affect Supply chain Integration, at ($\alpha \leq 0.05$).

Based on ERP system dimensions the following sub-hypotheses are derived:

$H_{02.1}$: ERP dimension (Human Resource Management System) does not affects supply chain integration, at ($\alpha \leq 0.05$).

$H_{02.2}$: ERP dimension (Customer Relationships Management System) does not affects supply chain integration, at ($\alpha \leq 0.05$).

$H_{02.3}$: ERP dimension (Inventory Management System) does not affects supply chain integration, at ($\alpha \leq 0.05$).

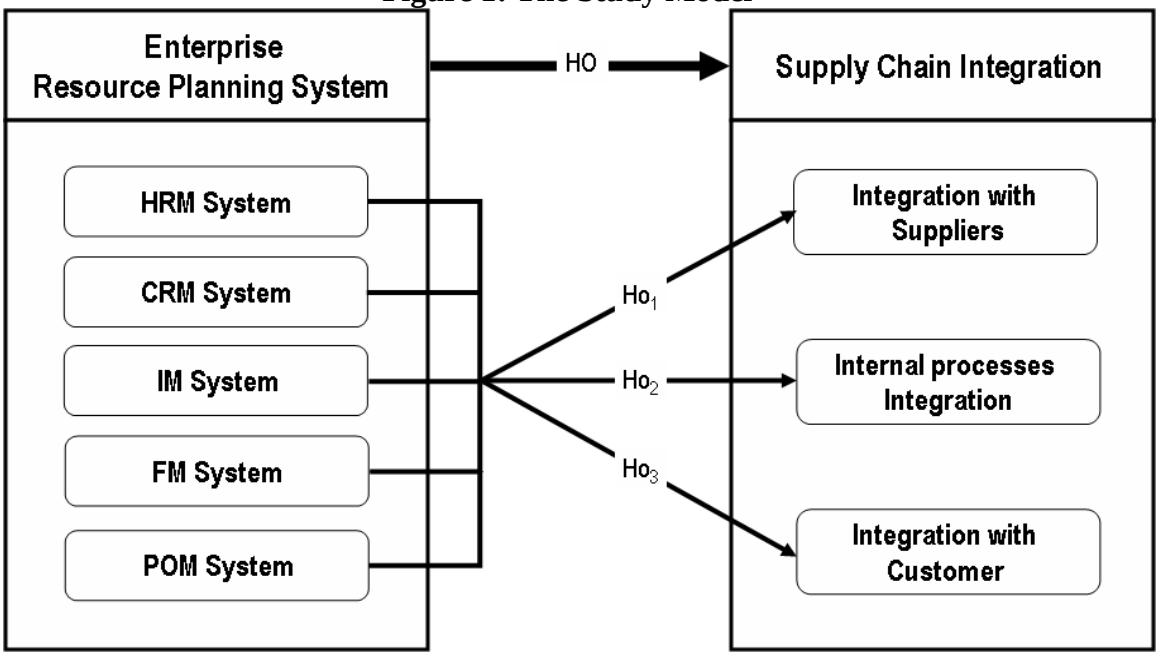
$H_{02.4}$: ERP dimension (Financial Management System) does not affects supply chain integration, at ($\alpha \leq 0.05$).

$H_{02.5}$: ERP dimension (Production and Operations Management System) does not affects supply chain integration, at ($\alpha \leq 0.05$).

Study Model:

Based on previous studies of the ERP system, the model used in the current study is shown in Figure (1):

Figure 1: The Study Model



Sources: The study model developed based on the following studies: **Independent variable: (**Kolinski and Fajfer 2011; Nawaz and Channakeshavalu, 2013; Ociepa, 2017; Aziz, et. al., 2018; Theebeh, et. al., 2018**)** to measure ERP System Usage. **Dependent variable: (**Sukati, et. al., 2012; Zhao, et. al., 2013; Yu, et. al., 2013; Huo, et. al., 2015; Cao, et. al., 2015; Annan, et. al., 2016**)** to measure the Supply Chain Integration.

Procedural and Operational Definitions of the Study Terms:

Independent Variable:

Enterprise Resources Planning (ERP) System: An automated, integrated program that supports essential functions and internal processes of the company such as

human resource management, customer relationships management, supply chain management, inventory management, and financial management across common database which improve sharing of information, knowledge, and resources, support timely decision making, and reduce costs and efforts.

Procedurally defined as a technical system designed to coordinate all resources, information, and activities of JPMOs to complete practical procedures such as human resources, inventory management, as well as, production and operations management. It was measured through:

Human Resource Management System: A set of programs that JPMOs use to manage internal HR functions, from managing employee data to payroll, employment, benefits, and training.

Customer Relationships Management System: A system for managing the JMPO's relationships with its current and potential customers including practices, strategies, and techniques that the JPMO uses to manage and keep the information, and evaluate its communications with customers in order to increase sales and the depth of relationships with the customer base.

Inventory Management System: A set of programs that allows Jordanian Pharmaceutical Manufacturing Organizations to control and manage inventory operations from the time goods or materials to enter the warehouse until they leave.

Financial Management System: A system for collecting, processing, analyzing, and preparing reports on the most important information and data that aims to assist JPMOs in verifying their financial position and enabling them to take appropriate management decisions for them.

Production and Operations Management System: An integrated and coordinated system to transform JPMOs' inputs into a set of outputs (product or service) through transformative production processes.

Dependent Variable:

Supply Chain Integration: A high level of coordination and collaboration among the company's internal processes and external partnerships "suppliers and customers" which enhances the flow of information, raw materials, and money along the

chain to ensure the right product, high quality, at the right place, right quantities, in the right price, and timely delivery to achieve competitive advantage.

Procedurally defined as the cooperation process between the functional departments of JPMOs, its suppliers and customers to reach the results that meet the interests of all stakeholders. It was measured through:

Integration with Suppliers: The cooperation for the long run between the JPMO and its suppliers.

Internal Processes Integration: The framework that JPMOs use to achieving the integration between their different functions and activities.

Integration with Customers: The relationship totality that expresses the practices that JPMOs launch for managing and resolving customer's complaints to satisfy their needs and desires and achieve their satisfaction and happiness.

Study Limitations and Delimitations:

Limitations:

Human Limitation: This study was carried out on managers of JPMOs.

Place Limitation: This study was carried out on JPMOs in Amman.

Time Limitation: This study was carried out during the first semester of 2019.

Study Delimitations:

This study aimed to investigate the impact of ERP system usage on supply chain integration in JPMOs. Generalizing its results on other industries and/or countries is questionable, so this study is limited for Jordanian pharmaceutical manufacturing organizations. The study tried to cover many/different dimensions of the ERP system, but there remain other dimensions not used.

Chapter Two: Theoretical and Conceptual Framework and Literature Review

Background

ERP system is a feature of programmatic and administrative development. It offers an effective approach for achieving integration between all the organizational functions and activities through designing a central database. The role of ERP is to receive data for all job activities and transmit information to the organization's administration in order to help in decision-making. Therefore, many organizations are opting to apply the ERP system, like many of the big firms around the world that have made the system one of their most important strategic tactics to develop and link their operations, manage their funds and resources and ultimately reach their financial targets and protect their funds and assets. Thus, this chapter discusses the elements of the ERP system and supply chain integration, as well as the relationship between ERP system and supply chain integration variables by reviewing the most important results of the relevant studies. Finally, the chapter offers an overview of the advantages of the current study and its contribution (i.e., what differentiates this study from previous ones?).

Definitions and Components of the Independent Variable:

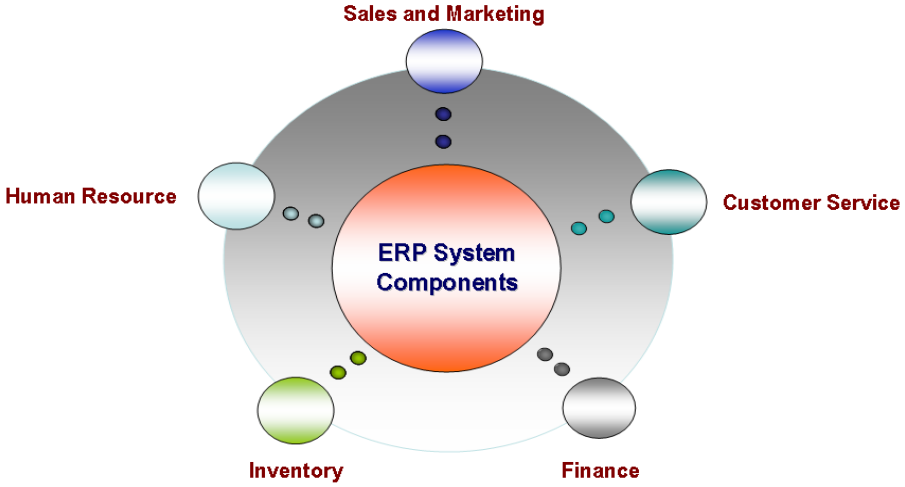
Enterprise Resource Planning (ERP) System: According to Hitt, et. al., (2012), the ERP system has been presented as an alternative for two or more independent applications that eliminate the need for required interfaces between systems. Moreover, the ERP system provides additional benefits that extend from standardization and maintenance to achieving high levels of performance capabilities. Mabert, et. al., (2013) investigated that ERP systems currently seek to cover all the basic functions of any service or production organization, since service organizations, nonprofits, and governments are all now able to use the ERP systems.

Consistent with the above, Gupta, et. al. (2013) defined the ERP System as a system designed to track information flow that is related to the customer's order, supply the raw materials, equipment, and timely delivery across a common database. Njihia and Mwirigi (2014) indicated that the ERP System integrates all data in the organization, in order to ease or improve information flow. Additionally, they determined that the information systems refers to the beginnings of events of what to know about "information

systems integration", which is the basis in the work of ERP software to the sixties and seventies and specifically by developing what is known as inventory tracking systems through Material Requirements Planning and MRP II (Manufacturing Resource Planning) systems which have also contributed to laying the foundation stone for the ERP system development.

Indeed, many IT systems researchers consider ERP systems as a functional extension of the manufacturing resource planning system. Ullah, et. al., (2017) mentioned that the system is a combined group of software that enhances internal and external processes for all departments of business across a mutual database, which gives support for decision-makers at the real-time and keep the business on the path to growth and survival. Jagoda and Samaranayake (2017) explained that the term Enterprise Resource Planning arose from the Material Requirements Planning and Industrial computerizes systems. It is introduced by Garnar firm for research and analysis. Garg and Khurana (2017) said that there are many examples of the units in ERP systems that have an individual application: manufacturing, supply chain, finance, customer relationship management, warehouse management, and decision support system. Ociepa (2017) described the ERP system as a system to manage resource planning, business commitments, data flows. Finally, Syahid, et. al., (2017) stated that the ERP system integrates data from each department under one centralized system that contains a number of modules designated based on the department's needs. Figure (2) reflects the enterprise resource planning system elements.

Figure 2: Reflects the Enterprise Resource Planning System Elements.

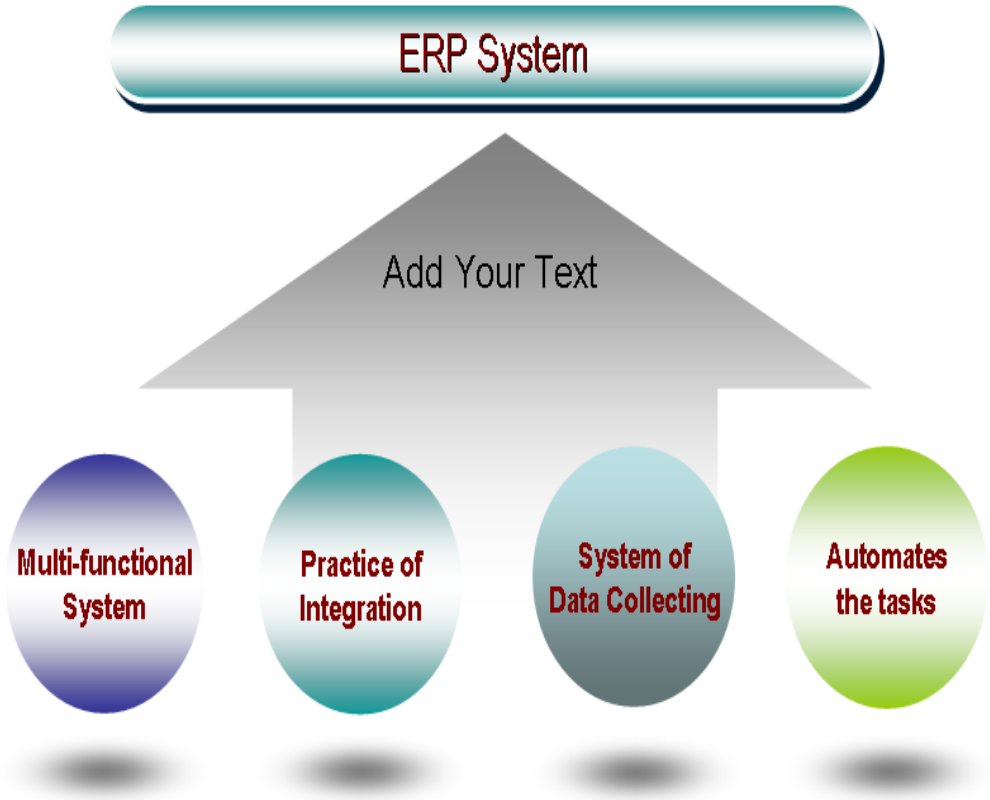


Sources: Prepared based on the literature review of previous study Ullah, et. al., (2017).

Accordingly, the study reviewed that ERP system includes the following points:

- A multi-functional system directed with an integrated set of program modules that support the organization's core internal business processes.
- The practice of integrating the organization's efforts into many activities into one administrative system.
- A system for collecting different information across departments in a common database that can be accessed by all employees.
- Automates the tasks involved in carrying out the business process as shown in Figure (3):

Figure 3: Enterprise Resource Planning System.

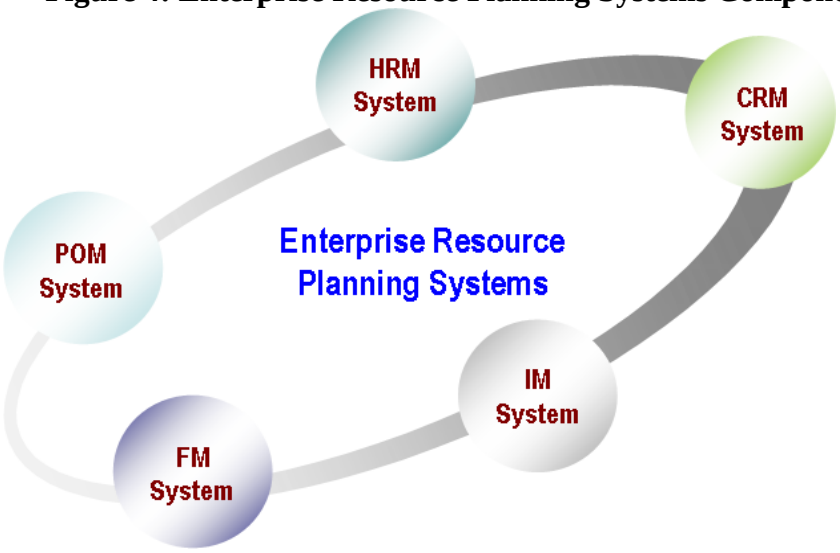


Sources: Prepared based on the literature review of researchers and previous studies.

Enterprise Resource Planning (ERP) System Components:

In this study, the measured dimensions of ERP system are Human Resource Management System, Customer Relationships Management System, Inventory Management System, Financial Management System, and Production and Operations Management System, as shown below in figure (4):

Figure 4: Enterprise Resource Planning Systems Components.



Sources: Prepared based on the literature review of researchers and previous studies.

Human Resource Management System (HRMS):

Johari, et. al., (2012) defined HRMS as a set of planned tactics and policies implemented by companies to ensure that human talent is used effectively and efficiently and contributes to the accomplishment of business objectives. Razimi, et. al., (2014) stated that the key role of HRM appears in attracting, selecting, placing, motivating, rewarding, and retaining employees. Additionally, HRM works on activities pertaining to investment in staffing, performance management, training and development, compensation and benefits, employee relations, and safety and health.

Majeed and Ozyer (2016) mentioned that human resource management systems are the designed programs to deal with human resource management activities such as recruitment, training, and evaluation of performance, with the aim of raising the efficiency of these activities through human resources data processing. Korff, et. al., (2017) defined the HRMS as a group of components that work in an organized and interactive way to collect, estimate and extract data related to human resources in the organization and interpretation in order to provide integrated information about human resources and interpretation in front of the beneficiaries from managers in organization to take decisions in order to raise the efficiency and effectiveness of individuals and jobs that contribute to achieving the effectiveness of the organization.

Zeebaree, et. al., (2019) explained that HRMS is designed to support organization's in the human resources management like managing the recruitment activities, job descriptions, training, development, performance evaluation and maintaining them, in

addition to constantly updating their data at all administrative levels, through supporting human resource planning for the strategic level and supporting the managers decisions in analyzing contract costs for the tactical administrative level, issuing individual reports, analyzing the location and transfers for the technical administrative level.

Overall, the HRMS is a set of tools that support the process of planning the manpower according to the company's functional needs such as selection, recruitment, training and development, motivation, empowerment, evaluation, and retention of talent, which helps for optimal usage of resources to achieve the strategic goals of the company and competitive advantage.

Customer Relationship Management System (CRMS):

Marinagi, et. al., (2014) mentioned that CRM is the business' ability to acquire customers, getting to know them, renewing contacts and building trust with them to ensure that the company will give them exactly what they need. Stojkic, et. al., (2016) stated that CRM is a strategy of management and communication with customers aimed at gathering information about customers to use for increasing customer satisfaction and loyalty, in order to have a better, longer and more profitable relationship with them. Haislip, et. al.,(2017) stated that the basic idea of a customer relationship management is built from marketing information system interest in customers and considering them one of the cornerstones of the organization in achieving success, growth, and survival when building bridges and interrelated relationships with customers.

Fouad and Al-Goblan (2017) defined customer relationship management as an intelligent system that deals with customer knowledge management through knowledge from customers, knowledge about customers and knowledge for customers. In other words, Salah, et. al., (2018) discussed that the customer relationship management system is “a technical method that uses information technology like databases and the internet to make effective use of the process of relationship marketing”. Al-Weshah, et. al., (2019) confirmed that the customer relationship management system contributes to achieving the organizational objectives related to the customer such as:

1. Listening to the customer, which reflects the knowledge that the customer provides while dealing with the organization, and this knowledge

2. The interaction between customers and the organization reflects the knowledge that the customer needs which the organization may not have. While the organization learns from its customers, customers also benefit from the opinions and initiatives that reach them through salesmen.

3. Meet the customers' needs by listening to them and giving the knowledge that will accelerate and strengthen the relationship.

Overall, the company's ability to attract customers, get to know them, build relationships and agreements that support the mutual trust, and retain them in order to ensure that services are presented seamlessly to customers and meet their needs and expectations which in turn enhances customer satisfaction.

Inventory Management System (IMS):

Andersson, et. al., (2010) reported that companies are focusing on inventory management to provide managers with the right information about the accurate quantity of inventory in warehouses in order to meet customer demands on time. At the same time, inventory management is considered as the linkage area between supply chain, sales and marketing, and customer service. Oballah, et. al., (2015) stated that inventory management includes almost all activities that are designed to ensure that customers have the needed product, as well as ensure the balance between the supply of products and demand, which is considered a challenge in managing inventory. Atieh, et. al., (2016) defined the IMS as a software that allows organizations to control and manage inventory processes (inventory checks and audits) from the time that goods or materials enter the warehouse until they leave. Amoah (2017) described the objectives of the inventory management system as follows:

1. Distribution of items in warehouse groups to achieve effective management of all kinds of commodities and consumer inventory.

2. Editing the initial requests for the inventory requirement to feed the sales channels with the required items.

3. Proof of inventory processes such as inter-transfers, supply, exchange and installation of bundled items, which financially affect the linked accounts.

4. Automatic control of the costs of goods and inventory value by methods of calculating the approved inventory costs.

5. Issue various reports to monitor inventory life and manage its circulation between branches.

Overall, the IMS is an automaton of planning, organizing, and controlling the flow of raw materials that provides managers with accurate information about the right quantities of inventory in warehouses to ensure sufficient goods exist to meet current or potential demands of the market and provide information on the over-flow or shortage of inventory that affects costs and delivery time.

Financial Management System (FMS):

Fatoki (2012) defined financial management as the area of business management, which deals with capital and a careful selection of sources of capital, in order to enable an organization to move in the direction of reaching its goals. Jared, et. al., (2017) clarified that the FMS provides organizations with a full range of financial functions to track daily financial operations and generate quarterly and annual financial data, as well as provides a set of tools for budget analysis and planning.

Michael, et. al., (2017) explained that FMS is an integrated system for handling and managing all financial activities and customer follow-up to provide all financial data for the financial control required by senior management and presents all necessary reports according to the indicators set to serve decision-making accurately and objectively. Mbaka and Namada (2019) investigated that financial management has many advantages that make operations easier for organizations. The following are some of the most important benefits of the FMS:

1. Makes the decision making the process faster, through the provision of timely, reliable, accurate and verifiable information, which makes it easier and faster to make decisions because the process of arranging the information used to access decisions has been assigned to the system.

2. It helps in planning by increasing the organization the ability to schedule and forecast financial indicators, in addition to making the process of allocating financial resources more effective therefore making the set targets be more realistic.

3. Makes business more efficient by giving organizations all the information needed to prevent misuse of the financial resource.

Overall, the FMS offers the automation of planning and controlling process of all financial activities that occur within the financial department of the company such as track of cash flow, revenue, expenditures, debts and other financial obligations which ensures the best usage of resources, retains liquidity, and facilitates decision-making on future investments and distribution of dividends, which in turn raises the capital and value of the company.

Production and Operation Management System (POMS):

Wang, et. al., (2010) discussed that the production and operations management system is the formula that the productive activity combines in order to produce goods and services. Moreover, POMS are many and varied in type. Umeda (2016) explained that there are specific POMS for an industrial organization and there are other systems for the service organizations. In other words, POMS for an industrial organization represent the organizational form that includes three main parts: inputs, processes, and outputs, while the POMS for the service organizations represent the organizational formula for operations management.

Day, et. al., (2018) stated that the production and operations system differs according to the nature of the elements used, the size of these elements, the difficulty in determining performance measurement criteria, or the nature of the activity, where the production and operations system performs many tasks, including:

1. Determining work locations.

2. Mixing production factors and designing processes with scientific and economic methods.

3. Production planning and assigning production policies to implement production plans and control production in terms of costs, quality and time.

4. Ensuring the organization of work, handling, and storage systems in the organization.

Overall, POMS is an integrated and coordinated system to transform JPMOs' inputs into a set of outputs (Product or service) through transformative production processes.

ERP System Requirements and Benefits:

ERP System Requirements: Abugabah, et. al., (2015) explained that ERP system usage requires prior systematic planning, especially with regard to the operations of the organization. Therefore, it requires coordination with individuals who specialize in these systems and coordination between the various divisions and departments in the organization.

Fadlalla and Amani (2015) said that using of ERP system requires a major change in work practices and relationships from individuals to the management of the organization because the process of change requires qualified individuals who are able to train workers and qualify them to adapt to the use of the ERP system. Hsu, et. al., (2015) identified that the requirements of ERP System to be teamwork, support for senior management, change of operations, project management, and effective communications training.

Costa, et. al., (2016) emphasized that the set of requirements to be re-engineering administrative processes, change management, work teams, organizational culture, support for senior management, future vision, effective communication, project management, software development, performance evaluation, organizational structure, end-user participation, and knowledge management. Whereas, et. al., (2017) categorized ERP system requirements into four factors: organizational, technological, strategic and tactical factors. Baker and Yousof (2017) emphasized on senior management support, project management, user training, communications, seller support, and business engineering re-engineering.

Al-Hadi and Al-Shaibany (2017) mentioned that these requirements are represented in the efficiency of project implementation, the product itself, the seller's point of view, the organizational climate, and technical factors. Finally, Kiran and Reddy (2019) stated that the requirements for using the ERP system in organizations are in terms of consultants' support, knowledge transfer, and senior management support, user's support of the system, effective communications, and conflict resolution.

ERP System Benefits:

In terms of benefits, Rouhani and Mehri (2019) stressed the following:

1. Internal efficiency, by minimizing the time required to achieve each business process.
2. Decision-making, through shared information and business processes requirements that enable making better decisions.
3. Increased agility, through adapting quick responses to environmental turbulence.
4. Enhanced security, through the security team's awareness of the server that contains corporate data.

Definitions and Components of the Dependent Variable:

Supply Chain Integration: There is a consensus in supply chain integration theory on its definition. Flynn, et. al., (2010) indicated that supply chain integration is "an effective method that enhances the performance of an organization's suppliers and customers". Sukati, et. al., (2012) pointed out the strong and active communication networks among all members of the supply chain. Besides, all of the above contribute to support integration process and create the competitive advantage of the institution.

Poranki, et. al., (2015) noted that the integration of the supply chain consists of internal processes and partnerships with suppliers and end-consumers to ensure information flow and raw materials in real-time, with high quality and competitive price. In addition, supply chain integration has been defined as "the degree to which a manufacturer collaborates with its external supply chain partners and coordinately manages Intra- and inter-organization processes". Lii and Kuo (2016) pointed out that supply chain integration enables an organization to design the products faster, with higher quality and lower costs.

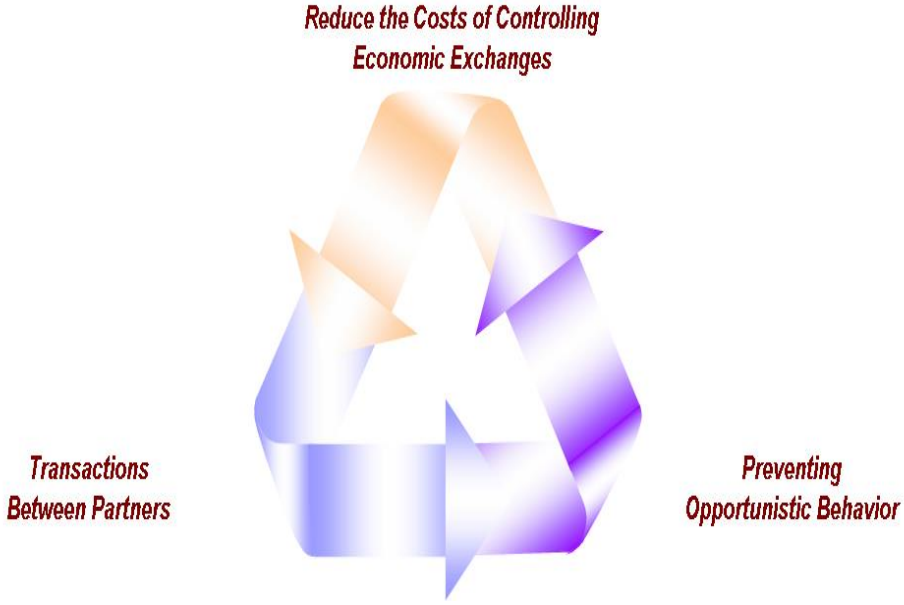
Annan, et. al., (2016) demonstrated that supply chain integration helps organizations minimize the cost of serving and monitoring customers and suppliers. Qi, et. al., (2017) defined that integration of the supply chain as "cooperation plans and activities between suppliers, manufacturers, warehouses distributors, and retailers that aim to develop products by transforming raw materials into finished goods for customers". Ayoub, et. al., (2017) stated that it is categorized into two parts: internal

integration, including operation processes, and external integration that includes partnerships with suppliers and customers.

Wheelen and Hunger (2011) stated that supply chain integration "intends to provide the products to the end consumer starting with purchasing materials ending with delivery to the end consumer". Rajaguru and Matanda (2019) described that integration is a mechanism that seeks to harmonize, organize, coordinate, and link operations of all parties of a supply chain starting from raw material supply and concluding with product delivery to end consumer in order to improve and develop business performance and reduce time, cost, and transactions.

Overall, SCI is a high level of coordination and collaboration among company's internal processes and external partnerships "suppliers and customers", which enhances the flow of information, raw materials, and money along the chain to ensure the right product, high quality, right place, right quantities, right price, and the timely delivery to achieve competitive advantage. Yang and Wei (2013) highlighted that the importance of supply chain integration can be clarified in three ways, as shown in Figure (5):

Figure 5: Importance of Supply Chain Integration.



Source: Prepared based on the study of Yang and Wei (2013).

Supply Chain Integration Components:

In the current study, the proposed dimensions of SCI are Integration with Supplier, Internal Processes Integration, and Integration with Customers, as follows:

Integration with Suppliers

Danese, et. al., (2013) explained that organizations can establish the partnership with suppliers by interchanging information, knowledge, materials, and objectives in different directions, in addition to the coordination of business plans, activities, and optimum exploiting of firms' resources. Afshan (2013) mentioned that maximizing the collaboration of companies with its suppliers to structure their inter-organizational practices, procedures, strategies, and behaviors into synchronized and manageable process in order to fulfill customer's requirements at the lowest cost. Zhang, et. al., (2015) stated that integration with suppliers is a major key to achieve an effective integration with customers.

Nazzal (2016) discussed that business integration with suppliers indicates a long-term relationship that has the potential to reduce costs in the supply chain. Shukor, et. al., (2016) highlighted that the long-term relationships and persistent with suppliers that will upgrade the integration process that will lead to further coordination and arrangement among all parties along the supply chain. Therefore, firms will never be affected by the lack of materials; it will become more efficient in production operations. Feyissa, et. al., (2019) claimed that by information sharing, all parties of the supply chain are empowered to engage in product design, costs, quality, practices, quantities, and delivery time.

Overall, the integration with suppliers is the coordinated process that occurs between the company and selected suppliers across communication channels, which contribute to the sharing of information, experiences, materials, building long-term commitments, and alliances that create the mutual trust, which in turn provides the company with high quality of materials, fast delivery, and lowest cost to enhance customer service. Moreover, integration with suppliers can be explained as the coordination practices, which occur between the organization and its suppliers through many information systems, connection networks, and business agreements in the long run.

Internal Processes Integration

Graham, et. al., (2005) explained that the direct integration among internal functions and processes promotes work efficiency, flexibility, productivity, product quality, and delivery along the supply chain. Also, establishing indirectly integration between internal processes improves the company and customer relationship. Huo (2012) reported

that internal integration as a peak performance of firms to accomplish actual positive results compared to their competitors. In addition, integrating internal practices would create a strong link between manufacturing and distribution operations to present the final product/services on-time and ineffective methods.

Afshan (2013) said that internal integration refers to the degree to which a manufacturer structures its own organizational strategies, processes, and practices into collaborative synchronized processes in order to meet customers' requirements at the lowest cost. Additionally, internal integration emphasizes those different departments within the organization should act as an integrated process rather than acting as functions. Nazzal (2016) stated that internal processes integration is essential for the success of any organization. The collaboration and coordination among the internal departments strongly reflect how effective the interaction with the supplier is on the one hand, and with the customer on the other hand.

Overall, the integration of internal processes is a set of internal interactions and activities that take place within company's divisions which aim to interchange skills, knowledge, practices, facilitate communications, flows of data across functional teams that work together which helps the company in an efficient decision making, solving problems, tracking of supply of materials, therefore leading it to achieving the strategic goals.

Integration with Customers

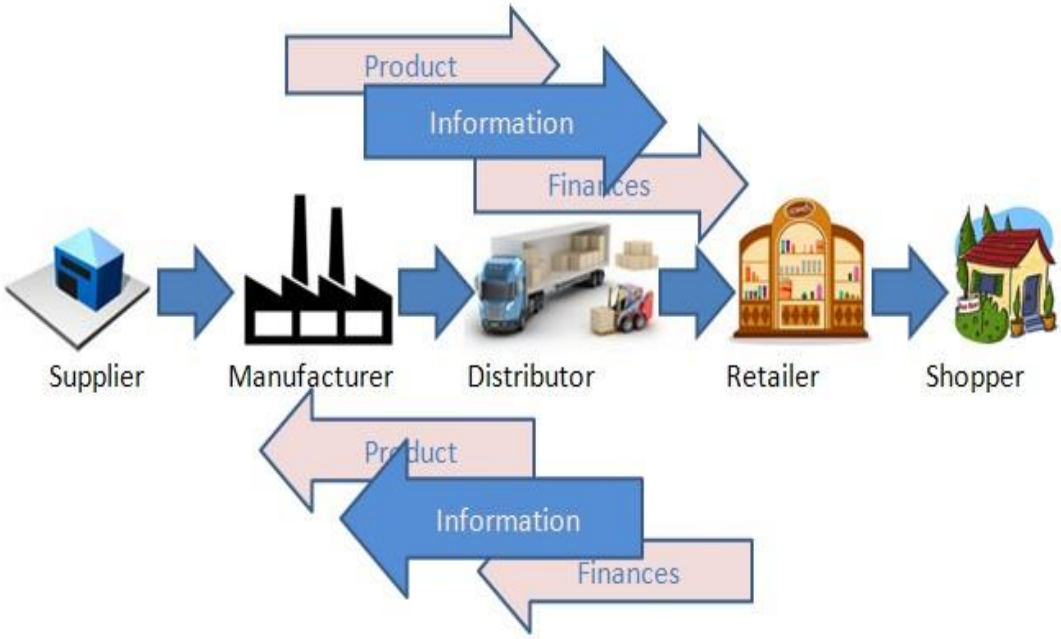
Swink, et. al., (2007) described that the integration with customers as the degree to which businesses collaborate with their customers to improve visibility, enable joint planning, and provide a better understanding of market expectations and opportunities, which helps in being more responsive to customer needs and requirement. Zhao, et. al., (2011) defined customer integration as the coordination and collaboration process among an organization and its customers to ensure the flow of products effectively. Furthermore, the solid relationships among an organization and customers offer opportunities for improving information accuracy, which reduces the time of product designed production-planning time and achieves customer satisfaction.

Alfalla, et. al., (2013) stated that the connection process between firm and customer will be through information systems and networks and computerization of the services to ensure the improvement and ease of communication. Huo, et. al., (2014) mentioned that efficient process integration with customers can operate on a seamless

product's delivery, improve planning, order tracking, and reduce stock obsolescence through accurate information related to customer needs, preferences, and expectations. Nazzal (2016) defined the organization-customer relationship as coordination and collaboration to enhance the flow of products, funds, and data effectively.

Overall, the integration with customers is the process of cooperation that occurs between a company and its customers that aims to improve visibility through a variety of activities like exchanging information, engaging in product development which in turn helps to build the long term relationships and the mutual trust by getting customer feedback on product/services for the purpose of enhancing quality, delivery, cost, and awareness of requirements to achieve customer satisfaction and competitiveness.

Figure 6: The Flows along the Supply Chain.



Source: Prepared based on the study of Ansari and Kant (2017).

Supply Chain Integration Benefits:

Haddud, et. al., (2017) explained the benefits of supply chain integration as follows:

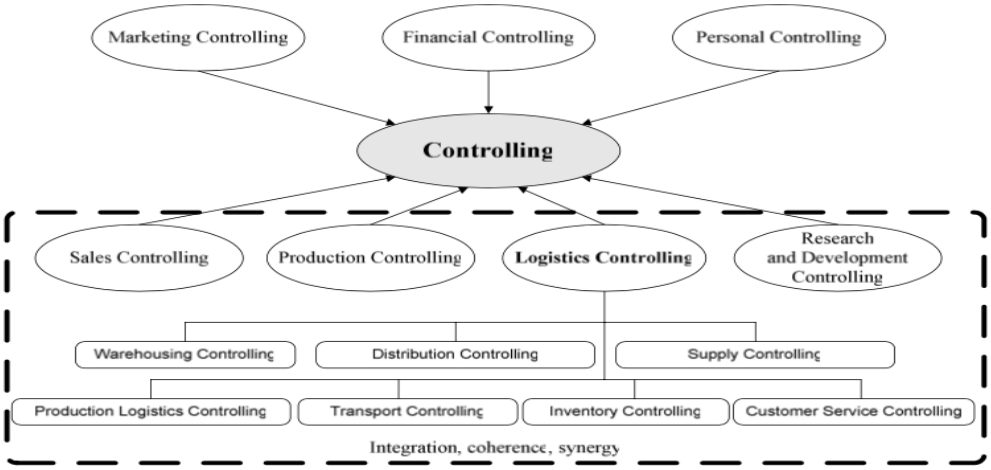
1. Work faster and more efficiently through rapid distribution.
2. Make decisions quickly and reduce the time needed to reach the market.
3. A form of partner trading.
4. Achieving better communications.
5. Enhancing relationships with current customers.

Previous Models:

Kolinski and Fajfer (2011) Model:

The model clarifies the main areas of logistics controlling in firms and the role of ERP system integration as the most important factor supporting logistics controlling along the supply chain, in addition to the effect of logistics controlling on-demand in a coordinated, integrated, and efficient manner.

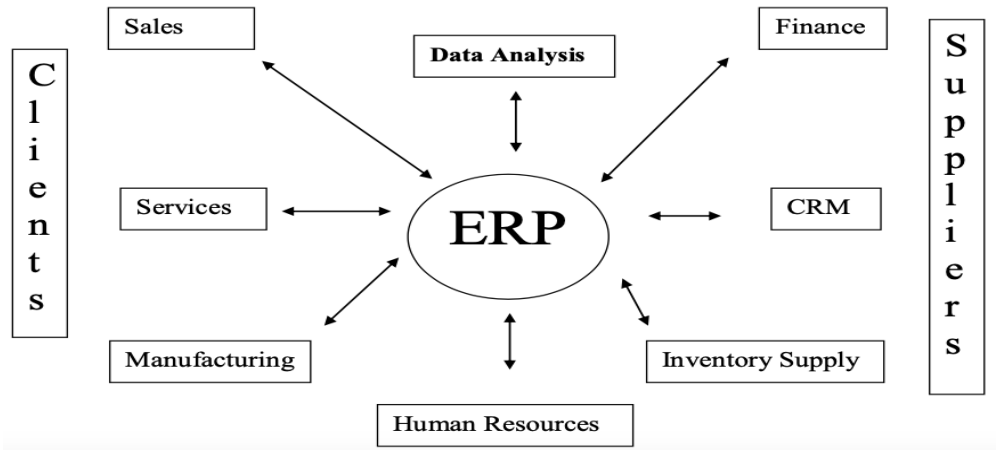
Figure 7: Kolinski and Fajfer (2011)



Nawaz and Channakeshavalu (2013) Model:

The model presents the integration of all functions and departments across the company through a common information system (IS) that serves all different departments' needs simultaneously. In addition, it explains how the ERP system combines all activities within a company into a single software that enhances the easy exchange of information and communication between various functions.

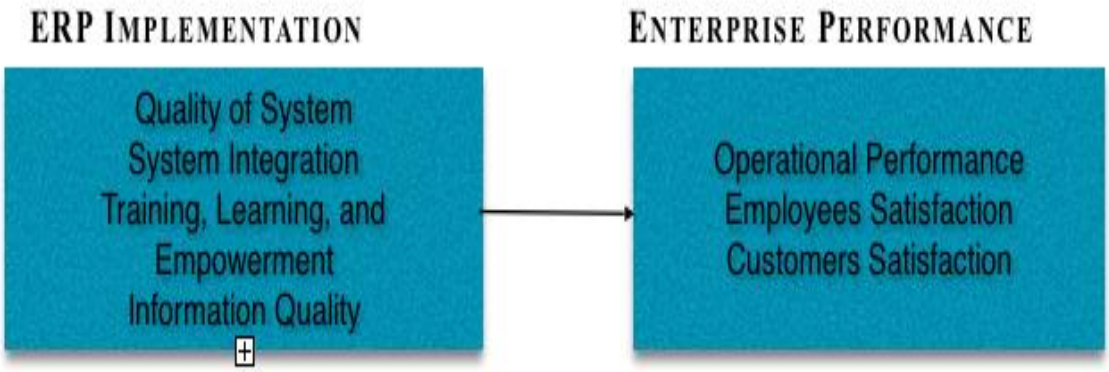
Figure 8: Nawaz and Channakeshavalu (2013).



Ociepa (2017) Model:

The model shows the relationship between ERP implementation as an information system which includes Quality of system, System Integration, Training and Learning, and Information Quality—and outcomes of organization performance, which include Operational Performance, Employees Satisfaction, and Customer Satisfaction that maximizes the value of an organization.

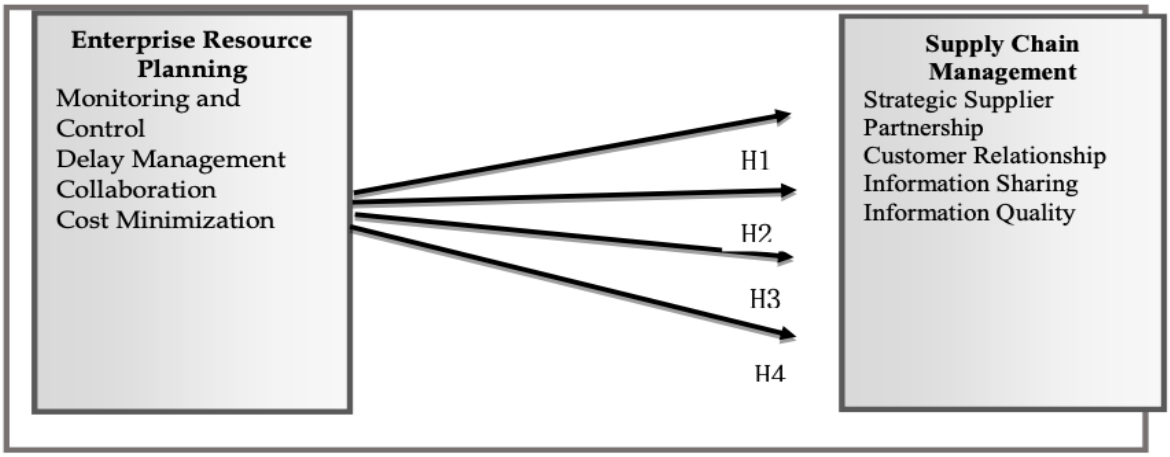
Figure 9: Ociepa (2017).



Aziz, et. al., (2018) Model:

The model explains the impact of ERP—which includes Monitoring and Control, Delay Management, Collaboration, and Cost Minimization on each separate dimension of Supply Chain Management, which includes Strategic Supplier Partnership, Customer Relationship, Information Sharing, and Information Quality.

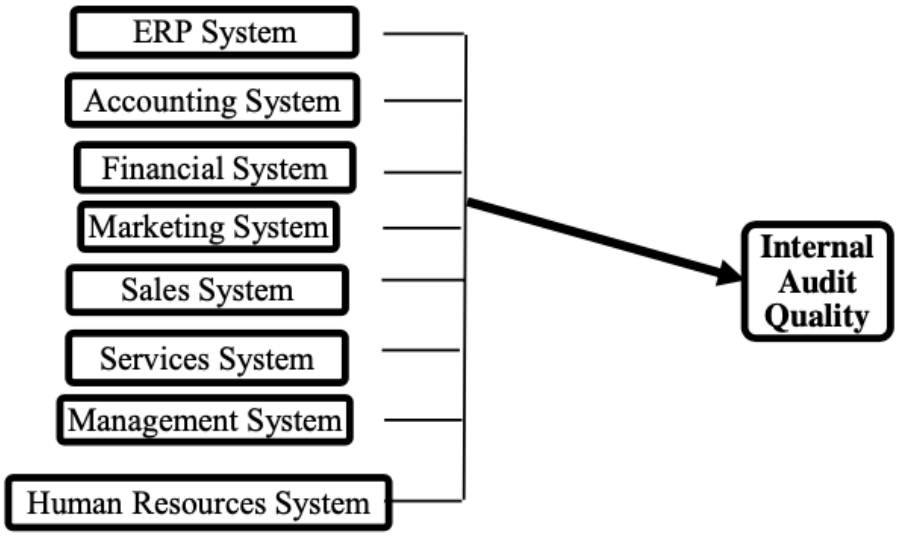
Figure 10: Aziz, et. Al., (2018)



Theebeh, et. al., (2018) Model:

The model investigates the direct role of ERP System through the core activities of the business, which focused on HRS, Accounting and Finance System, Sales and Marketing, Service System, and Management System—in achieving the internal audit quality at Jordanian Commercial Banks.

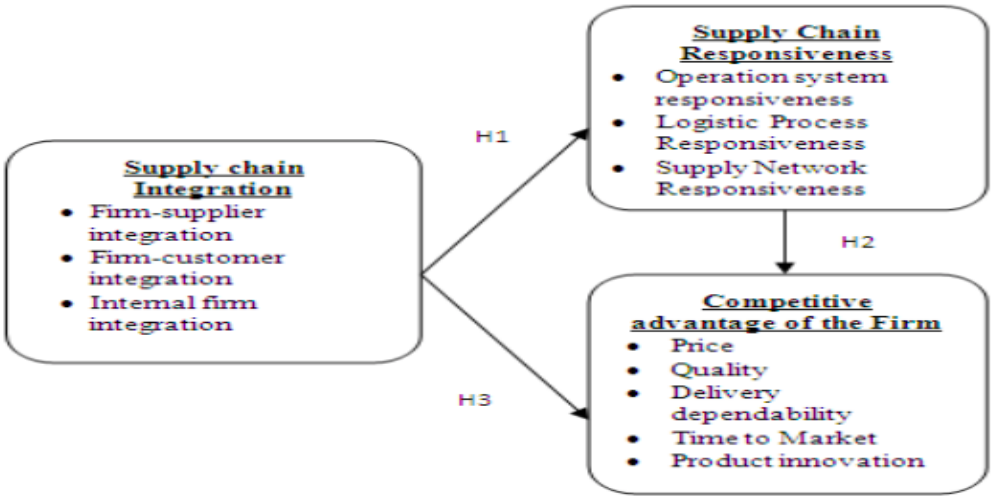
Figure 11: Theebeh, et. al., (2018).



Sukati, et. al., (2012) Model:

The model shows the effect of supply chain integration on the responsiveness of the supply chain and the firm's competitive advantage. Further, it explains the role of supply chain responsiveness in achieving the competitive advantage of the firm.

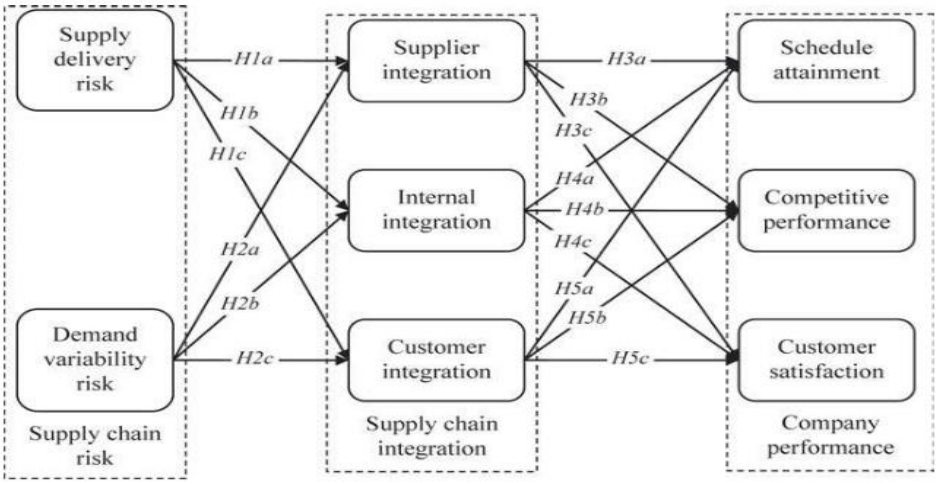
Figure 12: Sukati, et. al., (2012).



Zhao, et. al., (2013) Model:

The model illustrates the correlation between supply chain risks (SCRs), supply chain integration (SCI), and its effect on company performance. Moreover, it shows SCRs (supply delivery risk and demand variability risk) as barriers to supply chain integration and explains the extent of SCI components' effect on three aspects of company performance (Schedule Attainment, Competitive Performance, Customer Satisfaction).

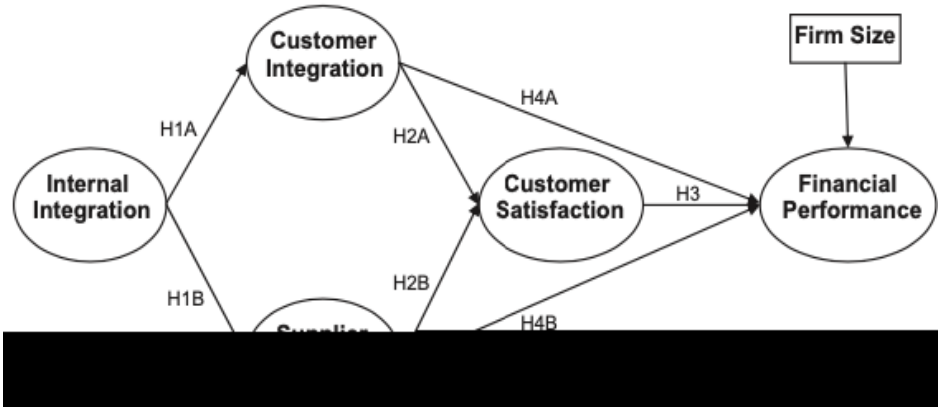
Figure 13: Zhao, et. al., (2013).



Yu, et. al., (2013) Model:

The model shows the relationship among supply chain integration aspects "Internal integration on External partners" and customer satisfaction. Further, it discusses the direct effect of supply chain integration and customer satisfaction on financial performance, and the effective role of firm size in boosting financial performance.

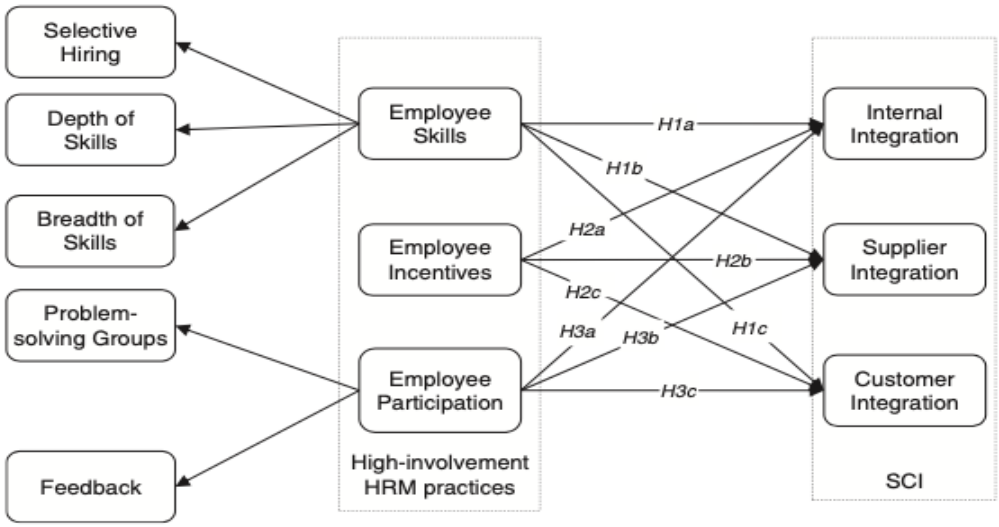
Figure 14: Yu, et. al., (2013).



Huo, et. al., (2015) Model:

The model explains the effect of high-involvement HRM practices on employee skills (Selective Hiring, Depth of Skills, and Breadth of Skills) and problem-solving groups and feedback. It also shows the correlation between supply chain integration (Internal Integration, Supplier Integration, and Customer Integration) and HRM practices (Skills, Incentives, and Participation of Employees).

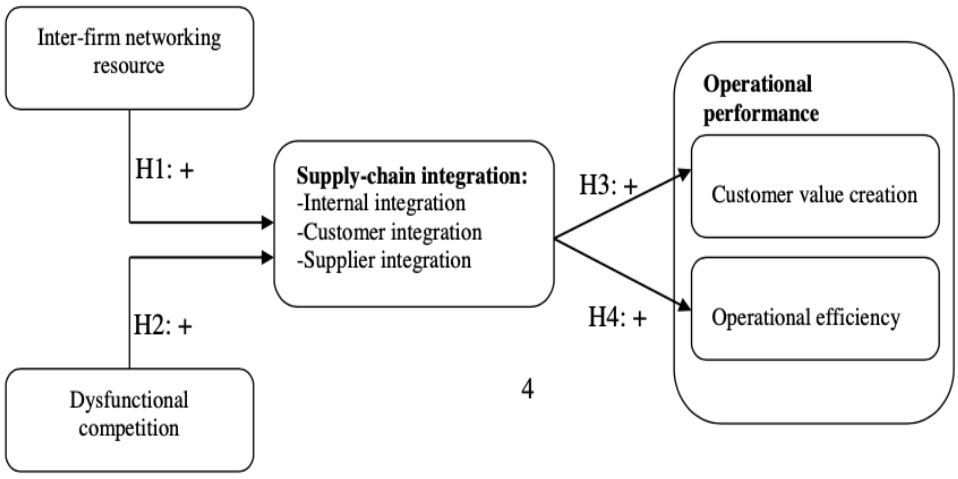
Figure 15: Huo, et. al., (2015).



Cao, et. al., (2015) Model:

The model investigates the impact of organizational culture through four aspects (Development, Group, Rational, and Hierarchical of Culture) individually and jointly on supply chain integration (Internally and externally).

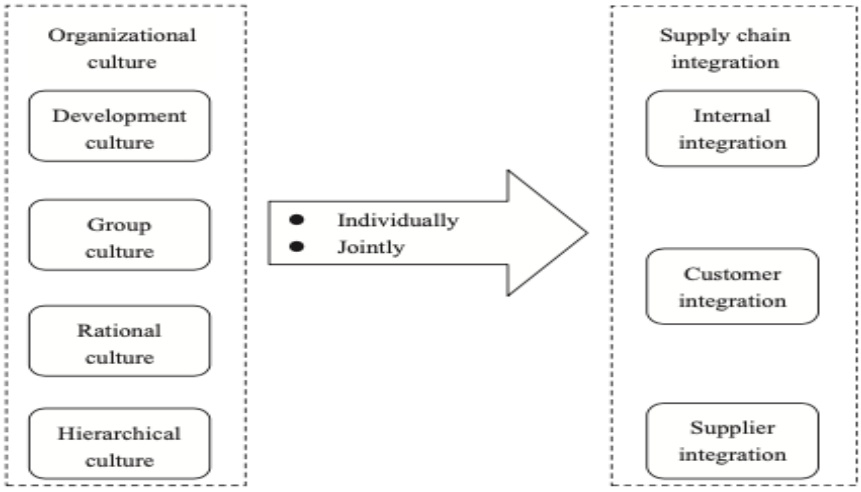
Figure 16: Cao, et. al., (2015).



Annan, et. al., (2016) Model:

The model presents a conceptual model that discusses inter-firm networking resources and dysfunctional competition, which in turn enhances supply chain integration directly. It also describes how SCI contributes to increases in operational performance.

Figure 17: Annan et al (2016).



The Relationships between Enterprise Resource Planning (ERP) System and Supply Chain Integration (SCI):

Many researchers have studied the correlation between the ERP system and supply chain management and performance of an organization. Shatat and Udin (2012) demonstrated that there is a positive and significant relationship between the two in Malaysian Manufacturing Companies. Jenatabadi, et. al., (2013) clarify the ERP system's effect on supply chain integration in Malaysian industrial and service firms. Alimohamadian and Abdi (2014) determined the effects of ERP success on supply chain integration, and they reached that ERP success has a positive effect on supply chain integration. Abro, et. al., (2017) reached that using ERP affects supply chain integration. Aziz, et. al., (2018) confirmed that the ERP has a positive impact on supply chain management practices.

Overall, the reviewed literature shows a direct impact of ERP system usage on supply chain integration. Moreover, most of the previous studies relationships have conducted for the supply chain management, SCM practices, SCM partnerships, SCM strat-

egies, and supply chain collaboration, as well as on financial performance and organizational performance. This study focuses on testing the Impact of ERP system usage on supply chain integration.

Previous Related Studies:

Related studies are an essential part of completing the requirements of scientific research, which requires that one refers to related studies to find out where they have reached and what could be done to pick up where these studies have left off. On this basis, the related study presented comes complementary to what has been explained about the concept and application of the ERP system and supply chain integration. Accordingly, the time criterion will be adopted in presenting related studies (i.e. according to the chronology from the oldest to the most recent, taking into account in selecting related studies the location of the variable searched as much as possible).

Shatat and Udin (2012) study entitled **"The Relationship between ERP System and Supply Chain Integration in Malaysian Manufacturing Companies",** aimed to investigate the relationship between ERP and supply chain integration in Malaysian Manufacturing Companies. The study field consists of Malaysian manufacturing companies that are using an ERP system. The study population included all employees working at Malaysian manufacturing companies that are using an ERP system. While the study sample consisted of (80) MIS or IT executives working at Malaysian manufacturing companies study field. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire survey. After employing the appropriate statistical methods, the study reached many results; most notably that there is a positive and significant relationship between ERP system and supply chain integration in Malaysian Manufacturing Companies.

Jenatabadi, et. al., (2013) study entitled **"Impact of Supply Chain Management on the Relationship between Enterprise Resource Planning System and Organizational Performance",** proposed the investigation of the mediating role of supply chain integration in the relationship between ERP system and organizational performance. The study field consisted of Malaysian industrial and service firms. The study population included (450) Malaysian firms that are using ERP system for at least two years. The study sample consisted of (174) randomly selected. The analysis unit included (174) individuals (ERP manager, director manager, or CEO). An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire survey.

After employing the appropriate statistical methods, the study reached many results; most notably that supply chain integration plays a positive mediating role in the relationship between ERP system and organizational performance in Malaysian industrial and service firms.

Xu, et. al., (2014) study entitled **"Relationships between intra-organizational resources, supply chain integration and business performance: An extended resource-based view",** explored the effect of intra-organizational resources (top management support and information technology) on supply chain integration as well as on business performance in four representative provinces (Guangdong, Shandong, Henan, and Shaanxi) at China. The study field consisted of industrial firms in China. The study population consisted of industrial firms located in four representative provinces (Guangdong, Shandong, Henan, and Shaanxi) in China. The study sample consisted of (174) industrial firms randomly selected located in four representative provinces (Guangdong, Shandong, Henan, and Shaanxi) in China. The analysis unit included (174) individuals (supply chain manager, a CEO/president, a vice-president or a director). An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods (partial least squares), the study reached many results; most notably that the intra-organizational resources (top management support and information technology) affects supply chain integration as well as business performance at industrial firms located in four representative provinces (Guangdong, Shandong, Henan, and Shaanxi) at China.

Alimohamadian and Abdi (2014) study entitled **"Analyzing the effects of information technology on supply chain integration: The role of ERP success mediator",** aimed to identify the mediating role of ERP success in the relationship between information technology and supply chain integration. The study field consisted of companies located in Tehran, Iran. The study population consisted of (3) Iranian companies including (325) employees. The study sample consisted of (163) employees randomly selected. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods, the study reached many results; most notably that the ERP success positively affects supply chain integration.

Huo, et. al., (2015) study entitled **"The effect of high-involvement human resource management practices on supply chain integration",** aimed to explain the ef-

fect of high-involvement human resource management practices on supply chain integration. The study field consisted of manufacturing industries (machinery, electronics, and transportation) in ten countries, including Australia, China, Finland, Germany, Italy, Japan, Korea, Spain, Switzerland, and the USA. The study population consisted of plants in the high-performance manufacturing study selected from a list of manufacturing plants in each country using a stratified random sampling method to maintain a balance among the three industries. The study sample consisted of (317) managers. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods, the study reached many results; most notably that the high-involvement human resource management practices positively affect supply chain integration.

Sundram, et. al., (2016) study entitled **"Supply chain practices and performance: the indirect effects of supply chain integration",** aimed to examine the relationship between several supply chain practices, supply chain integration, and supply chain performance in the Malaysian electronics sector. The study field consisted of (600) individual Malaysian electronics firms. The study population consisted of (234) individual Malaysian electronics firms. The study sample consisted of (156) individual Malaysian electronics firms. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods, the study reached many results; most notably that supply chain practices have a significant effect on supply chain integration and supply chain integration has an important role in enhancing supply chain practices.

Ata, et. al., (2017) study entitled **"The Impact of Using Enterprise Resource Planning (ERP) Systems on organization's Performance In Jordanian Industry Companies",** discussed the influence of using ERP system on organizations' performance in Jordanian industrial companies. The study field consisted of (2) Jordanian industrial companies. The study population consisted of all employees at all managerial levels at (2) Jordanian industrial companies. The study sample consisted of (72) individuals working at (2) Jordanian industrial companies. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods, the study reached many results; most notably that ERP system usage positively affects organizations' performance at the Jordanian industrial.

Abro, et. al., (2017) study entitled **"Antecedents of Enterprise Resource Planning and its Impact on Firm Performance with Supply Chain Integration as mediating factor",** aimed to test the mediating role of supply chain integration in the relationship between ERP implementation and firm performance. The study field consisted of (10) organizations from the kingdom of Saudi Arabia. The study population consisted of all managers at the seniority level who know about their organization. The study sample consisted of (70) managers working at (10) organizations from the kingdom of Saudi Arabia. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods, the study reached many results; most notably that supply chain integration plays a mediating role in the relationship between ERP implementation and firm performance.

Ali and Miller (2017) study entitled **"ERP System Implementation in Large Enterprises - A Systematic Literature Review",** offered a systematic discussion of the literature review associated with the implementation of the ERP system in large enterprises. The study field consisted of (952) research papers to develop and present a comprehensive structured review of the literature on ERP system implementation in a large enterprise with particular focus on pre-implementation, implementation, and post-implementation. A descriptive approach was used. The study reached many results; most notably that top management support, good project management teams, and good communications are the top most important. Therefore, the gap identified in this research is pre and post-implementation.

Theebeh, et. al., (2017) study entitled **"The Effect of Applying the Organization Enterprise Resource Planning System in the Quality of Internal Audit: A Case of Jordanian Commercial Banks",** discussed the effect of applying the organization ERP system to the quality of internal audit in Jordanian commercial banks. The study field consisted of (13) Jordanian Commercial Banks. The study population consisted of all individuals working in the Jordanian Commercial Banks study field. The study sample consisted of (121) individuals randomly selected working in Jordanian commercial banks. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods, the study reached many results; most notably that applying the organization ERP system has a positive effect on the quality of internal audit in Jordanian commercial banks.

Fadelelmoula (2018) study entitled **"The Effects of the Critical Success Factors for ERP Implementation on the Comprehensive Achievement of the Crucial Roles of Information Systems in the Higher Education Sector",** Proposed to examine the effects of certain key Critical Success Factors for the implementation of Enterprise Resource Planning Systems on the comprehensive achievement of the crucial roles of Computer-Based Information Systems. The study field consists of the higher education sector in the Kingdom of Saudi Arabia. The study population consists of all stakeholders in Prince Sattam Bin Abdulaziz University. The study sample consists of (219) key stakeholders in Prince Sattam Bin Abdulaziz University randomly selected. An analytical descriptive approach was used. To achieve the study objectives the researcher used questionnaires. After employing the appropriate statistical methods, the study reveals that the six key CSFs have a positive relationship with the comprehensive achievement of the crucial roles of CBISs.

Fahmi (2018) study entitled **"Analysis of Enterprise Resource Planning (ERP) Implementation in SMEs in East Kalimantan Indonesia",** aimed to analyze the critical factors that can improve the success of the implementation process of ERP systems in SMEs in East Kalimantan at Indonesia. The study field consists of firms in East Kalimantan Indonesia. The study population consists of all SMEs in East Kalimantan Indonesia. The study sample consists of (31) all SMEs in East Kalimantan Indonesia randomly selected. A quantitative approach was used. To achieve the study objectives the researcher used questionnaires. After employing the appropriate statistical methods, the study reveals that there is a significant influence between the key factors on the success of an implementation. While the partial factor of top management support, effective project management quite a significant effect. However, the factor of user engagement has no significant effect on the success of ERP implementation.

Edirisinghe and Roshantha (2018) study entitled **"Statistical Analysis on Enterprise Resource Planning Systems (ERP) On End-User Satisfaction",** aimed to investigate the influence of Enterprise Resource Planning Systems (ERP) On End-User Satisfaction. The study population consists of ERP End Users in the Organizations who have adopted ERP solutions in Sri Lanka (160) companies. The study sample consists of (125) companies that have been adopted major ERP products available in the market such as SAP, Oracle, and Microsoft in Sri Lanka stratified selected. A quantitative approach was

used. To achieve the study objectives the researcher used questionnaires. After employing the appropriate statistical methods, the study reveals that Enterprise Resource Planning Systems (ERP) influence on End-User Satisfaction in Sri Lanka.

Aziz, et. al., (2018) study entitled **"The impact of enterprise resource planning on supply chain management practices",** aimed to determine the impact of ERP on supply chain management practices. The study field consisted of logistics services companies in Egypt. The study population consisted of all employees working in logistics services companies in Egypt. The study sample consisted of (448) employees working at the top management level in logistics services companies in Egypt. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods, the study reached many results; most notably that ERP positively impacted supply chain management practices.

Aremu, et. al., (2018) study entitled **"Determinants of Enterprise Resource planning adoption on Organizations Performance among Medium Enterprises",** aimed to identify the determinants of ERP adoption and its impact on organizational performance in the medium enterprise. The study field consisted of (217) medium-sized enterprises located in Oyo State, Nigeria. The study population consisted of all employees working in medium-sized enterprises located in Oyo State, Nigeria. The study sample consisted of (226) CEO and managers working in medium-sized enterprises located in Oyo State, Nigeria. An analytical descriptive approach was used. To achieve the study objectives, the researchers used a questionnaire. After employing the appropriate statistical methods, the study reached many results; most notably that the organizational structure and technological change have a significant influence on the adoption of the ERP system to improve the performance of medium size enterprise firms.

Tapang and Azubike (2018) study entitled **"Effect of Enterprise Resource Planning Implementation on Financial Performance of Commercial Banks in Nigeria",** aimed to explain the effect of ERP implementation on the financial performance of commercial banks in Nigeria. The study field consisted of commercial banks in Nigeria. The study population consisted of (21) commercial banks in Nigeria. The study sample consisted of (10) commercial banks in Nigeria purposively selected. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods, the study reached many

results; most notably that ERP implementation has a significant effect on financial performance.

Hewavitharana, et. al., (2019) study entitled **"Impact of Enterprise Resource Planning (ERP) Systems to the Construction Industry",** aimed to investigate how ERP impacts the construction industry and establish the aspects to measure the ERP readiness before its implementation. The study field consisted of construction companies in Sri Lanka. The study population and sample consisted of (29) construction companies in Sri Lanka. An analytical descriptive approach was used. To achieve the study objectives, the researcher used (210) financial statements. After employing the appropriate statistical methods, the study reached many results; most notably that the ERP system positively impacts the construction industry.

Elgohary (2019) study entitled **"The Role of ERP Capabilities in Achieving Competitive Advantage: An Empirical Study on Dakahlia Governorate Companies, Egypt",** aimed to investigate the ERP Capabilities in Achieving Competitive Advantage in Dakahlia Governorate Companies, Egypt. The study population consists of all Companies working Dakahlia Governorate at Egypt. The study sample consists of (162) Companies working Dakahlia Governorate at Egypt selected randomly. An analytical descriptive approach was used. To achieve the study objectives the researcher used questionnaires. After employing the appropriate statistical methods, the study reached that the ERP Capabilities positively effect on Competitive Advantage Dakahlia Governorate Companies, Egypt.

Zolfagharian and Jafari (2019) study entitled **"The Role of Enterprise Resource Planning System Usage on User Satisfaction and Organizational Learning Capabilities",** aimed to identify the role of enterprise resource planning (ERP) system usage on user satisfaction and organizational learning capabilities in first and second grade in high schools in Semnan at Iran. The study population consists of all teachers of the first and second grades in high schools in Semnan in Iran (N=342). The study sample consists of (200) teachers of the first and second grades in high schools in Semnan at Iran selected randomly. An analytical descriptive approach was used. To achieve the study objectives the researcher used questionnaires. After employing the appropriate statistical methods, the study reached that there is a positive significant relationship between the ERP system usage and user satisfaction, managing commitment, transfer & integration, openness & experimentation, system perspective. ERP system by mediating user satisfaction has an

indirect and significant effect on the managing commitment, transfer & integration, openness & experimentation, system perspective.

Pakurar, et. al., (2019) study entitled **"The Impact of Supply Chain Integration and Internal Control on Financial Performance in the Jordanian Banking Sector",** aimed to investigate the impact of supply chain integration and internal control on the financial performance of the Jordanian banking sector. The study field consisted of the Jordanian banking sector. The study population consisted of all employees working in the Jordanian banking sector. The study sample consisted of (249) employees randomly selected working in the Jordanian banking sector. An analytical descriptive approach was used. To achieve the study objectives, the researcher used a questionnaire. After employing the appropriate statistical methods, the study reached many results; most notably that supply chain integration and internal control positively affect the financial performance of the Jordanian banking sector, and that the Jordanian banking sector can improve customer integration by utilizing recent information systems networks.

What is Differentiate this Study from the Previous Studies?

This study might be considered as the first study that investigates the direct impact of ERP system usage on supply chain integration in JPMOs in Amman.

- Almost of the previous studies have discussed the usage of ERP system and supply chain integration in different sectors and industries, but the current study has applied at pharmaceutical manufacturing sector in Amman as the study population.
- The samples of the previous studies have included a specific categories and limited samples such as employees and limited functions/departments, while the current study is consists of managers across the three levels of management, and a specific departments which consider the most related with supply chains at JPMOs as the study sample.
- Almost of the previous studies have explored the effect of ERP system using on performance of companies and financial performance, and the other studies have used supply chain integration as a mediating role, but the current study has included on the ERP system and supply chain integration as a main variables of the study at JPMOs.
- The majority of prior research was conducted to investigate ERP system implementation by measuring different elements such quality of information and system, that could affect the integration; but the current study has measured a specific business

functions as an elements of ERP system that could affect supply chain integration immediately.

Therefore, the findings of this study could be helpful in boosting the environmental requirements and added value to the customer through supply chain integration in JPMOs in Amman.

Chapter Three: Study Methodology (Method and Procedures)

Background

This chapter described the methodology, which used in the current study. It includes the study design, study population, sample, and unit of analysis. It also shows data sources and the study tool that used to collect data. Moreover, it includes validity and reliability tests for questionnaire. Finally, it shows the demographic characteristics of the sample.

Study Design:

The current study is considers as a descriptive and cause-effect study. It also aims to studying the impact of (ERP) system usage on supply chain integration at Jordanian pharmaceutical manufacturing organizations in Amman. It was started with a literature review to develop the study model. Then, a panel of judges used to improve the measurement tool i.e. questionnaire. Afterward, the survey carried out and the data collected of managers who are working across the three levels of management in the JPMOs such (human resource department, financial department, production department, supply chain department as well as operations & quality department).

After that, the collected data checked and coded on SPSS 24. Then normality, validity, and reliability tested and the correlation among variables checked. Finally, multiple regressions used to test the hypotheses.

Study Population, Sample and Unit of Analysis:

The study field consists of (14) pharmaceutical manufacturing organizations registered in the Jordanian association of pharmaceutical manufacturers in Jordan according to (JAPM) www.japm.com. The study population consists of managers who are working across the three levels of management in the JPMOs totaling (350) managers. To ensure the quality of the results obtained, the proper sample size of the study population were (183) managers who are working in the following JPMOs' departments (human resource department, financial department, production department, supply chain department, as well operations and quality department), who was available at the time of distributing the questionnaires and ready to participate, who were chosen in a randomly sampling method.

Data Collection Methods:

To achieve the study purposes, the study relied on two main sources were used to gathering information:

Secondary Sources: Secondary data collected from different sources such as journals, working papers, researches, thesis, articles, as well as, research and reading in various Internet sites.

Primary Sources: To address the analytical aspects of the current study, primary data collection through the questionnaire and Interview at JPMOs.

The Study Tool:

The Questionnaire:

The questionnaire was used as the main tool to actualize this study that explores the impact of ERP System Usage on Supply Chain Integration at Jordanian Pharmaceutical Manufacturing Organizations in Amman. This questionnaire was addressed to the managers from different companies, which included (54) items were measured by a five-point Likert-type scale to rate the respondent's actual perceptions regarding each item so that each answer took relative importance. The questionnaire instrumental sections are as follows:

Section One: Demographic Information. The demographic information was collected with closed-ended questions, through (6) Characteristics (Gender, Age, Experience, Education, Position and Division).

Section Two: ERP System. This section was measured the ERP System through (5) dimensions (Human Resource Management System, Customer Relationship Management System, Inventory Management System, Financial Management System, Production and Operations Management System) and (30) items as follows:

1. Human Resource Management System: (6) items arrangement from 1 – 6.
2. Customer Relationship Management System: (6) items arrangement from 7 – 12.
3. Inventory Management System: (6) items arrangement from 13 – 18.
4. Financial Management System: (6) items arrangement from 19 – 24.
5. Production and Operations Management System: (6) items arrangement from 25 – 30.

Section Three: Supply Chain Integration. This section was measured the Supply Chain Integration through (3) dimensions (Integration with Supplier, Internal Processes Integration, and Integration with Customer) and (24) items as follows:

1. Integration with Supplier: (8) items arrangement from 31 – 38.
2. Internal Process Integration: (8) items arrangement from 39 – 46.
3. Integration with Customer: (6) items arrangement from 47 – 54.

The study included a Likert scale as follows:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Data Collection and Analysis:

Out of 350 managers the researcher distributed (183) questionnaires for the participants, (177) questionnaire were returned from the sample, and the researcher excluded (6) questionnaire due to the unfinished information, so the questionnaires that valid for analysis were (168), and the response rate was (91%) from the original sample, so Table (3-10) shows the demographic characteristics of the study sample.

Validity Test:

The tool's validity confirmed by using three methods: content, face, and construct. The content validity established through collecting the data from multiple kinds of literature resources such as articles, thesis, papers, journals, researches, and the World Wide Web. Furthermore, face validity was accurately performed by academic reviewers from Middle East University and other universities. The questionnaire was submitted to (9) board of judges, to verify the sincerity of its statements, and to take their opinions, and re-wording of some paragraphs, and make the required modifications, to carefully strike a weight degree between the content of resolution in statements. Appendix (1) shows the names of the Arbitrators.

Construct Validity (Factor Analysis):

The construct validity confirmed using Principal Component Factor Analysis with Kaiser Meyer Olkin (KMO). The data explanatory and conformity examined using Principal Factor Analysis. Factor loading more than 0.50 is good and accepted if it is exceeding 0.40 (Hair, et. al. 2014). However, Kaiser Meyer Olkin (KMO) is used to measure sampling adequacy, harmony and inter-correlations, KMO values between 0.8 and 1 indicate that a high sampling is adequacy, and accepted if it is exceeding 0.6. 49. Another indicator is Bartlett's of Sphericity used for the determination of the suitability of data and correlation, where if the significant value of data is less than 0.05 at a 95%

confidence level, which indicates useful factor analysis. Variance percentage shows the explanation power of factors (Cerny & Kaiser, 1977).

Independent Variable: ERP System Dimensions:

ERP System Variable:

Table (1) illustrates that the loading factor of ERP System items scored between 0.846 and 0.934. Therefore, construct validity is assumed. KMO has rated 86.1%, which indicates good adequacy, and the Chi^2 is 780.256, which indicates the fitness of the model. Moreover, the variance percentage is 80.614, so it can explain 80.614% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 1: Principal Component Analysis for ERP System Variable

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	HRMS	0.846	0.861	780.256	10	80.614	0.000
2	CRMS	0.893					
3	IMS	0.915					
4	FMS	0.934					
5	POMS	0.899					

Human Resource Management System

Table (2) illustrates that the loading factor of HRMS items scored between 0.757 and 0.851. Therefore, construct validity is assumed. KMO has rated 84.2%, which indicates good adequacy, and the Chi^2 is 565.020, which indicates the fitness of the model. Moreover, the variance percentage is 64.771, so it can explain 64.771% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 2: Principal Component Analysis for HRMS

No.	Item	F1	KMO	Chi^2	BTS	% Var	Sig
1	ERP System plans workforce to meet functional needs	0.774	0.842	565.020	15	64.771	0.000
2	ERP System supports the recruitment process based on competence	0.851					
3	ERP System develops the selection of suitable employee	0.757					
4	ERP System supports the cross-functional team's development	0.845					
5	ERP System facilitates employees learning and development process (e-learning)	0.798					
6	ERP System supports employees performance evaluation	0.799					

Customer Relationship Management System

Table (3) illustrates that the loading factor of CRMS items scored between 0.662 and 0.869. Therefore, construct validity is assumed. KMO has rated 87.4%, which indicates good adequacy, and the Chi^2 is 560.994, which indicates the fitness of the model. Moreover, the variance percentage is 65.404, so it can explain 65.404% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 3: Principal Component Analysis for CRMS

No.	Item	F1	KMO	Chi^2	BTS	% Var	Sig
7	ERP System supports the quick order system of customers	0.662	0.874	560.994	15	65.404	0.000
8	ERP System enhances the quality of service	0.775					
9	ERP System develops suitable designs as customers' desires	0.860					
10	ERP System shares demand forecasts with customers	0.869					
11	ERP System helps long term relationships with customers	0.849					
12	ERP System follow-up customers' feedback about product/service provided	0.818					

Inventory Management System

Table (4) illustrates that the item loading of IMS scored between 0.689 and 0.855. Therefore, construct validity is assumed. KMO has rated 86.3%, which indicates good adequacy, and the Chi^2 is 618.754, which indicates the fitness of the model. Moreover, the variance percentage is 67.444, so it can explain 67.444% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 4: Principal Component Analysis for IMS

No.	Item	F1	KMO	Chi^2	BTS	% Var	Sig
13	ERP System adopts JIT technique to provide organization needs on time	0.689	0.862	618.754	15	67.444	0.000
14	ERP System provides inventory based on demand forecasting	0.852					
15	ERP System adopts Bar-coding device to get accurate information	0.833					
16	ERP System determines the re-order point based on inventory level	0.852					
17	ERP System hedges the right quantities to meet changes in demand	0.855					
18	ERP System monitors inventory to avoid damage and loss of materials	0.834					

Financial Management System

Table (5) illustrates that the item loading of FMS scored between 0.716 and 0.87, so, construct validity is assumed. KMO has rated 84.6%, which indicates good adequacy, and the Chi^2 is 642.038, which indicates the fitness of the model. Moreover, the variance percentage is 65.955, so it can explain 65.955% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 5: Principal Component Analysis for FMS

No.	Item	F1	KMO	Chi2	BTS	% Var	Sig
19	ERP System supports the planning for new sources of funds	0.716	0.846	642.038	15	65.955	0.000
20	ERP System coordinates activities according to the organization's objectives	0.845					
21	ERP System decides investments in new projects based on the availability of funds	0.779					
22	ERP System provides a level of liquidity to schedule expenditure and obligations	0.781					
23	ERP System supports an internal control system to improve the accuracy of data	0.876					
24	ERP System supports financial risk management	0.864					

Production and Operations Management System

Table (6) illustrates that the item loading of POMS scored between 0.771 and 0.889. Therefore, construct validity is assumed. KMO has rated 87.3%, which indicates good adequacy, and the Chi2 is 707.178, which indicates the fitness of the model. Moreover, the variance percentage is 70.994, so it can explain 70.994% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 6: Principal Component Analysis for POMS

No.	Item	F1	KMO	Chi^2	BTS	% Var	Sig
25	ERP System plans the production process based on demand forecasting	0.771	0.873	707.178	15	70.994	0.000
26	ERP system improves operations efficiency	0.845					
27	ERP system improves resource utilization	0.859					
28	ERP system improves order management (order cycle)	0.836					
29	ERP system adopts mass-production to reduce total costs of production	0.851					
30	ERP system supports zero-defect of production (High quality of product)	0.889					

Dependent Variable: Supply Chain Integration Dimensions:

Supply Chain Integration Variable:

Table (7) illustrates that the loading factor of ERP System items scored between 0.914 and 0.950. Therefore, construct validity is assumed. KMO has rated 75%, which indicates good adequacy, and the Chi2 is 409.042, which indicates the fitness of the model. Moreover, the variance percentage is 87.512, so it can explain 87.512% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 7: Principal Component Analysis for ERP System Variable

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	Integration with Suppliers	0.914	0.750	409.042	3	87.512	0.000
2	Internal Processes Integration	0.950					
3	Integration with Customers	0.941					

Integration with Suppliers:

Table (8) illustrates that the item loading of Integration with Suppliers scored between 0.747 and 0.881. Therefore, construct validity is assumed. KMO has rated 89.1%, which indicates good adequacy, and the Chi2 is 955.716, which indicates the fitness of the model. Moreover, the variance percentage is 65.398, so it can explain 65.398% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 8: Principal Component Analysis for Integration with Suppliers

No.	Item	F1	KMO	Chi^2	BTS	% Var	Sig
31	The company owns a full database about selected suppliers	0.794	0.891	955.716	28	65.398	0.000
32	The company develops cooperative relationships with suppliers	0.756					
33	The company shares demand forecasts with suppliers	0.842					
34	The company gets a suitable cost from suppliers	0.837					
35	The company helps suppliers to improve their quality	0.881					
36	The company receives timely from suppliers	0.821					
37	The company gets the correct quantities of materials	0.781					
38	The company reduces waste of materials by coordination with suppliers	0.747					

Internal Processes Integration

Table (9) illustrates that the item loading of Internal Processes Integration scored between 0.718 and 0.867. Therefore, construct validity is assumed. KMO has rated 91%,

which indicates good adequacy, and the Chi^2 is 989.589, which indicates the fitness of the model. Moreover, the variance percentage is 65.873, so it can explain 65.873% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 9: Principal Component Analysis for Internal Processes Integration

No.	Item	F1	KMO	Chi^2	BTS	% Var	Sig
39	The company integrates data among internal functions	0.718	0.910	989.589	28	65.873	0.000
40	The company uses a cross-functional team into product development	0.773					
41	The company develops communication among all internal functions	0.807					
42	The company reduces the time required for each transaction	0.861					
43	The company develops employees' abilities by shared experience a cross-functional teams	0.832					
44	The company increases work flexibility via a cross-functional teamwork	0.840					
45	The company achieves goals jointly	0.867					
46	The company reduces conflicts between functions	0.784					

Integration with Customers

Table (10) illustrates that the item loading of Integration with Customers scored between 0.801 and 0.891. Therefore, construct validity is assumed. KMO has rated 93.2%, which indicates good adequacy, and the Chi^2 is 1140.937, which indicates the fitness of the model. Moreover, the variance percentage is 72.664, so it can explain 72.664% of the variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table 10: Principal Component Analysis for Integration with Customer

No.	Item	F1	KMO	Chi^2	BTS	% Var	Sig
47	The company works as a partner with customers	0.801	0.932	1140.937	28	72.664	0.000
48	The company improves the delivery time of customers' orders	0.872					
49	The company provides customers with a suitable price of products	0.832					
50	The company considers customers' feedback to improve quality	0.871					
51	The company raises customer satisfaction	0.876					
52	The company improves customers involvement in the product development process	0.891					
53	The company shares available quantities of inventory with customer	0.866					
54	The company improves responsiveness to customers' needs	0.805					

Reliability Test:

The study used Cronbach's Alpha internal consistency test to measure the consistency of the respondents' answers for all questions in the scale. Alpha ≥ 0.70 is good and 0.60 is accepted (Hair, et. al., 2010). Table (11) illustrates that the reliability values of the main study variables. The Cronbach's Alpha was accepted for all variables, where the Cronbach's Alpha values for independent dimensions are between 0.888 and 0.917, and for dependent dimensions are between 0.922 and 0.945 (Hair, et. al., 2010).

Table 11: Reliability Test (Cronbach's Alpha Values)

No.	Variable	Dimensions	No. of items	Cronbach's alpha Value
1	**ERP System**			
	1-1	HRM System	6	0.888
	1-2	CRM System	6	0.890
	1 – 3	IM System	6	0.903
	1 – 4	FM System	6	0.894
	1 – 5	POM System	6	0.917
2	**Supply Chain Integration**			
	2-1	Integration with Suppliers	8	0.922
	2-2	Internal Processes Integration	8	0.926
	2 – 3	Integration with Customers	8	0.945

Normal Distribution:

Kolmogorov-Smirnov (Z) test has been carried out to ensure the normal distribution of the data.

From table (12) it is apparent that the distribution of all variables was normal, where the significance level of all variables is greater than (0.05).

Table 12: Normal Distribution of study variables

No.	Variables	Kolmogorov – Smirnov	Sig.*	Result
1	**ERP System**	**0.816**	**0.518**	**Normal Distribution**
1-1	HRM System	1.150	0.142	Normal Distribution
1-2	CRM System	1.143	0.147	Normal Distribution
1-3	IM System	1.180	0.123	Normal Distribution
1-4	FM System	1.215	0.104	Normal Distribution
1-5	POM System	1.081	0.193	Normal Distribution
2	**Supply Chain Integration**	**0.621**	**0.835**	**Normal Distribution**
2-1	Integration with Suppliers	0.759	0.612	Normal Distribution
2 – 2	Internal Processes Integration	0.904	0.387	Normal Distribution
2 – 3	Integration with Customers	1.100	0.178	Normal Distribution

***Distribution is normal when the significance, at (0.05> α).**

Demographic Information Analysis:

The demographic analysis presented in the below sections based on the characteristics of the valid respondent i.e. frequency and percentage of participants such as gender, age, experience, education, position, and Divisions.

Gender: Table (13) shows that the majority of respondents are males, were 114 (67.9%), and only 54 (32.1%) are females. This is justified since the female's proportion is low within the scope of tested divisions and this percentage is much higher within other divisions.

This study would be explains that the factors affecting female labor participation which including of social status, maternity, childcare, and household responsibilities, also social values are often blamed for the low participation rates of female labor in Jordan. Moreover, based on the Jordan human development report for year 2011, which summarizes employers' reasons for preferring male employees, the main ones being females' limited ability for manual labor and for working late hours, and problems with families are refusing to allow them to work.

Finally, the "glass ceiling" limiting female promotions still exists, but it is eroding, with 18 percent of management positions in the private sector now going to females according to Jordan's National Employment Strategy 2011-2020 (https://www.ilo.org).

Table 13: Respondents Gender

Variable	Categorization	Frequency	Percent
Gender	Male	114	%67.9
	Female	54	%32.1
Total		**168**	**100**

Age (Years): Table (14) shows that the majority of respondents ages are between (30-39 years) 22 (13.1%) out of the total sample, then those ages between (40-49 years) 119 (70.8%), after that the respondents younger than 30 years 7 (4.2%), finally those older than 50 years 20 (11.9%).

Table 14: Respondents Age (Years)

Variable	Categorization	Frequency	Percent
Age	Less than 30 Years	7	%4.2
	Less than 40 Years	22	%13.1
	Less than 50 Years	119	%70.8
	More than 50 Years	20	%11.9
Total		**168**	**100**

Experience: Table (15) shows that the majority of respondents are having experience between (10-20 years) 88 (52.4%), then respondents experience between (21-30 years) 29 (17.3%), followed by those with experience less than 10 years 42 (25%). Finally, respondents have more than 30 years 'experience been 9 (5.4%).

Table 15: Respondents Experience

Variable	Categorization	Frequency	Percent
Experience	Less than 10 Years	42	%25
	Between 10 – 20 Years	88	%52.4
	Between 21 – 30 Years	29	%17.3
	More than 30 Years	9	%5.4
Total		**168**	**100**

Education: Table (16) shows that the majority of respondents hold a bachelor's degree, where the majority of 97 (57.7%) have a bachelor's degree after that 53 (31.5%) have a Master's degree, finally 18 (10.7%) have Ph.D. degree.

Table 16: Respondents Education

Variable	Categorization	Frequency	Percent
Education	Diploma or less	-	-
	Bachelors	97	%57.7
	Master	53	%31.5
	Doctorate (PhD)	18	%10.7
Total		**168**	**100**

Position: Table (17) shows that the majority of respondents are supervisors 95 (65.5%) out of the total respondents after that 49 (29.2%) are managers from the Middle level; finally, the third category is high level 24 (14.3%).

Table 17: Respondents Position

Variable	Categorization	Frequency	Percent
Position	High level	24	%14.3
	Middle level	49	%29.2
	Supervisor	95	%56.5
	Others	-	-
Total		**168**	**100**

Division: Table (18) shows that the majority of respondents are 48 (28.6%) from operations and quality Dept. out of the total respondents after that 43 (25.6%) from production Dept. then 38 (22.6%) from human resource Dept., followed by respondents from

finance Dept. 20 (11.9%). Finally, the respondents from the supply chain Dept. 19 (11.3%).

Table 18: Respondents Division

Variable	Categorization	Frequency	Percent
Division	HR Dept.	38	%22.6
	Finance Dept.	20	%11.9
	Production Dept.	43	%25.6
	Supply Chain Dept.	19	%11.3
	Operations & Quality Dept.	48	%28.6
Total		**168**	**100**

Chapter Four: Data Analysis

Background

This chapter describes the results of the statistical analysis for the data collected according to the research questions and research hypotheses. It includes descriptive analysis, the relationship between independent and dependent variables, hypothesis testing, and summary of the resuutls.

Descriptive Statistical Analysis Results:

The mean, standard deviation, t-value, ranking, important level were used to describe the respondents' perception and the degree of an important level of each variable, dimensions, and items.

The important level is divided into three categories based on the following formula:

$$\text{Class Interval} = \frac{\text{Maximum Class} - \text{Minimum Class}}{\text{Number of Level}}$$

$$\text{Class Interval} = \frac{5-1}{3} = \frac{4}{3} = 1.33$$

- The Low degree from 1 - less than 2.33
- The Medium degree from 2.33 - less than 3.66
- The High degree from 3.67 - 5

Independent Variable: Enterprise Resource Planning (ERP) System:

Table (19) illustrates that the means of ERP sub-variables are ranging between 3.53 and 3.57, with standard deviation ranges between 0.714 and 0.749, which means that respondents agree on a medium implementation of ERP system sub-variables, production and operations management system has rated the highest, followed by inventory management system, then customer relationship management system, financial management system, and human resources management system, respectively.

Table 19: Mean, Standard Deviation, Rank, and important level of Enterprise Resource Planning System dimensions

No.	ERP System Dimensions	M.	S.D.	t	Sig.	Rank	Imp.
1	Human Resource Management System	3.53	0.727	9.533	0.000	5	Medium
2	Customer Relationship Management System	3.54	0.714	9.884	0.000	3	Medium
3	Inventory Management System	3.55	0.734	9.730	0.000	2	Medium
4	Financial Management System	3.54	0.715	9.816	0.000	4	Medium
5	Production and Operations Management System	3.57	0.749	9.775	0.000	1	Medium
General Mean		**3.55**	**0.653**	**10.862**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Human Resource Management System

Table (20) illustrates that the means of HRMS items range from 3.35 to 3.61 with a standard deviation between 0.782 and 1.050. This indicates that respondents agree on a medium important level of HRMS items; this is supported by high t-value compared to T-tabulated value for items from 1 to 6. The average mean is 3.53 with a standard deviation of 0.727, which clarifies that the respondents are medium aware and concern about HRMS, where (t-value is 9.533 >T-tabulated = 1.960).

Table 20: Mean, Standard Deviation, t-value, Rank, and important level of Human Resource Management System

No.	HRMS	M.	S.D.	t	Sig.	Rank	Imp.
1	ERP System plans workforce to meet functional needs	3.35	1.050	4.333	0.000	6	Medium
2	ERP System supports the recruitment process based on competence	3.45	0.927	6.323	0.000	5	Medium
3	ERP System develops the selection of suitable employee	3.59	0.857	8.912	0.000	4	Medium
4	ERP System supports the cross-functional teams development	3.60	0.903	8.626	0.000	3	Medium
5	ERP System facilitates employees learning and development process (e-learning)	3.61	0.903	8.718	0.000	2	Medium
6	ERP System supports employees performance evaluation	3.61	0.782	10.066	0.000	1	Medium
General Mean		**3.53**	**0.727**	**9.533**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Customer Relationship Management System

Table (21) illustrates that the means of CRMS items range from 3.36 to 3.64 with a standard deviation between 0.843 and 0.957. This indicates that respondents agree on a medium important level of CRMS items; this is supported by high t-value compared to T-tabulated value for items from 7 to 12. The average mean is 3.54 with a standard deviation of 0.714, which clarifies that the respondents are medium aware and concern about CRMS, where (t-value is 9.884 >T-tabulated = 1.960).

Table 21: Mean, Standard Deviation, t-value, Rank, and important level of Customer Relationship Management System

No.	CRMS	M.	S.D.	t	Sig.	Rank	Imp.
7	ERP System supports the quick order system of customers	3.36	0.957	4.919	0.000	6	Medium
8	ERP System enhances quality of service	3.64	0.843	9.889	0.000	1	Medium
9	ERP System develops suitable designs as customers' desires	3.64	0.844	9.786	0.000	2	Medium
10	ERP System shares demand forecasts with customers	3.52	0.941	7.214	0.000	5	Medium
11	ERP System helps long term relationships with customers	3.53	0.861	7.973	0.000	4	Medium
12	ERP System follow-up customers' feedback about product/service provided	3.57	0.879	8.422	0.000	3	Medium
General Mean		**3.54**	**0.714**	**9.884**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Inventory Management System

Table (22) illustrates that the means of IMS items range from 3.46 to 3.68 with a standard deviation between 0.814 and 0.966.

This indicates that respondents agree on medium to high important level of IMS items; this is supported by high t-value compared to T-tabulated value for items from 13 to 18. The average mean is 3.55 with a standard deviation of 0.735, which clarifies that the respondents are highly aware and concern about IMS, where (t-value is 9.730 >T-tabulated = 1.960).

Table 22: Mean, Standard Deviation, t-value, Rank, and important level of Inventory Management System

No.	IMS	M.	S.D.	t	Sig.	Rank	Imp.
13	ERP System adopts JIT technique to provide organization needs on time	3.68	0.814	10.806	0.000	1	High
14	ERP System provides inventory based on demand forecasting	3.50	0.935	6.931	0.000	5	Medium
15	ERP System adopts Bar-coding device to get accurate information	3.61	0.902	8.811	0.000	2	Medium
16	ERP System determines re-order point based on inventory level	3.55	0.853	8.317	0.000	3	Medium
17	ERP System hedges the right quantities to meet changes in demand	3.51	0.966	6.866	0.000	4	Medium
18	ERP System monitors inventory to avoid damage and loss of materials	3.46	0.895	6.639	0.000	6	Medium
General Mean		**3.55**	**0.735**	**9.730**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Financial Management System

Table (23) illustrates that the means of FMS items range from 3.42 to 3.76 with a standard deviation between 0.822 and 0.960. This indicates that respondents agree on

medium to a highly important level of FMS items; this is supported by high t-value compared to T-tabulated value for items from 19 to 24. The average mean is 3.54 with a standard deviation of 0.715, which clarifies that the respondents are highly aware and concern about FMS, where (t-value is 9.816 >T-tabulated = 1.960).

Table 23: Mean, Standard Deviation, t-value, Rank, and important level of Financial Management System

No.	FMS	M.	S.D.	t	Sig.	Rank	Imp.
19	ERP System supports the planning for new sources of funds	3.52	0.960	7.072	0.000	3	Medium
20	ERP System coordinates activities according to organization's objectives	3.50	0.833	7.776	0.000	4	Medium
21	ERP System decides investments in new projects based on availability of funds	3.42	0.822	6.570	0.000	6	Medium
22	ERP System provides level of liquidity to schedule expenditure and obligations	3.76	0.830	11.808	0.000	1	High
23	ERP System supports an internal control system to improve accuracy of data	3.55	0.940	7.550	0.000	2	Medium
24	ERP System supports financial risk management	3.51	0.909	7.214	0.000	4	Medium
General Mean		**3.54**	**0.715**	**9.816**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Production and Operations Management System

Table (24) illustrates that the means of POMS items range from 3.49 to 3.66 with a standard deviation between 0.839 and 0.941. This indicates that respondents agree on a medium important level of POMS items; this is supported by high t-value compared to T-tabulated value for items from 25 to 30. The average mean is 3.57 with a standard deviation of 0.750, which clarifies that the respondents are medium aware and concern about POMS, where (t-value is 9.775 >T-tabulated = 1.960).

Table 24: Mean, Standard Deviation, t-value, Rank, and important level of Production and Operations Management System

No.	POMS	M.	S.D.	t	Sig.	Rank	Imp.
25	ERP System plans the production process based on demand forecasting	3.63	0.900	8.998	0.000	2	Medium
26	ERP system improves operations efficiency	3.66	0.881	9.719	0.000	1	Medium
27	ERP system improves resource utilization	3.62	0.839	9.561	0.000	3	Medium
28	ERP system improves order management	3.51	0.916	7.247	0.000	4	Medium
29	ERP system adopts mass-production to reduce total costs of production	3.49	0.941	6.721	0.000	5	Medium
30	ERP system supports zero defect of production	3.49	0.869	7.284	0.000	6	Medium
General Mean		**3.57**	**0.750**	**9.775**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Dependent Variable: Supply Chain Integration:

Table (25) illustrates that the means of Supply Chain Integration sub-variables range from 3.39 to 3.49 with a standard deviation between 0.720 and 0.797. This indicates that respondents agree on a medium important level of Supply Chain Integration sub-variables that are supported by high t-value compared to T-tabulated.

The average mean is 3.44 with a standard deviation of 0.710, which clarifies that the respondents are medium aware and concern about Supply Chain Integration, where (t-value is 8.003 >T-tabulated = 1.960). IPI has rated the highest implementation, then IC and IS, respectively.

Table 25: Mean, Standard Deviation, t-value, Rank, and important level of Supply Chain Integration dimensions

No.	Supply Chain Integration	M.	S.D.	t	Sig.	Rank	Imp.
1	Integration with Suppliers	3.39	0.761	6.678	0.000	3	Medium
2	Internal Processes Integration	3.49	0.720	8.891	0.000	1	Medium
3	Integration with Customers	3.43	0.797	6.983	0.000	2	Medium
General Mean		**3.44**	**0.710**	**8.003**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Integration with Suppliers

Table (26) illustrates that the means of Integration with Suppliers items range from 3.23 to 3.54 with a standard deviation between 0.833 and 1.099. This indicates that respondents agree on a medium important level of IWS items; this is supported by high t-value compared to T-tabulated value for items from 31 to 38. The average mean is 3.39 with a standard deviation of 0.761, which clarifies that the respondents are medium aware and concern about Integration with Suppliers, where (t-value is 6.678 >T-tabulated = 1.960).

Table 26: Mean, Standard Deviation, t-value, Rank, and important level of Integration with Suppliers

No.	Integration with Suppliers	M.	S.D.	t	Sig.	Rank	Imp.
31	The company owns a full database about selected suppliers	3.52	0.889	7.551	0.000	2	Medium
32	The company develops cooperative relationships with suppliers	3.39	1.099	4.561	0.000	4	Medium
33	The company shares demand forecasts with suppliers	3.23	1.082	2.710	0.000	8	Medium
34	The company gets a suitable cost from suppliers	3.26	0.998	3.400	0.000	7	Medium
35	The company helps suppliers to improve their quality	3.35	0.855	5.236	0.000	6	Medium
36	The company receives timely from suppliers	3.35	0.896	4.996	0.000	5	Medium
37	The company gets the correct quantities of materials	3.54	0.881	7.966	0.000	1	Medium
38	The company reduces waste of materials by coordination with suppliers	3.51	0.833	7.962	0.000	3	Medium
General Mean		**3.39**	**0.761**	**6.678**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Internal Processes Integration

Table (27) illustrates that the means of Internal Processes Integration items range from 3.41 to 3.55 with a standard deviation between 0.832 and 0.954. This indicates that respondents agree on a medium important level of IPI items, this is supported by high t-value compared to T-tabulated value for items from 39 to 46. The average mean is 3.49 with a standard deviation of 0.720, which clarifies that the respondents are medium aware and concern about Internal Processes Integration, where (t-value is 8.891 >T-tabulated = 1.960).

Table 27: Mean, Standard Deviation, t-value, Rank, and important level of Internal Processes Integration

No.	Internal Processes Integration	M.	S.D.	t	Sig.	Rank	Imp.
39	The company integrates data among internal functions	3.54	0.832	8.435	0.000	1	Medium
40	The company uses a cross-functional teams into product development	3.41	0.891	5.973	0.000	8	Medium
41	The company develops communication among all internal functions	3.50	0.869	7.461	0.000	5	Medium
42	The company reduces the time required for each transaction	3.49	0.954	6.632	0.000	6	Medium
43	The company develops employees' abilities by shared experience a cross-functional teams	3.46	0.921	6.531	0.000	7	Medium
44	The company increases work flexibility via a cross-functional teamwork	3.50	0.869	7.461	0.000	3	Medium
45	The company achieves goals jointly	3.49	0.889	7.203	0.000	3	Medium
46	The company reduces conflicts between functions	3.55	0.874	8.211	0.000	2	Medium
General Mean		**3.49**	**0.720**	**8.891**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Integration with Customers

Table (28) illustrates that the means of Integration with Customer items range from 3.32 to 3.55 with a standard deviation between 0.867 and 1.023. This indicates that respondents agree on a medium important level of IWC items, this is supported by high t-value compared to T-tabulated value for items from 47 to 54. The average mean is 3.43 with a standard deviation of 0.797, which clarifies that the respondents are medium aware and concern about Integration with Customers, where (t-value is 6.983 >T-tabulated = 1.960).

Table 28: Mean, Standard Deviation, t-value, Rank, and important level of Integration with Customers

No.	Integration with Customers	M.	S.D.	t	Sig.	Rank	Imp.
47	The company works as a partner with customers	3.55	0.901	7.876	0.000	1	Medium
48	The company improves the delivery time of customers' orders	3.45	0.972	6.035	0.000	2	Medium
49	The company provides customers with a suitable price of products	3.43	0.913	6.167	0.000	5	Medium
50	The company considers customers' feedback to improve quality	3.44	0.867	6.588	0.000	3	Medium
51	The company raises customer satisfaction	3.44	0.887	6.436	0.000	3	Medium
52	The company improves customers involvement in the product development process	3.38	0.939	5.174	0.000	7	Medium
53	The company shares available quantities of inventory with customer	3.32	1.023	4.074	0.000	8	Medium
54	The company improves responsiveness to customers' needs	3.42	0.982	5.579	0.000	6	Medium
General Mean		**3.43**	**0.797**	**6.983**	**0.000**	**-**	**Medium**

T-tabulated = 1.960

Relationship between Independent and Dependent Variables:

Bivariate Pearson Correlation Test has been used to check the relationship between variables.

Table (29) illustrates that the relationships among ERP System sub-variables are strong, where r ranges between 0.652 and 0.881. Moreover, the relationships among Supply chain Integration sub-variables are also strong, where r ranges between 0.773 and 0.866. Finally, the relationship between independent and dependent variables is very strong, where r equals 0.856. Further, this indicates that the any change in any sub-variable will affects other variables.

Table 29: Relationship between Independent and Dependent Variables

Variables	HRMS	CRMS	IMS	FMS	POMS	ERP	IWS	IPI	IWC	SCI
HRMS										
CRMS	.744**									
IMS	.707**	.790**								
FMS	.712**	.750**	.836**							
POMS	.652**	.727**	.768**	.881**						
ERP	.875**	.907**	.922**	.912**	.837**					
IWS	.601**	.685**	.761**	.799**	.794**	.787**				
IPI	.682**	.698**	.742**	.765**	.746**	.798**	.798**			
IWC	.660**	.745**	.767**	.781**	.749**	.816**	.773**	.866**		
SCI	.692**	.759**	.810**	.836**	.816**	.856**	.916**	.947**	.943**	

**** Correlation is significant at the (0.01) level (2-tailed).**

The Study Hypotheses Test:

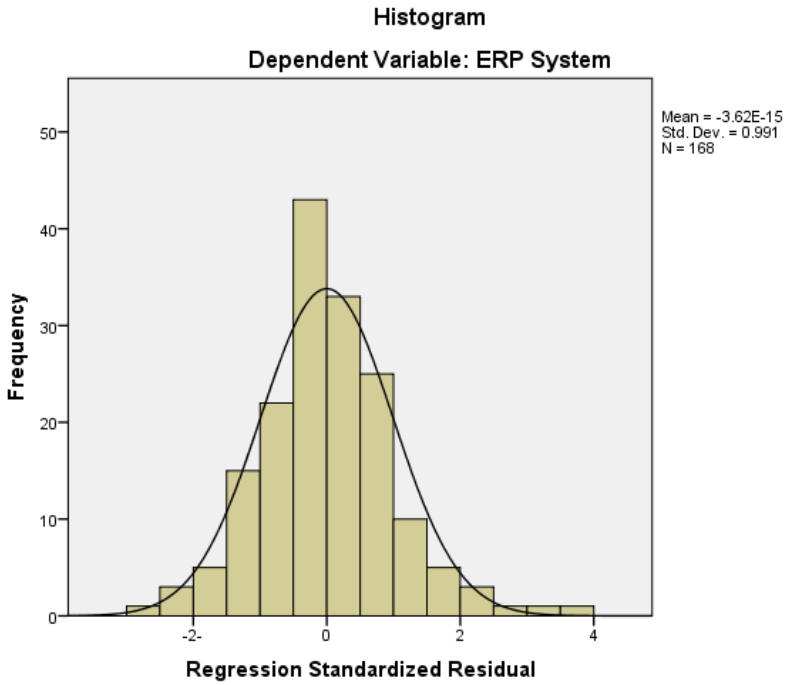
H_{01}: ERP System does not affect **Supply Chain Integration dimensions** (integration with suppliers, internal processes integration, and integration with customers) in Jordanian pharmaceutical manufacturing organizations, at ($\alpha \leq 0.05$).

H_{02}: **ERP System dimensions** (human resource management system, customer relationships management system, inventory management system, financial management system, and production and operations management system) do not affect **Supply Chain Integration** in Jordanian pharmaceutical manufacturing organizations, at ($\alpha \leq 0.05$).

After confirming the normality, validity, reliability, and correlation, so the multiple regressions are used to test the hypotheses. To confirm the validity of multiple regressions, the study also carried out the following test: Normality, linearity, Equal variance (homoscedasticity), Multicollinearity.

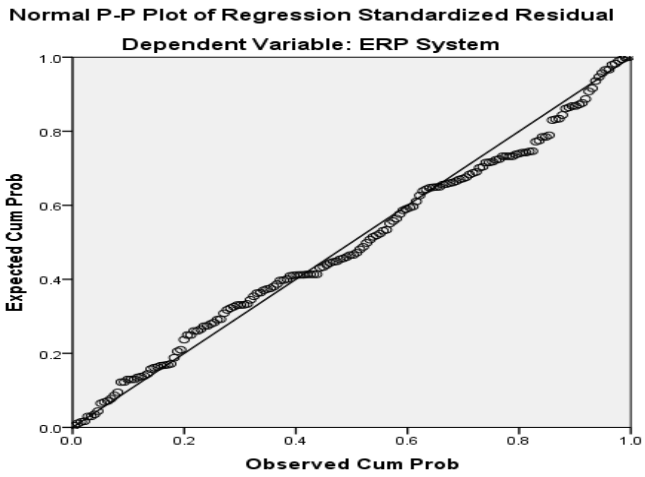
Normality: Figure 18 illustrates that the shape follows the normal distribution; in such a case, the model does not violates this assumption.

Figure 18: Normality Test.



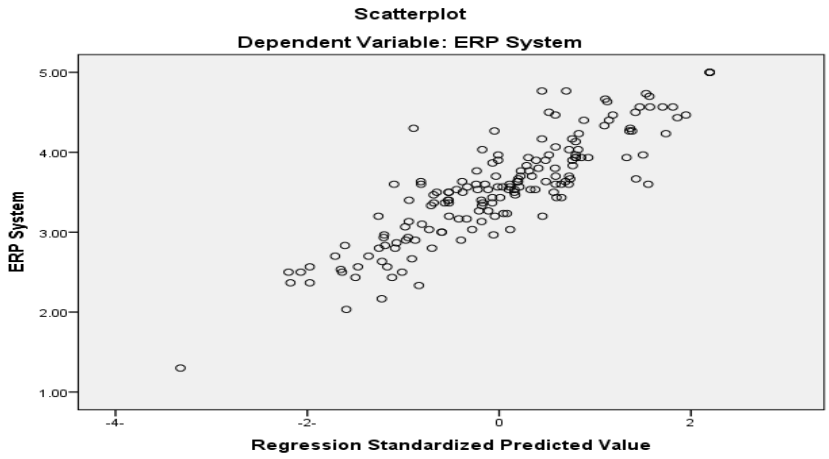
Linearity: Figure (19) illustrates that there is a linear relationship between independent and dependent variables. In such a case, the model does not violate this assumption.

Figure 19: Linearity Test.



Equal variance (homoscedasticity): Figure (20) illustrates that the errors are scattered around the mean, therefore there is no relation between errors and predicted values, in such case the model does not violate this assumption.

Figure 20: Equal variance Test.



Multi-Collinearity:

Table (30) illustrates that Multi-Collinearity: Variance Inflation Factor (VIF) value is less than 10, and tolerance is more than 10%, where one predictor variable in a multiple regression model can be linearly predicted from the others with a substantial degree of accuracy.

Table 30: Durbin-Watson value and Variance Inflation Factor

Dependent Sub-Variables	Collinearity Statistics	
	Tolerance	VIF
Integration with Suppliers	.337	2.971
Internal Process Integration	.209	4.788
Integration with Customers	.231	4.327

Main Hypothesis (1):

H_{01}: ERP System does not affects **Supply Chain Integration dimensions** (integration with suppliers, internal processes integration, and integration with customers) in Jordanian pharmaceutical manufacturing organizations, at ($\alpha \leq 0.05$).

Table (31) illustrates that when regressing the ERP System variable on the three sub-variables together, the result shows ERP System can explain 76.4% of variation on supply chain integration sub-variables of JPMOs, where (R^2=0.764, F=176.547, Sig= 0.000). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that ERP System affects supply chain integration dimensions in Jordanian pharmaceutical manufacturing organizations, at ($\alpha \leq 0.05$).

Table 31: Multiple Regressions of ERP System on Supply Chain Integration Dimensions.

Model	r	R^2	Adjusted R^2	f	Sig.
1	.874	.764	.759	176.547	0.000

a. Predictors: (Constant), Integration with Customer, Integration with Supplier, Internal Processes Integration.

Table (32) shows ERP System affects on each supply chain integration sub-variable:

Table 32: Multiple Regressions of ERP System on Supply Chain Integration dimensions (IWS, IPI, IWC) (ANOVA).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.813	.125		6.489	.000
	Integration with suppliers	.320	.056	.372	5.686	.000
	Internal processes integration	.173	.075	.191	2.295	.023
	Integration with customers	.305	.065	.372	4.712	.000

a. Dependent Variable: ERP System

$H_{01.1}$: The ERP System does not affects integration with suppliers at JPMOs, at ($\alpha \leq 0.05$). Table (32) illustrates that the ERP System impacts integration with suppliers at JPMOs, where (β=0.372, t=5.686, sig.=0.000). Therefore, the null hypothesis is rejected and the alternative is accepted, which states that the ERP System affects integration with suppliers at JPMOs, at ($\alpha \leq 0.05$).

$H_{01.2}$: The ERP System does not affects internal processes integration at JPMOs, at ($\alpha \leq 0.05$). Table (32) illustrates that the ERP System impacts internal processes integration at JPMOs, where (β=1.91, t=2.295, sig.=0.000). Therefore, the null hypothesis is

rejected and the alternative is accepted, which states that the ERP System affects internal processes integration at JPMOs, at ($\alpha \leq 0.05$).

$H_{01.3}$: The ERP System does not affects integration with customers at JPMOs, at ($\alpha \leq 0.05$). Table (32) illustrates that the ERP System affects integration with customers at JPMOs, where (β=0.372, t=4.712, sig.=0.000). Therefore, the null hypothesis is rejected and the alternative is accepted, which states that the ERP System affects integration with customers at JPMOs, at ($\alpha \leq 0.05$).

Main Hypothesis (2):

H_{02}: **ERP System dimensions** (human resource management system, customer relationships management system, inventory management system, financial management system, and production and operations management system) do not affect **Supply Chain Integration** in Jordanian pharmaceutical manufacturing organizations, at ($\alpha \leq 0.05$).

Table (33) illustrates that when regressing the ERP System five sub-variables together on supply chain integration, the result shows ERP System can explain 77.2% of variation on supply chain integration of JPMOs, where (R^2=0.772, F=109.845, Sig= 0.000). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that ERP System dimensions affect supply chain integration in Jordanian pharmaceutical manufacturing organizations, at ($\alpha \leq 0.05$).

Table 33: Multiple Regressions of ERP System dimensions with Supply Chain Integration.

Model	r	R^2	Adjusted R^2	f	Sig.
1	.879	.772	.765	109.845	.000

a. Predictors: (Constant), Production & Operations Management System, Human Resource Management System, Customer Relationship Management System, Inventory Management System, Financial Management

Table (34) shows ERP system sub-variables impact on supply chain integration:

Table 34: Multiple Regressions of ERP System dimensions (HRMS, CRMS, IMS, FMS, POMS) on Supply Chain Integration (ANOVA).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.116	.148		.784	.434
	Human Resource Management System	.067	.059	.069	1.142	.255
	Customer Relationship Management System	.138	.069	.139	2.002	.047
	Inventory Management System	.229	.074	.237	3.084	.002
	Financial Management System	.243	.095	.245	2.575	.011
	Production & Operations Management System	.257	.077	.272	3.347	.001

a. Dependent Variable: Supply Chain Integration

$H_{02.1}$: The ERP system dimension (Human Resource Management System) does not affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$). Table (34) illustrates that the ERP system dimension (HRMS) affects supply chain integration at JPMOs, where (β=0.069, t=1.142, sig.=0.255). Therefore, the null hypothesis is accepted, which states that the ERP system dimension (HRMS) does not affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$).

$H_{02.2}$: The ERP system dimension (Customer Relationship Management System) does not affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$). Table (34) illustrates that the ERP system dimension (CRMS) affects supply chain integration at JPMOs, where (β=0.139, t=2.002, sig.=0.047). Therefore, the null hypothesis is rejected and the alternative is accepted, which states that the ERP system dimension (CRMS) affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$).

$H_{02.3}$: The ERP system dimension (Inventory Management System) does not affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$). Table (34) illustrates that the ERP system dimension (IMS) affects supply chain integration at JPMOs, where (β=0.237, t=3.084, sig.=0.002). Therefore, the null hypothesis is rejected and the alternative is accepted, which states that the ERP system dimension (IMS) affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$).

$H_{02.4}$: The ERP system dimension (Financial Management System) does not affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$). Table (34) illustrates that the ERP system dimension (FMS) affects supply chain integration at JPMOs, where (β=0.245, t=2.575, sig.=0.011). Therefore, the null hypothesis is rejected and the alternative is accepted, which states that the ERP system dimension (FMS) affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$).

$H_{02.5}$: The ERP system dimension (Production and Operations Management System) does not affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$). Table (34) illustrates that the ERP system dimension (POMS) affects supply chain integration at JPMOs, where (β=0.272, t=3.347, sig.=0.001). Therefore, the null hypothesis is rejected and the alternative is accepted, which states that the ERP system dimension (POMS) affects supply chain integration at JPMOs, at ($\alpha \leq 0.05$).

In summary, results show that JPMOs have a medium implementation of ERP System sub-variables, where the production and operations management system has rated the highest, then inventory management system, followed by financial management system, customer relationships management system, and human resource management

system, respectively. Results show that JPMOs also having a medium implementation of Supply Chain Integration sub-variables, where internal processes integration has rated the highest implementation, then integration with customers and integration with suppliers, respectively.

Moreover, Bivariate Pearson Correlation Test illustrates that the relationships among ERP System sub-variables are strong, and the relationships among supply chain integration sub-variables are also strong, and the relationship between independent and dependent variables is very strong.

Furthermore, the results show that the ERP System dimensions together affect Supply Chain Integration dimensions in Jordanian pharmaceutical manufacturing organizations, where ERP System has the highest effects on integration with suppliers, then integration with customers and finally, internal processes integration.

Finally, the results also show that the ERP System dimensions affect Supply Chain Integration in Jordanian pharmaceutical manufacturing organizations, where the production and operations management system has the highest effects on supply chain integration, and then inventory management system, followed by the financial management system, and customer relationship management system, respectively. While the human resource management system does not has a significant effect on supply chain integration, at ($\alpha \leq 0.05$).

Chapter Five: Results' Discussion and Recommendations

Background

In light of the results of the statistical analysis, the study presents the following results, the conclusion with their accompanied set of recommendations and suggestions.

Results 'Discussion:

Descriptive Results for Study Variables:

The results of the study show that in Jordanian pharmaceutical manufacturing organizations have a medium implementation of ERP System dimensions, where production and operations management system has rated the highest, then inventory management system, followed by financial management system, and customer relationships management system, and human resource management system, respectively.

Results show that JPMOs also having a medium implementation of supply chain integration sub-variables, where internal processes integration has rated the highest implementation, then integration with customers and integration with suppliers, respectively.

Table (35) summarizes the affect matrix among the ERP System and supply chain integration sub-variables (integration with suppliers, internal processes integration, and integration with customers) via ANOVA analysis, the results as follow:

Table 35: Summary of Multiple Regressions ERP System on Supply Chain Integration sub-variables (Integration with Suppliers, Internal Processes Integration, and Integration with Customers) (ANOVA)

ERP System	Supply Chain Integration Dimensions
+	Integration with Suppliers
+	Internal Processes Integration
+	Integration with Customers

Bivariate Pearson Correlation Test illustrates that the relationships among ERP System sub-variables are strong, and the relationships among supply chain integration sub-variables are also strong, and the relationship between independent and dependent variables is very strong.

Finally, the results show that the ERP System affects supply chain integration dimensions in Jordanian pharmaceutical manufacturing organizations, where ERP System has the highest effect on integration with suppliers, then integration with customers and finally, internal processes integration. As well as, results show that the ERP System dimensions affect supply chain integration in Jordanian pharmaceutical manufacturing organizations, where the production and operations management system has the highest effects on supply chain integration, and then inventory management system, followed by the financial management system, and customer relationship management system, respectively. While the human resource management system does not has a significant effect on supply chain integration, at ($\alpha \leq 0.05$).

1. The significant effect of the total ERP System dimensions on total supply chain integration dimensions in Jordanian pharmaceutical manufacturing organizations, which supported by previous studies of Shatat and Udin (2012) reported that there is a positive and significant linkages between ERP system and supply chain integration.

2. The significant effect of the total ERP System dimensions on integration with suppliers in Jordanian pharmaceutical manufacturing organizations, which supported by previous studies of Handoko, et. al., (2015) confirmed that ERP system usage positively correlates with the supplier relationship.

3. The significant effect of the total ERP System dimensions on internal processes integration in Jordanian pharmaceutical manufacturing organizations, which supported by previous studies of Ata, et. al., (2017) mentioned that ERP system usage positively affects organizations' performance at Jordanian industrial.

4. The significant effect of the total ERP System dimensions on integration with customers in Jordanian pharmaceutical manufacturing organizations, which supported by previous studies of Abro, et. al., (2017) reported that ERP system usage encourages supply chain integration.

5. The significant effects of the ERP System dimension (customer relationships management system) on total supply chain integration in Jordanian pharmaceutical manufacturing organizations, which supported by previous studies of Zolfagharian and Jafari (2019) pointed out that ERP system has a significant effect on customer satisfaction and quality of service .

6. The significant effects of the ERP System dimension (inventory management system) on total supply chain integration in Jordanian pharmaceutical manufacturing organizations, which supported by previous studies of Aziz, et. al., (2018) stated that ERP system usage has an effects on supply chain management.

7. The significant effects of the ERP System dimension (financial management system) on total supply chain integration in Jordanian pharmaceutical manufacturing organizations, which supported by previous studies of Tapang and Azubike (2018) stated that ERP system has a significant effect on financial performance.

8. The significant effects of the ERP System dimension (production and operations management system) on total supply chain integration in Jordanian pharmaceutical manufacturing organizations, which supported by previous studies of Elgohary (2019) reported that ERP system capabilities positively effect on quality of product and operations of companies, and on competitiveness.

9. While of the ERP System dimension (human resource management system) does not has a significant effect on supply chain integration, at ($\alpha \leq 0.05$). Which supported by previous studies of Fahmi (2018) reported that the factor of user engagement has no significant effect on the success of ERP implementation.

Conclusion:

This study is conducted to answering the study main questions: ERP System does not affects supply chain integration dimensions (integration with suppliers, internal processes integration, and integration with customers) in Jordanian pharmaceutical manufacturing organizations. ERP System dimensions (human resource management system, customer relationships management system, inventory management system, financial management system, and production and operations management system) do not affect supply chain integration in Jordanian pharmaceutical manufacturing organizations. Data were collected through the questionnaire, which tested for its validity and reliability. Then, the correlation and multiple regressions were used to test the hypotheses.

The results of the study show that in Jordanian pharmaceutical manufacturing organizations have a medium implementation of ERP System sub-variables, where production and operations management system has rated the highest, then inventory management system, followed by financial management system, customer relationships management system, and human resource management system, respectively.

Results show that JPMOs also having a medium implementation of supply chain integration sub-variables, where internal processes has rated the highest implementation, then integration with customers and integration with suppliers, respectively. Bivariate Pearson Correlation Test illustrates that the relationships among ERP System sub-variables are strong, and the relationships among supply chain integration sub-variables are also strong, and the relationship between independent and dependent variables is very strong.

Furthermore, the results show that the ERP System affects supply chain integration sub-variables in Jordanian pharmaceutical manufacturing organizations, where ERP System has the highest effects on integration with suppliers, then integration with customers and finally, internal processes integration.

Finally, the results show that the ERP System dimensions affect supply chain integration in Jordanian pharmaceutical manufacturing organizations, where the production and operations management system has the highest effects on supply chain integration, and then inventory management system, followed by the financial management system, and customer relationship management system, respectively. While the human resource management system does not has a significant effect on supply chain integration, at ($\alpha \leq 0.05$).

Recommendations and Suggestions:

Recommendations for Jordanian Pharmaceutical Manufacturing Organizations in Amman:

The results of the study show that the real and practical use of the ERP System in Jordanian pharmaceutical manufacturing organizations was average. Therefore, the study recommends the following for JPMOs:

1. Jordanian pharmaceutical manufacturing organizations should take advantage of the ERP system used that by modify these models to suit the nature of their own operations.

2. Jordanian pharmaceutical manufacturing organizations have to exploit all their resources and various departments, which in turn contribute to improving overall performance with more efficiently and effectively.

3. Jordanian pharmaceutical manufacturing organizations must develop the relations with suppliers based on integration and partnership.

4. Jordanian pharmaceutical manufacturing organizations that are not using the ERP System need to expedite their adoption of the system in order to improve the supply chain integration and internal processes which enhancing the strategic goals of organization.

5. Jordanian pharmaceutical manufacturing organizations must adopt and implement the (HRMS) module within organization, because it is high important for employees evaluation and their satisfaction, as well improves their skills.

6. Jordanian pharmaceutical manufacturing organizations' management have to give the direct higher attention and significance towards the development processes of supply chain integration skills that maximizing the supply chain management performance.

Recommendations for Academics and Future Research:

1. This study is carried out on Jordanian pharmaceutical manufacturing organizations in Amman. To be able to generalize the current study results, it is recommended to conduct such a study on the same industry in other countries, especially in Arab World because they have a similar social and cultural life-style.

2. This study is carried out on Jordanian pharmaceutical manufacturing organizations in Amman. Therefore, it is advised to apply the same variables to other manufacturing industries.

3. This study carried out within a limited period; therefore, it is advised to repeat this study after a suitable time to check sector development based on longer period of survey.

4. Need to conduct a study titled "The Moderating role of Supply Chain Integration in the relationship between the ERP System and operating performance in Jordanian pharmaceutical manufacturing organizations".

5. Extending the analyses to other industries and countries represent future research opportunities, which can be done by further testing with larger samples within the same industry, and including other industries will help mitigate the issue of generalizing conclusions on others.

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Appendices

Appendix 1: Names of Arbitrators

No.	Name	Specialization	University
1	Prof. Mohammed Al- Naimi	Statistic	Jordan
2	Prof. Rateb Sweis	Business Administration	Jordan
3	Prof. Zakaria Metlak Al- Douri	Business Administration	Isra
4	Dr. Abdullah Bataineh	Business Administration	MEU
5	Dr. Nedal Al- Salhi	Business Administration	Petra
6	Dr. Fayez Al- Badri	Business Administration	MEU
7	Dr. Nahla Al- Nazar	Business Administration	MEU
8	Dr. Sameer AL-Jabali	Marketing	MEU
9	Dr. Wasef Mater	Business Administration	MEU

Appendix 2: Names of Jordanian Pharmaceutical Manufacturing Organizations in (JAPM)

No.	Names of Organizations
1	Total Quality Pharma
2	Arab Pharmaceutical Manufacturing Co.
3	Amman Pharma Industries
4	Arab Center Co. for Pharmaceuticals & Chemicals
5	Dar AlDawa Development& Investment Co.
6	Hayat Pharmaceutical Industries
7	Hikma Pharmaceuticals
8	Jordan Sweden Medical and Sterilization
9	Jordanian Pharmaceutical Manufacturing
10	Middle East Pharmaceutical & Chemical Industries
11	Pharma International Co.
12	Ram Pharmaceutical Industries
13	Arab Pharmaceutical Manufacturing
14	United Pharmaceutical Manufacturing Co.

Appendix 3: Names of Interviewed Persons

No.	Name	Job	Firm
1	Eng. Maher Al-shaikh	Supervisor at Supply Chain Department	Hikma Pharmaceuticals
2	Mr. Mahmoud Sukaria	Supervisor at HR Department	Hikma Pharmaceuticals
3	Mr. Amjad Salameh	ERP Manager	Jordanian Pharmaceutical Manufacturing Co.
4	Miss. Dana Maraqa	Supervisor at Supply Chain Department	Hikma Pharmaceuticals

Appendix 4: Questionnaire

Dear Mr. /Dr. …….

I would like to request you to referee the attached questionnaire, which will be used for the thesis entitled:

"The Impact of (ERP) System Usage on Supply Chain Integration at Jordanian Pharmaceutical Manufacturing Organizations in Amman"

أثر استخدام نظام تخطيط موارد المؤسسات على تكامل سلسلة التوريد في شركات صناعة الأدوية الأردنية في عمان

You are requested to spare your precious time to fill up the questionnaire. Your views and answers are important to us; please answer all questions, as we cannot use the questionnaire if it is incomplete.

Finally, the information given by you will be kept confidential and will be used for academic purposes only.

Thank you for your support and collaboration.

Prepared by: Samar Ahmad Sandouqa

Supervised by: Dr. Abdel-Aziz Ahmad Sharabati

Part 1: Demographic Information

Gender:	☐ Male	☐ Female			
Age (Years):	☐ less than 30	☐ less than 40	☐ less than 50	☐ More than 50	
Experience:	☐ less than 10	☐ Bet.10-20	☐ Bet.21-30	☐ More than 30	
Education:	☐ Diploma or less	☐ Bachelor	☐ Master	☐ PhD	
Position:	☐ High Level	☐ Middle Level	☐ Supervisor	☐ Others	
Division:	☐ HR Dept.	☐ Finance Dept.	☐ Production Dept.	☐ Supply Chain Dept.	☐ Operations & Quality

Part 2: This questionnaire includes 54 paragraphs, which may take 15 minutes to answer all related questions. I appreciate your participation in this study, and you can add any note you think it is valuable for the research purposes and for your organization in particular and to pharmaceutical manufacturing in general. The responses will be treated as confidential data and will be used only for academic purposes. Please evaluate each question according to actual implementation and not your belief, as follows:

1 = strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = strongly agree

No	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
ERP System						
Human Resource Management System						
1	ERP System plans workforce to meet functional needs	**1**	**2**	**3**	**4**	**5**
2	ERP System supports the recruitment process based on competence	**1**	**2**	**3**	**4**	**5**
3	ERP System develops the selection of suitable employee	**1**	**2**	**3**	**4**	**5**
4	ERP System supports the cross-functional teams development	**1**	**2**	**3**	**4**	**5**
5	ERP System facilitates employees learning and development process (e-learning)	**1**	**2**	**3**	**4**	**5**
6	ERP System supports employees performance evaluation	**1**	**2**	**3**	**4**	**5**
Customer Relationship Management System						
7	ERP System supports the quick order system of customers	**1**	**2**	**3**	**4**	**5**
8	ERP System enhances the quality of service	**1**	**2**	**3**	**4**	**5**
9	ERP System develops suitable designs as customers' desires	**1**	**2**	**3**	**4**	**5**
10	ERP System shares demand forecasts with customers	**1**	**2**	**3**	**4**	**5**
11	ERP System helps long term relationships with customers	**1**	**2**	**3**	**4**	**5**
12	ERP System follow-up customers' feedback about product/service provided	**1**	**2**	**3**	**4**	**5**
Inventory Management System						
13	ERP System adopts JIT technique to provide organization needs on time	**1**	**2**	**3**	**4**	**5**
14	ERP System provides inventory based on demand forecasting	**1**	**2**	**3**	**4**	**5**
15	ERP System adopts Bar-coding device to get accurate information	**1**	**2**	**3**	**4**	**5**
16	ERP System determines the re-order point based on inventory level	**1**	**2**	**3**	**4**	**5**
17	ERP System hedges the right quantities to meet changes in demand	**1**	**2**	**3**	**4**	**5**
18	ERP System monitors inventory to avoid damage and loss of materials	**1**	**2**	**3**	**4**	**5**
Financial Management System						
19	ERP System supports the planning for new sources of funds	**1**	**2**	**3**	**4**	**5**
20	ERP System coordinates activities according to the organization's objectives	**1**	**2**	**3**	**4**	**5**
21	ERP System decides investments in new projects based on the availability of funds	**1**	**2**	**3**	**4**	**5**
22	ERP System provides a level of liquidity to schedule expenditure and obligations	**1**	**2**	**3**	**4**	**5**
23	ERP System supports an internal control system to improve the accuracy of data	**1**	**2**	**3**	**4**	**5**
24	ERP System supports financial risk management	**1**	**2**	**3**	**4**	**5**

Production & Operations Management System						
25	ERP System plans the production process based on demand forecasting	**1**	**2**	**3**	**4**	**5**
26	ERP system improves operations efficiency	**1**	**2**	**3**	**4**	**5**
27	ERP system improves resource utilization	**1**	**2**	**3**	**4**	**5**
28	ERP system improves order management (order cycle)	**1**	**2**	**3**	**4**	**5**
29	ERP system adopts mass-production to reduce total costs of production	**1**	**2**	**3**	**4**	**5**
30	ERP system supports zero-defect of production (High quality of product)	**1**	**2**	**3**	**4**	**5**
Supply Chain Integration						
Integration with Supplier						
31	The company owns a full database about selected suppliers	**1**	**2**	**3**	**4**	**5**
32	The company develops cooperative relationships with suppliers	**1**	**2**	**3**	**4**	**5**
33	The company shares demand forecasts with suppliers	**1**	**2**	**3**	**4**	**5**
34	The company gets a suitable cost from suppliers	**1**	**2**	**3**	**4**	**5**
35	The company helps suppliers to improve their quality	**1**	**2**	**3**	**4**	**5**
36	The company receives timely from suppliers	**1**	**2**	**3**	**4**	**5**
37	The company gets the correct quantities of materials	**1**	**2**	**3**	**4**	**5**
38	The company reduces waste of materials by coordination with suppliers	**1**	**2**	**3**	**4**	**5**
Internal Process Integration						
39	The company integrates data among internal functions	**1**	**2**	**3**	**4**	**5**
40	The company uses a cross-functional team into product development	**1**	**2**	**3**	**4**	**5**
41	The company develops communication among all internal functions	**1**	**2**	**3**	**4**	**5**
42	The company reduces the time required for each transaction	**1**	**2**	**3**	**4**	**5**
43	The company develops employees' abilities by shared experience a cross-functional teams	**1**	**2**	**3**	**4**	**5**
44	The company increases work flexibility via a cross-functional teamwork	**1**	**2**	**3**	**4**	**5**
45	The company achieves goals jointly	**1**	**2**	**3**	**4**	**5**
46	The company reduces conflicts between functions	**1**	**2**	**3**	**4**	**5**
Integration with Customer						
47	The company works as a partner with customers	**1**	**2**	**3**	**4**	**5**
48	The company improves the delivery time of customers' orders	**1**	**2**	**3**	**4**	**5**
49	The company provides customers with a suitable price of products	**1**	**2**	**3**	**4**	**5**
50	The company considers customers' feedback to improve quality	**1**	**2**	**3**	**4**	**5**
51	The company raises customer satisfaction	**1**	**2**	**3**	**4**	**5**
52	The company improves customers involvement in the product development process	**1**	**2**	**3**	**4**	**5**
53	The company shares available quantities of inventory with customer	**1**	**2**	**3**	**4**	**5**
54	The company improves responsiveness to customers' needs	**1**	**2**	**3**	**4**	**5**