



**The Impact of Supply Chain Integration on  
Operational Performance at Jordanian  
Pharmaceutical Manufacturing Organizations**

**أثر تكامل سلسلة التوريد على الأداء التشغيلي لشركات صناعة  
الأدوية الأردنية**

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**Thesis Submitted in Partial Fulfillment of the Requirements  
for Master Degree in Management**

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This thesis of the student Hamza Saleh "Sultan EL-Tamimi", which studied "The Impact of Supply Chain Integration on Operational Performance at Jordanian Pharmaceutical Manufacturing Organizations" has been defined, accepted and approved on 06/06/2015.


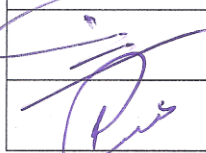
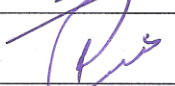
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## قرار لجنة المناقشة

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Hamza Saleh "Sultan El-Tamimi"

## **Dedication**

I present my effort to my late father, and to my dear Mother. To my wife and to my children for their support and patience and to my all family. Thank you everybody for your esteemed support.

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## **Abstract**

The purpose of this study is to investigate the influence of Supply Chain Integration (SCI) on Jordanian Pharmaceutical Manufacturing (JPM) Organizations' Operational Performance (OP). The current study is considered as a causality study, it investigates the effect of SCI elements on JPM Organizations' OP. The study surveyed the managers working at the 14 JPM Organizations. Practical data were collected from 121 managers out of 235 managers, by means of a questionnaire which developed and refined through experts' interviews and the panel of judges committee. Statistical techniques such as descriptive statistics, correlation, and multiple regressions were employed. The results of the study indicated a positive significant relationship between SCI and JPM organizations' OP. The results also indicated that the managers in JPM organizations were almost similar in their preference of the customer integration and internal integration indicators over supplier integration indicators. However, the customer integration indicators are the most important indicators, followed by internal integration, and finally supplier integration. Furthermore, empirical results indicated that there are strong inter-relationships and interactions among the three components of SCI and between them and OP. Finally, the results showed that the respondents believed that there is a strong relationship between SCI and OP. Results indicated that the internal integration was having the highest effect on OP, followed by supplier integration and finally customer integration. Finally, the current study recommend considering improving the three components of SCI together because they are strongly interrelated.

**Key Words:** Supply Chain Integration (SCI), Supplier Integration (SI), Internal Integration (II), Customer Integration (CI), Operational Performance (OP), Jordanian Pharmaceutical Manufacturing (JPM) organization.

## أثر تكامل سلسلة التوريد على الأداء التشغيلي لشركات صناعة الأدوية الأردنية

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الملخص

### Abstract

تهدف هذه الدراسة الى استطلاع أثر تكامل سلسلة التوريد وأثره على الأداء التشغيلي لشركات صناعة الأدوية الأردنية. تعتبر هذه الدراسة دراسة سببية، حيث انها مصممة لدراسة تأثير تكامل سلسلة التوريد على الأداء التشغيلي لشركات صناعة الأدوية الأردنية. تم اجراء المسح الشامل للمدراء العاملين في شركات صناعة الأدوية الأردنية وعددها أربعة عشر شركة باستخدام الاستبانة للحصول على البيانات اللازمة للتحليل، حيث تم جمع 121 استبانة صالحة للتحليل من أصل 235 والتي تم جمعها من المدراء العاملين بالشركات اعلاه. تم تطوير الاستبانة وتقييمها وتحكيمها من خلال عرضها على بعض الخبراء في مجال الصناعة الدوائية، بالاضافة الى تقييمها من قبل مجموعة من المحكمين الاكاديميين. استخدمت مجموعة من الاختبارات الاحصائية المناسبة للبحث مثل الوصف الاحصائي، فحص العلاقات بين المتغيرات، وتم ايضا اختبار معامل الانحدار المتعدد بين جميع متغيرات الدراسة. أظهرت نتائج الدراسة الى وجود علاقة ايجابية ذات دلالة احصائية بين تكامل سلسلة التوريد والأداء التشغيلي لشركات صناعة الأدوية الأردنية، كم اشارت النتائج بوجود اجماع من قبل المدراء على مؤشرات تكامل سلسلة التوريد وهي: التكامل مع الزبائن، التكامل الداخلي، والتكامل مع الموردين. مع العلم بأن مؤشرات التكامل مع الزبائن كانت الأكثر اهمية بين المؤشرات الثلاثة، يليها التكامل الداخلي، واخيرا التكامل مع الموردين. ومن ناحية اخرى اظهرت النتائج بوجود علاقة تداخلية وتفاعلية قوية بين كل من: عناصر تكامل سلسلة التوريد الثلاثة، عناصر تكامل سلسلة التوريد وعناصر الأداء التشغيلي. واخيرا اشارت النتائج بأن المستطلعين يعتقدون بأن هناك علاقة قوية مابين تكامل سلسلة التوريد وبين الأداء التشغيلي في تلك الشركات. حيث اظهرت النتائج وبشكل واضح بأن التكامل الداخلي كان له الأثر الأكبر في العلاقة، يليه في الأثر التكامل مع الموردين، ثم يأتي التكامل مع الزبائن بأقل درجات الأثر في تلك العلاقة أيضا. واخيرا وليس اخرا، توصلت الدراسة الى مجموعة من الأستنتاجات والتوصيات والتي يمكن ان تساهم بشكل فعال في زيادة وتحسين الأداء التشغيلي في شركات صناعة الأدوية، ومن اهم التوصيات الاخذ بعين الاعتبار القيام بتطوير العناصر الثلاثة المكونة لتكامل سلسلة التوريد مجتمعة وذلك لأنها متداخلة ومتفاعلة مع بعضها بقوة شديدة.

**الكلمات ذات الدلالة:** تكامل سلسلة التوريد، التكامل مع الموردين، التكامل الداخلي، التكامل مع الزبائن، الأداء التشغيلي، شركات صناعة الأدوية الأردنية.

# **Chapter One:**

## **Introduction**

### **1.1. Background:**

Recent technological advancement of communication and transportation lead to globalization. Due to globalization customers' needs and requirements have been changed and developed. Customers need a suitable product in suitable place at suitable time with high quality and suitable cost. Any organization would like to compete in recent hyper-market should match with the above mentioned customers' requirements. To fulfill the customers' requirements organizations should improve all their activities and processes. Supply chain management is a system that improves all activities which carried out by organization. Supply chain management is a complex system which covers all supportive activities from suppliers to after sales services. To be able to grow and survive any organization has to identify its strengths and weaknesses, to re-enforce on strengths and overcome weaknesses. Implementing supply chain management can be a source of competitive advantages which lead to better overall organizations' performance.

Vaidya and Hudnurkar (2012) stated that collaboration in supply chain plays a dominant role for improving organization's performance and gaining competitive advantage. Cooper, et al. (1997) said that to utilize the supply chain at its maximum performance level, organizations have to integrate its goals and activities together. Vaidya, et. al (2012:294) mentioned that supply-chain partners need to focus on various elements to ensure competitive advantage: price negotiation to increase in margin, and financial collaboration to ensure innovative product design. Lambert and cooper, (2000) announced that supply chain management requires integration and coordination for satisfying and responding to



change in consumer demand. Finally, Frohlich and Westbrook, (2001) pointed out that supply chain integration influences performance.

Therefore, it seems that its worth to study the effect of integration of supply chain processes and activities on operational performance, so this study investigates the impact of supply chain integration on operational performance at Jordanian Pharmaceutical Manufacturing Organizations.

## **1.2. Problem Statement:**

From the researcher experience in the Pharmaceutical Manufacturing Organization and through unstructured interviews with a group of managers, it was shown that many challenges and obstacles were confronting supply chain management which in turn affected the overall performance at these organizations. First, different departments are concerned with achieving their own objectives separately. Second, supply chain activities and processes are performed by different departments without specialized people. Third, continuous changes in rules and regulation which imposed by Jordanian Food and Drug Association and other universal regulations associations which lead to delay in supplier selection and delay in preparation of the inputs to manufacturing organization. Finally, continuous changing in customer needs and requirements due to tough competitions among the organizations. Consequently, this lead to difficulties in integrating supply chain activities and processes, which delay providing products and services to customers in suitable place at suitable time and losing of competitive advantage. Therefore, the managers believed that its worth to study the topic of supply chain integration, so the purpose of this research is to answer the following question: Is there an impact of supply chain

integration on operational performance at Jordanian Pharmaceutical Manufacturing Organizations?

**Problem Questions:**

1. What is the importance of implementing supply chain integration elements in Jordanian Pharmaceutical Manufacturing Organizations?

2. What is the importance of operational performance dimensions at Jordanian Pharmaceutical Manufacturing Organizations?

3. Is there a relationship between supply chain integration and operational performance in Jordanian Pharmaceutical Manufacturing Organizations?

4. Is there an impact of supply chain integration elements on operational performance in Jordanian Pharmaceutical Manufacturing Organizations?

Based on the elements of supply chain integration, the fourth questions can be divided into the following sub-questions:

4.1 Is there an impact of supplier integration on operational performance at Jordanian Pharmaceutical Manufacturing Organizations?

4.2 Is there an impact of internal integration on operational performance at Jordanian Pharmaceutical Manufacturing Organizations?

4.3 Is there an impact of customer integration on operational performance at Jordanian Pharmaceutical Manufacturing Organizations?

Problem question number one and two will be answered by statistical analysis (mean standard deviation and t-value). Problem question number three will be answered by conducting Bivariate Pearson Correlation. Finally, the fourth problem question and its sub-questions will be answered by testing the hypotheses.

### **1.3. Study Purpose and Objectives:**

The main purpose of this study is to investigate the impact of supply chain integration on operational performance at Jordanian pharmaceutical organizations. The objectives of this research are to:

1. Identify the importance of integration with supplier.
2. Identify the importance of internal integration.
3. Identify the importance of integration with customer.
4. Study the impact of supplier, internal, and external on operational performance.

This research will also provide sound recommendations to Jordanian pharmaceutical Manufacturing Organizations, and might be for other industries and decision makers. Finally, this study will contribute to scientific field.

### **1.4. Study Importance and scope:**

Nowadays, the topic of supply chain integration and its effect on performance is getting more and more importance due to its impact on organization's survival, continuity, and growth. Therefore, studying the impact of supply chain integration on performance is crucial topic for organizations, as well as, for academicians. This study might be considered as initiative that explore the impact of supply chain integration on operational performance at pharmaceutical manufacturing organizations. As a result, a better understanding of the role of supply chain integration in operational performance will improve the pharmaceutical organizations' performance. Results of this study are not only important for pharmaceutical industry, but also for other industries, decision makers and the academician.

### **1.5. Study Hypotheses:**

Based on the problem statement and its elements, the following hypotheses can be derived:

**H<sub>0.1</sub>:** Supply chain integration elements do not have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations, at ( $\alpha \leq 0.05$ ).

The main hypothesis can be divided into three hypotheses according to the supply chain integration elements (variables) as follows:

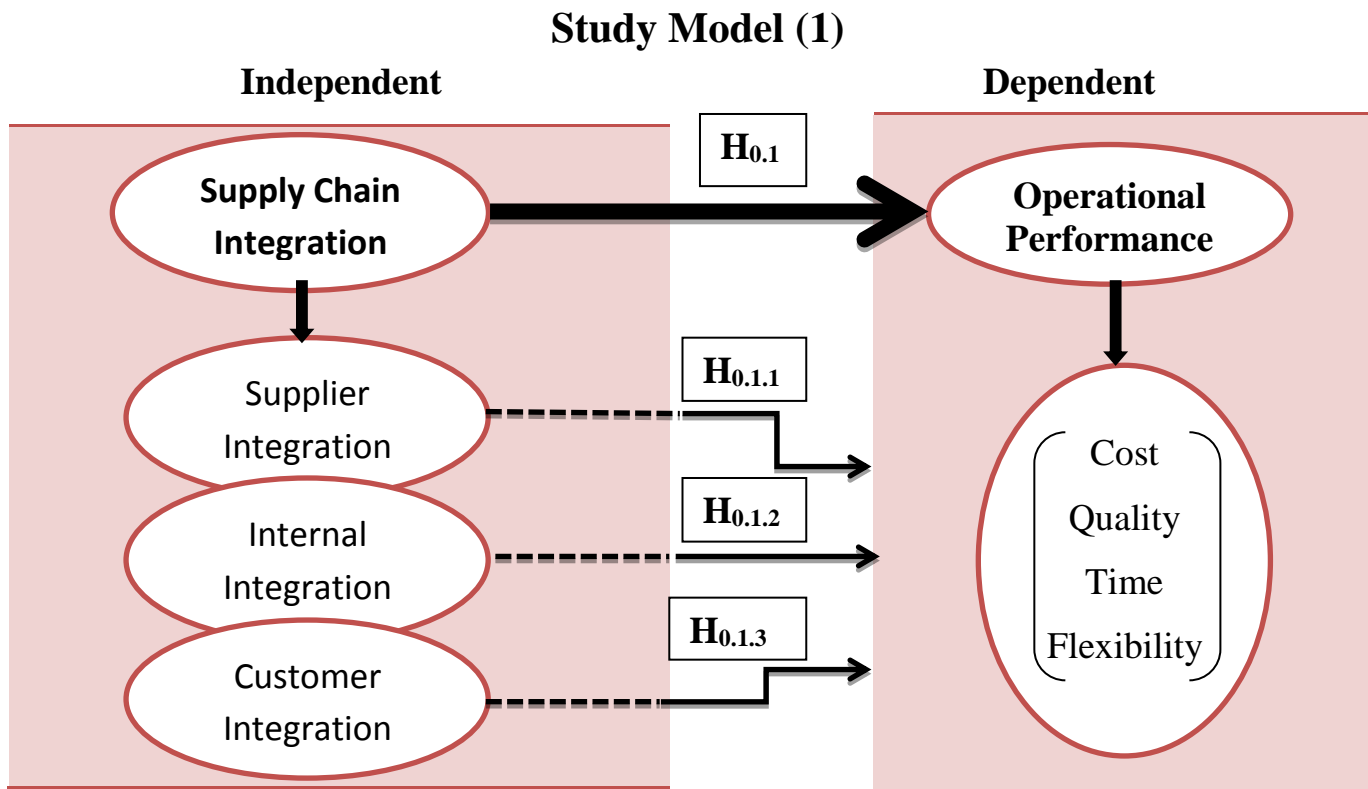
**H<sub>0.1.1</sub>:** Supplier integration does not have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations, at ( $\alpha \leq 0.05$ ).

**H<sub>0.1.2</sub>:** Internal integration does not have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations, at ( $\alpha \leq 0.05$ ).

**H<sub>0.1.3</sub>:** Customer integration does not have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organization, at ( $\alpha \leq 0.05$ ).

### **1.6. Study Model:**

Based on previous studies of supply chain integration and depending on different models, the current study chooses to set the study model that shows the impact of supply chain integration with its all elements (supplier, customer and internal Integration) on operational performance (Cost, quality, time, and flexibility) as shown in Model (1).



**Source:** study model developed by researcher based on: independent variables such as: (Zhao, L., Huo, B., Sun, L., and Zhao, X. (2013); Xu, D., Huo, B., and Sun, L. (2014); Zhang, M., and Huo, B. (2012). Dependent variable such as: (Zhao, L., Huo, B., Sun, L., and Zhao, X. (2013); Vaidya, M., and Hudnurkar, M. (2012); Gimenez, C., Vaart, T.V.D., and Donk, D.P.V. (2011).

Based on previous studies regarding supply chain integration, the researcher chooses to set the following model that shows the impact of supply chain integration with its all elements (supplier, customer and internal Integration) on operational performance (Cost, quality, time, and flexibility) as shown in Model (1).

### 1.7. Study Limitations:

**Human limitation:** The study will consider only managers and supervisors working at Jordanian pharmaceutical manufacturing organizations.

**Place limitation:** The study will be carried out on Jordanian pharmaceutical manufacturing organizations located in Amman-Jordan.

**Time limitation:** The study will be carried out during the period first semester and second semester of academic year 2014/2015.

**Study delimitation:** This study will be carried out on Jordanian pharmaceutical manufacturing organizations, so generalizing the results of these organizations on other industry are questionable. In addition, the study will be carried on Jordan setting; also generalizing Jordanian results to other countries may be questionable. The considered elements and measures for each variable may need to be refined. Although most variables used in this research have high measurement reliability and validity, some variables may have room for further instrument refinement.

### **1.8. Conceptual and Operational Definitions of Key Words:**

In this study, the following conceptual and procedural will be used:

**Supply Chain Integration:** The process of collaboration within supply chain players that manage inter and intra-organization activities to achieve effective and efficient flow of products, services and information to provide a maximum value to the customer in right place at suitable price and high speed. In the current study the integration was measured by the following:

**Supplier Integration:** The process of cooperation between supplier and organization that facilitate sharing of information, knowledge, materials and experiences. It was measured by items no.1-10 (Appendix 5) that reflects the nature of relationship, partnership, and other relevant issues between supplier and Pharmaceutical Manufacturing Organization.

**Internal Integration:** The process of maintaining cross-functional cooperation and collaboration within the organization that intends to achieve organizational strategic goals. It was measured by a group of

items no.11-20 (Appendix 5) that identified the nature of relationship, coordination and collaboration among organizational departments.

**Customer Integration:** The process of building and maintaining a strong relationship and partnership with the customers. It includes sharing the knowledge, experiences, products, services, and suggestions with customers. It was measured by selected items no.21-30 (Appendix 5) that explores the relationship and partnership and related issues.

**Operational Performance:** Group of standards and benchmarks that are adopted and used by the organizations to achieve competitive advantage, customer satisfaction, and maximum level of profitability. In this study supply chain operational performance was measured by the following dimensions: Flexibility, Time (Speed), Quality, and Cost.

**Flexibility:** The ability of organization to adapt to fluctuation in demand in term of product or service specification, volume, and on-time delivery. It was measured by specific items no.31-36 (Appendix 5) that reflects the ability of the organizations to overcome these fluctuations in demand.

**Time (Speed):** Delivery time that is required by the company to provide the product or and services to the customer according to agreed timetable.it was measured by selected items no 37-42 (Appendix 5) that reflects the speed in delivering the products and services to customers.

**Quality:** Juran and Godfery (1998) defined quality as "those features of products which meets customer needs and thereby provide customer satisfaction". In this study quality defined as the degree to which supply chain integration meets customer needs and demands. It was measured by items no.43-48 (Appendix 5) that embodied the concept of quality.

**Cost:** The total costs and expenses that are incurred by completing all/ and or specific activities and operations within supply chain. It was measured by selected items no.49-56 (Appendix 5) that reflects the total incurred costs and expenses.



## **Chapter Two**

### **Conceptual and Theoretical Framework and Previous Studies**

#### **2.1 Conceptual and Theoretical Framework:**

##### **Introduction:**

Different authors defined supply chain integration and operational performance in different ways, each definition was tailored according to the nature of the study, industry, and research objective. Supply chain integration is about collaboration, cooperation and coordination among different players of supply chain which enhances organization's performance. The following section will tackle the concepts of supply chain integration and operational performance, as well as, the relationship between them.

#### **2.2 Supply Chain:**

Supply chain is considered as a system that includes group of activities, processes and sub-processes such as procurement, operations, transportation, warehousing. It aims to provide the products and/or services either to consumer or customer starting with purchasing materials and equipment then transforming it to semi- finished products that will be reprocessed again to produce the final products.

Supply chain management is concerned with the planning and managing the flow of materials, products and services among and between these processes. The ultimate goals of managing supply chain is to provide the products at the agreed delivery time, suitable quality, and competitive price to the customers, and that is reflected by the customer's satisfaction and the overall organizational performance.

The concept of supply chain has been evolved over time. Chopra and Meindal (2007:3) said that supply chain consists of all parties involved directly or indirectly in fulfilling customer demand, it includes all functions involved in receiving and fulfilling a customer's requests. These functions include manufacturers and suppliers, warehouses, transporters, retailers, and final customers. Chopra and Meindal (2007) added that the objective of every supply chain is to maximize the overall value created. Wheelen and Hunger (2012) stated that "Supply chain management is the forming of networks for sourcing raw materials, manufacturing products or creating services, storing and distributing the goods, and delivering them to customers and consumers". Then they added that the concept of supply chain is used first to reduce costs, and then to improve customer service and get new products to market faster than others. Finally, Krajewski, et. al (2013) defined supply chain as it is the interrelated series of processes within a firm and across different firms that produce a products or service to the satisfaction of customers.

In summary, the concept of supply chain management was recently introduced which covers all activities carried out by organizations to collaborate with suppliers and customers to satisfy customers' needs, requirements and preferences.

### **2.3 Supply Chain Integration:**

Due to the intense of global competition, the organizations create cooperative and mutually beneficial relationship among supply chain partners (Wisner and Tan, 2000). Bowersox et. al. 1999, Westbrook and Frohlich (2001), pointed out that organizations or companies need to implement supply chain integration to meet the new challenges of the global competitive environment. Many studies propose different supply chain definitions. Rosenzweig, et. al. (2002), Pagell (2004), and Han &

Omta (2007) defined integration of supply chain as a process of collaboration in which companies work together in a cooperative manner to arrive at mutually acceptable outcomes. Zhao, et. al. (2008) described supply chain integration as “the degree to which an organization strategically collaborates with its supply chain partners and manages intra- and inter-organization processes to achieve effective and efficient flows of products, services, information, money and decisions, with the objective of providing maximum value to its customers”. Krajewski, et. al (2013) defined supply chain integration as “the effective coordination of supply chain processes through the seamless flow of information up and down the supply chain". Supply chain integration can be defined as the process through which all parties who involved with supply chain; supplier, organizations and customers, are working independently and dependently in a harmony way to achieve a unite objectives such as providing maximum customer value, lowering overall cost. Bagachi, et. al. 2005, Fabee-Costes and Jahre, (2007) said that supply chain integration is a key to the success of companies and supply chains.

In this study, supply chain integration defined as the process of collaboration within supply chain players that manage inter and intra-organization activities to achieve effective and efficient flow of products, services and information to provide a maximum value to the customer in right place at suitable price and high speed. Supply chain integration was measured by: supplier, internal, and customer integration.

#### **2.4 Supply Chain Integration Elements**

Supply chain management can be classified into three macro processes (stages) to better understanding of supply chain integration Chopra and Meindl (2007):

a. Customer relationship management: all processes and activities those focus on downstream interaction between the organization and customer.

b. Internal supply chain management: all processes and activities that focus on internal operations within organization.

c. Supplier relationship management: processes that focus on upstream interaction between organization and supplier.

At the start, the organizations were focusing on what they were able to do to manage the business and achieve their goals which were represented by the profitability and customer satisfaction, so the main focus was on managing internal processes between the departments which was effective at that time. Later, the concept of organizational performance was coupled with supply chain performance, so the organizations that plan to continue, compete, survive, and being superior over the other competitors started to adopt this concept and tried to expand the scope of managing the relationship with the other supply chain parties (suppliers and customers).

Even an effective supply chain management couldn't be able to achieve its objectives and being effective unless it maintained internal (interdepartmental) and external coordination and collaboration, thereby the importance of supply chain integration has emerged between and among these processes and activities. In addition, supply chain must be designed in a way that ensure all processes, activities, roles, and stages are aligned to support the supply chain strategy. Basic Enterprise Resource Planning (ERP) is one of various software systems that used to make the integration between the three processes (stages).

Monk and Wagner (2013) defined ERP as "a system that can help a company integrate its operations by serving as a company-wide computing environment that include delivering consistent data across all business function". Evolution and development in information technology allowed ERP to evolve and being flexible to match the between all supply chain parties. ERP link different applications into single application that integrates the data and business processes such as integrating the following operational functions: marketing and sales, accounting, human resources, purchasing, and logistics.

Many researches and academic papers have been written about supply chain management and its elements. Some were investigated supply chain integration. Others were studied supply chain performance, while others were discussed mediating factors that affect supply chain integration or performance and/ or both of them. Finally, some studies have addressed both elements together (supply chain integration and performance).

Zhang and Huo (2012) focused on dependence and trust and its impact on external integration (supplier and customer). Frohlich and Westbrook, (2001) studied the arcs of integration (supplier and customer). Van der Vaart and van Donk (2008:51) analyzed integration from different perspectives: attitudes, pattern, and practices. Zhao, et. al. (2011) emphasized on internal integration, and concluded that internal integration is the source of both customer and supplier integration through relationship commitment to customer and relationship commitment to supplier.

Rosenzweig, et. al. (2002) explored supply chain integration intensity on competitive capabilities and business performance. In addition, they studied the mediating effect of competitive capabilities

between supply chain integration and business performance. Alam, et. al. (2014) studied the mediating effect of logistics integration on supply chain performance. The results showed that logistic integration has very significant direct effect on supply chain performance.

Lockamy and McCormack (2004) explored the linkage between supply chain operations reference planning practices (plan, source, make, and delivery) to supply chain performance. Zelbst, et. al. (2009) investigated supply chain performance through the impact of supply chain linkages. In addition, they assessed the relationships of the linkages with supply chain performance. Vaidya and Hudnurkar (2012) explored multiple criteria for supply chain performance. These criteria's include: cost, customer service, productivity, asset-management, quality, time, innovativeness, flexibility/adaptability, supplier profile, marketing measures and ability to collaborate. Cirtita, et. al. (2012) explained one-dimensional structure; supply chain operations reference that consists of: flexibility, costs, delivery reliability, asset management efficiency, and responsiveness.

Huo (2012) examined the impact of supply chain integration with its elements (Supplier, Internal and customer integration) on three types of company performance (supplier-related, customer-related and financial performance). Huo (2012) concluded that internal integration improves external integration, and both integration directly and indirectly enhance company performance. Xu, et. al. (2014) explored intra-organizational resources (Top management support and Information technology) and inter-organizational capabilities (Supplier and Customer integration) and its effect on competitive advantage (Performance). They found that inter-organizational resources were vital enablers of supply chain integration. In addition, both supplier and customer integration have significant effect

on business performance. Zhao, et. al. (2013) investigated the impact of supply chain risk (supply delivery, and demand delivery risk) on supply chain integration (supplier, internal, and customer integration) and company performance (schedule attainment, competitive performance, and customer satisfaction).

From above it shows clearly the importance of the relationships between and among supply chain activities, processes, and personnel who perform specific tasks to add value for overall supply chain partners. Accordingly and based on previous studies regarding to the importance of all supply chain elements, this study was intended to investigate all the supply chain variables: Supplier, Internal, and Customer integration variables.

#### **2.4.1 Supplier Integration**

Suppliers are considered the main and the only source for inputs that are needed by the organizational operations, so they have an essential role in the continuation of manufacturing products and /or services in order to meet customer requirements. In the modern era, giant manufacturing organizations tend to build strong relationship and partnership with their suppliers to manage the fluctuation in customer demands and reducing the cycle and delivery time. More over the suppliers now are more involved in designing the products and operations to facilitate the manufacturing process and being close to the customer.

From the literature review, Stank, et. al. (2001), defined supplier integration as "the degree to which a firm can partner with its key supplier members". Some authors use the term downstream integration to express supplier integration. Scannell, et. al. (2000) have focused on upstream integration, analyzing the integration with suppliers. Flynn, et.

al. (2010), also comment on supplier integration as it involves core competencies related to coordination with critical suppliers.

Accordingly, current study defined supplier integration as the process of cooperation between supplier and organization that facilitate sharing of information, knowledge, materials and experiences. It was measured by specific items that reflect the nature of relationship, partnership, and other relevant issues between supplier and Pharmaceutical Manufacturing Organization.

### **2.4.2 Internal Integration**

Internal integration is the center of gravity for both suppliers and customers and it's considered the linchpin that maintains the stability and continuity for all supply chain parties, so the organization couldn't make neither supplier nor customer integration without internal integration. Building the proper supply chain strategy depends heavily on the existence of clear and shared goals, which originally derived from the adoption of all departments of the organizational mission, vision, and objectives. In the presence of such consensus, each department is considering two types of customers. The first customer is the main customer that the organization plans to provide with the final product or service, and the second customer is the department or the employee where depending on the other output to continue achieving their tasks and thus achieving the overall organizational objectives.

Many researchers were defining internal integration. Among them, Flynn, et. al. (2010) defined internal integration as "the degree to which a manufacturer structures its own strategies, practices and processes into synchronized, collaborative processes to fulfill its customers' requirements and efficiently interact with suppliers". Zhao, et. al. (2011) said that "the internal integration stresses organizational structure,



procedures, and practices, so it must be collaborative and synchronized to fulfill customer requirements”.

In this study, internal integration defined as the process of maintaining cross-functional cooperation and collaboration within the organization that intends to achieve organizational strategic goals. It was measured by a group of items that identified the nature of relationship, coordination and collaboration among organizational departments.

### **2.4.3 Customer Integration**

Customers are considering the source of life for organizations whatever they provide either product or service and it's considered the fresh air that is needed by the organization to grow and being able to survive in the presence of the strong and tough competitions. Customer needs and requirements are always transformed, so what was considered essential in the past perhaps it becomes complementary in the near future. Accordingly, the organizations should monitor the external environment such as political, economic, social, technological, and legal changes. Moreover it should behave proactively but not reactively to be superior over competitors in satisfying customer needs.

Managing the relationship with customer is considered a vital element in supply chain. Customer integration was discussed and defined by different researchers' perspectives. Flynn, et. al. (2010), added that customer integration involves core competencies derived from coordination with critical customers. Kulp, et. al. (2004) have studied the integration with buyers.

Van der Vaart and Van Donk (2008:51) analyzed supply chain integration from different perspectives: attitudes, pattern, and practices. While other authors have studied integration with customers and

suppliers such as Salvador, et. al. (2001); Frohlich and Westbrook (2001); and Narasimhan and Kim (2002). Rosenzweig, et. al. (2002) examined supply chain integration as a single dimensional construct, while Droge, et. al. (2004); Koufteros, et. al. (2005); Flynn, et. al. (2010) and Zhao, et. al. (2011) considered a broader perspective for supply chain integration as internal integration and external integration. Huo, B. (2012) said that both supplier integration and customer integration can be classified as external integration.

In current study, customer integration defined as the process of building and maintaining a strong relationship and partnership with the customers. It includes sharing the knowledge, experiences, products, services, and suggestions with customers. It was measured by selected items that explore the relationship and partnership and related issues.

The current research addresses the supply chain integration which includes supplier integration, internal integration and customer integration.

## **2.5 Supply Chain Operational Performance:**

The concept of supply chain operational performance has been emerged from supply chain strategy which derived from overall business strategy. A competitive strategy defined as "the set of customer needs that it seeks to satisfy through its products and services" Chopra and Meindal (2007). Each organization attempt to adopt different competitive strategy that fit to its strategy, then it seeks to afford the suitable capabilities and resources that help to achieve it. For example, one organization aims to provide high quality products with high price, another organization aims to provide high availability of a variety of products of reasonable quality at low price, while another organization aims to provide too many

products so its competitive strategy must be built to around providing the customer convenience, availability, and responsiveness, and so on .

Any company intended to be successful must fit between supply chain strategy and its competitive strategy. Chopra and Meindal (2007) comment on strategic fit that it's refers to the consistency between the customer priorities that the competitive strategy hope to satisfy.

Academicians and researchers have investigated supply chain performance from many different perspectives. Wang, et. al. (2009) developed supply chain performance measures based on efficiency. Gimenez, et. al. (2011) studied profits, delivery speed and transportation costs as a performance measures. Vanichchinchai (2014), investigated firm's supply performance that composed of flexibility, cost, relationship and responsiveness.

Frohlich and Westbrook (2001) and Yu, et. al. (2001) stated that eliminating non-added value activities, decreasing variance of orders and speeding product flows effect organizations performance. Hult, et. al. (2002) mentioned that IT and process innovation can contribute significantly to operational performance. Shah (2009) said that organizations must recognize the nature of trade-offs between customer services and costs. The organizations attempt to gain competitive advantages by aligning supply chain processes and decisions with its business strategy. Shah (2009) stated that supply chain strategy should ensure that supply chain provides a superior value to the end user in an efficient manner. Zelbst, et. al. (2009) emphasized that organization success depend heavily on the success of supply chain in which the organization participates as a partner. Wheelen and Hunger (2012) reviewed Porter's competitive strategies (lower cost, focus and differentiation) and argued that business strategy focuses on improving

the competitive position of a business unit's, products and/or services within specific industry or market segment. Wheelen and Hunger (2012) indicated that supplier network resources have a significant impact on firm's performance. Alam, et. al. (2014) concluded that logistic integration has mediating effect on operational performance.

Bowersox, et. al. (2000) and Croxton, et. al. (2001) said that the use of external linkage performance metrics leads to the creation of end-customer value through integrating activities and communication with other member firms along the supply chain. Harrison and New (2002) pointed out the importance of operational performance metrics as a standard framework to assess operational performance which include internal and external firm links. Vaidya and Hudnurkar (2012) presented the criteria of performance evaluation through cost, customer service, productivity, asset measurement, quality, time, innovativeness, price, flexibility / adaptability, ability to collaborate, supplier profile, and marketing measures.

This study is considered the operational performance as a group of standards and benchmarks that are adopted and used by the organizations to achieve competitive advantage, customer satisfaction, and maximum level of profitability. In this study supply chain operational performance was measured by the following dimensions: Flexibility, Time (Speed), Quality, and Cost because they are considered the most common dimensions that were investigated between previous studies.

### **2.5.1 Flexibility**

Building the competitive strategy to be flexible requires the commitment toward certain actions and activities, among these are educating the employee for different tasks, motivate employee for more

flexible work schedules, working in teams, and enhancing communication in the organization.

Rosenzweig, et. al. (2002) defined flexibility as" the ability of the firm to develop flexible operations in hypercompetitive environment to meet the frequent changes in volume, product mix and schedules occur". The researcher defined the flexibility as the ability of organization to adapt to fluctuation in demand in term of product or service specification, volume, and on-time delivery. It was measured by specific items that reflect the ability of the organizations to overcome these fluctuations in demand.

### **2.5.2 Time (Speed)**

Building a strategy on the basis of reducing the time between customer demands until meeting these demands entails work on the following: forecasting demand system, coordination of work processes, and change organizational layout, and managing the transportation.

The traditional dimension to measures the performance that expressed by delivery time and lead time. Different studies were defined time, lead time, and cycle time. Cycle time is the time between one completion jobs or tasks to another, i.e. from starting one process or task to start the same process or task again. Lead time is the time that is required from setting the order by customer to deliver the product or service (company and supplier) including manufacture, transportation, processing, warehousing, and delivering the product or service to the final customer. Gimenez, et. al. (2011) defined the lead time as the time needed for the delivery of the products to the key buyer. The researcher adopts delivery time that is required by the company to provide the product or and services to the customer according to agreed timetable.it

was measured by selected items that reflects the speed in delivering the products and services to customers.

### **2.5.3 Quality**

Building the strategy based on quality of products, services, and processes requires matching the following: educate employee with specific tasks, applying monitoring system, motivating committed employee of quality standard, and monitoring for complaints.

The degree through which the supply chain activities and processes seek to meet customer needs, requirements, and demands by following rules and standards of Good manufacturing Practice (GMP), ISO, and GFDA. From the customer perspective the organization should provide reliable service such as order entry, document preparation, and warehouse picking accuracy. Juran and Godfery (1998) defined quality as "those features of products which meets customer needs and thereby provide customer satisfaction". In this study quality defined as the degree to which supply chain integration meets customer needs and demands. It was measured by items that embodied the concept of quality.

### **2.5.4 Cost**

Building the strategy based on reducing the overall costs entail to run out the following: reducing inventories, maximum utilization of resources, work- in- process inventory turnover, and eliminating non-added value activities.

Likely the most common and important measure in evaluating operational supply chain is cost. Bowersox, et.al. (2009) defined the cost as the total cost incurred to accomplish specific operation. Organization attempt to decrease prices and maximizing profit. Vaidya and Hudnurkar (2012:311) defined cost as the summation of all costs that includes:

inbound and outbound freight, warehouse cost, third party storage cost, order processing cost, direct labor cost, administrative and service costs. Cirtita, et. al. (2012) defined the cost as "the total costs associated with operating the supply chain". In this research the author defined the cost as the total costs and expenses that are incurred by completing all/and or specific activities and operations within supply chain. It was measured by selected items that reflect the total incurred costs and expenses.

Referring to the above previous studies and the referring to the importance of supply chain management and the resulting of substantial benefits as a result of integration, the researcher was investigating the supply chain integration as an independent variable represented by: supplier, internal, and customer integration, and the operational performance as a dependent variable represented by: cost, quality, time, and flexibility.

## **2.6 Relationship between Supply Chain Integration and Operational Performance:**

In the literature reviews, it was shown that there is a strong relationship between supply chain integration and performance. Some studies claimed that there is a strong relationship between supplier and customer integration and organizational performance, other studies comments the presence of relationship between upstream and downstream interactions and operational performance, another group of studies assured the inevitability of relationship between supplier, internal, and customer integration with the overall organizational performance.

Almost all studies concluded that the supply chain integration is considered as vital process that affects operational performance, consequently the organizations' overall business performance.

Scannell, et. al. (2000) concluded that supply chain practices were positively associated with aggregation measures of cost and flexibility. Salvador, et. al. (2001); Frohlich and Westbrook (2001); and Vickery, et. al. (2003) found a positive and direct relationship between information technology integration and supply chain integration. Chen and Paulraj, (2004) said that: internal integration of different departments within a firm should act as integrated process. Kulp, et. al. (2004); Gimenez and Ventura, (2005); and Fynes, et. al. (2005) showed the importance of downstream integration. Bagchi, et. al. (2005) stated that supply chain integration affects operational performance, and the degree of integration influences cost and efficiency. Swink, et. al. (2007) and Flynn, et. al. (2010) pointed out that external integration emphasizes the importance of cooperation and collaboration with suppliers and customers.

Frohlich and Westbrook (2001); Swink, et. al. (2007); Van der Vaart and Van Donk, (2008); and Zhao, et. al. (2011) have been suggested that supplier integration and customer integration play different roles in performance improvement and capability development. Xiao, et. al. (2010) found a significant role of both relationship commitment and trust in improving cooperation performance and operational performance. Flynn, et. al. (2010) found that internal integration and customer integration were more strongly related to performance improvement than supplier integration. Gimenez, et. al. (2011) found that a positive effect of integration on performance in terms of profits, delivery speed, and transportation cost. Alam, et. al. (2014) mentioned that due to integration supplier get closer to their customers and may involve customers in shaping and fabricating the products or service in a way to satisfy customers demands.



The current study was considered supplier integration, internal integration, and customer integration as independent variables, while operational performance elements (cost, quality, time, and flexibility) as dependent variable. More specifically, the purpose of the current study is to investigate the impact of supply chain integration on operational performance at Jordanian pharmaceutical manufacturing organizations.

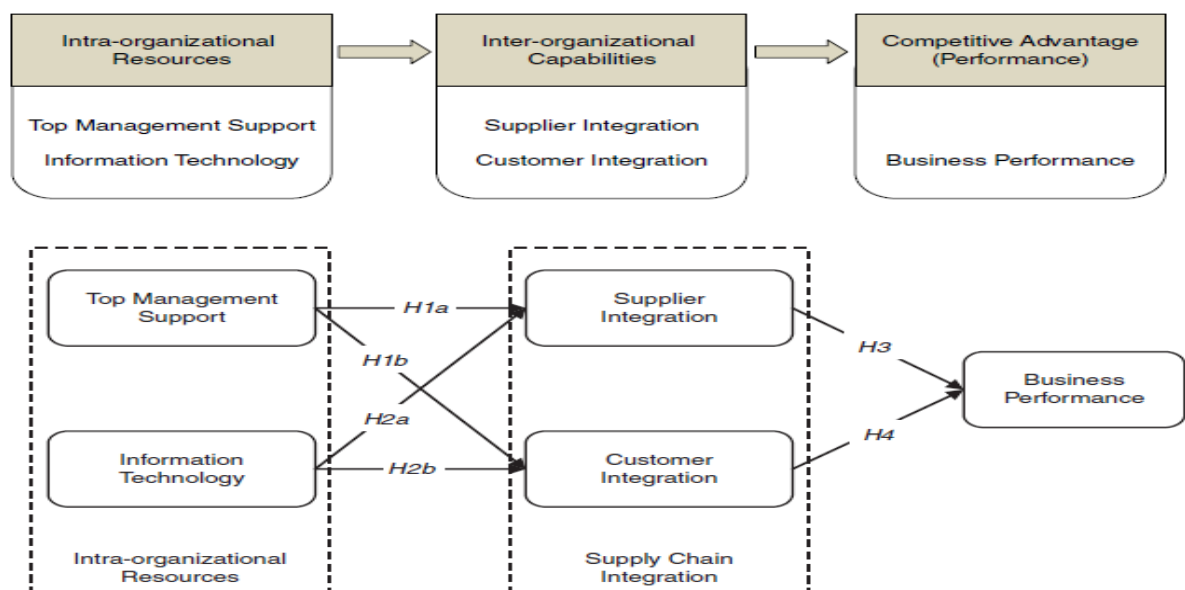
Whatever the classification used in any research or literature, the aim was to understand, measure and manage the supply chain integration. In most researches, the supply chain integration was divided into three components: Supplier, internal and customer integration (Flynn, et. al. (2010).

## 2.7 Previous Models:

In this section, the researcher was referred to different previous models to develop and refine the study model.

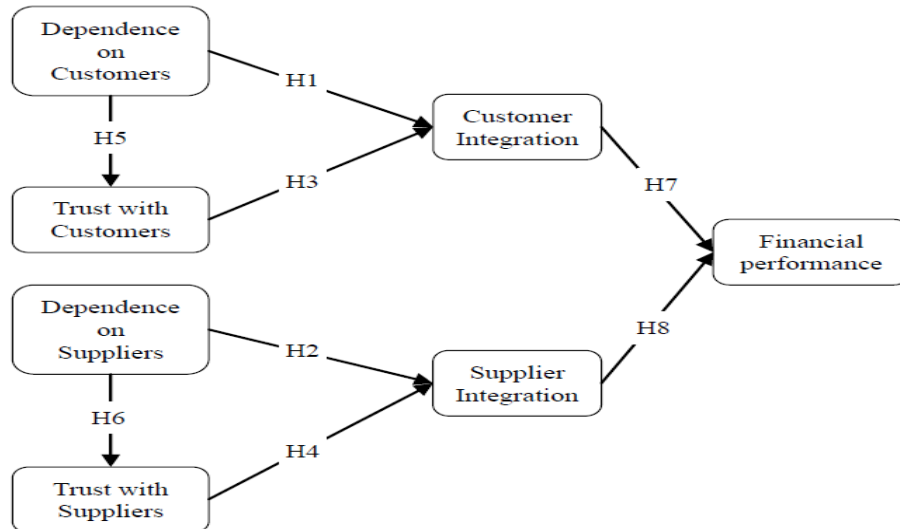
**Xu, et. al. (2014) Model:** Were exploring the mediating effect of supply chain integration (Supplier and customer) on business performance as shown in model (1) below:

**Model (2): Xu, et. al. (2014) Model**



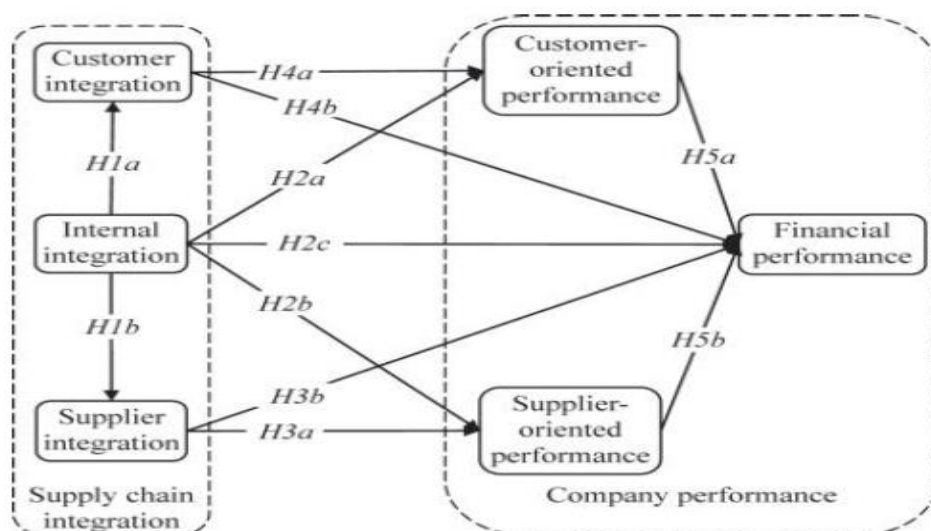
**Zhang and Huo (2012) Model:** Studied the impact of dependence and trust on supply chain integration (customer and supplier integration) as shown in model (2) below:

**Model (3): Zhang and Huo (2012) Model**



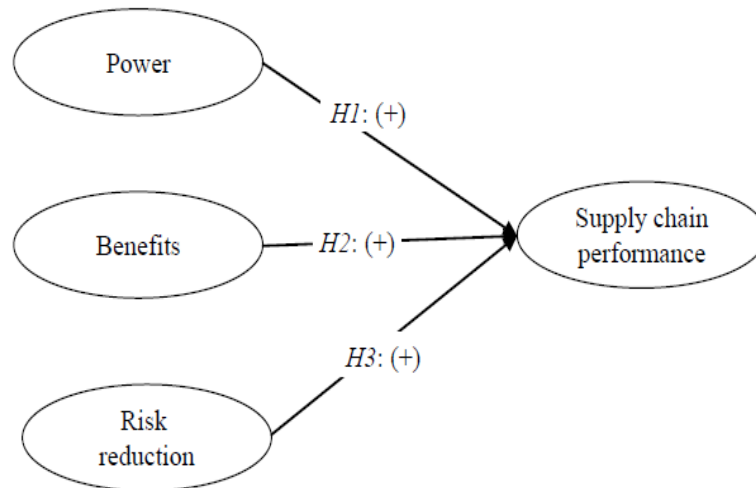
**Huo (2012) Model:** Examined the impact of supply chain integration (internal, customer, and supplier integration) on company performance (customer-oriented, supplier oriented, and financial performance) as shown in model (3) below:

**Model (4): Huo (2012) Model**



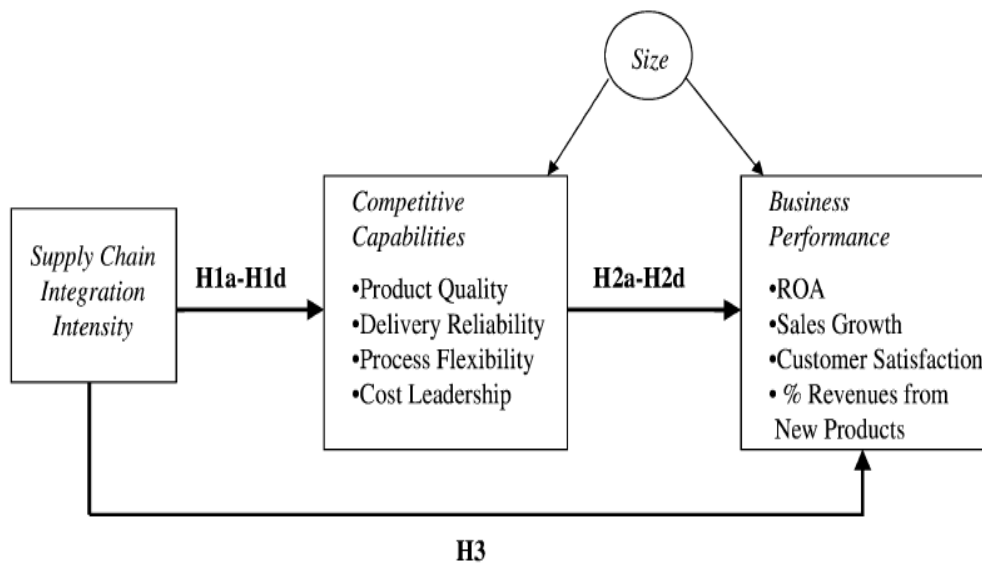
**Zelbst, et. al. (2009) Model:** Examined the impact of supply chain linkages (power, benefits, and risk reduction) on supply chain performance as shown in model (4) below:

**Model (5): Zelbst, et. al. (2009) Model**



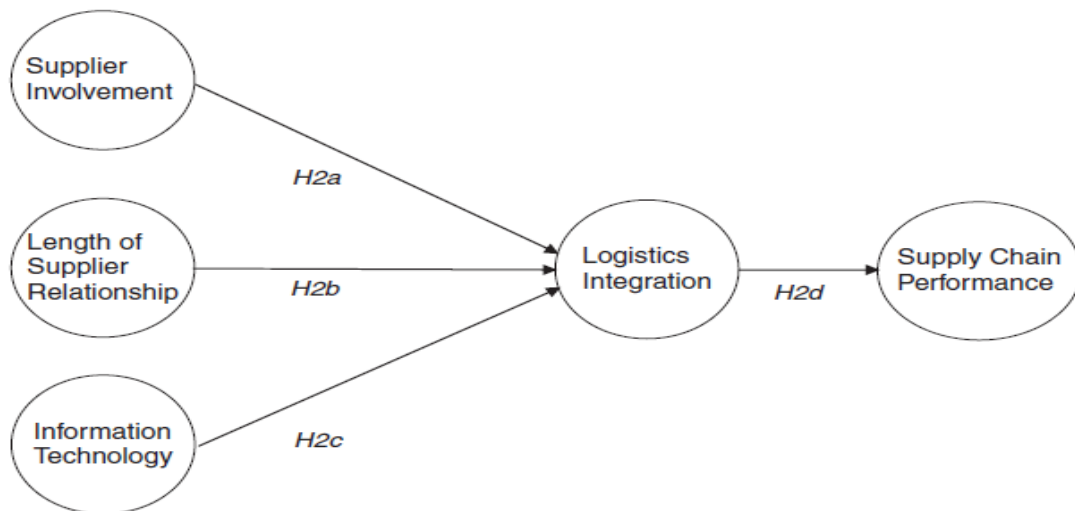
**Rosenzweig, et. al. (2002) Model:** Studied the impact of supply chain integration intensity of both competitive priorities (product quality, process flexibility, cost leadership, and delivery reliability) and business performance (return on investment, revenue from new product, customer satisfaction, and sales growth) as shown in model (5) below:

**Model (6): Rosenzweig, et. al. (2002) Model**



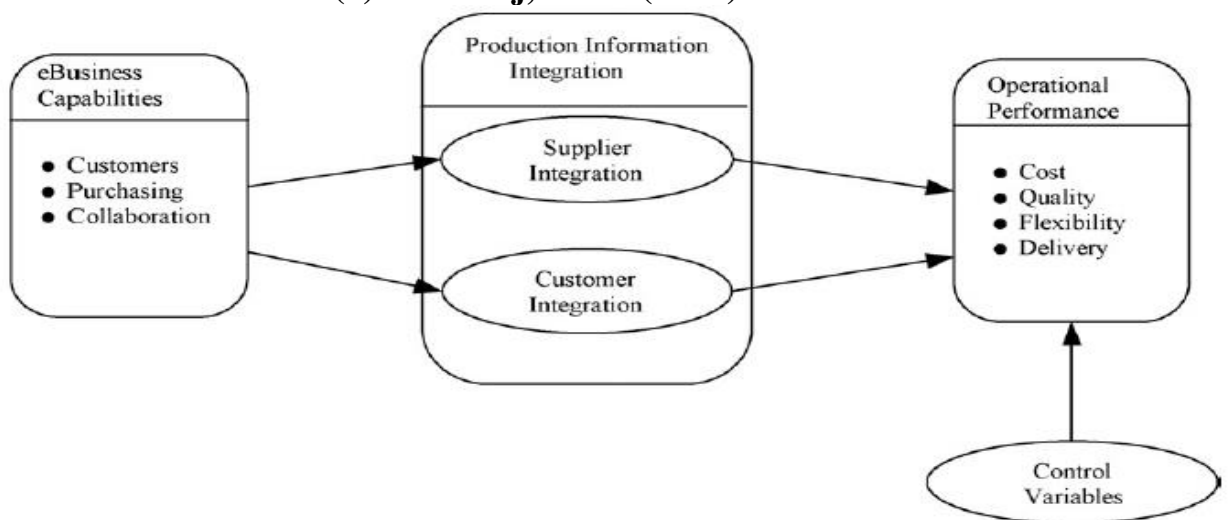
**Alam, et. al. (2014) Model:** Studied the impact of supplier involvement, length of supplier relationship, information technology, and the mediating effect of logistics integration on supply chain performance as shown in model (6) below:

**Model (7): Alam, et. al. (2014) Model:**

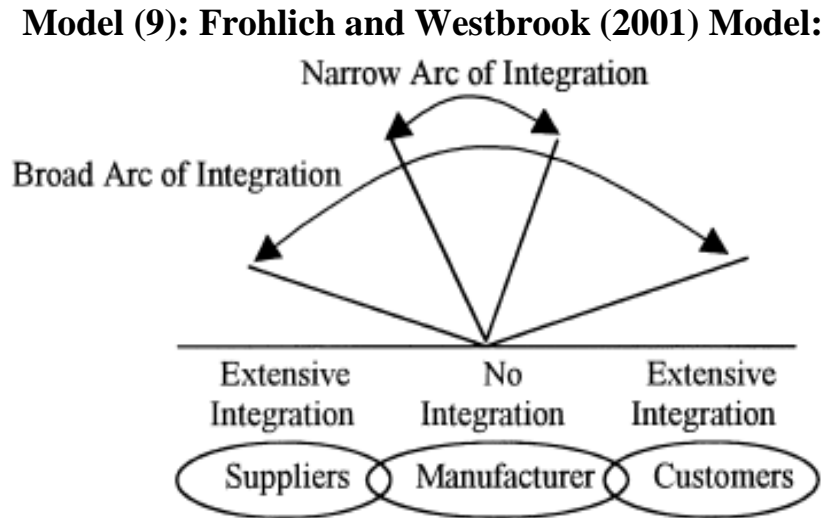


**Devaraj, et. al. (2007) Model:** Examined the impact of e-business capabilities (purchasing, customer, and collaboration) on operational performance (cost, flexibility, delivery and quality) through the mediating effect of production information integration (customer and supplier integration) as shown in model (7) below:

**Model (8): Devaraj, et. al. (2007) Model**

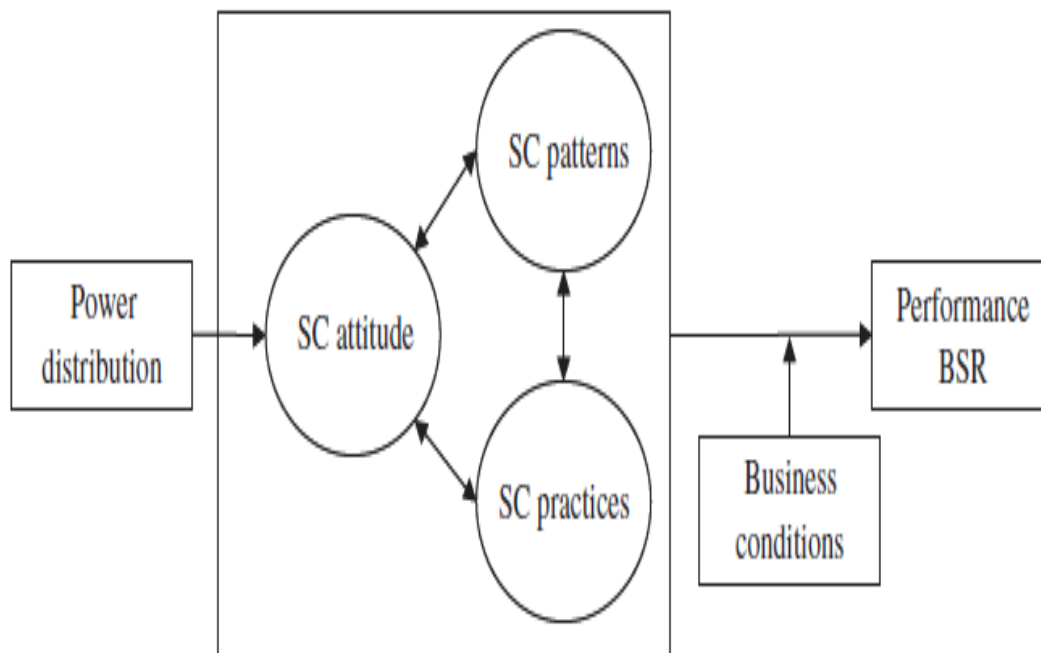


**Frohlich and Westbrook (2001) Model:** investigated the relationship between supplier and customer integration and its effect on operations performance as shown in model (8) below:



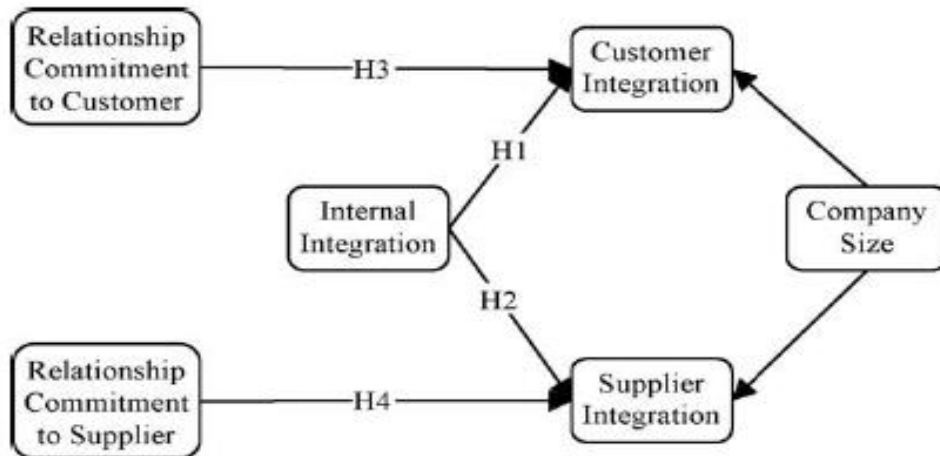
**Van der Vaart and Van Donk (2008) Model:** studied the impact of supply chain integration (Attitude, practices, and patterns) on business performance through business conditions as moderator as shown in model (9) below:

**Model (10): Van der Vaart and Van Donk (2008) Model**



**Zhao, et. al. (2011) Model:** Examined the impact of internal integration and relationship commitment on external integration as shown in model (10) below:

**Model (11): Zhao, et. al. (2011) Model:**



After reviewing the previous models that were studying a group of independent variables such as: intra-organizational resources, dependence on customers, trust with customers, dependence on suppliers, trust with suppliers, customer integration, internal integration, supplier integration, power, benefits, risk reduction, supply chain intensity, and e-business capacities on a group of dependent variables such as: competitive advantages, financial performance, supply chain performance, business performance, and operational performance. In addition some models were investigating the relationship while others investigated the impact. Based on above previous models, the current study model was refined and developed to serve the study purposes and objectives.

## 2.8 Previous Studies:

Many researchers investigated the relationship between supply chain integration and organizational performance from different aspects, while few researchers investigated the effect of supply chain integration on operational performance in the pharmaceutical industry. The following

section, due to limited space will tackle only selected previous researches:

1. Rosenzweig, et. al. (2002) study titled: "**The influence of an integration strategy on competitive capabilities and business performance: An exploratory study of consumer products manufacturers**", aimed at examining the intensity of supply chain integration on business performance. The study surveyed 1997 from targeted population that consisted of manufacturers in the top quartile of sales revenues in 35 countries. The unit of analysis was broad industrial sectors such as automotive, consumer products, pharmaceuticals, chemicals, high tech, and aerospace. Descriptive statistics, correlation and hierarchical regression analysis were used. It found that supply chain integration intensity leads directly to improved business performance.

2. Cheng, et. al. (2004) study title: "**An empirical study of supply chain performance in transport logistics**", purpose to evaluate the three transport logistics industry sectors, sea, air, and third party logistics services. A cross-sectional survey (questionnaire) was administered and completed by 924 firms in the transport logistics industry in Hong Kong. Mean, standard deviation, Cronbach's alpha, reliability, validity, ANOVA tests were applied. The result showed that there were significant in supply chain performance between firms in the three sectors.

3. Saeed, et. al. (2005) study title: "**Examining the Impact of Interorganizational Systems on Process Efficiency and Sourcing Leverage in Buyer–Supplier Dyads**", aimed at understanding the linkages between interorganizational systems, buyer-supplier relationship, and manufacturing performance. Research methodology was

based on survey to collect the data. It was found that the external integration enhanced the manufacturing firms' process efficiency.

4. Peterson (2005) study title: "**Supplier integration into new product development: coordinating product, process and supply chain design**", purposed to examine the role of supplier involvement in new product development. Data was collected using a questionnaire. Multiple regression analysis was applied to find the relationships between research elements. It was found that supplier involvement has a positive impact in new product development and made significant improvements in financial returns as well.

5. Kim (2006) study title: "**The effect of supply chain integration on the alignment between corporate competitive capability and supply chain operational capability**", designed to identify the shape of interactive relationship between supply chain operational capability and corporate competitive capability, and identify the role of supply chain integration on these interactive capabilities. Data were collected through questionnaire of 623 respondents (from Korea and Japan). Confirmatory factor analyses, and regression analysis were conducted. It found that the effect of interaction between operational capability and corporate competitive capability on performance improvements became insignificant related to the substitute role of supply chain integration.

6. Devaraj, et. al. (2007) study title: "**Impact of e-Business technologies on operational performance: The role of production information integration in the supply chain**", designed to identify the impact of information technology on performance. Questionnaire was used as tool of collecting data and distributed on different industries. The total number of the sample was 1464 from different industries such as



computer components, printed circuits boards, electronic equipment and supplies, and automotive bodies and parts. Descriptive statistics and correlations tests were applied to analyze the results. It was found that information technology was supporting supplier integration and customer integration as well. In addition, it was found also the supplier integration has a positive impact on performance.

7. Fawcett, et. al. (2007) study title: "**Information sharing and supply chain performance: the role of connectivity and willingness**", aimed at understanding the role of information technology to enhance supply chain performance. Multi-method empirical approaches were used, surveys and interviews. Cross functional survey was applied, and 588 respondents were received by email, while 144 interviews were completed. Factor analysis, ANOVA, F-static's,  $R^2$  tests were applied. It was found that information sharing has direct impact on operational performance and enable of creation cohesive supply chain.

8. Koufteros, et. al. (2007) study title: "**Black-box**" and "**gray-box**" **supplier integration in product development: Antecedents, consequences and the moderating role of firm size**", purposed to investigate the antecedent and consequences of supplier integration in product activities. Research methodology was built based on social network perspective using 157 firms as a sample. It was found that antecedents, supply base rationalization, supplier selection, and embeddedness with supplier had positive impact on supplier integration.

9. Al-Lamy and Al-Amery (2008) study title: "**The possibility of implementing supply chain integration indicators: An analytical study at the production of shoes in Bagdad**", aimed to apply the measurements of supply chain variables performance. The researcher used the quantitative manner to analyze the results. It founded that

different conditions were affected the supply chain and the importance of upward and downward integration to build long-term relationship with partners and customers.

10. Jr, et. al. (2008) study titled: "**The impact of aligning marketing strategies throughout the supply chain**", aimed to incorporate supply chain marketing as a focal construct and operational performance and organizational performance as consequences. Data were collected by an e-mail from 117 managers working at different manufacturing firms such as oil and gas, and logistics firms. Reliability (Cronbach's alpha), validity, correlation coefficient were applied. It found that aligning marketing strategies of partners throughout the supply chain improves operational performance, which leads to improve organizational performance of each supply chain partner. In addition, integration of supply chain marketing strategies does not directly impact organization performance.

11. Chris, et. al. (2009) study titled: "**Managing risk in pharmaceutical global supply chain outsourcing**" aimed at studying the global outsourcing trends, drivers, functions (areas), and emerging risks in pharmaceutical global supply chain outsourcing (US ). Data was collected via questionnaire. Analytic hierarchy process (AHP) model was used. It founded that regulatory risk was the most important risk, followed by intellectual property risk technical risk and business risk

12. Zelbst, et. al. (2009) study titled: "**Impact of supply chain linkages on operational performance**", aimed at examining the impact of supply chain linkages on operational performance. A total of 145 manufacturing and services sector managers were surveyed. The measurement scales were assessed for reliability and validity and further assessed within a measurement model context. Study hypotheses were

then tested using a multiple regression approach. It found that power, benefits, and risk reduction linkages were positively and significantly impact operational performance. Power identified as the dominant linkage for manufacturers, and risk reduction as the most important within the services sector.

13. Forslund and Jonsson, (2009) study titled: "**Obstacles to supply chain integration of the performance management process in buyer-supplier dyads: The buyers' perspective**", aimed at explaining to what degree supplier relationship obstacles and operational tool obstacles hinder supply chain integration of the performance management process. Hypothetic-deductive study, where the results were based on a survey to 257 purchasing managers in nine manufacturing industries in Sweden. Mean, standard deviation, and reliability coefficients of scales tests were applied. It found that supplier relationship obstacles (lack of trust, different goals and priorities and lack of parallel communication structure) significantly hindered performance management process integration.

14. Jassim (2010) study title: "**The Strategies of supply chain and its impact to achieve the competitive advantage: case study in Diwaniyah Textile state factory**", aimed at explore the relationship between supply chain strategies and competitive advantage. Total valid questionnaires were 30 questionnaires. It was collected from the managers in the factory. Mean, standard deviation, correlation, multiple regression were applied. It was found that there was a positive impact of supply chain strategies (outward strategies) on competitive advantage.

15. Al-Shaar (2010) study titled: "**The Impact of Supply Chain Integration through the Supply Chain Response on Operational Performance in Large and Medium Sized Jordanian Industrial**

**Companies: A Field Study**", aimed at exploring the impact of supply chain integration on operational performance through mediator (supply chain response). The researcher used the questionnaire, 141 questionnaires were collected. Structural equation modeling was used to test the hypothesis and the study model. It found that supply chain integration (Internal, strategic, and external integration) was affecting the operational performance.

16. Chris, et. al. (2010) study titled: "**An analysis of strategic supplier selection and evaluation in a generic pharmaceutical firm supply chain**", purposed at studying, analyzing, and evaluating of suppliers in a generic pharmaceutical firm. Data was collected by a survey questionnaire. Analytic hierarchy process (AHP) model was used and implemented with the support of the Expert Choice Software. It found that the regulatory compliance selection criterion was the most favored, followed by quality, risk, cost, supplier profile, and service.

17. Rossetti, et. al. (2010) study titled: "**Forces, trends, and decisions in pharmaceutical supply chain management**", aimed at identifying and examining the major forces that were changing the way biopharmaceutical medications are purchased, distributed, and sold throughout the supply chain. Multiple interviews with key informants at each level of the value chain at wholesaler, hospital, manufacturer, regulators, and retailers were combined with manifest text analysis from practitioner articles. Manifest text analysis was applied. It found that compensation forces had a high influence in the discussions with pharmaceutical supply chain members.

18. Gimenez, (2011) study titled: "**Supply chain integration and performance: the moderating effect of supply complexity**", aimed at investigating the effectiveness of supply chain integration in different

contexts. A survey-based research design was developed to measure different dimensions or aspects of supply chain integration and supply complexity. Data were collected from manufacturers in The Netherlands and Spain from different industries such as Manufacture of pulp, manufacture of chemicals, manufacture of radio and television, manufacture of medical instruments, manufacture of motor vehicles, and manufactures of machinery and computers. 145 completed and valid questionnaires were collected (80 from Netherland and 65 questionnaires from Spain). Factor analysis, regression analysis were performed. It found that supply chain integration increased performance if supply complexity was high, while a very limited or no influence of supply chain integration can be detected in case of low supply complexity. The results also showed that in high supply complexity environments the use of structured communication means to achieve supply chain integration had a negative effect on cost performance.

19. Wong, et. al. (2011) study titled: "**The contingency effects of environmental uncertainty on the relationship between supply chain integration and operational performance**", aimed at building and testing a theoretical model of the contingency effects of the environmental uncertainty on the relationship between supply chain integration and operational performance. Multi-group and structural path analyses of survey were collected from 151 of Thailand's automotive manufacturing plants. It found that there is a positive relationship between supply chain integration dimensions and operational performance dimensions as well.

20. Jin, et. al. (2012) study titled: "**Awareness is not enough Commitment and performance implications of supply chain integration**", purpose was to provide an update on the rhetoric and

reality of supply chain integration and extend theory related to adoption and efficacy of integration strategies. A multi-method-survey and interview-replication approach to gauge the extent to which companies are increasing their engagement in supply chain integration and assess integration's influence on firm performance. 505 usable surveys were analyzed. t-test, descriptive statistics, validity, and regression analysis were employed. It found that integration positively related to operational performance and firm performance - primarily through its influence on productivity and customer service.

21. Cirtita and Segura, (2012) study titled: "**Measuring downstream operational performance**", aimed at determining if performance metric systems will improve inter-firm performance. The survey completed by 73 members of the council of supply chain management professionals consisting of high-level managers representing US companies by questionnaire. Mean, standard deviation, validity, reliability, factor analysis were applied. It found that downstream supply chain integration does not affect positively by downstream supply chain metrics. While it positively affect inter-firm performance.

22. Huo (2012) study titled: "**The impact of supply chain integration on company performance: an organizational capability perspective**", purpose to examine the impact of three types of supply chain integration (internal, supplier, and customer integration) on three types of company's performance from the perspective of organizational capability (supplier-oriented performance, customer-oriented performance, and financial performance). Data were collected from 617 companies in China. Reliability, validity, and structural equation modeling method were performed. It found that internal integration

improves external integration and that internal and external integration directly and indirectly enhance company's performance.

23. Zhang and Huo, (2012) study titled: "**The impact of dependence and trust on supply chain integration**", aimed at investigating the joint influence of dependence and trust in supply chain relationships on supply chain integration and financial performance. Structural equation modeling based on empirical data collected from 617 manufacturers in China such as arts and crafts, building materials, chemicals and electrical, food and beverage, jewelry, pharmaceutical and medical, publishing and printing, and other industries. Reliability, validity, and structural equation modeling method were used. It found that trust with customers/suppliers significantly influence supply chain integration. Both supplier integration and customer integration significantly improved financial performance.

24. Luthje and Arlbjorn, (2012) study titled: "**Global operations and their interaction with operational performance**", aimed at: exploring whether operational performance affected differently depending on the choice of globalization strategy. Based on in-depth literature reviews and explorative case studies – two offshoring and two outsourcing projects. A model explaining the choice of localization and globalization strategy (the OLI model) was applied as a basic framework. Data collected through in-depth interviews with persons responsible for the offshoring and outsourcing projects. It addressed that different practice of managing operational performance in offshoring and outsourcing strategies. The OLI model provides an increased consciousness of the managerial challenges related to operational performance based on the chosen globalization strategy.

25. Hamad (2013) study titled: "**The impact of supply chain integration on organizational performance and the role of environmental turbulence: An empirical study on food industry firms in Jordan**", purposed to investigate the impact of supply chain integration on organizational performance on the food industry firms in Jordan. Casual descriptive analytical method was used .Questionnaire was administered and the actual collected and used in analysis were 326 respondents for all food industry firms. Mean, standard deviation, t-test, simple regression and path analysis tests were applied. It was found that there was a significant impact of supply chain integration on organizational performance and environmental turbulence.

26. Parast and Spillan, (2013) study titled: "**Logistics and supply chain process integration as a source of competitive advantage: An empirical analysis** ", aimed at investigating the effectiveness of logistics and supply chain integration on firm competitiveness in manufacturing firms. Structural equation modeling was used to determine the effect of two sets of logistics and supply chain integration practices (logistics/supply chain information integration and logistics/supply chain process integration) along with logistics outsourcing decision practices (logistics investment decisions and private warehousing decisions) on firm competitiveness. 782 questionnaires were collected from US and 361 usable questionnaires were collected from China. A comparison of Means, standard deviations, and reliability coefficients were performed. The results indicated that logistics/supply chain strategy was the main driver of logistics and supply chain integration and logistics decisions. Furthermore, the findings suggested that logistics/ supply chain process integration was the most significant predictor of firm's competitive position.



27. Spillan, et. al. (2013) study titled: "**A comparison of the effect of logistic strategy and logistics integration on firm competitiveness in the USA and China**", purpose to give empirically compare logistics strategies in Chinese and US manufacturing firms and the outcomes of these strategies. A structured questionnaire used to gather data from Chinese and American logistics managers. Using confirmatory factor analysis, the authors compared the three dimensions of the overall logistics strategy, process strategy, market strategy, and information strategy – in two countries. A structural equation model used to assess the impact of overall logistics strategy on perceived competitiveness in two countries. It found that data from both countries provides strong support for the three dimensions of overall logistic strategy. In addition, it found that overall logistics strategy, when combined with logistics coordination effectiveness and customer service effectiveness, contributes to organizational effectiveness.

28. Zhao, et. al. (2013) study titled: "**The impact of supply chain risk on supply chain integration and company performance: a global Investigation**", aimed at empirically exploring the relationships among supply chain risks, supply chain integration, and company performance in a global context. Based on the high performance manufacturing, project database collected from 317 manufacturing plants in ten countries and three representative industries (machinery, electronics and transportation components). Validity, reliability, and structural equation modeling methods were used. It found that supply chain risks, especially supply delivery risk, negatively related to supply chain integration. While supplier, internal, and customer integration affects the competitive performance, and customer satisfaction.

29. Han, et. al. (2013) study titled: "**The impact of supply chain integration on firm performance in the pork processing industry in China**", aimed at investigating the effects of supply chain integration on firm performance in pork supply chains in China. The study followed by a causal research approach and survey methodology to collect data from 229 pork processors. It suggested that internal integration and buyer-supplier relationship coordination are significantly related to firm performance in both relationships. Information technology integration not significantly related to both upstream and downstream relationships. Logistics integration significantly contributes to pork processors' performance in relationships with downstream customers.

30. Xu, et. al. (2014) study titled: "**Relationships between Intra-organizational resources, supply chain integration and Business performance**" in China, aimed at exploring the effects of intra-organizational resources, on inter-organizational capabilities and on business performance. 17 usable questionnaires were used to analyze the results. Composite Reliability, AVE, average variance extracted, and Cronbach's alpha tests were used. It found that top management support and information technology are two vital enablers of supply chain integration and have different roles in improving supply chain integration. In addition, supplier integration has a significant effect on business performance, and customer integration has a marginally significant effect.

31. Alam, et. al. (2014) study titled: "**The mediating effect of logistics integration on operational performance**", aimed at analyzing the impact of individual logistics-related factors, namely, supplier involvement, length of supplier relationship, use of information technology, and logistics integration on a firm's operational performance. Data collected from 187 organizations in Brazil, Korea and India.

Descriptive statistics, Harman's one-factor test, Cronbach's alpha and composite reliability measures, validity, t-statistics tests were performed. Results showed that for the combined data, the direct effects of supplier integration, length of supplier relationship and information technology on operational performance were insignificant while logistics integration had a very significant direct effect on operational performance.

32. Okello and Were (2014) study titled: "**Influences of Supply Chain Management Practices on Performance of the Nairobi Securities Exchange's listed, Food Manufacturing Companies In Nairobi**", aimed at finding out the influence of supply chain practices on the performance of food manufacturing companies in Nairobi Kenya. Data was collected by questionnaire. The study sample consisted of ninety respondents who were support staff members from six manufacturing companies. It found that product development process, inventory management, lead time, technology and innovation have a significant influence on the performance of food manufacturing companies in Kenya.

33. Vanichchinchai, (2014) study titled: "**Supply chain management, supply performance and total quality management**", aimed at assessing the level of supply chain management practices, total quality management practice on firm's supply performance in the automotive industry in Thailand. 211 valid questionnaires were collected from automotive industry in Thailand. Descriptive statistics were employed (reliability and validity), MONOVA was applied to test the differences between study variables. It found that organizations' that applied supply chain management practices and total quality management practices achieved a higher level of firm's supply performance.

34. Al-Tarawneh and Shlash (2015) study titled: "**The impact of the perceived strategic supply chain management skills on the supply management performance through the supplier's integration: a field study on the Jordanian industrial companies in the city of Sahab**", aimed at measuring and analyzing the impact of perceived strategic supply chain management skills on performance. 139 valid questionnaires were used in analyzing the results. Means, standard deviation, and multiple regressing tests were applied. It found a positive effect of supply management skills on supply management performance. In addition to the significant effect of supply management skills on supplier integration.

From the literature review above, it seems that it is a worth-full to study the relationship between supply chain integration and operational performance which affect organizations' overall performance. Jordanian pharmaceutical manufacturing organizations are not exceptional; therefore, this research was dedicated to explore the impact of supply chain integration on operational performance at Jordanian pharmaceutical manufacturing organizations.

## **2.9 Expected Contribution of Current Study as Compared with Previous Studies:**

The current study may have the following contribution compared to previous studies:

1- Supply chain integration and operational performance concept: most of the previous researches studied the concept of supply chain management, but few studied the concept of supply chain management integration. This study is dedicated towards studying supply chain integration.

2- Purpose: Most of the previous studies were conducted to measure supply chain integration from a financial perspective. Whereas this study considered other perspectives.

3- Industry: Previous researches were conducted on different industries, but very few considered the Pharmaceutical industry in their research. This study is dedicated to Pharmaceutical industries.

4- Environment: Most of the previous researches have been carried out in different countries outside the Arab region, while the current study was conducted in Jordan, as one part of the Arab region.

5- Comparison: The researcher compared the results of current research with previous studies mentioned earlier to highlight the similarities and differences that may arise.

## **Chapter Three:**

### **Study Methodology (Methods and Procedure)**

#### **3.1 Study Design:**

The current study is considered as a causality study, because it aims at investigating the cause/effect relationship between supply chain integration elements and operational performance at Jordanian Manufacturing organizations. It starts with literature review and experts' interviews to develop the currently used measurement model and explore the supply chain integration profile of Jordanian pharmaceutical Manufacturing organizations. Then, a panel of judges was conducted to finalize the items to be included in the questionnaire, then to confirm reliability and validity of the questionnaire were carried out. Finally, the survey will be conducted, and the results will be compared with previous researches work.

#### **3.2 Study Population, Sample and Unit of Analysis:**

##### **3.2.1 Population and Samples:**

The pharmaceutical manufacturing organizations that are registered in Jordanian Association of Pharmaceutical Manufacturers at 2015 Jordan are 14 organizations. Based on the presence of supply chain department in each pharmaceutical manufacturing organization, the data which can be obtained is considered valuable to serve the research purposes as its considered preliminary study in this field, so 9 pharmaceutical manufacturing organizations were chosen and surveyed which represents 64% of total Pharmaceutical organizations by using questionnaire to collect the primary data and examine the topic of supply chain integration and its effect on operational performance, thus negating any need for

sampling. Two hundred and thirty five (235) questionnaires were distributed to all pharmaceutical manufacturing organizations (Appendix 9).

**3.2.2 Unit of Analysis:** The survey unit of analysis is composing of all managers at three levels (top level, middle level and supervisors) who are working at pharmaceutical manufacturing organizations. And who will be available at the time of distributing the questionnaires and who will fill it.

### **3.3 Data Collection Method (Tools):**

Two sources of data collection were used: Primary and secondary data:

**Secondary Data:** Data was collected from different sources such as journals, working papers, researches, thesis, articles and worldwide Web and Jordanian Pharmaceutical Manufacturing organizations.

**Primary Data:** Data was collected by extensive survey by questionnaire (Appendix 5 and 8).

#### **3.3.1 Tool of Collecting Data:**

The proper tool was chosen and tested to suit the current study and to match the study hypothesis and research model. Basically the initial questionnaire items were developed relying on former studies. Then, the questionnaire was reviewed and validated by an academic panel of judges and references. Then, the questionnaire was also reviewed and validated by professional and highly experienced experts in the field of pharmaceutical manufacturing organizations (Appendix 1).

### 3.3.2 Questionnaire Variables:

The questionnaire variables are divided into two parts as shown in Appendixes 5 and 8:

1- First part contains demographic dimensions related to gender, age, academic qualification, position, department, and experience.

2- Second part is composing of both independent and dependent variables as follows:

a- Independent Variables (Supply Chain Integration): Based on literature review, the researcher has identified three variables that contribute to Jordanian pharmaceutical operational performance (supplier integration, internal integration, and customer integration) each variable was measured by 10 items and the total were 30 items (from item 1 to item 30 in the questionnaire).

b- Dependent Variable (Operational Performance): Based on literature review, the researcher has identified five dimensions related to operational performance (cost, quality, time, and flexibility) each dimension was measured by 6 items and the total items were 24 items (from item 31 to item 54 in the questionnaire).

All items were measured by five-point Likert-type scale to take the advantage of respondent's perceptions, varying from value 1 (strongly agree) to value 5 (strongly disagree) that was used through the study questionnaire.

**3.3.3 Panel of Judges (Referees):** panel of judges and referees were selected from both distinguished academicians, and professional with highly experienced leaders in the pharmaceutical manufacturing organizations.



### **3.4 Statistical Methods and Procedures:**

Research data have been collected during the time period of April to the first week of May at 2015. The targeted pharmaceutical manufacturing organizations were 14 organizations. The researcher tried to survey all these organization but he could not reach to 5 organizations due to several reasons such as the crowded manufacturing schedule for the next three months, preoccupation with auditing from internal and external committees, and the lack of cooperation of some organizations, so the overall percentage of surveyed organizations is 64% of total Pharmaceutical organizations. The total number of questionnaires was 235 questionnaires that were distributed out of about 300 managers which indicate to 78% of total unit of analysis. The researcher was collected 135 questionnaires which form 45% response rate of total units of analysis. Fourteen questionnaires were abandoned due to incomplete statements from respondents. Consequently, the valid questionnaires were 121 out of 135 collected questionnaires which represent 40% of total units of analysis. SPSS 20 was used to analyze the impact of supply chain integration on Operational performance at pharmaceutical organizations.

#### **3.4.1 Validity Test:**

Two methods were used to confirm the content validity. First: content validity, multiple sources of data (literature such as previous studies, expert interviews) were used to develop and refine the model and measures. Second: Face validity, panel of judges was carried out to modify the finale version of the questionnaire (Sekaran 2003).

#### **3.4.2 Reliability Test (Cronbach's Alpha):**

If the Cronbach's Alpha coefficient value is between 0 and 1 it will be accepted.

**Table (3.1) Reliability Test:**

<b>Variables</b>	<b>No. of Items</b>	<b>Cronbach's Alpha</b>
Supplier Integration	10	0.847
Internal Integration	10	0.907
Customer Integration	10	0.882
Company Integration	3	0.804
Flexibility	6	0.887
Speed (Time)	6	0.888
Quality	6	0.901
Cost	6	0.844
Operational Performance	4	0.844

The reliability is considered high if the value is near to 1 (Sekaran 2003). As shown below in table (3.1) that Cronbach's Alpha coefficient value for independent variables were ranging from 0.847 and 0.907 and for dependent variables were ranging between 0.884 and 0.901 which means that Cronbach's Alpha coefficient value is accepted and highly reliable.

The Importance of each item will be calculated as follows:

$$(5-1)/3 = 1.33.$$

Three levels of importance will be considered according to the following intervals:

1- Low degree of importance lies between 1 and 2.33(1 + 1.33 = 2.33).

2- Medium degree of importance lies between 2.34 and 3.67 (2.34+ 1.33 = 2.34-3.67).

3- High degree of importance lies between: 3.68 up to 5.

While, the ranking will be calculated based on t-Value.

## **Chapter Four:**

### **Analysis and Results**

#### **4.1 Introduction:**

The ultimate goal of this research is to investigate the impact of supply chain integration on operational performance at Jordanian pharmaceutical manufacturing organizations. In this chapter the researcher will show the results and related analysis. In addition, he will focus on the significant outcomes with its statistical indications. First, the study variables will be analyzed and described from statistical point of view by using means, standard deviations, t-values, importance and ranking. Second, the researcher will represent correlation among independent variables, then their correlation with dependent variables. Finally, study hypothesis will be tested by multiple- regressions.

#### **4.2 Respondents' Demographic Description:**

Table (4.1) shows the general characteristics of the respondents in terms of gender, age, academic qualification, position, department, and experience.

1- Gender: It seems that most respondents are male with 61 (50.4%) while the female is 60 respondents (49.6%) which represents.

2- Age: It is clear that the most respondent ages are between 25 and 35 years old (62.8%), while the least respondent ages are between 56 years old and above (1.7%). This indicates that the Jordanian community is youth in nature.

3- Academic qualification: It seems that the most respondents hold Bachelor degree with 84 (69.4%) respondents, while the least academic qualification degree is doctorate with 1 respondent (0.8%). This

entails the need for higher degree in academic qualification especially in higher level positions.

**Table (4.1): Demographic Analysis**

<b>Dimension</b>		<b>Frequency</b>	<b>Percent</b>
<b>Gender</b>	Male	61	50.4
	Female	60	49.6
	Total	121	100.0
<b>Age</b>	25-35 Between	76	62.8
	36-45 Between	33	27.3
	46-55 Between	10	8.3
	>56	2	1.7
	Total	121	100.0
<b>Academic Qualifications</b>	Diploma	16	13.2
	Bachelor	84	69.4
	Master	20	16.5
	Doctorate	1	0.8
	Total	121	100.0
<b>Position</b>	High Management level	18	14.9
	Medium Management level	64	52.9
	Low Management level	39	32.2
	Total	121	100.0
<b>Department</b>	Operation	22	18.2
	Research & Development	12	9.9
	Marketing	13	10.7
	Management	42	34.7
	Other	32	26.4
	Total	121	100.0
<b>Years of Experience</b>	Less than 5	54	44.6
	Between 6-10	37	30.6
	Between 11-15	17	14.0
	>15	13	10.7
	Total	121	100.0

4- Position: Its obviously clear that the most respondent are from the middle management level with 64 respondents (52.9%), while the least respondents from the top management level with 18 (14.9%).

5- Department: It seems that the most respondent are working in management department with 74 respondents (51.1 %) and that are the sum of management and other department (respondent from other department were from management department as well), while the least

respondent are from Research and development department with 12 respondents (9.9%).

6- Years of experience: It's clear that most respondent years of experience are less than five years with 54 respondents (44.6%), while the least years of experience are more than fifteen years with 13 respondents (10.7%).

### 4.3 Study Variable Analysis:

This part of analysis will describe both independent and dependent variables from statistical point of view through means, standard deviations, t-values, importance and ranking.

#### A- Independent Variables Analysis

What is the importance of implementing supply chain integration elements in Jordanian Pharmaceutical Manufacturing Organizations? To answer this question, the researcher used the following: Mean, Standard Deviation, Importance and Ranking of Independent Variables.

**Table (4.2): Mean, Standard Deviation, Importance and Ranking of Independent Variables**

Item	Mean	Std. Deviation	t-Value	Importance	Rank
Supplier Integration	3.90	0.59	16.91	High	2
Internal Integration	3.96	0.63	16.67	High	3
Customer Integration	4.01	0.57	19.56	High	1
<b>Company Integration</b>	<b>3.96</b>	<b>0.51</b>	<b>20.82</b>	<b>High</b>	

t-Tabulated = 1.96

Table (4.2) shows that the mean of independent variables is between 3.90 and 4.01, with standard deviation between 0.57 and 0.63, which indicate that there is an agreement among JPM organizations on highly implementation of the three independent variables. The overall mean of the three variables is 3.96 with standard deviation 0.51, which mean there is an agreement among JPM organizations on highly

implementation of the company's integration. Also, all variables are important for JPM organizations, since ( $t=20.82>1.96$ ). Above results indicate that there is an awareness of Jordanian Pharmaceutical Manufacturing Organizations managers about the importance of supply chain integration. Above results indicate that Pharmaceutical Manufacturing organizations are well organized since supply chain department are available at each organization and they are aware about the concept of supply chain integration. Moreover, this industry offer life-saving products and that entail the necessity to follow the rules and regulations that guarantee the availability of these products when needed.

Based on the Means of independent variables, it obviously clear that the respondents believe that integration with customer is the most important then internal integration, finally integration with suppliers. This indicates that there is awareness about the ultimate and strategic goal that each organization attempts to achieve which is customer satisfaction. The cycle is start with the customer needs and requirements and end up with satisfying these needs and requirements.

### **Supplier Integration:**

The Table (4.3) shows the mean of supplier integration items is between 3.63 and 4.21 with the standard deviation between 0.73 and 1.10, which means that there is an agreement among JPM organizations on highly implementation of supplier integration items.

The overall mean of the supplier integration items is 3.90 with standard deviation 0.59, which mean there is an agreement among JPM organizations on highly implementation of supplier variable. Also all supplier integration items are highly important for JPM organizations, since ( $t=16.91>1.96$ ). This indicates that there is an agreement among the managers about the importance of supplier integration and its effect on

the operational performance at Jordanian Pharmaceutical Manufacturing Organizations.

**Table (4.3): Mean, Standard Deviation, Importance and Ranking of Supplier Integration Items:**

No.	Item	Mean	Std. Deviation	t-Value	Importance	Rank
1	The company shares information with suppliers through the electronic network.	4.21	0.77	17.16	High	2
2	The company is working to build partnership with suppliers	3.80	0.97	9.08	High	7
3	The company is working with suppliers through clear contracts (regarding the quantities, specifications, costs, and delivery)	4.17	0.73	17.46	High	1
4	Suppliers are committed to the required specifications	4.05	0.76	15.15	High	3
5	Suppliers contribute in product design	3.77	1.00	8.47	High	8
6	The company is holding regular meetings with suppliers to review the business issues.	3.96	0.83	12.70	High	5
7	There are joint activities between the company and suppliers (Training program, joint celebrations, exchange of experience)	3.69	1.10	6.84	High	9
8	The company and suppliers are connected with an electronic system to control the inventory	3.63	1.10	6.26	Medium	10
9	The company and suppliers are discussing the significant changes that affect the continuity of their relationship	3.98	0.75	14.38	High	4
10	There are common awareness programs are hold between the company and suppliers to develop the business	3.76	0.90	9.35	High	6
	<b>Supplier Integration</b>	<b>3.90</b>	<b>0.59</b>	<b>16.91</b>		

t-Tabulated = 1.96

#### **Internal Integration:**

Table (4.4) shows that the mean of internal integration items is between 3.76 and 4.21 with standard deviation between 0.69 and 1.04, Which means that there is agreement among JPM organizations on highly implementation the internal integration items. The overall mean of the internal integration items is 3.96 with standard deviation 0.63, which mean there is an agreement among JPM organizations on highly implementation of internal integration variable.

**Table (4.4): Mean, Standard Deviation, Importance and Ranking of Internal Integration Items:**

No.	Item	Mean	Std. Deviation	t-Value	Importance	Rank
11	The company is constantly striving to unify their culture with stakeholders ( mission and vision)	3.93	0.86	11.87	High	6
12	The company involves different department during the preparation of strategic plan	3.76	0.98	8.51	High	9
13	The company uses MRP system ( to harmonize forecasting, procurement, production, and sales)	4.02	0.74	15.08	High	3
14	There is an internal network for the exchange of information between the employees	4.21	0.69	19.12	High	1
15	The company holds training program to increase the employees competencies	4.03	0.82	13.93	High	4
16	The company is keen to hold regular meetings with departments managers to coordinate the work	4.09	0.73	16.43	High	2
17	The company holds extensive meetings to increase the homogeneity among employees	3.92	0.95	10.58	High	8
18	The company allow the employees to participate in solving the problems and internal conflicts and settlement	3.80	1.04	8.50	High	10
19	The company departments share in the development of production processes	3.93	0.88	11.64	High	7
20	There are multiple teams working with each other interactively	3.92	0.82	12.27	High	5
	<b>Internal Integration</b>	<b>3.96</b>	<b>0.63</b>	<b>16.67</b>		

t-Tabulated = 1.96

Also all internal integration variable statements are highly important for JPM organizations, since ( $t = 16.76 > 1.96$ ). This indicate that there is an agreement among the managers about the importance of internal integration and its effect on the operational performance at Jordanian Pharmaceutical Manufacturing Organizations

### **Customer Integration:**

Table (4.5) shows that the mean of customer integration is between 3.76 and 4.52 with standard deviation between 0.58 and 0.92, Which means that there is agreement among JPM organizations on highly implementation the customer integration items. The overall mean of the customer integration items is 4.01 with standard deviation 0.57, which



mean there is an agreement among JPM organizations on highly implementation of customer integration variable.

**Table (4.5): Mean, Standard Deviation, Importance and Ranking of Customer Integration Items:**

No.	Item	Mean	Std. Deviation	t-Value	Importance	Rank
21	Customer's satisfaction is central goal that the company pursued to achieve	4.52	0.58	28.90	High	1
22	The company seeks to build partnership with customers	4.03	0.87	13.13	High	5
23	There is specialized customer service department in the company	3.98	0.89	12.23	High	7
24	The company has a fast system to receive orders from the customers	4.01	0.70	15.82	High	3
25	The company reserves the full databases about their customers	3.97	0.82	13.04	High	6
26	The company set up scientific seminar for its customers	3.81	0.89	10.03	High	9
27	Company customers are encouraged to provide feedback	4.02	0.80	14.08	High	4
28	The company deals with the complaints and observations of the customers properly	4.13	0.72	17.34	High	2
29	The company engages its customers in the preparation of marketing programs	3.82	0.89	10.17	High	8
30	The company engages its customers in the design of the company's products	3.76	0.92	9.07	High	10
<b>Customer Integration</b>		<b>4.01</b>	<b>0.57</b>	<b>19.56</b>		

t-Tabulated = 1.96

Also all customer integration items are highly important for JPM organizations, since ( $t=19.56 > 1.96$ ). This indicate that there is an agreement among the managers about the highly importance of customer integration and its effect on the operational performance at Jordanian Pharmaceutical Manufacturing Organizations.

### **B- Dependent Variables Analysis:**

What is the importance of implementing operational performance dimensions at Jordanian Pharmaceutical Manufacturing Organizations? To answer this question, the researcher used the following: Mean, Standard Deviation, Importance and Ranking of dependent Variables.

**Table (4.6): Mean, Standard Deviation, Importance and Ranking of Dependent Variables**

Item	Mean	Std. Deviation	t-Value	Importance	Rank
Flexibility	4.13	0.64	19.34	High	3
Time (Speed)	4.08	0.61	19.26	High	4
Quality	4.50	0.56	29.24	High	1
Cost	4.17	0.58	22.18	High	2
<b>Operational Performance</b>	<b>4.22</b>	<b>0.50</b>	<b>27.03</b>		

Table (4.6) shows that the average mean of dependent dimensions is between 4.08 and 4.50, with standard deviation between 0.56 and 0.64, which indicate that there is an agreement among JPM organizations on highly implementation of the four dependent dimensions. The overall mean of the four dimensions is 4.22 with standard deviation 0.50, which mean there is an agreement among JPM organizations on highly implementation of the operational performance variable. Also operational performance variable is important for JPM organizations, since ( $t=27.03 > 1.96$ ).

According to the respondents perception about the importance of dependent variable dimensions implementation and based on the mean of each dimension, the importance is ranked as the following: quality, cost, flexibility and time (Speed). This result shows the quality of pharmaceutical products is considered vital and cannot be ignored or neglected because of its impact on the lives of human being (Customer). Cost dimension is ranked on the second level because the decrease the overall cost will affect the organization position in the market against other competitors, so each organization must decrease their cost to the minimum without compromising the level of the quality. Flexibility comes in the third level, which means that all the organization should have the ability to match the fluctuation in demand to match the customer's requirements and that can be applied through the availability

of the new machines with the high capacity, and the optimal arrangement of departmental layouts in a way that facilitate the flow of materials and information and shorten the time and movement between the organizational departments. At the end, time is ranked the in fourth level and this does not neglect the importance of the role played by time to maintain organizational competitive position in the market, on the contrary the organization that apply the quality standards, has the ability to decrease the overall cost, and has the capacity to adapt to the fluctuation in customer demand will inevitably reduce both cycle and lead time.

### **Flexibility:**

Table (4.7) shows that the mean of flexibility dimension is between 4.06 and 4.22 with standard deviation between 0.76 and 0.85, which means that there is agreement among JPM organizations on highly implementation the flexibility items.

**Table (4.7): Mean, Standard Deviation, Importance and Ranking of Flexibility**

No.	Item	Mean	Std. Deviation	t-Value	Importance	Rank
31	The company is to amend the characteristics of the products according to customer's needs (without conflicting with the regulations and instructions)	4.10	0.82	14.73	High	4
32	The company has the ability to respond to changes in production volumes	4.22	0.76	17.75	High	1
33	The company possesses the ability to respond rapidly to changes in the work Environment ( internal and external changes)	4.10	0.77	15.74	High	3
34	The company choses suppliers who are flexible in responding to requests of the company when needed	4.17	0.77	16.74	High	2
35	The company is characterized by openness to new ideas at work	4.06	0.83	14.03	High	6
36	The company gives its customers pay facilities after checking their financial status	4.10	0.85	14.22	High	5
	<b>Flexibility</b>	<b>4.13</b>	<b>0.64</b>	<b>19.34</b>		

The overall mean of the flexibility items is 4.13 with standard deviation 0.64, which mean there is an agreement among JPM organizations on highly implementation of the flexibility dimension. Also all flexibility items are highly important for JPM organizations, since ( $t=19.34>1.96$ ). This indicates that there is an agreement among the managers about the importance of flexibility dimension and its effect on the operational performance at Jordanian Pharmaceutical Manufacturing Organizations.

### **Time (Speed):**

Table (4.8) shows that the mean of time (speed) dimension is between 3.99 and 4.17 with standard deviation between 0.71 and 0.87, which means that there is agreement among JPM organizations on highly implementation of time (speed) elements. The overall mean of the time (speed) items is 4.08 with standard deviation 0.61, which mean there is an agreement among JPM organizations on highly implementation of the time (speed) dimension. Also all time (speed) items are highly important for JPM organizations, since ( $t=19.26>1.96$ ).

**Table (4.8): Mean, Standard Deviation, Importance and Ranking of Time (Speed)**

No.	Item	Mean	Std. Deviation	t-Value	Importance	Rank
37	The company is committed to provide fast service to its customers	4.11	0.75	16.23	High	3
38	The company is committed to deliver orders to customers within the agreed delivery times	4.11	0.74	16.48	High	2
39	Suppliers are committed to supply orders by the agreed timetables	4.07	0.755	15.66	High	4
40	The company reserves the minimum limit of stock which could continue of work in the case of raw material delay	3.99	0.87	12.53	High	6
41	The company bears the differences in transportation costs in order to meet the deadlines of supplying orders to customers	4.01	0.77	14.42	High	5
42	The company is characterized by quick exchange of information with stakeholders.	4.17	0.71	18.02	High	1
	<b>Time (Speed)</b>	<b>4.08</b>	<b>0.61</b>	<b>19.26</b>		

This indicate that there is an agreement among the managers about the highly importance of time dimension and its positive effect on the operational performance at Jordanian Pharmaceutical Manufacturing Organizations.

### Quality:

Table (4.9) shows that the mean of quality dimension is between 4.36 and 4.59 with standard deviation between 0.62 and 0.78, which means that there is agreement among JPM organizations on highly implementation the quality items. The overall mean of the quality items is 4.50 with standard deviation 0.56, which mean there is an agreement among JPM organizations on highly implementation of the quality dimension. Also all quality items are highly important for JPM organizations, since ( $t=29.24 > 1.96$ ). This indicate that there is an agreement among the Jordanian Pharmaceutical Manufacturing Organization managers about the importance of quality and its effect on the operational performance.

**Table (4.9): Mean, Standard Deviation, Importance and Ranking of Quality**

No.	Item	Mean	Std. Deviation	t-Value	Importance	Rank
43	The company is committed to provide the production according to local and international slandered like GPM	4.57	0.66	26.33	High	3
44	The company produces various forms of the products to suits customers' needs (provide several forms of the medication)	4.42	0.75	20.85	High	5
45	The company uses transportation means that maintain the products quality (such as refrigerated cars to keep the temperature)	4.53	0.62	27.12	High	1
46	The company is committed to proper storage conditions according to the specifications	4.53	0.63	26.55	High	2
47	The company has control tracking system to keep the inventory valid (Expiry date)	4.59	0.68	25.70	High	4
48	The company choses their suppliers on the basis of high-quality	4.36	0.78	19.02	High	6
	<b>Quality</b>	<b>4.50</b>	<b>0.56</b>	<b>29.24</b>		

### Cost:

Table (4.10) shows that the mean of cost is between 4.12 and 4.27 with standard deviation between 0.72 and 0.84, which means that there is agreement among JPM organizations on highly implementation the cost items. The overall mean of the cost items is 4.17 with standard deviation 0.58, which mean there is an agreement among JPM organizations on highly implementation of the cost dimension. Also all cost items are highly important for JPM organizations, since ( $t=22.18 > 1.96$ ). This result indicate that there is an agreement among the Jordanian Pharmaceutical Manufacturing Organization managers about the importance of cost and its effect on the operational performance.

**Table (4.10): Mean, Standard Deviation, Importance and Ranking of Cost**

No.	Item	Mean	Std. Deviation	t-Value	Importance	Rank
49	The company is seeking to reduce the wasteful use or resources (electricity, water, raw materials)	4.17	0.84	15.26	High	6
50	The company is working to reduce defective in output (the proportion of damaged products)	4.27	0.72	19.48	High	1
51	The company arrange its internal processes in a manner to shorten performing activities (layout)	4.12	0.77	16.06	High	4
52	The company is working to reduce the inventory to minimum level to the extent that does not hinder the continuation of work	4.12	0.79	15.62	High	5
53	The company uses the cheapest transportation means without compromising the quality of the products	4.20	0.75	17.61	High	2
54	The company is working on economy of scale (large-scale production to reduce the cost per unit)	4.16	0.79	16.21	High	3
	<b>Cost</b>	<b>4.17</b>	<b>0.58</b>	<b>22.18</b>		

### 4.4 Relationships between the Study Variables:

Is there a relationship between supply chain integration and operational performance in Jordanian Pharmaceutical Manufacturing Organizations? To answer this question, the researcher used Bivariate

Pearson's Correlation (r) Among Independent Variables, Dependent variables, and between Independent and Dependent Variables.

Bivariate Pearson correlation (r) table (4.11) shows that the relationships among supply chain integration variables are very strong, since r value ranges between 0.534 and 0.618. Therefore, results show that there are strong relationships among supply chain integration variables. The table also shows the relationships among operational performance dimensions are strong to very strong since r value ranges between 0.524 and 0.653. These results indicate that there are strong relationships among operational performance dimensions.

**Table (4.11) Bivariate Pearson's Correlation (r) Among Independent Variables, Dependent variables, and between Independent and Dependent Variables.**

		1	2	3	4	5	6	7	8	9
1	Supplier Integration	Correlation								
		Sig.								
2	Internal Integration	Correlation	<b>0.534**</b>							
		Sig.	<b>.000</b>							
3	Customer Integration	Correlation	<b>0.587**</b>	<b>0.618**</b>						
		Sig.	<b>.000</b>	<b>.000</b>						
4	Company Integration	Correlation	0.830**	0.856**	0.859**					
		Sig.	.000	.000	.000					
5	Flexibility	Correlation	0.590**	0.667**	0.696**	0.767**				
		Sig.	.000	.000	.000	.000				
6	Speed (Time)	Correlation	0.563**	0.600**	0.586**	0.688**	<b>0.653**</b>			
		Sig.	.000	.000	.000	.000	<b>.000</b>			
7	Quality	Correlation	0.439**	0.360**	0.382**	0.463**	<b>0.539**</b>	<b>0.524**</b>		
		Sig.	.000	.000	.000	.000	<b>.000</b>	<b>.000</b>		
8	Cost	Correlation	0.542**	0.568**	0.523**	0.643**	<b>0.621**</b>	<b>0.573**</b>	<b>0.535**</b>	
		Sig.	.000	.000	.000	.000	<b>.000</b>	<b>.000</b>	<b>.000</b>	
9	Operational Performance	Correlation	<b>0.649**</b>	<b>0.670**</b>	<b>0.668**</b>	<b>0.781**</b>	0.861**	0.838**	0.777**	0.823**
		Sig.	<b>.000</b>	<b>.000</b>	<b>.000</b>	<b>.000</b>	.000	.000	.000	.000

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

The table also shows the relationship between supplier integration and operational performance is strong, since r value is 0.649. In addition the relationship between internal integration and operational performance

is strong too, since  $r$  value is 0.670. Moreover, the relationship between customer integration and operational performance is strong. Since  $r$  value is 0.686.

Finally, the table also shows the relationship between supply chain integration and operational performance is very strong since  $r$  value is 0.781.

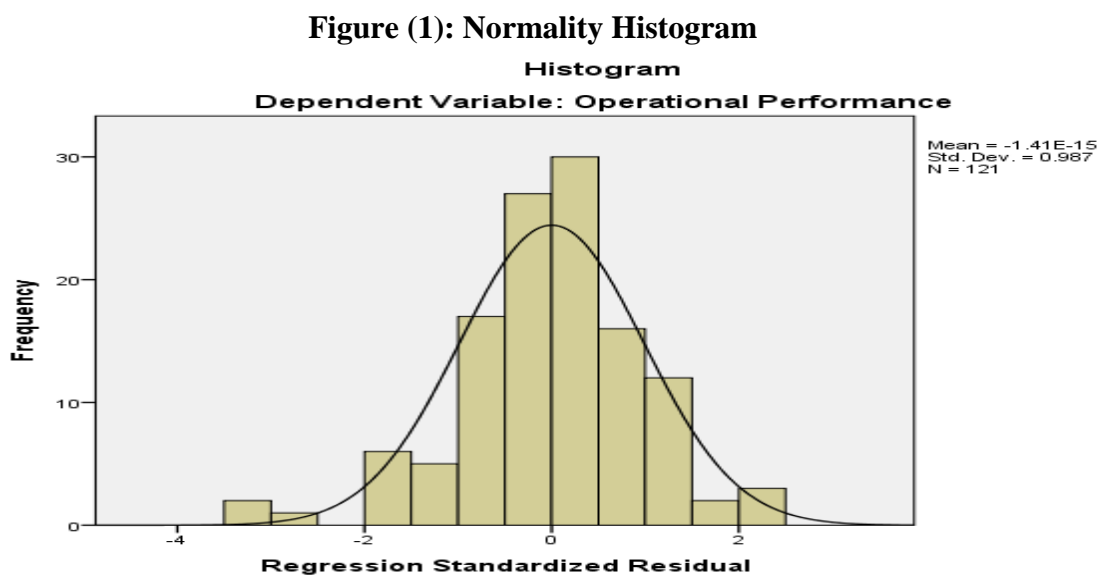
#### 4.5 Testing Study Hypothesis:

Is there an impact of supply chain integration elements on operational performance in Jordanian Pharmaceutical Manufacturing Organizations? To test the hypotheses multiple regressions analysis is used to analyze the effect of the supply chain integration variables on operational performance variable.

To be able to use multiple regressions the following assumptions should be fulfilled: Normality, validity, reliability, multi-colleanearity, independence of errors and correlation.

##### Normal Distribution (Histogram):

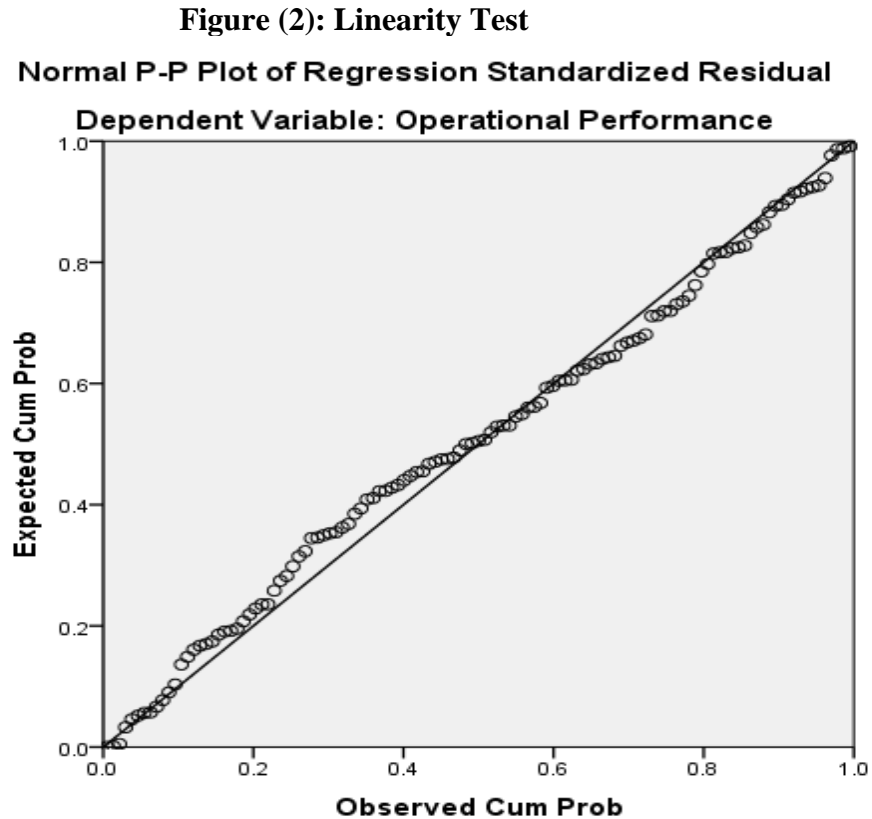
Figure (1) shows that the data were normally distributed.





### Linearity:

Figure (2) shows that the relationships between independent and dependent variables are linear.



### Multiple regressions:

As far as normality, validity and reliability were assumed, so regressions analysis can be used in the case at hand; especially after achieving the following underlying assumptions: Durbin-Watson **test to ensure independence of errors**, If Durbin-Watson test value is about 2 the model does not violate this assumption. While **VIF** (Variance Inflation Factor) and **tolerance** are used **to test multi-collinearity**. If VIF is less than 10 and tolerance is more than 0.2, the **multi-collinearity model does not violate this assumption**.

Table (4.12) shows that Durbin Watson value is ( $d=1.469$ ), which is around two **the residuals are not correlated with each other**;

therefore, the **independence of errors is not violated**. Table (4.10) result also shows that the VIF values are less than 10 and the tolerance values are more than **0.2**. This indicates that there is **no multi-collinearity within the independent variables of the study**.

**Table (4.12) Multi-Collinearity and Durbin-Watson Tests for Main Hypothesis**

Variables	Tolerance	VIF	Durbin-Watson
Supplier Integration	0.608	1.645	1.469
Internal Integration	0.573	1.744	
Customer Integration	0.526	1.900	

#### **4.5.1 The Main Hypothesis:**

##### **Hypothesis:**

**H<sub>0</sub>:** Supply chain integration elements do not have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations, at ( $\alpha \leq 0.05$ ).

Table (4.13) shows that when regressing the three independent variables of supply chain integration together against dependent variable operational performance.  $R^2$  shows the fitness of the model for multiple regressions and explains the variance of independent variable on dependent variable.

**Table (4.13): Results of Multiple Regressions Analysis (ANOVA<sup>a</sup>): Regressing Supply Chain Integration Variables against Total Operational Performance**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	Sig.
1	0.781 <sup>a</sup>	0.610	0.600	61.026	.000 <sup>b</sup>

Since  $R^2$  is 61% then the independent variable can explain 61% of variance on dependent variable, since ( $R^2=61$ ,  $F=61.026$ ,  $Sig.=0.000$ ). Consequently, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that Supply chain integration elements have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations, at ( $\alpha \leq 0.05$ ).

Table (4.14) again shows the significance effect of each independent variable on dependent variable.

**Table (4.14) Results of Multiple Regressions Analysis (Coefficients<sup>a</sup>): Regressing Supply Chain Integration Variables against Total Operational Performance Dimensions**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.186	0.228		5.211	0.000
	Supplier Integration	0.258	0.063	0.304	4.113	0.000
	Internal Integration	0.259	0.060	0.332	4.352	0.000
	Customer Integration	0.249	0.070	0.285	3.577	0.001

Dependent Variable: Operational Performance

#### 4.5.2 Sub-Hypothesis:

**H<sub>0.1</sub>:** Supplier integration does not have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations, at ( $\alpha \leq 0.05$ ).

Table (4.14) shows that there is a positive direct impact of supplier integration on operational performance, since (Beta= 0.304, t=4.113, sig. 0.000,  $p < 0.05$ ). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which indicates that the supplier integration has an impact on operational performance at ( $\alpha \leq 0.05$ ).

**Sub-Hypothesis H<sub>0.2</sub>:** Internal integration does not have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations, at ( $\alpha \leq 0.05$ ).

Table (4.14) shows that there is a positive direct impact of supplier integration on operational performance, since (Beta= 0.332, t=4.352, sig. 0.000,  $p < 0.05$ ), the null hypothesis is rejected and the alternative hypothesis is accepted, which indicates that the internal integration has an impact on operational performance at ( $\alpha \leq 0.05$ ).

**Sub-Hypothesis H<sub>0.3</sub>:** Customer integration does not have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organization, at ( $\alpha \leq 0.05$ ).

Table (4.14) shows that there is a positive direct impact of supplier integration on operational performance, since (Beta= 0.285, t=3.557, sig. 0.000,  $p < 0.05$ ), the null hypothesis is rejected and the alternative hypothesis is accepted, which indicates that the internal integration has an impact on operational performance at ( $\alpha \leq 0.05$ ).

From the above table (4.14), the researcher concludes that all supply chain integration variables have an impact on operational performance at Jordanian Pharmaceutical Manufacturing organizations. The internal integration was holding the highest impact (Beta= 0.332, t=4.352, sig. 0.000), followed by supplier integration variable (Beta= 0.304, t=4.113, sig. 0.000), then customer integration hold the least impact (Beta= 0.285, t=3.557, sig. 0.000).

The researcher believe that the highly importance of internal integration refers to the managers awareness about the importance of internal integration and it's positively impact on the other two integration variables (Supplier and customer), in other words the first step is to make an internal integration to facilitate the integration with supplier and customer.

## **Chapter Five:**

### **Results Discussions, Conclusions and Recommendations**

#### **5.1 Results' Discussion:**

In this section, the study results will be presented and discussed in the light of previous studies as follows:

1- Result of the current study shows that there is a significant importance of the supply chain integration among Jordanian Pharmaceutical Manufacturing Organizations. The researcher refers this result to the awareness of the managers, supervisors, and other employees who work at Jordanian Pharmaceutical Manufacturing Organizations about the importance of supply chain integration and its effect on the overall operational performance. All independent variables have high degree of integration (supplier, internal, and customers). The researcher believe that the first and highest level of integration is related to the customer integration which is actually the most important variable among supply chain integration because customer satisfaction is the ultimate goal that all organizations seek to achieve. Then, internal integration is ranked in the second level of integration as it's the linchpin between supplier integration and customer integration, and it's impossible to achieve either supplier integration or customer integration without internal integration. Finally, supplier integration is ranked in the third level and that's may refer to the respondents believe about the highly importance of customer and internal integration because of the difficulties in satisfying customer needs and requirements and to change the employee behaviors and attitudes toward new culture.

2- The study showed that there are strong inter-relationships and interactions among the three components of SCI and between them and OP. Finally, the results showed that the respondents believed that there is a strong relationship between SCI and OP.

3- Results indicated that the internal integration was having the highest effect on OP, followed by supplier integration and finally customer integration. These results are going with line with the most of previous studies, such as Wong, et. al. (2011) who showed that there is a positive relationship between supply chain integration dimensions and operational performance dimensions as well. Jin, et. al. (2012) also showed that the integration positively related to operational performance and firm performance - primarily through its influence on productivity and customer service, Zhang and Huo, (2012) showed that the trust with customers/suppliers significantly influence supply chain integration. Both supplier integration and customer integration significantly improved financial performance, Al-shaar (2010) , Zhao, et. al. (2013), Han, et. al. (2013), Xu, et. al. (2014) showed that supplier, internal, and customer integration affects the competitive performance and related to the firms performance as well.

4- The study result shows that the supply chain integration have an impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations. This result is go in line with different previous studies, such as Jassim (2010) showed that that there was a positive impact of supply chain strategies (outward strategies) on competitive advantage, while Rosenzweig, et. al. (2002) , Hamad (2013), Huo (2012) found that there was a significant impact of supply chain integration on business and organizational performance as well.

4.1 - The study shows that supplier integration has an impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations. This result agrees with the following two studies: Peterson (2005) showed that the supplier involvement has a positive impact in new product development and made significant improvements in financial returns as well, and Saeed, et. al. (2005) showed that the external integration enhanced the manufacturing firms' process efficiency.

4.2- The study shows that internal integration has an impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations. This result is supported by Jr, et. al. (2008) and Huo(2012). Jr, et. al. (2008) showed that aligning marketing strategies of partners throughout the supply chain improves operational performance, and Huo (2012) showed that internal integration improves external integration and that internal and external integration directly and indirectly enhance company's performance and that goes directly with the study result about the most important role of internal integration.

4.3- The study shows that customer integration has an impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations. This result is matching with result of Jassim (2010) who showed that that there was a positive impact of supply chain strategies (outward strategies) on competitive advantage.

Some studies discussed several factors that affect supply chain integration such as Devaraj, et. al. (2007) showed that information technology was supporting supplier integration and customer integration as well. Xu, et. al. (2014) who showed that top management support and information technology are two vital enablers of supply chain integration, while Parast and Spillan, (2013) indicated that logistics/supply chain strategy was the main driver of logistics and supply chain integration and

logistics decisions. In addition, Zhang and Huo, (2012) showed that trust with customers/suppliers significantly influence supply chain integration.

## **5.2. Conclusion:**

There is a significant importance of supply chain integration among the Jordanian Pharmaceutical Manufacturing Organizations. And there is high importance of the supply chain integration variables in the Jordanian Pharmaceutical Manufacturing Organizations field. Results indicate that Pharmaceutical Manufacturing organizations are well organized since supply chain department are available at each organization and they are aware about the concept of supply chain integration. Moreover, this industry offer life- saving products and that entail the necessity to follow the rules and regulations that guarantee the availability of these products when needed.

There is a high importance of the operational performance variable at Jordanian Pharmaceutical Manufacturing Organizations and the overall result indicates that there is a significant importance of the operational performance dimensions among Jordanian Pharmaceutical Manufacturing Organizations. This result indicate that the managers and supervisors at Jordanian pharmaceutical manufacturing organization have the knowledge about the criteria and dimensions of evaluating the performance, in addition they apply these criteria and dimensions regularly for the growth and development of their organizations.

Based on the multiple regressions the null hypothesis which states that Supply chain integration elements do not have direct impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations is rejected and the alternative hypothesis is accepted, at ( $\alpha \leq 0.05$ ). This result indicates that supply chain integration is necessary and



inevitably for all the processes and activities from supplier to customer and vice versa. In addition, this result also reflects the maturity of these organizations about the new concepts of supply chain and the need for being updates for the prosperity and development of Pharmaceutical organizations.

Customer integration has highest impact on the operational performance at Jordanian Pharmaceutical Manufacturing Organizations. Then followed by the internal integration, and finally followed with supplier integrations. The researcher believes that customer integration variable has the highest impact refers to the managers awareness about the importance of customer integration and it's positively impact on the other two integration variables.

There is a strong positive relationship between supply chain integration and operational performance dimensions of Jordanian Pharmaceutical Manufacturing Organizations. In addition, independent variables are correlated among themselves, and there are correlation between them and the operational performance dimensions. And they are positively related (Independent variables are positively related among each other, the dependent dimensions are also positively related among each other of them, and independent variables and dependent dimensions are also positively related together).

The researcher summarized the following conclusions:

- 1- Result of the current study shows that there is a significant importance of the supply chain integration among Jordanian Pharmaceutical Manufacturing Organizations. All variables have high existence. Internal integration was the highest importance, followed by supplier integration, and customer integration sequentially.

2- The study result shows that the supply chain integration have an impact on operational performance at Jordanian Pharmaceutical Manufacturing Organizations. Internal integration was the highest importance, followed by supplier integration, and customer integration sequentially.

3- Finally, result shows that there is a strong positive relationship between the supply chain integration and the operational performance dimensions at Jordanian Pharmaceutical Manufacturing Organizations. It also shows that there are strong relationships and interactions among supply chain integration.

### **5.3. Recommendations:**

In the light of all the study results, the following recommendations can be proposed:

#### **Recommendations for Pharmaceutical industry and other industries:**

- It is recommended that JPM Organizations should work more closely with suppliers in order to increase the level of integration which in turn increases the Operational Performance through linking both suppliers and pharmaceutical organizations with advanced information system to facilitate the flow of materials, information, and experiences, in addition to control the inventory.
- The results show that JPM organizations should improve the three SCI variables together because they are strongly interrelated.
- It is advisable to pay more attention to the strategic relationship with suppliers through enhancing joint programs and activities to increase the coherence and harmony.

- It is recommended to pay greater attention to the internal integration through the involvement of various departments in formulating the strategic plans.
- It is recommended to engage the customers in designing the company's products which will positively affect the integration with customers.
- It is advised to focus on enhancing the flexibility of Pharmaceutical manufacturing organization through openness to the new ideas at work.

**Recommendations for academicians and future research:**

- This study is dedicated to the pharmaceutical manufacturing industry, so it is advisable to study the supply chain integration on other manufacturing organizations.
- The study recommends that to carry out similar research on Pharmaceutical industry in Arab Countries in order to compare the results and stand on the differences, if available, and provide the suitable interpretations.
- Despite the accuracy of including all supply chain integration variables, however there may be scope to add other variables including the addition of a variable to an intermediary such as the impact of the external environment, also it is possible to add other paragraphs that can give clearer results.
- It is recommended that to restudying the same topic on the same companies over a period of time to evaluate the progress resulting from the application of supply chain integration.
- It is advised to conduct similar studies from the perspective of suppliers and customers.

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## Appendices:

### Appendix (1): Panel of Referees Committee:

No.	Name	Qualification	Organization
1	Prof. Mohammad Al No'imi	Ph. D. Management	Middle East University
2-	Prof. Laith al-rubee	Ph. D. Management	Middle East University
3-	Prof. Kamil Moghrabi	Ph. D. Management	Middle East University
4-	Prof. Abdel Bari Al-Durah	Ph. D. Management	Middle East University
5-	Dr. Ahmad Ali Saleh	Ph. D. Management	Middle East University
6-	Dr. Mohammad Khir Abu Zeid	Ph. D. Management	Middle East University
7-	Dr. Haitham Hijazi	Ph. D. Management	Middle East University
8-	Dr. Ali Abbas	Ph. D. Management	Middle East University
9-	Dr. Hanadi Salameh	Ph. D. Marketing	Middle East University
10-	Dr. Feras Abu Gaoud	Ph. D. Marketing	Middle East University
11-	Dr. Ahmad Al Zamel	Ph. D. Marketing	Middle East University
12-	Prof. Najem Aboud Najem	Ph. D. Management	Al-Zaytona University
13-	Dr Abdel Aziz Al-Nadawi	Ph. D. Management	Al-Zaytona University
14-	Dr. Khaled Al-amoush	Ph. D. Management	Al-Zaytona University
15-	Pfor. Najem Abdulla Al-azawi	Ph. D. Management	Petra University
16-	Dr. Musa Khair Eldin	Ph. D. Management	Petra University
17-	Dr. Sabah Hmaid	Ph. D. Management	Petra University
18-	Dr. Ayman Abdulla	Ph. D. Management	University of Jordan
19-	Dr. Ibrahim Zuhd	Manufacturing Organization	GM
20-	Eng. Mohammad A. Tarabia	Manufacturing Organization	Executive Manufacturing Manager JPM
21-	Eng. Deima Al-Jundi	Supply Planning Manager	HIKMA Pharmaceuticals
22-	Mr. Taha Mansour	Supervisor at Operational Department	HIKMA Pharmaceuticals

**Appendix (2):**  
**Members of the Jordanian Association of Pharmaceutical**  
**Manufacturers 2015.**

<b>No.</b>	<b>Company</b>	<b>Year Established</b>	<b>Type</b>
<b>1</b>	The Arab Pharmaceutical Manufacturing Co. LTD (APM)	1962	Public
<b>2</b>	Dar Al Dawa Development and Investment Co. (DAD)	1975	Public
<b>3</b>	Hikma Pharmaceuticals (HIKMA)	1977	Pubic
<b>4</b>	Jordanian Pharmaceutical Manufacturing Co. PLC (JPM)	1978	Public
<b>5</b>	Arab Center for Pharmaceutical and Chemical (ACPC)	1983	Public
<b>6</b>	United Pharmaceutical (UPM)	1989	Private
<b>7</b>	Amman Pharmaceutical Industries Co. (API)	1989	Private
<b>8</b>	Ram Pharmaceutical Industries Co. Ltd (RAM)	1992	Private
<b>9</b>	Hayat Pharmaceutical Industry (HPI)	1993	Public
<b>10</b>	Middle East Pharmaceutical Manufacturing Co. (MIDPHARMA)	1993	Public
<b>11</b>	Total Quality Pharma(TQ Pharma)	1994	Private
<b>12</b>	Jordan Sweden Medical and Sterilization Co.	1996	Private
<b>13</b>	Al-Kindi Pharmaceutical Industries PLC. (KP)	1997	Private
<b>14</b>	Amman Pharmaceutical Industries Co. (API)	1999	Private

### **Appendix (3):**

#### **Panel of Judges (Referees) Committee Letter (English Version)**

“Supply Chain Integration Questionnaire Evaluation Letter”

Dear Professor:

Supply Chain Integration is considered one of the vital topics in the Manufacturing field in general and Pharmaceuticals Manufacturing field in particular. Supply chain management represents all the activities and operations that facilitate the dissemination of information and experiences and transfers of raw material from suppliers to the manufacturing organizations then to the customers and vice versa. Hence the importance of supply chain integration (supplier, internal, and customer integration), whereas integrations contribute to decrease the time period from the time of customer demand for the products or services until they are delivered. In addition to saving efforts and financial capabilities and get customer satisfaction and achieve the maximum level of profitability.

The purpose of this study is to investigate the impact of supply chain integration on operational performance at Jordanian pharmaceutical manufacturing organizations.

You have been chosen and invited to participate as one of the panel judge for this master thesis questionnaire. Your guidance and participation in this research is highly appreciated.

Please put down your suggestions and recommendations onto the questionnaire, adding any comments you wish about any particular issues that you consider of importance. It is important to state that the design and analysis of this study concentrates on the firm.

Again, thank you for your participation and guidance, and if you have any questions or concerns please do not hesitate to contact 00962798802035.

**Thank you very much.**

Researcher: Hamza Saleh "Sultan El-Tamimi"

Supervisor: Dr. Abdulaziz Ahmad Al-Sharbati



## **Appendix (4):**

### **Participants Letter (English Version)**

“Supply Chain Integration Questionnaire Evaluation Letter”

Dear participant:

Supply Chain Integration is considered one of the vital topics in the Manufacturing field in general and Pharmaceuticals Manufacturing field in particular. Supply chain management represents all the activities and operations that facilitate the dissemination of information and experiences and transfers of raw material from suppliers to the manufacturing organizations then to the customers and vice versa. Hence the importance of supply chain integration (supplier, internal, and customer integration), whereas integrations contribute to decrease the time period from the time of customer demand for the products or services until they are delivered. In addition to saving efforts and financial capabilities and get customer satisfaction and achieve the maximum level of profitability. The purpose of this study is to investigate the impact of supply chain integration on operational performance at Jordanian pharmaceutical manufacturing organizations. I am honored to invite you to participate in filling the 54 questionnaire items according to the current situations at your organization which I expect to take 10 minutes to be filled. I strongly appreciate your participation in this study, and you can add any note you think its valuable for the research purposes and for your organization in particular and to pharmaceutical manufacturing in general, with the knowledge that the answers are secrete and only will be used for research purposes.

I hope to remind you about the importance of your answer to all questionnaire items to serve the research design. And if you need to pursue the research results it will be available to you upon request. Again I reiterate my thanks and gratitude for your guidance and support< and if you have any queries or note please call me at mobile no.00962798802035.

**Thank you very much.**

Researcher: Hamza Saleh "Sultan El-Tamimi"

Supervisor: Dr. Abzel Aziz Ahmad AL-Sharabati

## Appendix (5): Thesis Questionnaire (English Version)

### Questionnaire of the Impact of supply chain integration on Operational Performance at Jordanian Pharmaceutical Manufacturing Organizations.

Demographic information

- Gender:  Male  Female
- Age (years):  25 – 35  Between 35 – 45  Between 45 - 55  above 55
- Education:  Diploma or less  Bachelor  Master  Doctorate  Doctorate
- Position:  High level  Middle level  Supervisors
- Division:  Production  R&D  Marketing  Management  Others
- Years of experience:  Less or equal 5  Between 5 – 10  Between 10 – 15  Above 15

The following 54 items tap into supply chain and its effect on operational performance. Please, answer these questions based on actual and current situation and not on beliefs.

[1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree] based on how you feel about the statement.

### Supply Chain Integration

#### Supplier Integration:

1	The company share information with suppliers through the electronic network.	1	2	3	4	5
2	The company is working to build partnership with suppliers	1	2	3	4	5
3	The company is working with suppliers through clear contracts (regarding the quantities, specifications, costs, and delivery)	1	2	3	4	5
4	Suppliers are committed to the required specifications	1	2	3	4	5
5	Suppliers contribute in product design	1	2	3	4	5
6	The company is holding regular meetings with suppliers to review the business issues.	1	2	3	4	5
7	There are joint activities between the company and suppliers (Training program, joint celebrations, exchange of experience)	1	2	3	4	5
8	The company and suppliers are connected with an electronic system to control the inventory	1	2	3	4	5
9	The company and suppliers are discussing the significant changes that affect the continuity of their relationship	1	2	3	4	5
10	There are common awareness programs are hold between the company and suppliers to develop the business	1	2	3	4	5

**Internal Integration:**

11	The company is constantly striving to unify their culture with stakeholders ( mission and vision)	1	2	3	4	5
12	The company involves different department during the preparation of strategic plan	1	2	3	4	5
13	The company uses MRP system ( to harmonize forecasting, procurement, production, and sales)	1	2	3	4	5
14	There is an internal network for the exchange of information between the employees	1	2	3	4	5
15	The company holds training program to increase the employees competencies	1	2	3	4	5
16	The company is keen to hold regular meetings with departments managers to coordinate the work	1	2	3	4	5
17	The company holds extensive meetings to increase the homogeneity among employees	1	2	3	4	5
18	The company allow the employees to participate in solving the problems and internal conflicts and settlement	1	2	3	4	5
19	The company departments share in the development of production processes	1	2	3	4	5
20	There are multiple teams working with each other interactively	1	2	3	4	5

**Customer Integration:**

21	Customer's satisfaction is central goal that the company pursued to achieve	1	2	3	4	5
22	The company seeks to build partnership with customers	1	2	3	4	5
23	There is specialized customer service department in the company	1	2	3	4	5
24	The company has a fast system to receive orders from the customers	1	2	3	4	5
25	The company reserves the full databases about their customers	1	2	3	4	5
26	The company set up scientific seminar for its customers	1	2	3	4	5
27	Company customers are encouraged to provide feedback	1	2	3	4	5
28	The company deals with the complaints and observations of the customers properly	1	2	3	4	5
29	The company engages its customers in the preparation of marketing programs	1	2	3	4	5
30	The company engages its customers in the design of the company's products	1	2	3	4	5

**Operational Performance****Flexibility:**

31	The company is to amend the characteristics of the products according to customer's needs (without conflicting with the regulations and instructions)	1	2	3	4	5
32	The company has the ability to respond to changes in production volumes	1	2	3	4	5
33	The company possesses the ability to respond rapidly to changes in the work Environment ( internal and external changes)	1	2	3	4	5
34	The company chooses suppliers who are flexible in responding to requests of the company when needed	1	2	3	4	5
35	The company is characterized by openness to new ideas at work	1	2	3	4	5
36	The company gives its customers pay facilities after checking their financial status	1	2	3	4	5

**Time (Speed):**

37	The company is committed to provide fast service to its customers	1	2	3	4	5
38	The company is committed to deliver orders to customers within the agreed delivery times	1	2	3	4	5
39	Suppliers are committed to supply orders by the agreed timetables	1	2	3	4	5
40	The company reserves the minimum limit of stock which could continue of work in the case of raw material delay	1	2	3	4	5
41	The company bears the differences in transportation costs in order to meet the deadlines of supplying orders to customers	1	2	3	4	5
42	The company is characterized by quick exchange of information with stakeholders.	1	2	3	4	5

**Quality:**

43	The company is committed to provide the production according to local and international slandered like GPM	1	2	3	4	5
44	The company produces various forms of the products to suits customers' needs (provide several forms of the medication)	1	2	3	4	5
45	The company uses transportation means that maintain the products quality (such as refrigerated cars to keep the temperature)	1	2	3	4	5
46	The company is committed to proper storage conditions according to the specifications	1	2	3	4	5
47	The company has control tracking system to keep the inventory valid (Expiry date)	1	2	3	4	5
48	The company choses their suppliers on the basis of high-quality	1	2	3	4	5

**Cost:**

49	The company is seeking to reduce the wasteful use or resources (electricity, water, raw materials)	1	2	3	4	5
50	The company is working to reduce defective in output (the proportion of damaged products)	1	2	3	4	5
51	The company arrange its internal processes in a manner to shorten performing activities (layout)	1	2	3	4	5
52	The company is working to reduce the inventory to minimum level to the extent that does not hinder the continuation of work	1	2	3	4	5
53	The company uses the cheapest transportation means without compromising the quality of the products	1	2	3	4	5
54	The company is working on economy of scale ( large-scale production to reduce the cost per unit)	1	2	3	4	5

## Appendix (6):

### Panel of Referees Committee Letter (Arabic Version)

استبانة حول تكامل سلسلة التوريد وأثره على الأداء التشغيلي لشركات صناعة الأدوية الأردنية  
حضرة الأستاذ الفاضل:

يجري اعداد موضوع هذا البحث (رسالة ماجستير) حول دراسة أثر تكامل سلسلة التوريد على الأداء التشغيلي في شركات صناعة الأدوية الأردنية. ونظرا لخبرتكم في هذا المجال أرجو من حضرتكم التكرم بتقييم فقرات هذا الاستبيان الذي ستقاس عباراته بواسطة الوضوح،الملائمة والانتفاء،وتدوين اقتراحاتكم وتوصياتكم بشأنه، وإضافة أي تعليقات حول القضايا التي ترونها هامة لهذه الرسالة و/أو لصناعة الأدوية، وأنا على أتم الاستعداد للأخذ باقتراحاتكم وتوصياتكم عند إعادة كتابة وتعديل الاستبيان. وإنني اقدر اشتراككم وتوجيهاتكم لصالح هذه الدراسة.

أكرر شكري لاشتراككم وتوجيهاتكم، وإذا كان لديكم أي استفسار أو ملاحظة، الرجاء الاتصال على الرقم (00962798802035).

وشكرا لكم على اهتمامكم.

الباحث: حمزه صالح "سلطان التميمي"

المشرف: د. عبدالعزيز أحمد الشرباتي

## Appendix (7):

### Participants Letter (Arabic Arabic)

استبانة حول تكامل سلسلة التوريد وأثره على الأداء التشغيلي لشركات صناعة الأدوية الأردنية

المشارك الفاضل:

تعتبر سلسلة التوريد من المواضيع الهامة في ميادين الصناعة عامة وفي مجال صناعة الأدوية خاصة. وتمثل سلسلة التوريد جميع الأنشطة والعمليات التي تضمن انتقال المعلومات والمواد والخبرات من الموردين الى المنظمات الصناعية ثم الى الزبائن والعكس. ومن هنا فقد برزت اهمية التكامل (تكامل مع الموردين، تكامل داخلي، تكامل مع الزبائن)، حيث ان عملية التكامل تساهم في تقليل المدة الزمنية من وقت طلب المواد من قبل الزبائن الى استلامها، بالاضافة الى توفير الجهد والمقدرات المالية والحصول على رضا الزبائن وتحقيق اعلى مستويات الربحية. ان غرض هذه الدراسة (رسالة ماجستير) هو معرفة أثر تكامل سلسلة التوريد على الاداء التشغيلي في شركات صناعة الأدوية الأردنية.

أشرف بدعوتك للمشاركة بتعبئة فقرات استبانة تكامل سلسلة التوريد ضمن الواقع الحالي لشركتكم الموقرة والتي تحتوي على 54 فقرة، والتي اتوقع ان تستغرق حوالي 10 دقائق لإكمالها. انني اقدر وبشدة مشاركتك في هذه الدراسة، ويمكنك ايضا اضافة اي ملاحظات حول ما تراه مناسباً لهذا البحث خاصة ولشركتكم وللصناعة الدوائية عامة. علماً بأن الاجابات سرية للغاية وسوف تستخدم لأغراض البحث فقط.

ارجو ان أذكرك بأهمية اجابتك على جميع فقرات الاستبانة لخدمة تصميم البحث. وفي حال رغبتكم بمتابعة نتائج هذا البحث فانها ستكون متوفرة لديكم عند طلبكم لها. أكرر شكري وامتناني لدعمكم ولتوجيهاتكم، وإذا كان لديكم أي استفسار أو ملاحظة، الرجاء الاتصال على الرقم (0798802035).

ولكم جزيل الشكر والتقدير

الباحث: حمزه صالح سلطان التميمي"

المشرف: د. عبدالعزيز أحمد الشرياتي

## Appendix (8):

## Thesis Questionnaire (Arabic Version)

استبانة حول تكامل سلسلة التوريد وأثره على الأداء التشغيلي لشركات صناعة الأدوية الأردنية

الخصائص الديموغرافية:

- الجنس:  ذكر  انثى
- العمر:  35-25  45-36  55-46  56 فما فوق
- المؤهل العلمي:  دبلوم  بكالوريوس  ماجستير  دكتوراة
- المستوى الإداري:  ادارة عليا  ادارة وسطى  مشرف (supervisor)
- القسم:  الانتاج  البحث والتطوير  التسويق  الادارة  اخرى
- الخبرة: اقل من 5 سنوات  6-10 سنوات  11-15 سنة  اكثر من 15 سنة
- متغيرات الدراسة:

(الرجاء التأكد من إجابة كل سؤال ووضع دائرة حول الجواب الصحيح استناداً إلى مشاركتك وأحاسيسك حول الواقع الموجود وليس بناء على الاعتقاد أو الوضع المثالي كالفقرة كالتالي: [1 = لا أوافق بقوة.....، 5 = أوافق بقوة])

رقم	العبارات	بغوة	غير مطبق	محايد	مطبق	مطبق بقوة
		1	2	3	4	5
<b>Supplier Integration (التكامل مع المورد)</b>						
1.	تتبادل الشركة المعلومات مع الموردين من خلال الشبكة الإلكترونية	1	2	3	4	5
2.	تعمل الشركة على بناء شراكات مع الموردين	1	2	3	4	5
3.	تعمل الشركة مع الموردين من خلال عقود واضحة (بخصوص الكميات والمواصفات والكلف والتسليم)	1	2	3	4	5
4.	يلتزم الموردون بالمواصفات المطلوبة	1	2	3	4	5
5.	يساهم الموردون في تصميم المنتجات	1	2	3	4	5
6.	توجد اجتماعات دورية بين الشركة والموردين لمراجعة العمل المشترك	1	2	3	4	5
7.	يوجد فعاليات مشتركة بين الشركة والموردين (مثل برامج تدريب، احتفالات مشتركة، تبادل الخبرات)	1	2	3	4	5
8.	ترتبط الشركة مع الموردين بنظام الي حول المخزون	1	2	3	4	5
9.	تقوم الشركة بمناقشة الموردين حول التغيرات الهامة التي تؤثر على استمرارية العلاقة معهم	1	2	3	4	5
10.	يوجد برامج توعية مشتركة بين الشركة والموردين لتطوير العمل	1	2	3	4	5
<b>Internal Integration (التكامل الداخلي في الشركة)</b>						
11.	تسعى الشركة باستمرار لتوحيد ثقافة العاملين حول اهدافها ( الرسالة والرؤية)	1	2	3	4	5
12.	تقوم الشركة باشتراك الاقسام المختلفة اثناء اعداد الخطط الاستراتيجية	1	2	3	4	5
13.	تستخدم الشركة نظام تخطيط الاحتياجات للشركة (نظام يسعى للموائمة بين التنبؤ والانتاج والمشتريات والمبيعات)	1	2	3	4	5

رقم	العبارات	بقوة	غير مطبق	غير مطبق	محايد	مطبق	مطبق بقوة
		1	2	3	4	5	
14.	يوجد شبكة اتصال داخلية لتبادل المعلومات بين العاملين	1	2	3	4	5	
15.	يوجد برامج تدريب مشتركة لرفع كفاءة العاملين	1	2	3	4	5	
16.	تحرص الشركة على عقد اجتماعات دورية بين مدراء الاقسام المختلفة لتنسيق العمل فيما بينهم	1	2	3	4	5	
17.	تعقد الشركة اجتماعات موسعة للعاملين لزيادة التجانس فيما بينهم	1	2	3	4	5	
18.	تعمل الشركة على إشراك الموظفين في حل المشاكل والصراعات الداخلية وتسويتها	1	2	3	4	5	
19.	تتشارك الاقسام المختلفة في تطوير العمليات الانتاجية	1	2	3	4	5	
20.	توجد فرق متعددة المهام تعمل مع بعضها بشكل تفاعلي	1	2	3	4	5	
<b>Customer Integration ( التكامل مع الزبائن )</b>							
21.	رضا الزبون هو هدف تسعى إليه الشركة	1	2	3	4	5	
22.	تسعى الشركة لبناء شراكات مع الزبائن	1	2	3	4	5	
23.	يوجد في الشركة قسم مختص لخدمة العملاء	1	2	3	4	5	
24.	لدى الشركة نظام سريع لتلقي الطلبات من الزبائن	1	2	3	4	5	
25.	تحتفظ الشركة بقواعد بيانات كاملة حول الزبائن	1	2	3	4	5	
26.	تقوم الشركة باقامة ندوات علمية للزبائن	1	2	3	4	5	
27.	تشجع الشركة الزبائن على تزويدها بالتغذية الراجعة	1	2	3	4	5	
28.	تتعامل الشركة مع ملاحظات وشكاوي الزبائن بشكل مناسب	1	2	3	4	5	
29.	تشارك الشركة زبائنها الرئيسيين في اعداد برامجها التسويقية	1	2	3	4	5	
30.	تشارك الشركة زبائنها في تصميم منتجات الشركة	1	2	3	4	5	
<b>المرونة</b>							
31.	تقوم الشركة بتعديل خصائص المنتج حسب احتياجات الزبائن بما لا يتعارض مع الانظمة والتعليمات	1	2	3	4	5	
32.	لدى الشركة القدرة على الاستجابة للتغيرات في كميات الانتاج	1	2	3	4	5	
33.	تمتلك الشركة القدرة على الاستجابة السريعة للمتغيرات في بيئة العمل (تغيرات داخلية أو خارجية)	1	2	3	4	5	
34.	تختار الشركة موردين يتصفون بالمرونة في الاستجابة لطلبات الشركة عند الحاجة	1	2	3	4	5	
35.	تمتاز الشركة بالانفتاح على الافكار الجديدة في العمل	1	2	3	4	5	
36.	تمنح الشركة تسهيلات دفع لزيائنها بعد التأكد من ملائمتهم المالية	1	2	3	4	5	
<b>الوقت (السرعة)</b>							
37.	تلتزم الشركة بالسرعة في تقديم خدماتها للزبائن	1	2	3	4	5	
38.	تلتزم الشركة بتسليم الطلبات للزبائن ضمن اوقات التسليم المتفق عليها	1	2	3	4	5	
39.	يلتزم الموردون بتوريد الطلبات حسب الجدول الزمني المتفق عليه	1	2	3	4	5	
40.	تحتفظ الشركة بالحد الأدنى من المخزون الذي يمكنها من استمرار العمل في حال تأخر المواد الاولية	1	2	3	4	5	



رقم	العبارات					
	مطبق بقوة	مطبق	محايد	غير مطبق	غير مطبق بقوة	
	5	4	3	2	1	
41.	5	4	3	2	1	تتحمل الشركة الفروق في كلف وسائل الشحن من اجل الالتزام بمواعيد توريد الطلبات للزبائن
42.	5	4	3	2	1	تمتاز الشركة بسرعة تبادل المعلومات مع اصحاب المصالح في الشركة
<b>الجودة</b>						
43.	5	4	3	2	1	تلتزم الشركة بتقديم الانتاج حسب المعايير المحلية والعالمية (GMP)
44.	5	4	3	2	1	تقوم الشركة بإنتاج أشكال مختلفة من المنتج لتتلائم مع متطلبات الزبائن (توفر الدواء بعدة أشكال)
45.	5	4	3	2	1	تستخدم الشركة وسائل نقل تحافظ على جودة المنتجات (مثل البرادات للحفاظ على درجة الحرارة)
46.	5	4	3	2	1	تلتزم الشركة بشروط التخزين حسب المواصفات
47.	5	4	3	2	1	تتبع الشركة نظام مراقبة للحفاظ على صلاحية المخزون (تاريخ الانتهاء)
48.	5	4	3	2	1	تختار الشركة مورديها على اساس الجودة العالية
<b>التكلفة</b>						
49.	5	4	3	2	1	تسعى الشركة لتقليل الهدر في استخدام الموارد ( الكهرباء، الماء، المواد الاولية)
50.	5	4	3	2	1	تعمل الشركة على تقليل المعيب في المخرجات (نسبة التالف)
51.	5	4	3	2	1	تقوم الشركة بالترتيب الداخلي للعمليات (layout) بطريقة تختصر من زمن أداء الأنشطة
52.	5	4	3	2	1	تعمل الشركة على تقليل المخزون للحد الأدنى الذي لا يعيق استمرار العمل
53.	5	4	3	2	1	تستخدم الشركة وسائل النقل الاقل تكلفة دون المساس بجودة المنتجات
54.	5	4	3	2	1	تقوم الشركة بالعمل على اسلوب اقتصاديات الحجم (الانتاج بكميات كبيرة لتقليل كلفة القطعة الواحدة)

### Appendix (9):

#### Jordanian Pharmaceutical Manufacturing Organizations (participant of the survey)

Organization	No. of Distributed Questionnaires	No. of returned Questionnaires	No. of Valid Questionnaires	Percentage %
Jordan Sweden Medical and Sterilization Co.	20	20	14	70%
Hayat Pharmaceutical Industry (HPI)	15	15	6	40%
Total Quality Pharma(TQ Pharma)	20	20	14	70%
Jordanian Pharmaceutical Manufacturing Co. PLC (JPM)	20	20	10	50%
Dar Al Dawa Development and Investment Co. (DAD)	20	20	12	60%
United Pharmaceutical (UPM)	25	25	19	76%
Hikma Pharmaceuticals (HIKMA)	25	25	16	64%
Pharma International Co.	20	20	19	95%
Amman Pharmaceutical Industries Co. (API)	20	20	11	55%
Ram Pharmaceutical Industries Co. Ltd (RAM)	20	0	0	0
Middle East Pharmaceutical Manufacturing Co. (MIDPHARMA)	30	30	0	0
Al-Kindi Pharmaceutical Industries PLC. (KP)	0	0	0	0