جـــامـعـــة الـــشـرق الأوسـط
MIDDLE EAST UNIVERSITY
Amman - Jordan

The Impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry.

أثر برج مراقبة سلسلة التوريد على الميزات التنافسية لصناعة الأدوية الأردنية

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

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Authorization

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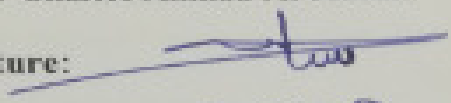
Signature: 

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Examination Committee's Decision

This thesis of the student Sharief Ahmad Al-Atrash, which study "The Impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry" has been defined, accepted and approved on 28/07/2018.

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Sharief Ahmad Al-Atrash

Dedication

Nobody has been more important to me in the dedication of this thesis than my family. I would like to thank my father and the soul of my mother, whose love and guidance are with me in whatever I pursue. They are the ultimate role models. Most importantly, I wish to thank my loving and supportive wife, Razan, and my wonderful daughters, Leen and Haneen.

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The Impact of Supply Chain Control Tower on Competitive Advantages of.

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Abstract

Purpose: Supply Chain Control Tower has emerged as a key tool for supply chain management, which attempt visualizing and control supply chain activities to achieve Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation). Therefore, this study aims to investigate the impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry.

Design/Methodology/Approach: To actualize this study the data collected from 132 managers and team leaders who are working at Jordanian pharmaceutical manufacturing organizations by questionnaire. After confirming the normality, validity and reliability of the tool, descriptive analysis carried out, and correlation between variables checked. Finally, the impact tested by multiple regressions.

Findings: The result shows that the Jordanian pharmaceutical manufacturing organizations implement both Supply Chain Control Tower sub-variables and Competitive Advantages dimensions. It also shows that there is strong correlation between Supply Chain Control Tower sub-variables and Competitive Advantages dimensions. Finally, it shows that there is a significant and positive impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry, where In-bound and Out-bound logistics has rated the highest impact on Competitive Advantages, then Demand Planning, Operations, Procurement and Sourcing, respectively. While, Warehousing and Inventory does not show a significant impact on total Competitive Advantages.

Practical and Managerial Implications: Implementing the Supply Chain Control Tower in pharmaceutical industry is mandatory not option. Therefore, including Supply Chain Control Tower within vision, mission and strategies will direct plans and daily activities towards Competitive Advantages.

Social Implications: This study recommends companies to consider corporate social responsibility with their Supply Chain Control Tower activities, starting from selecting the suppliers, internal processes and selling to customers.

Limitations/Recommendations: The current study conducted on Jordanian pharmaceuticals manufacturing organizations. Therefore, it recommends the future researches to collect more data over a longer time to check the current model validity and measuring instrument. It also recommends carrying out similar studies on other industries in Jordan and same industry outside Jordan to test its results generalizability.

Originality/Value: This study may be considered as one of few studies that tackle the issue of Supply Chain Control Tower, and investigates its impact on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry.

Keywords: Supply Chain Management, Supply Chain Control Tower, Competitive Advantages, Jordanian Pharmaceuticals Manufacturing Industry.

أثر برج مراقبة سلسلة التوريد على الميزات التنافسية لصناعة الأدوية الأردنية

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الملخص

الغرض: يعدسرج مراقبة سلسلة التوريد أداة رئيسية لإدارة سلسة التوريد والذي يسعى لتوضيح وضبط عمليات سلسة التوريد لتحقيق الميزات التنافسية(**التكلفة ،الجودة ،الاستجابة ،الاعتمادية و الابتكار**) ، لذلك تهدف هذه الدراسة إلىسحث أثرسرج مراقبة سلسلة التوريد على الميزات التنافسية لصناعة الأدوية الأردنية.

التصميم/الاجراءات: من أجل تطبيق هذه الدراسة جمعت البيانات من 132 مدير وقائد فريق ممن يعملون في شركات صناعة الأدوية الأردنيةسواسطة الاستبانة. وبعد التأكد من التوزيع الطبيعي للإجابات وصدق وثبات الأداة، تم إجراء التحليل الوصفي والتحقق من الارتباطسين المتغيرات. وأخيرًا، تم اختبار الأثرسواسطة الانحدار المتعدد.

النتائج: أظهرت النتائج أن شركات صناعة الأدوية الأردنية تطبق كل من متغيراتسرج مراقبة سلسلة التوريد وبُعاد الميزات التنافسية. وتظهر أيضا أن العلاقةسين متغيراتسرج مراقبة سلسلة التوريد وبُعاد الميزات التنافسية قوية. وكذلك أظهرت النتائج أن هناك أثر إيجابي وذو دلالة إحصائية لبرج مراقبة سلسلة التوريد على الميزات التنافسية في شركات لناعة الأدوية الأردنية، حيث كان الأثر الأكبر للوجستيات الداخلية والخارجية على الميزات التنافسية، ثم تخطيط الطلب، التشغيل والإنتاج، المشتريات والمصادر على التوالي،سينما لم يكن هناك أثر ذو دلالة إحصائية للتخزين والمخزون على الميزات التنافسية.

التطبيقات العملية والإدارية: أصبح اليوم تطبيقسرج مراقبة سلسلة التوريد في صناعة الأدوية إجباري وليس اختياري. ولهذا يجب تضمين سرج مراقبة سلسلة التوريد في رؤية ورسالة واستراتيجيات الشركات لتوجيه الخطط والعمليات اليومية نحو تحقيق الميزات التنافسية.

التطبيقات المجتمعية: توصي هذه الدراسة الشركات الأخذسعين الاعتبار المسؤولية المجتمعية للشركات من خلال نشاطاتسرج مراقبة سلسلة التوريدسدء من اختيار المورد ثم العمليات الداخلية وصولا للزسائن.

المحددات/التوصيات: تم إجراء هذه الدراسة على شركات صناعة الادوية الأردنية، لذلك توصي هذه الدراسة إجراء بُحاث مستقبلية لجمع المزيد من البيانات على مدار فترة أطول للتحقق من صدق وثبات النموذج الحالي وأداة القياس. توصى الدراسةبإجراء مزيد من الأبحاث لتشمل الصناعات أخرى في الأردن وصناعة الأدوية خارج الأردن للتأكد من إمكانية تعميم النتائج.

الأصالة / القيمة: يمكن اعتبار هذه الدراسة واحد من الدراسات القليلة التي تتناول موضوعسرج مراقبة سلسلة التوريد، وتستطلع أثره على الميزات التنافسية لصناعة الأدوية الأردنية.

الكلمات المفتاحية: إدارة سلسلة التوريد،سرج مراقبة سلسلة التوريد، الميزات التنافسية، صناعة الأدوية الأردنية.

Chapter One: Introduction

1.1 Background:

The current era has witnessed a dramatic evolution in communication and transportation technology. This evolution created an open market, where consumers' needs and wants were globalized. In addition, customers' segments were having a common needs and wants. Nowadays, consumers everywhere are searching for high quality products with suitable prices. Therefore, the organizations are competing to provide right product in right quality, at right place, time and price.

The global competition is not limited to one country or one organization (Chen, et. al. 2009; Christopher 2013). Almost all nations and organizations are exposed to this competition. Therefore, to be able to fulfil with this global competition, every organization should think globally while acting locally. To do so, organizations should work with its partners and integrate its activities, whether related to supply, Operations, distributors, or sales to create value for customers Enz & Lambert (2015).

By integrating the value chain properly, organizations can achieve Competitive Advantages through the price, quality, reliability, responsiveness, and innovation. Some organizations such as pharmaceutical organizations use what is called Supply Chain Control Tower as a strategic tool to achieve the Competitive Advantages besides to sustain supply chain sub-variables synergy.

Lambert (2004) said that there is great debate about the definition of supply chain management. Lambert & Cooper (2000), Chopra & Meindl (2001), Chan, et. al. (2003) and Shukla, et. al. (2011) defined supply chain management as the integration of key processes from main customers and suppliers to deliver products, services and information, which are considered as a value added for customers through value chains.

The importance of supply chain was intensely studied during the last decades, Mentzer, et. al. (2001), Lee (2002), Heng, et. al. (2005) and Li, et. al. (2006) mentioned that, the main goal and objective of SCM is to provide a strategic weapon to build up and enhance sustainable Competitive Advantages by cost reduction without compromising customer satisfaction. Jain, et. al. (2010) and Sukati, et. al. (2011) stated that the supply chain management is considered as a driver for almost all corporates to be able to compete successfully in the current dynamic and complex business environment. As a part of these industries, the pharmaceutical industry should realize the importance of supply chain management. Ebel, et. al. (2012) in his report indicated that pharmaceutical executives are consider supply chain as a critical issue and curial key factor that affecting commercial sector beside its impact over customers' relationships. Koufteros, et. al. (1997), Boyer & Lewis (2002), and Kroes & Ghosh (2010) indecated that the Competitive Advantages and priorities are the competencies of goods delivery time, quality, cost, flexibility and innovation for any operation`s strategy

To achieve Comparative Advantages via supply chain Bhagwat, et. al. (2007), Kurien, et. al. (2011) and Shukla, et. al. (2011) stated that, the industries need to intensively deploy business performance measurement and improvement system all overall of supply chain functions. Deshpande (2012) and Heaney (2014) mentioned that the performance and measuring systems in supply chain should synchronize between demand and supply; moreover, it harmonizes the movement of goods, information and funds throughout supply chain network.

Recently the Supply Chain Control Tower was applied as a performance measurement system aims to measuring, visualizing, controlling and improving supply chain performance. Miroglio (2013), Alias, et. al. (2014), Heaney (2014) and Greene & Caragher (2015) defined the role of Supply

Chain Control Tower as an innovative technological hub point among the supply chain sub-variables and its importance to leverage and differentiate value in supply chain. Trzuskawska-Grzesińska (2017) outlined that, it is imperative for organizations to adopt Supply Chain Control Tower to acquire the response and visibility.

The supply chain management considered as a key and critical function in the globe competition, and that rise the need for the Supply Chain Control Tower to synergize the performance of supply chain multi-functions and to accomplish the organizational Competitive Advantages. Besides, the Supply Chain Control Tower is considered as an enabler and instrument for decision makers and the process executor to measure, visualize, re-adjust and improve processes. Therefore, this study is directed to study the impact of applying Supply Chain Control Tower on Competitive Advantages in Jordanian Pharmaceutical Manufacturing Industry.

1.2 Study Purpose:

This study aims to investigate the impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry. The investigation was focused on the role of control tower on visualizing, controlling the key performance indicators for the main supply chain functions (supply chain demanding planning, Procurement and Sourcing, Operations, in-bound and out-bond logistics and inventory and warehousing) and their impact on Competitive Advantages (cost, quality, reliability, responsiveness and innovation). While the study objectives are:

1. Provide a theoretical framework about the impact of Supply Chain Control Tower on the Competitive Advantages that will support academics and researches about Supply Chain Control Tower.
2. Due to the limited number of previous Supply Chain Control Tower modules, this study aims to drive a framework for Supply Chain Control Tower implementation.

3. Evaluate the level of Supply Chain Control Tower deployment in Jordanian Pharmaceutical Manufacturing Industry.

4. Raise the awareness to deploy the Supply Chain Control Tower in pharmaceutical industry and other industries.

To provide recommendations to managers at pharmaceutical industry and other related industries, as well as, for decision makers who concern about supply chain and Competitive Advantages. Furthermore, to provide an additional paper to literature and academic line.

1.3 Study Significance:

The current study might be considered as one of the leading studies that examine the impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry, and even the impact of control tower on Competitive Advantages at any Operations industry in Jordan. Moreover, this study aims to draw valuable understanding guidelines about the impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry, others manufacturing industries, institutions and decision makers. The content also maybe an interest to academic studies related to the reporting and decision making concerning Supply Chain Control Tower.

Therefore, the value of this study arises from the following scientific and practical considerations:

1. Drive the attention to the Supply Chain Control Tower and its influence on enhancing Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry.

2. Highlight the importance of visualizing and controlling the control tower sub-variables and the quick influence on supply chain processes cycle on Jordanian Pharmaceutical Manufacturing Industry.

3. Support other researches in the study of Supply Chain Control Tower, and its importance either on pharmaceuticals manufacturing industry or on other industries.

4. Support the decision makers in pharmaceuticals industry or even other industries, and give recommendation to apply Supply Chain Control Tower.

The importance of current study is to emphasize the role of Supply Chain Control Tower in creating the Competitive Advantages for Jordanian pharmaceutical industries; moreover, it helps other industries to achieve Competitive Advantages. In addition to layout a practical road map for decision makers to adopt Supply Chain Control Tower system based on its significant impact. Finally, the current study may add a value for libraries to be used as a secondary source of data, as well as it may help scholars and practitioners to open the debate about the practicality of deploying Supply Chain Control Tower.

1.4 Problem Statement:

The miss alignment among supply chain functions is considered as one of the most challenges, that facing organizations to compete efficiently, and seek for achieving the departmental targets and goals over organizational targets, that will prevent achieving the Competitive Advantages. In addition to that the Jordanian pharmaceuticals manufacturing industry is in need to improve its internal capabilities especially in supply chain to approach the best practice of multinational pharmaceutical manufacturing industry in order to maintain and sustain the industry in Jordan. Therefore, the global organizations deployed a system to achieve the synergy among the supply chain sub-variable to maintain the direction towered the corporate strategy. Bhosle, et. al. (2011) stated that the globalization and the wide scope of supply chain is interfering the supply chain efficacy and approaching

Competitive Advantages. Jain, et. al. (2010) emphasized that the organizations are in need to measure and visualize their supply chain functions to identify the in-competitive parts, besides establishing dynamic strategies and instantly launch necessary improvement actions. Shukla, et. al. (2011) concluded the lack of supply chain measurement is considered as one of the highly factors that affecting the function of supply chain and there is a need to build a formal performance measurement tracking system. Goh, et. al. (2009) highlight the need for a visualizing system to monitor and share the information and knowledge about the sub-variables within supply chain to empower process agility, based on that raised the requirement for control tower to measure and visualize daily supply chain activities and handle the deviations.

Finally, to be an efficient player in business market, executives must find a tool to harmonize and synchronize their supply chain activities to achieve the corporate strategy and Competitive Advantages.

The problem of this research can be perceived by scientifically answering the following questions:

The main question:

1. Do Supply Chain Control Tower (Procurement and Sourcing, Demand Planning, Operations, In-bound and Out-bound logistics and Warehousing and Inventory) affect Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry?

2. Does Supply Chain Control Tower affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry?

Based on SC control tower sub-variables, the main question can be divided into the following sub-questions:

2.1 Does Procurement and Sourcing affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry?

2.2 Does Demand Planning affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry?

2.3 Does Operations affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry?

2.4 Does In-bound and Out-bound logistic affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry?

2.5 Does Warehousing and Inventory affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry?

1.5 Study Hypothesis:

Based on the problem statement and according to the study model, the following hypotheses can be developed:

H_{01}: Supply Chain Control Tower (Procurement and Sourcing, Demand Planning, Operations, In-bound and Out-bound logistics and Warehousing and Inventory) do not affect Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

H_{02}: Supply Chain Control Tower does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

The main hypothesis can be divided to the following according to supply chain functions:

$H_{02.1}$: Procurement and Sourcing does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

$H_{02.2}$: Demand Planning does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

$H_{02.3}$: Operations does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

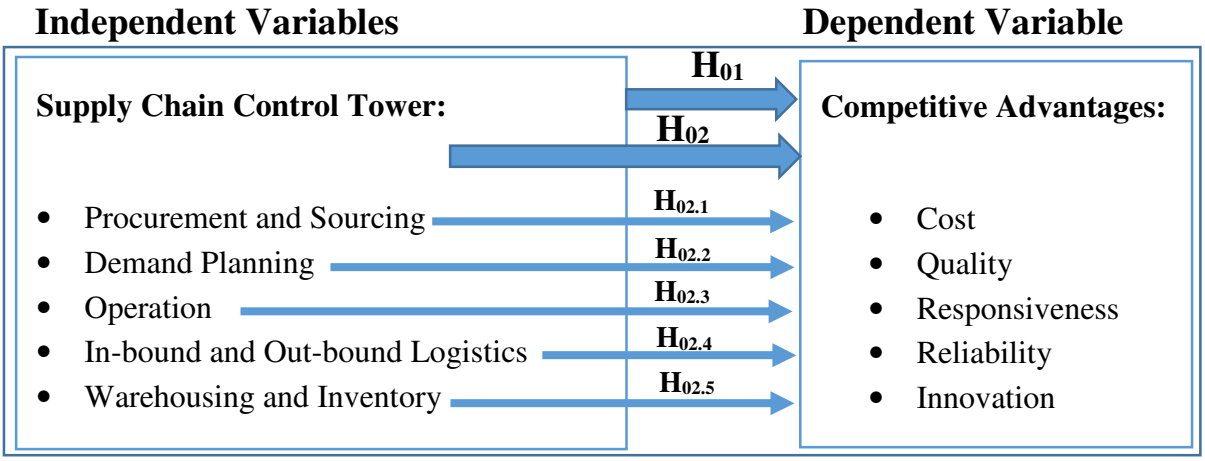
$H_{02.4}$: In-bound and Out-bound logistics does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

$H_{02.5}$: Inventory and warehousing does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

1.6 Study Model:

This study investigated the impact of Supply Chain Control Tower as an independent variable on Competitive Advantages of the Jordanian Pharmaceuticals Manufacturing Industry as the dependent variable, moreover, the impact of Supply Chain Control Tower to be investigated for each one of the five Competitive Advantages dimensions, finally each one of the Supply Chain Control Tower sub-variable to be investigated on each dimension of Competitive Advantages.

Model (1.1): Study Model



Source: for independent variable: (Lambert & Cooper, 2000; Lambert, 2004; Li, et. al. 2006; Stadtler & Kilger, 2008; Blanchard, 2010; Gunasekaran, et. al., 2001; Sukati, et. al., 2011; Chopra & Meindl, 2013; and Doesburg, 2015). For dependent variable: (Koufteros, et. al., 1997; Gunasekaran, et. al., 2001; Boyer & Lewis, 2002; Li, et. al., 2006; Kroes & Ghosh, 2010; Sukati, et. al., 2011; Thatte, et. al., 2013 and Marinagi. et, al., 2014).

1.7 Conceptual and Operational Definitions of Key Words:

Supply Chain Control Tower: The Supply Chain Control Tower is a central system for collecting, analyzing and visualizing the progress of supply chain sub-variables. Moreover, it will alert and initiate the corrective actions for deviations, in order to align performance with organization strategy.

Procurement and Sourcing: The Procurement and Sourcing is the process responsible for identifying, selecting and purchasing the organization requirements from suppliers and venders to be able to add value to the customer, which maximizes the value added and align with organization's strategy.

Demand Planning: The Demand Planning can be defined as the processes of forecasting market demand, aggregating demand, planning and scheduling organization's resources. Demand Planning is an enabler for supply chain activities to be efficient and effective in the way that fulfilling customer demand.

Operations: The operations component is the process where value is added to materials to convert them from input to output that matches with customers' requirements.

In-bound and Out-bound logistics: The In-bound and Out-bound logistics are defined as the process of transferring of raw requirements, semi-finish and finished products along the up-stream and down-stream supply chain while maintaining its status and handling requirements.

Warehousing and Inventory: The Warehousing and Inventory component is defined as the process of receiving, storing and dispatching raw requirements, semi-finished and finished product considering the storage conditions and requirements.

Competitive Advantages: The Competitive Advantages are defined as the organization capabilities that are built to offer the value for customers more than competitors do.

Cost: The cost as Competitive Advantages can be defined as the organizational capability to offer a product with the lowest cost in industry without compromising quality.

Quality: The quality is a Competitive Advantages that can be defined as the organization capabilities to offer a premium product that differentiate itself from rivalries to meet or exceed customers' requirements.

Responsiveness: The responsiveness is the Competitive Advantages that enable the organization to handle changes in customers' demand or requirements. Responsiveness is based on two pillars, the first one is the organization flexibility to adopt any changes in demand as quantities or requirements, and the second pillar is the organization speed to fulfil such demand.

Reliability: The reliability is defined as the Competitive Advantages, which gives organizational capability that consistently achieves the task against customers' requirements and needs.

Innovation: The innovation Competitive Advantages is defined as the organizational creativity for introducing, developing or redesigning their processes, products and markets in a way that differentiate itself from competitors.

1.8 Study Limitations and Delimitations:

Human Limitation:

This study was carried out on managers who working at Jordanian Pharmaceutical Manufacturing Industry.

Place Limitation:

This study carried on Jordanian Pharmaceutical Manufacturing Industry located in Amman - Jordan. All Jordanian Pharmaceutical Manufacturing Industry are located in Amman.

Time Limitation:

This study was carried out within the period between 1st semester and 2nd semester of academic year 2017/2018.

Study Delimitation: The use of one industry limits its generalizability to other industries. The study was carried out in Jordan; therefore, generalizing results of one industry and/or Jordanian setting to other industries and/or countries may be questionable. Extending the analyses to other industries and countries represent future research opportunities, which can be done by further testing with larger samples within same industry, and including other industries will help mitigate the issue of generalizing conclusions on other organizations and industries. Moreover, further empirical researches involving data collection over diverse countries especially Arab countries are needed.

Limitations to data access refer to the fact that data gathering through the questionnaires and annual reports is controlled to the period of these questionnaires, which may limit the quality and quantity of the data

collected. In addition, lack of similar studies in Jordan and other Arab countries.

Chapter Two: Conceptual and Theoretical Framework and Previous Studies

2.1 Introduction:

This chapter includes definitions and components of Supply Chain Control Tower and Competitive Advantages, relationships between Supply Chain Control Tower and Competitive Advantages variables. Moreover, it includes previous models and previous studies. Finally, it summarizes what differentiate this study from previous studies.

2.2 Definitions and Components of Variables:

2.2.1 Supply Chain Control Tower:

Although the concept of Supply Chain Control Tower is a new concept, it seems that there is a consensus among practitioners, researchers and scholars about its definition. Bhosle, et. al. (2011) defined Supply Chain Control Tower as a technological hub for supply chain data collection to draw a short and long-term visibility to match the decision taking with the strategic goal. Ball & Munroe (2012) stated that, Supply Chain Control Tower is a multi-dimensional view of supply chain processes for finding solutions, alerting deviations and creating an end-to-end actual view. In addition, Miroglio (2013) mentioned that, the Supply Chain Control Tower is a system of sensing and analyzing the data captured from supply chain processes, in order to accurately describe the actual status and deploy the profitable decisions. Mena, et. al. (2014) defined Supply Chain Control Tower as a visualizing system use a predetermined metrics to detect deviations in supply chain process and identifying the root causes. Greene & Caragher (2015) defined Supply Chain Control Tower as an enabler technology that empower decision makers to create a powerful supply chain with synchronized functional departments.

In summary, Supply Chain Control Tower is a central system for collecting, analyzing and visualizing the progress of supply chain sub-variables; moreover, it will alert and initiate the corrective actions for deviations, in order to align performance with the organization strategy.

2.2.2 Control Tower Components:

It has been noticed that limitation of studies and literatures that described the Supply Chain Control Tower and its sub-variables. Therefore, this study will study the main supply chain sub-variables that are described by researchers and scholar. Mentzer, et. al. (2001), listed three sub-variables for supply chain In-bound and Out-bound logistics, production and purchasing. Gunasekaran, et. al. (2001), Grigorescu (2015) and Doesburg (2015) described supply chain sub-variables as the Inbound out bound logistics, procurement, production warehousing and Demand Planning. Li, et. al. (2006) listed purchasing, supply management, transportation and logistics management. Shukla, et. al. (2011) categorized sub-variables as the sourcing, procurement, production, order processing, inventory management, transportation, manufacturing, warehousing, and customer services. Council, et. al. (2012) described the supply chain sub-variables as the planning, sourcing and procurement, conversion, and all logistics activities. Trzuskawska-Grzesińska, et. al. (2017), listed the following functions for supply chain sub-variables supply base performance, conversion processes, balance between supply and demand, inbound/outbound logistics and procurement.

In this study, the proposed control tower components are Procurement and Sourcing; Demand Planning; Operations; In-bound and Out-bound logistics; and Warehousing and Inventory.

Procurement and Sourcing:

The Procurement and Sourcing concept is well defined as the traditional function of procurement but the recent definitions insist on about the importance of adopting the integrations strategies. Stadtler & Kilger (2008) and Georgise, et. al. (2012) defined Procurement and Sourcing as the process of identifying and selecting suppliers, scheduling the deliveries receiving and issuing payments. Council (2012) defined Procurement and Sourcing as the process that continuous improvement the procurement activities and a systematic approach for the timeline for procurement, budgeting, risks and opportunities. Chopra & Meindl (2013) defined Procurement and Sourcing as the process of acquiring of raw, semi-finish or finished materials moreover the services form suppliers. Grigorescu (2015) defined Procurement and Sourcing as the procurement process of essential resources to carry out activities.

In summary, Procurement and Sourcing is the process, responsible for identifying, selecting and purchasing the organization requirements from suppliers and venders to be able to add value to customer, which maximizes the value added and align it with the organization's strategy.

Demand Planning:

There is a different definition for Demand Planning mentioned by researchers and scholars. Croxton, et. al. (2002) defined the Demand Planning as a supply chain management processes that fulfill customers' needs through internal supply capabilities. Zhou, et. al. (2011) and Kaipia & Holmström (2007) defined the Demand Planning as the process of meeting customers' demand by predicting the demand and create inventory to meet that demand. Min & Yu (2008) defined the Demand Planning as an actively communicating supply chain partners actively and build forecast to meet demand. Vlckova & Patak (2010) defined the Demand Planning as a methodology, that is utilizing forecasts, in order to manage demand starting

by raw materials requisition then the transformation up to deliveries to customers. Stadtler & Kilger (2008) and Georgise, et. al. (2012) defined the Demand Planning as a set of processes that includes demand forecasting, resources estimation and balancing organization's requirements and resources. Chopra & Meindl (2013) defined the Demand Planning as a maximizing the capabilities and overcoming the constraints, during planned horizon to fulfil the demand.

In summary, the Demand Planning can be defined as the processes of forecasting market demand, aggregating demand, planning and scheduling organization's resources. Demand Planning is an enabler for supply chain activities to be efficient and effective in the way that fulfil customer demand.

Operations:

Almost all the referenced researches have a consensus definition about operations. Stadtler & Kilger (2008) defined Operations as the process of transforming the raw material, semi-finished and products to the next level that match the with demand, it includes production activities scheduling, transforming and testing against planned specifications. Georgise, et. al. (2012) and Chopra & Meindl (2001) defined Operations as the processes that is associated with materials conversion or creation of the content for services. Grigorescu (2015) defined the Operations as a process of transforming inputs into final products using production activities that includes assembly, testing, packing and maintenance.

In summary, the Operations component is the process where value is added to material by converting them from input to output that matches with customers' requirements.

In-bound and Out-bound logistics:

The In-bound and Out-bound logistics definition vary among the reaches based on the handled tasks and duties. Frazelle (2002) defined In-bound and Out-bound logistics as the process of transferring the material,

information and money between consumers and suppliers. Stadtler & Kilger (2008) and Grigorescu (2015) defined In-bound and Out-bound logistics as the up and down stream processes of that delivering the supply from suppliers and deliver final product to customer. Chopra & Meindl (2013) defined In-bound and Out-bound logistics as set of activities aiming to move and store a product from the supplier stage to a customer stage through supply chain. Christopher (2016) defined In-bound and Out-bound logistics as the art and science of planning and coordinating the essential activities to deliver servicees and goods at the lowest cost.

In summary, the In-bound and Out-bound logistics is defined as the process of transferring raw requirements, semi-finish and finished products along the up-stream and down-stream supply chain while maintaining its status and handling requirements.

Warehousing and Inventory:

There is a consensus in researches about Warehousing and Inventory definition. Stadtler & Kilger (2008) defined the Warehousing and Inventory as the process of receiving inventories, dispatch shipments and generating shipping documents and invoices. Frazelle (2002) and Chopra & Meindl (2013) defined the Warehousing and Inventory as the process of handling all raw materials, semi-finished products and final products within a supply chain. Christopher (2016) defined the Warehousing and Inventory as the process of managing the movement and storage of materials, parts and inventory along the value chain processes in a way that guarantee the profitability, maximizing resources and cost effectiveness.

In summary, Warehousing and Inventory component is defined as the process of receiving, storing and dispatching raw requirements, semi-finished and finished product considering storage conditions and requirements.

2.2.3 Competitive Advantages:

There is consensus between the Competitive Advantages concept and definition. Rondeau, et. al. (2000) defined Competitive Advantages as the factors of competition, which are valuable from customer point of view. Chopra & Meindl (2001) stated that the Competitive Advantages is the organization capability to satisfy the set of customers' needs by its products and services comparing to its competitors offering. Li, et. al. (2006) mentioned that the Competitive Advantages is the organization competency to build an edge position over competitors. Ambe (2010) defined the Competitive Advantages as the high level of satisfaction achieved by targeted market through its products and services. Marinagi, et. al. (2014) and Veerendrakumar & Narasalagi (2015) mentioned the Competitive Advantages definition as the creation of essential organization`s bases to differentiate itself from its competitors.

In summary, the Competitive Advantages are defined as the organization capabilities built to offer the value for customers more than competitors do.

Competitive Advantages Components:

The researchers and academics consensus about the core of the Competitive Advantages elements, Koufteros, et. al. (1997) described Competitive Advantages as the competitive pricing, premium pricing, value-to-customer quality, dependable delivery and production innovation. Gunasekaran, et. al. (2001), Li, et. al. (2006), Sukati, et. al. (2011) and Saber, et. al. (2014) classified the Competitive Advantages as the price, quality, delivery dependability, time to market and product innovation. Kroes & Ghosh (2010) described Competitive Advantages as the cost, time, innovativeness, quality and flexibility. Jie, et. al. (2013) enrolled responsiveness and quality as a Competitive Advantages.

Finally, the following Competitive Advantages will be considered in the current study: Cost, Quality, Responsiveness, Reliability and Innovation.

Cost:

The definition of cost as a Competitive Advantages had a consensus by researchers and scholars. Li, et. al. (2006) defined the cost as a Competitive Advantages that enables the organizations competing on lower price in the markets. Ambe (2010) defined the cost as a Competitive Advantages achieved when an organization offers the same services as the competitors but in lower cost. Sirmon, et. al. (2011) defined the cost advantage as the strategy that create internal capabilities that helps to achieve efficiencies and approach the lower costs against competitors. Council (2012) defined the cost strategy through competing others organization by efficiently managing the cost of operations along the supply chain processes, that includes labor, material, management and transportation costs. Wheelen & Hunger (2017) defined the cost competitive strategy that focus on a specific customers or regional market and attempts to utilize that niche.

In summary, the cost as Competitive Advantages can be defined as the organizational capability to offer a product with lowest cost in industry without compromising quality.

Quality:

There is no well and cut definition for quality Competitive Advantages by researches. Koufteros (1995) defined the quality as the capability of an organization to produce products with high quality and performance, which is considered valuable for customers. Li, et. al. (2006) mentioned that the quality as a Competitive Advantages when the organizations capable to offer products and services that matching with the higher value for customers through the products quality and performance. Slack, et. al. (2010) stated that the quality Competitive Advantages is the organization oriented to set the

quality as the function of value creation in order to achieve customer confirmation and perceived high level of products quality.

In summary, the quality is a Competitive Advantages that can be defined as the organization capabilities to offer a premium product that differentiate itself from rivalries to meet or exceed customers' requirements.

Responsiveness:

There is a different definition for responsiveness Competitive Advantages, some researchers and scholars refer to speed and flexibility concepts as an alternative for responsiveness but some of researchers were enrolled them as sub-variables of responsiveness. Holweg (2005) and Duclos, et. al. (2003) defined the supply chain responsiveness as the punctual capability and strength of supply chain to adopt any change in market behavior and demand. Stadtler & Kilger (2008) describes the responsiveness as a Competitive Advantages that can be achieved by the supply chain capabilities to response fast against changes in target market in the desired time. Slack, et. al. (2010), Chopra & Meindl (2013) and Christopher (2016) attempt to identify the responsiveness as a supply chain Competitive Advantages through two main scopes; the first one is indicating the **flexibility** of organization to cover the changes and disturbances in marketplace and customer demand, the second scope is the **speed** of supply chain to deliver the customer's orders. Georgise, et. al. (2012) and Council (2012) focused on the speed as a responsiveness and that achieved by organizations capability to deliver the products to the customer in the shortest time. Thatte, et. al. (2013) indicate that the responsiveness is the integration and responsiveness of the functions of Operations, logistics and supplier.

In summary, the responsiveness is the Competitive Advantages that capable organization to handle changes in customers' demand or requirements. Responsiveness based on two pillars, the first one is the

organization flexibility to adopt any changes in demand quantities or requirements, and the second pillar is the organization speed to fulfil the demand.

Reliability:

After revising the studies and researches, it has been noticed that there is an agreement by researchers about the definition of reliability. Thomas (2002) defined the reliability as the ability of supply chain to accomplish mission requirements and supply along the value chain. Georgise, et. al. (2012) stated that, the reliability as the capability to achieve tasks based on expectations and that required a high predictability of process outputs to achieve the metrics of the right time, quantity and quality. Slack, et. al. (2010) stated that the reliability is reducing of uncertainty to guarantee on time delivery, product quality.

In summary, the reliability defined as the Competitive Advantages the organizational capability that consistently achieves the task against customers' requirements and needs.

Innovation:

There is an agreement by researches about the definition of innovation as a competitive strategy. Koufteros (1995) and Li, et. al. (2006) defined the innovation as a strategy accomplished when the organizations are capable to develop and introduce new products and features for the market. Bloch (2007) is defined the innovative organizations as the organizations that introduce a new or improved products, services, or processes, and penetrating new markets by developing new organizational methods, practices, procedures or external relations. Sirmon, et. al. (2011) defined the innovation as the systemic strategy of developing innovation and capabilities that enable organizations to differentiate their deliverables from competitors.

In summary, the innovation Competitive Advantages is defined as the organizational creativity for introducing, developing or redesigning their

processes, products and markets in a way that differentiate itself from competitors.

2.3 The Relationship between Supply Chain Control Tower and Organizations Competitive Advantages:

Many researchers studied the relationships between supply chain management practices and Competitive Advantages and organizational performance, Li, et. al. (2006) studied the impact of supply chain management's practices on Competitive Advantages and organization's performance. Bhosle, et. al. (2011) presented the global Supply Chain Control Towers against end-to-end supply chain visibility. Sukati, et. al. (2011) investigated the relationship between supply chain management practices and Competitive Advantages of the firm. Thatte, et. al. (2013) studied the impact of SCM practices on supply chain responsiveness and Competitive Advantages. Jie, et. al. (2013) studied the link between the supply chain practices and Competitive Advantages. Saber, et. al. (2014) analyzed the impact of supply chain management's techniques on Competitive Advantages in the market. Trzuskawska-Grzesińska (2017) reviewed control towers in supply chain management – past and future.

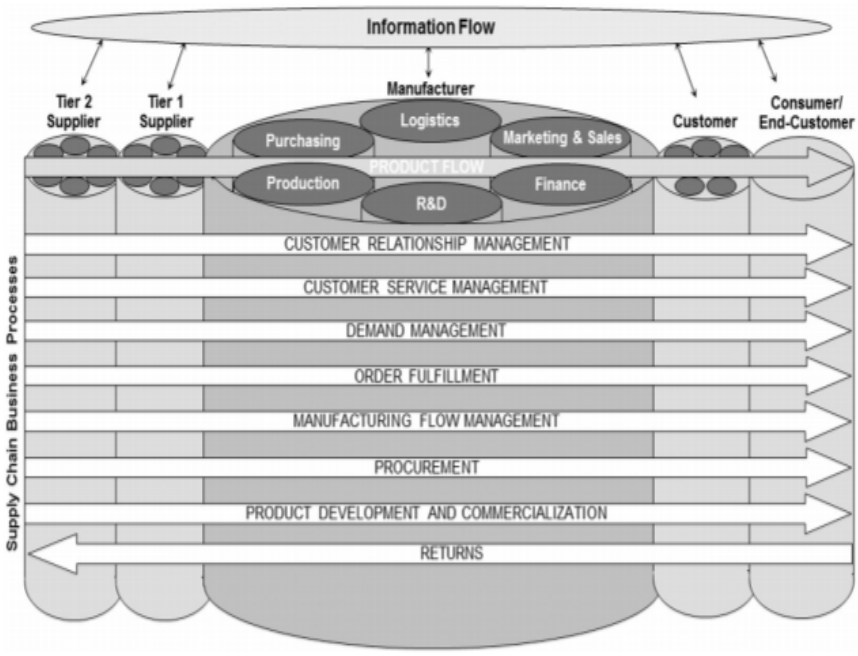
In summary, a very few literatures investigated the Supply Chain Control Tower on any organizational performance or Competitive Advantages. Furthermore, the most of previous relationships conducted for supply chain practices, supply chain collaboration or supply chain cooperation. This study conceptualizes the functional tasks of values chain to examine the impact of Supply Chain Control Tower on Competitive Advantages. The Supply Chain Control Tower conceptualization extracted based on the summarization of previous relationships.

2.4 Previous Models:

After reviewing related literature, it has been found that not only the definition and classification of each sub-variable was not clear nor unified. Moreover, the measurement methods and models were not unified as well. Very limited literatures discussed and studied the Supply Chain Control Tower concept, furthermore its sub-variables and components. The following section will briefly discuss some of literatures and models that studied the supply chain managements' sub-variables and the relationship with one or more of organizational Competitive Advantages.

Lambert & Cooper (2000) Model:

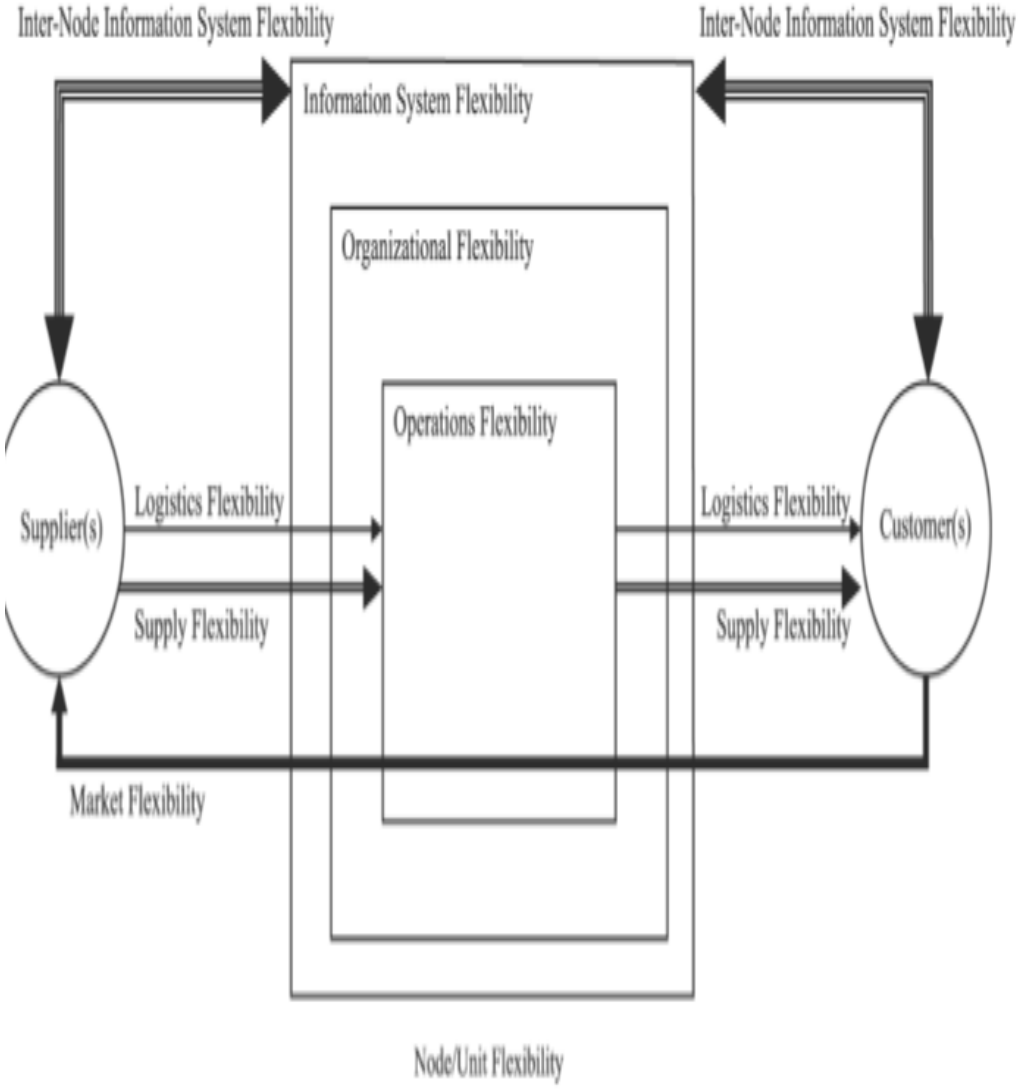
The SCM model shows a simplified supply chain network structure. The information and product flows, and the key supply chain business processes penetrating functional silos within the company. The model presents various corporate silos across the supply chain. Thus, the supply chain processes are linked across intra- and intercompany boundaries.



Model (2.1): Lambert & Cooper (2000) Model

Duclos, et. al. (2003) Model:

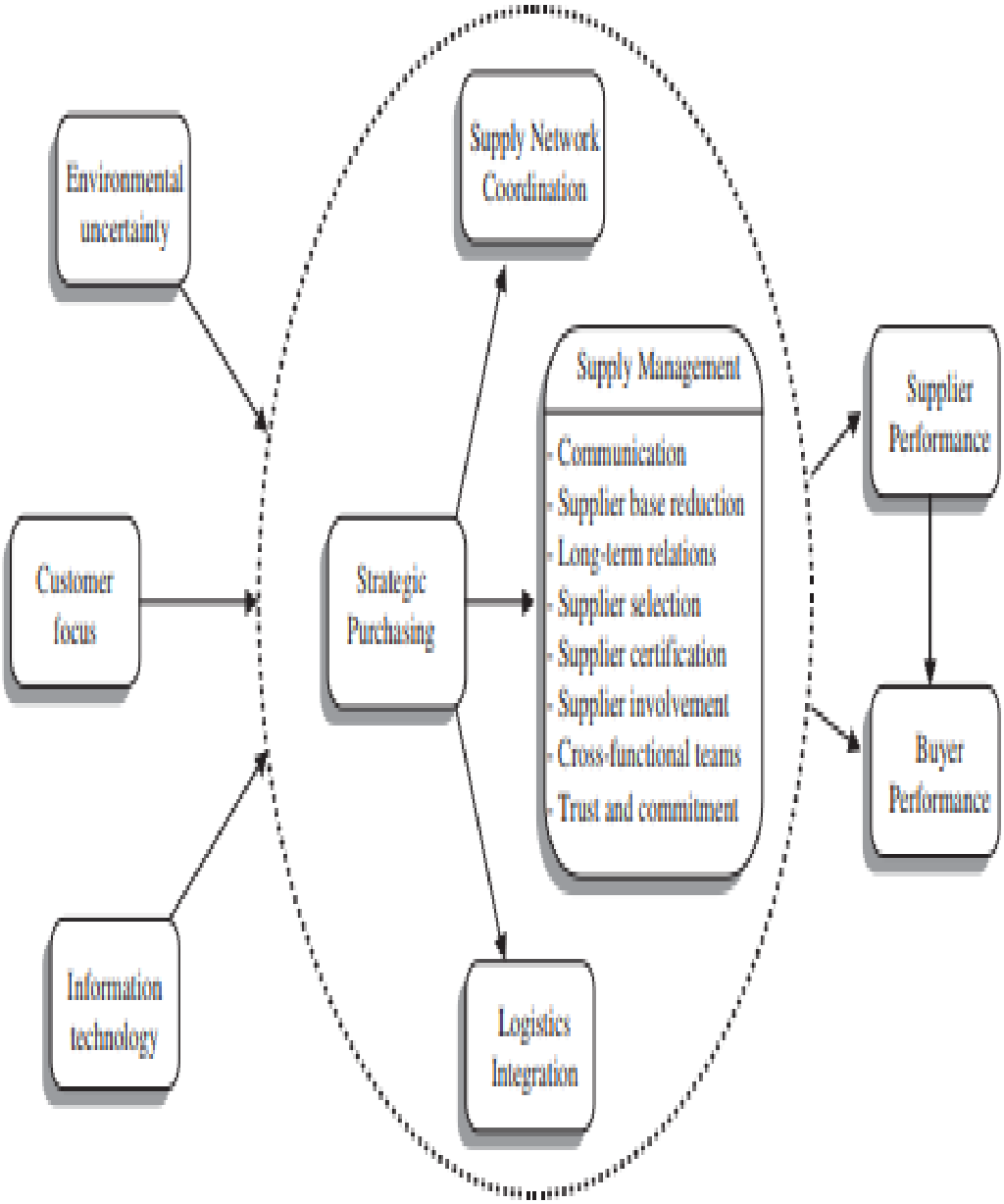
The model summarizes the literatures and establishes a theoretical foundation for supply chain flexibility techniques, where the study attempted to investigate the internal flexibilities and the external flexibilities. Moreover, it identified the cross enterprise of supply chain and improve the supply chain flexibility measurements through six supply chain flexibility components: operation system flexibility, market flexibility, logistics flexibility, organizational flexibility and information system flexibility



Model (2.2): Duclos, et. al. (2003) Model

Chen & Paulraj (2004) Model:

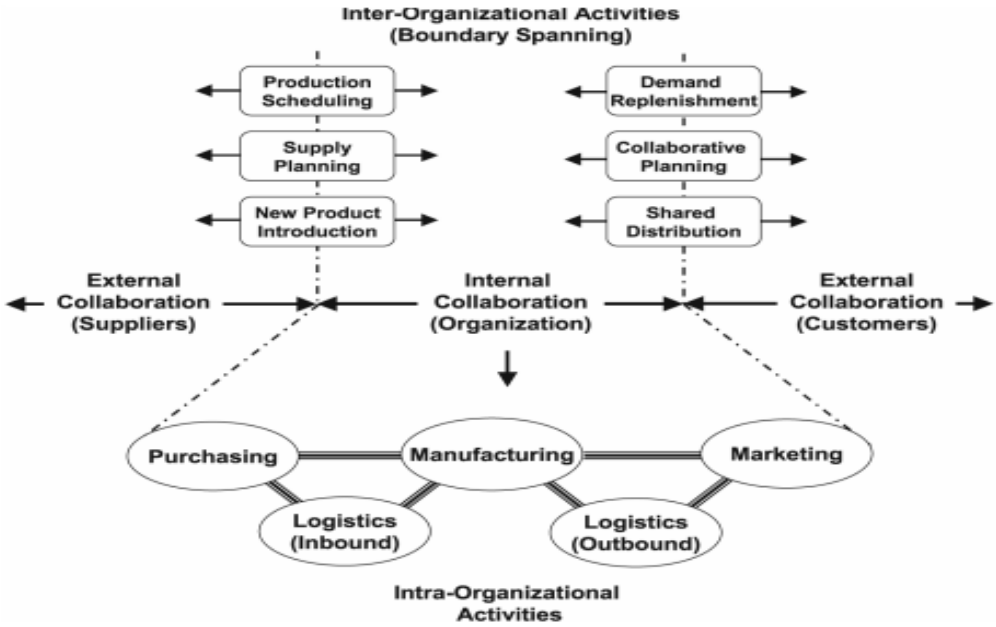
The study presents a framework for supply chain management based on the critical supply chain management elements: strategic purchasing, supply management, logistics integration and supply network coordination. The elements impact was investigated on the supply chain performance: Financial, Operational and Measuring supply chain performance.



Model (2.3): Chen & Paulraj (2004) Model

Barratt (2004) Model:

The study proposed a model for supply chain elements and the inter-correlation among those elements beside the way they were influencing supply chain approach toward achieving supply chain collaboration. Moreover, the possible opportunities for vertical supply chain collaboration includes the following supply chain elements: customer relationship management, collaborative Demand Planning, demand replenishment, and shared distribution on the upstream side of the supply chain: supplier relationship management, supplier planning, production scheduling and collaborative design.

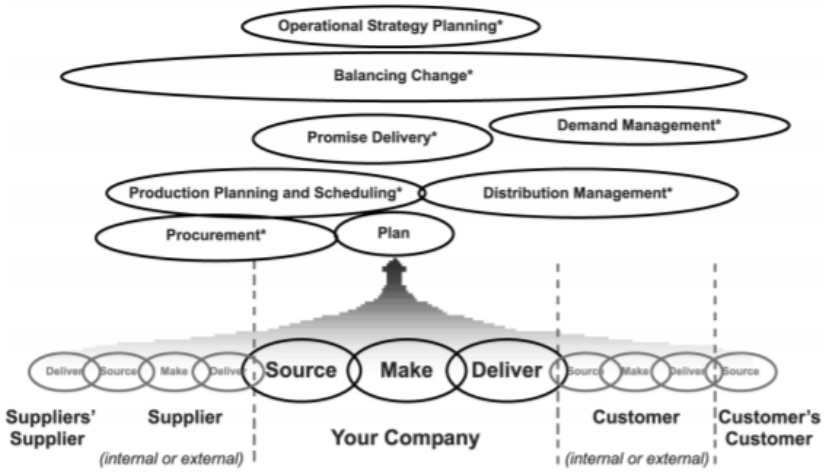


Model (2.4): Barratt (2004)

Lockamy & McCormack (2004) Model:

This model illustrates the relationship between supply chain management practices and performance based on the SCOR Model (plan, source, make, and deliver) and nine key supply-chain management practices.

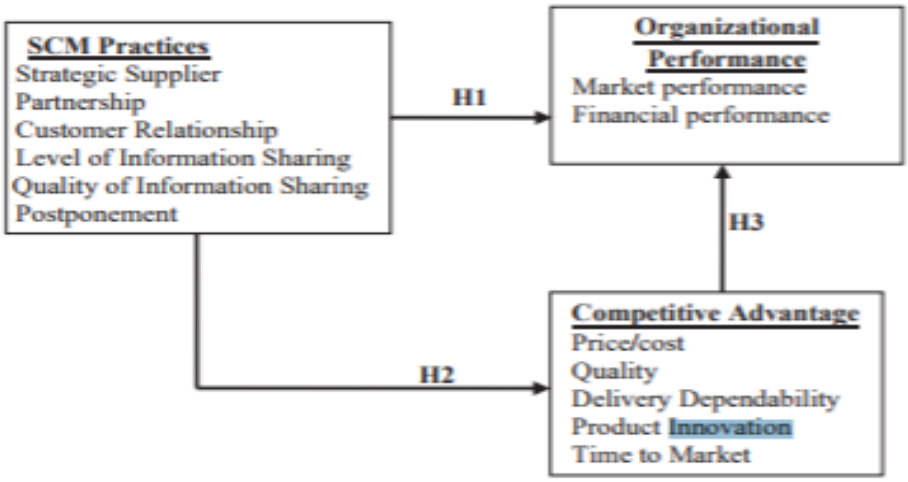
The results showed that planning processes are essential along the SCOR decisions.



Model (2.5): Lockamy & McCormack (2004) Model

Li, et. al. (2006) Model:

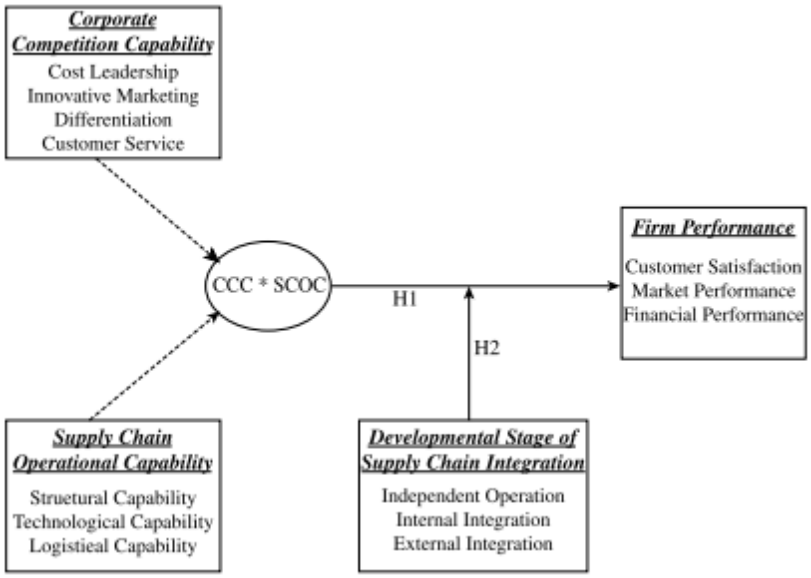
The supply chain management framework shows a five-dimensional construct for supply chain practices. The five dimensions are strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing and postponement. The dimension's impact was investigated on Competitive Advantages and organizational performance



Model (2.6): Li, et. Al. (2006) Model

Kim (2006) Model:

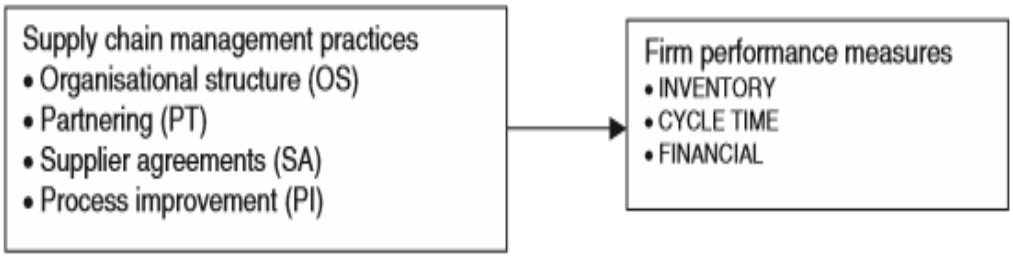
The model presents the relationship between supply chain operational capability and corporate competitive capability on firm's performance. In addition, it recognizes the role of supply chain integration on interactive capabilities.



Model (2.7): Kim (2006) Model

Martin & Patterson (2009) Model:

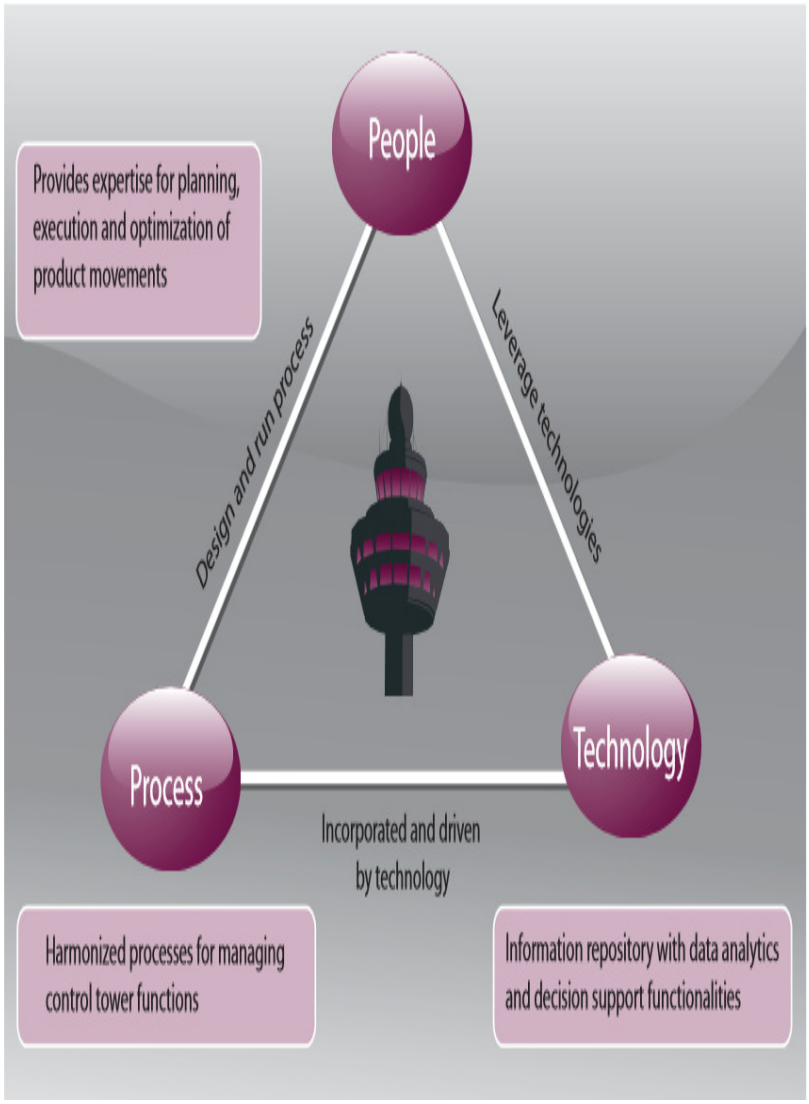
The model illustrates the supply chain practices: organizational structure, partnering, supplier agreements and process improvement that used by companies to manage their relationships with suppliers and customers and identified the key matrices for measuring firm's performance: inventory, cycle and financial.



Model (2.8): Martin & Patterson (2009) Model

Bhosle, et. al. (2011) Model:

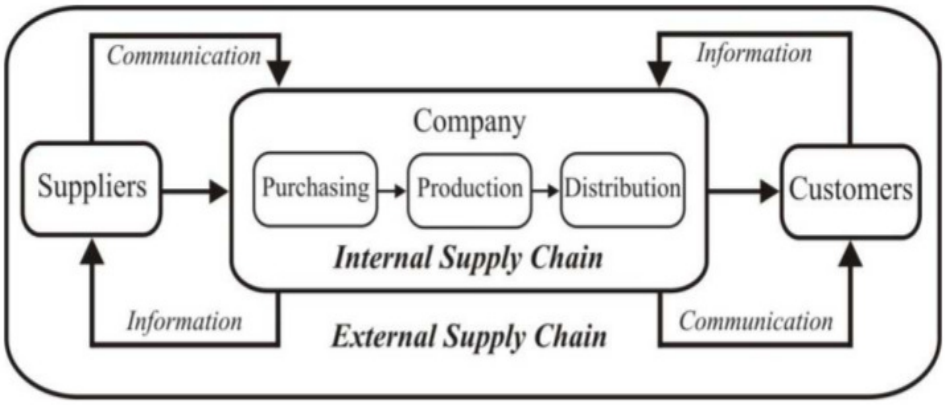
The model presents Supply Chain Control Tower as a hubs used for gathering and distributing information, and allow people to use these visibilities to detect and act on risks or opportunities more quickly. Control towers are typically set-up to monitor, measure, manage, transport and inventory movements across the supply chain. Control towers combine organizations (people), systems and processes in order to provide supply chain partners with a high level of product visibility along the entire supply chain.



Model (2.9): Bhosle, et. al. (2011) Model

Bratic (2011) Model:

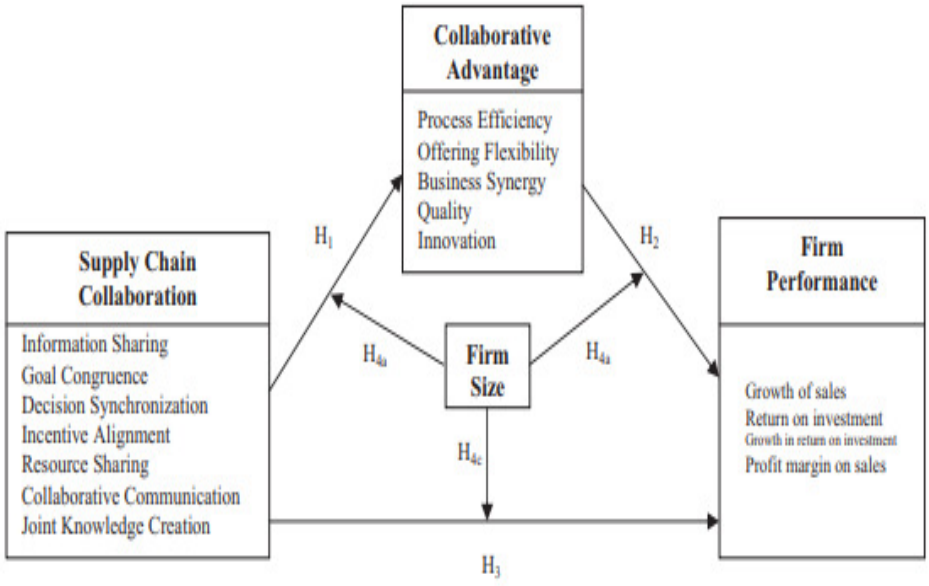
The framework presents two main dimensions: supply chain management practices along the value chain process starting by supplier to the end customer and Competitive Advantages: price, quality, time and product innovation.



Model (2.10): Bratic (2011) Model

Cao & Zhang (2011) Model:

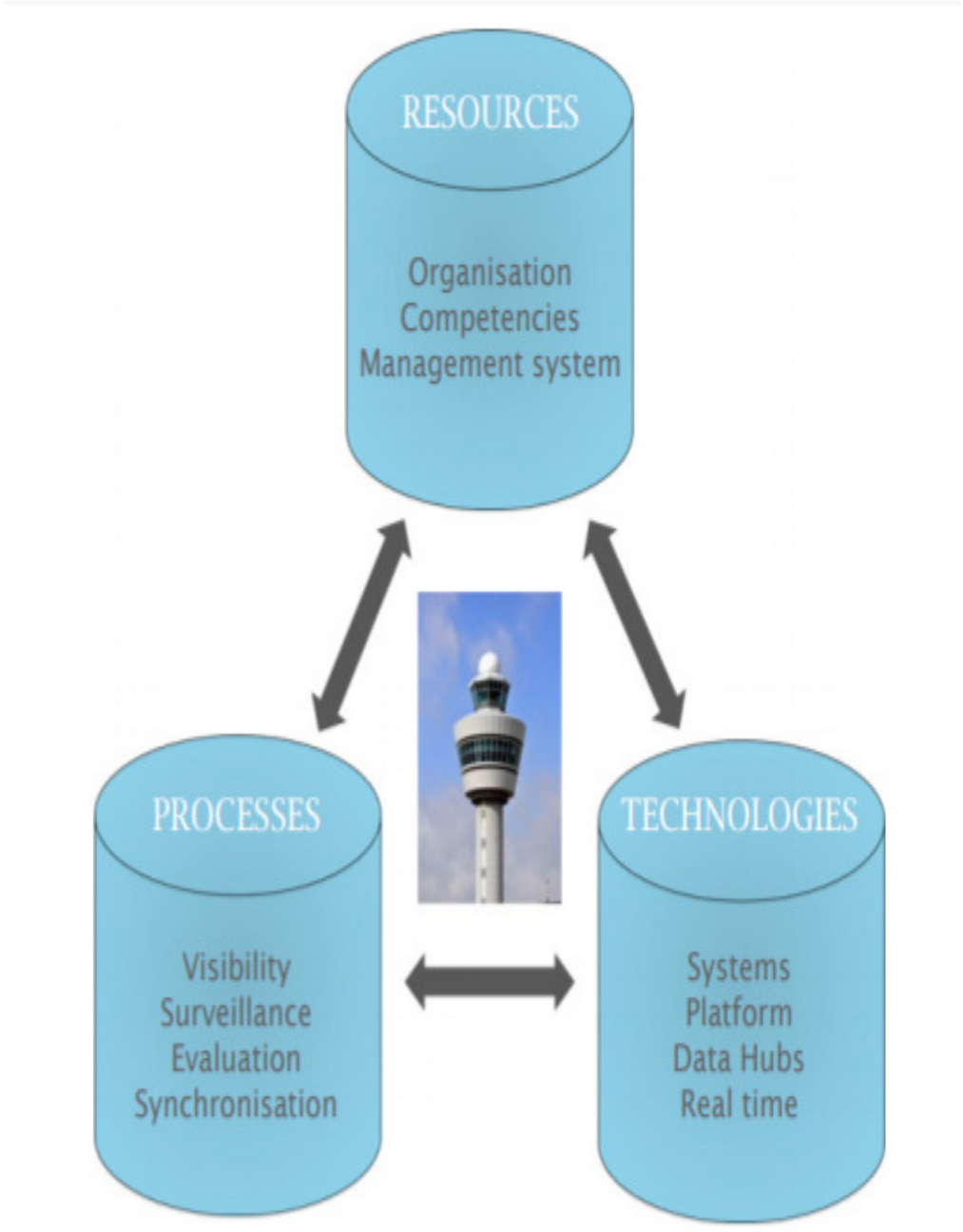
The model shows the supply chain collaboration on firms' performance using an intermediate of collaborative advantages.



Model (2.11): Cao & Zhang (2011) Model

Miroglio (2013) Model:

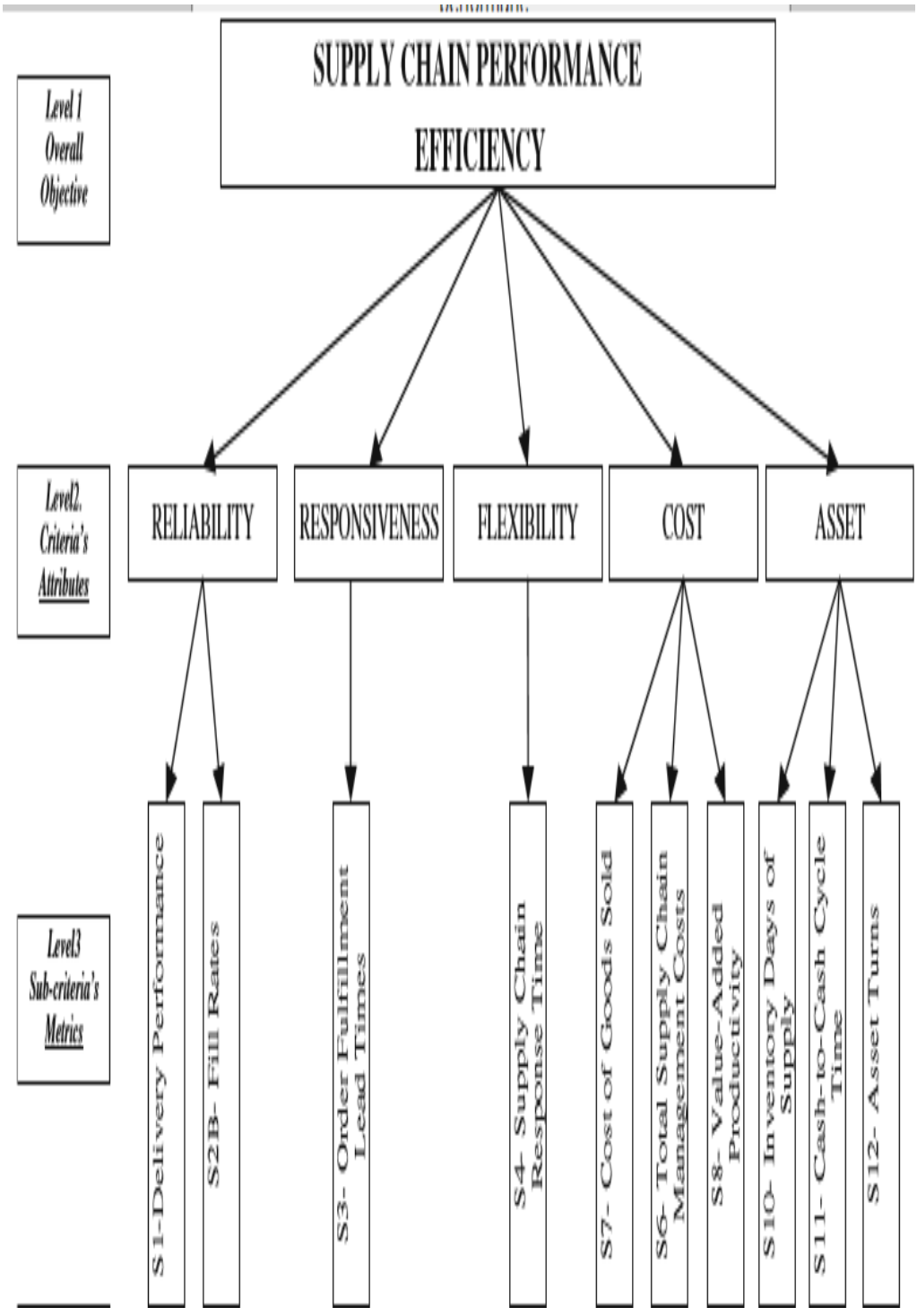
The framework shows the three pillars of a Supply Chain Control Tower: resources (organization, skills and a management system), technology (systems, cloud platform, data hub, interoperable middleware, real time engine for alerts and propagation of information) and processes (visibility, surveillance, evaluation and synchronization).



Model (2.12): Miroglio (2013) Model

Kocaoglu, et. al. (2013) Model:

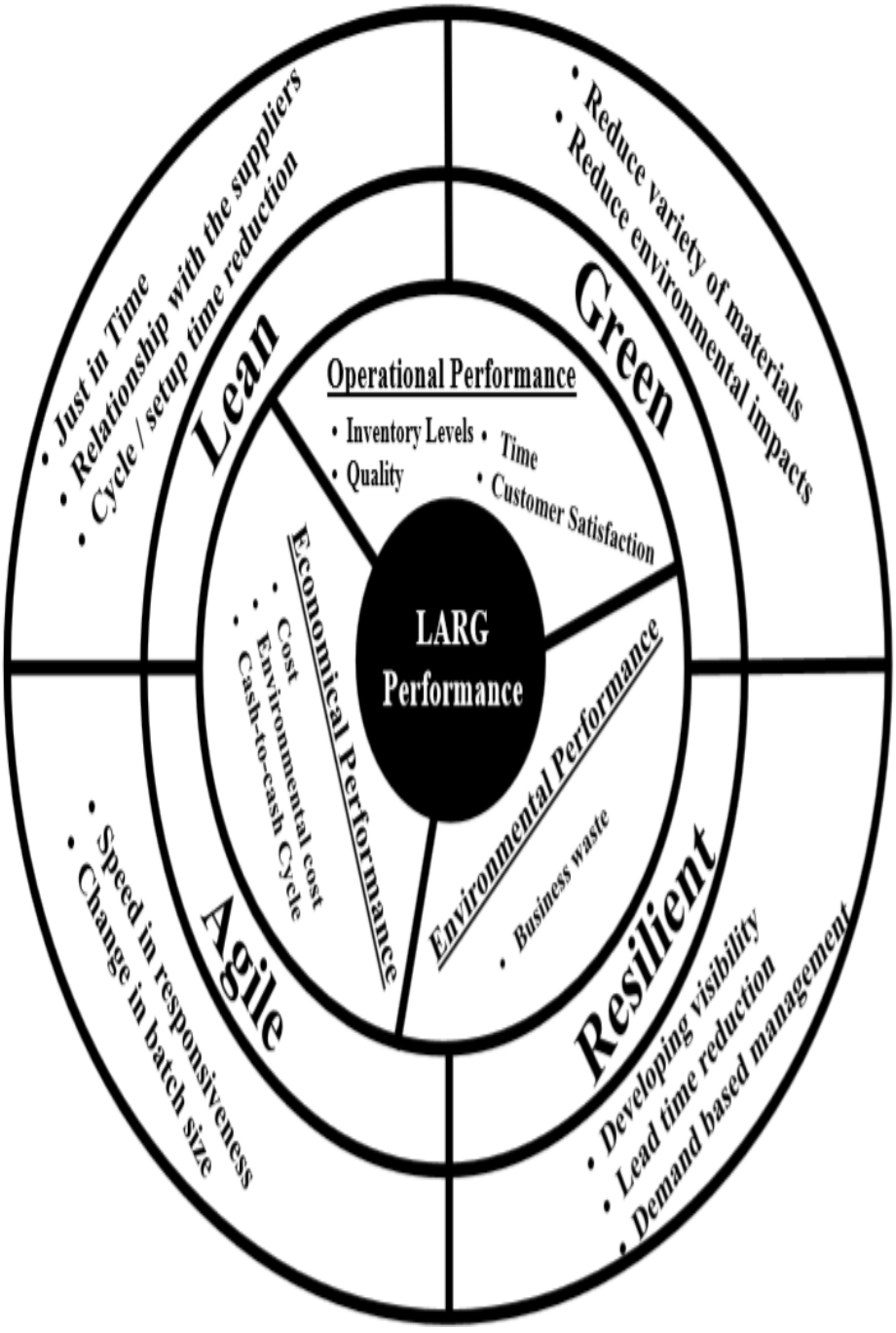
The model shows the supply chain management n Competitive Advantages by estimate the values of the metrics and technique for order preference by similarity to normalization of metric for strategic objectives.



Model (2. 13): Kocaoglu, et. al. (2013) Model

Azfar, et. al. (2014) Model:

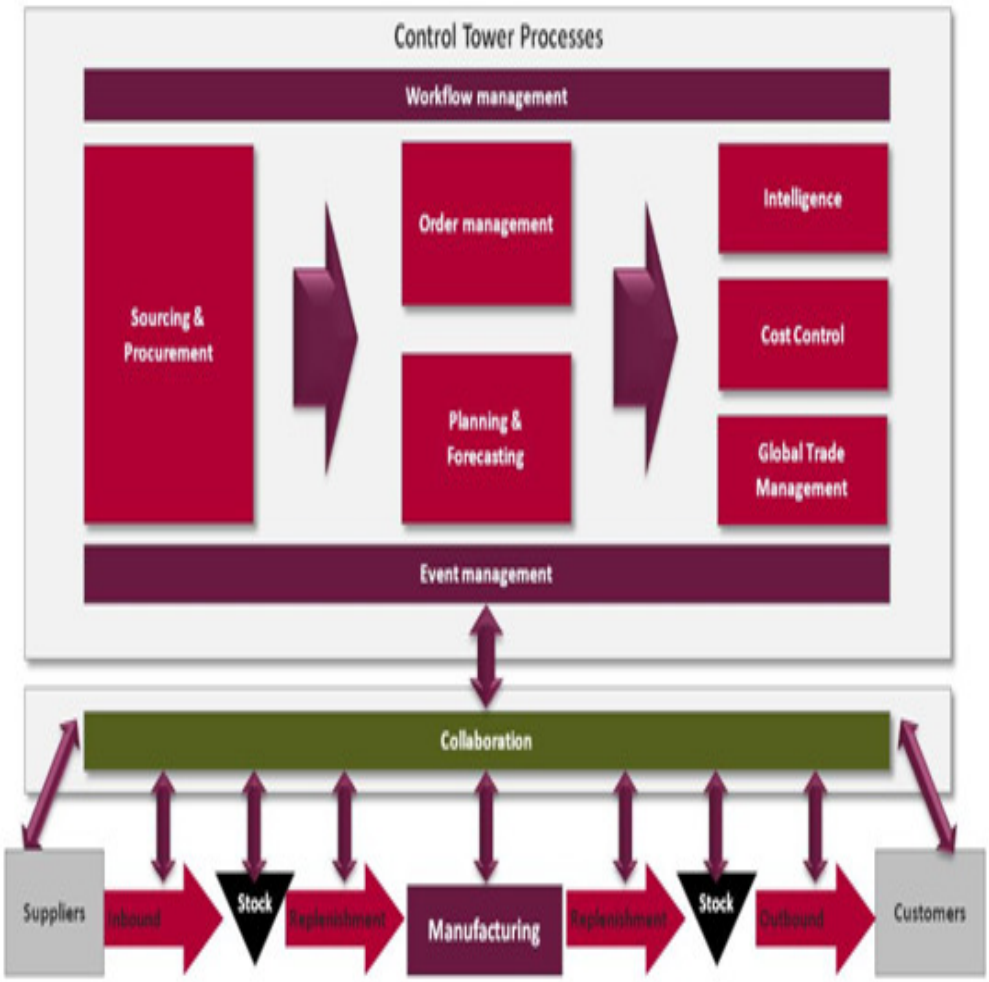
The study proposed a method for measuring the supply chain performance based on the supply chain paradigm (Lean, Agile, Resilient and green) and the critical performance measuring (Operational Performance, Economic Performance and Environmental Performance).



Model (2.14): Azfar, et. al. (2014) Model

Doesburg (2015) Model:

The model illustrated the information flow inside supply chain and its implications within Supply Chain Control Tower were the status from suppliers and/or logistic service providers is collected, stored in a structured way and used to provide the control tower team with info on the actual status of orders, products, inventories and shipments. This information is used to make informed decisions when planning, monitoring and analyzing the supply chain.



Model (2.15): Doesburg (2015) Model

In summary, the above previous models helped to decide on which sub-variables to include; understand the relationship between variables; and how they interact and affect each other.

2.5 Previous Studies:

Gimenez & Ventura (2003) study titled: "**Supply chain management as a Competitive Advantages in the Spanish grocery sector**", investigated the impact of integration between firm internal processes and external processes to achieve Comparative Advantages through measuring the organizational performance. The study analyzed following factors with organizational performance costs, stock out and reducing lead-time, through comparing firm performance with competitors to measure the impact on Competitive Advantages. An empirical test conducted and the result was when the companies achieve internal and external integration then the high performance achieved and leaded to achieve the Competitive Advantages.

Duclos, et. al. (2003) study titled: "**A conceptual model of supply chain flexibility**", the study reviewed the literatures and established a theoretical foundation for supply chain flexibility techniques, where the authors attempted to investigate the internal flexibilities and the external flexibilities. Moreover, they identified the cross enterprise of supply chain and improve the supply chain flexibility measurements beside the six supply chain flexibility components: operation system flexibility, market flexibility, logistics flexibility, organizational flexibility and information system flexibility.

Chen & Paulraj (2004) study titled: "**Understanding supply chain management: critical research and a theoretical framework**", attempted to develop a framework to enhance the understanding of supply chain management and help the researches to undertake the empirical and theoretical study about the facilitation of supply chain management and the impact on the supply chain performance. After analyzing 400 articles and body of works through the purchasing, transportation, logistics, marketing, organizational dynamics, information management, operations management,

and strategic management. The study came up with a framework that tested the validity of relationships among supply chain initiatives and the impact on supply chain performance.

Cheng, et. al. (2004) study title: "**An empirical study of supply chain performance in transport logistics**", purposed to evaluate the transport industry, sea, air, and third party logistics services. A survey (questionnaire) was conducted at 924 firms in the transport logistics industry in Hong Kong. Statistical test applied and the results showed that the there is a significant impact for supply chain performance among firms in the three sectors.

Barratt (2004) study titled: "**Understanding the meaning of collaboration in the supply chain**", the study suggested approach about the supply chain segmentation depending on customers buying behaviors and the need of services, and the paper emphasized on the elements of supply chain that achieves collaboration and how the relevant cultural, strategic and implementation elements inter-relate with each other. Moreover, the study concluded that many of the problems related to supply chain collaboration are due to a lack of understanding of what collaboration actually indicates.

Kim (2006) study title: "**The effect of supply chain integration on the alignment between corporate competitive capability and supply chain operational capability**", designed to study the relationship between supply chain operational capability and corporate competitive capability, and recognize the role of supply chain integration on interactive capabilities. A questionnaire conducted and based on 623 respondents (in Korea and Japan). The data were statically analyzed and 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.

Li, et. al. (2006) study titled: "**The impact of supply chain management practices on Competitive Advantages and organizational performance**", attempted to study the impact of supply chain management practices over five dimensions (strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing and postponement) on the organizational Competitive Advantages and performance. This study used literature analysis of companies and selected 196 companies as a case study. The results showed that there was a positive relationship between supply chain management practices and Competitive Advantages. In addition, it showed a direct and positive relationship between Competitive Advantages and organizational performance.

Kim, et. al. (2006) study titled: "**Information system innovations and supply chain management: channel relationships and firm performance**", investigated the communications in supply chain systems and effect on the relationships with partners and market performance. A 184 firms surveyed in U.S. The research concluded that the innovations of supply chain communication influenced information flow and activities coordination. Moreover, the implementation of innovation in supply chain communication will be more effective with implementing of administrative innovations.

Wagner & Bode (2008) study titled: "**An empirical examination of supply chain performance along several dimensions of risk**", attempted to imperially examine the impact of supply chain risk sources depending on the relationship of supply chain risks and supply chain performance. The data collected by surveying 4946 of the top-level logistics and supply chain managers in Germany with 760 active responses. The results showed that the supply chain risks have a negative impact on the supply chain performance.

Martin & Patterson (2009) study titled: "**On measuring company performance within a supply chain**", studied the most common factors that may be used to measure the supply chain performance, the research concluded that, among the investigated firms that used the supply chain management two factors were considered the key factors for performance measurements as following: 1) Inventory level 2) Cycle time.

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. Surveyed 145 managers at manufacturing and services sector. The measurement scales were used to assess reliability and validity, as well as, assessing the measurement model context. Study hypotheses were 36 then tested using a multiple regression approach. Based on the data the power, benefits and risk reduction linkages had a significant impact on operational performance. Power identified as the dominant linkage for manufacturers and risk reduction as the most important within the services sector.

Jassim (2010) study title: "**The Strategies of supply chain and its impact to achieve the Competitive Advantages: case study in Diwaniyah Textile state factory**", examined the relationship between supply chain strategies and Competitive Advantages. A questionnaire filled by 30 respondents in managerial level. Mean, standard deviation, correlation, multiple regression was applied. Moreover, it showed that there was a significant impact of supply chain strategies on Competitive Advantages.

Bhosle, et. al. (2011) report titled: "**Global Supply Chain Control Towers, achieving end-to-end Supply Chain Visibility**", aimed to report the impact of SCCT on organizations' visibility. A consultant company "Capgemini Consulting "presents the impact of Supply Chain Control Tower on end to end supply chain visibility. This study used literature analysis and

implemented in SAMSUNG Company. The result shows that, control tower implementation builds an efficient and integrated organization to increase load efficiency, improve tracking and customer service and enhance transport efficiency using best-in-class carriers and redesigned transport solutions.

Sukati, et. al. (2011) study titled: "**An investigation of the relationship between supply chain management practices and Competitive Advantages of the firm**", purpose was to present the relationship between supply chain management (SCM) practices, supply chain responsiveness (SCR) and investigates its relationship with Competitive Advantages (CA). The data collection instrument used was a questionnaire, which was administrated to a total sample of 200 managers. The results indicated that SCM practices are related to SCR. The result also suggested that SCR is related to CA.

Agus (2011) study titled: "**Supply chain management, product quality and business performance**", aimed to specify the key elements of supply chain management that would be influencing the firm's performance and products quality. About 250 supply chain and production managers were survived to inveterate that relationships, afterward the data analyzed using SEM module, where the data revealed the significant elements for supply chain were supplier partnership, new technology, innovation, strategic and postponement concept and lean manufacturing.

Cao & Zhang (2011) study titled: "**Supply chain collaboration: Impact on collaborative advantage and firm performance**", the study aimed to explore the impact of supply chain collaboration on firms' performance. A web survey conducted and the data analyzed statistically to reveal that, the supply chain collaboration was positively impact the collaborative advantage and firms' performance. Collaborative advantage is

an intermediate variable that empowers supply chain partners to attain synergies and maximize performance.

Parast & Spillan, (2013) study titled: "**Logistics and supply chain process integration as a source of Competitive Advantages: An empirical analysis**", examined the effectiveness of logistics and supply chain integration on corporate competitiveness. Modeling method was used to define the impact of two sets of logistics and supply chain practices along with logistics outsourcing decision practices on corporate competitiveness. About 782 respondents filled a questionnaire in US and 361 from China. A comparison of Means, standard deviations, and reliability coefficients were performed. The results showed that the logistics/supply chain strategy was the main driver of logistics and supply chain integration and logistics decisions and competitive position.

Thatte, et. al. (2013) study titled: "**Impact of SCM practices of a firm on supply chain responsiveness and Competitive Advantages of a firm**", aimed to test the relationships between supply chain management practices, supply chain responsiveness and Competitive Advantages. This study used structural equation modeling based on the responses of 294 manufacturing and supply chain area. The results showed that higher level of SCM practices can lead to improved supply chain responsiveness and enhanced Competitive Advantages. Furthermore, supply chain responsiveness can have a direct positive impact on Competitive Advantages.

Jie, et. al. (2013) study titled: "**Linking supply chain practices to Competitive Advantages: An example from Australian agribusiness**" aimed to present an integrated modelling framework that links management action to supply chain processes and then to Competitive Advantages. This study used survey responses about supply chain management in the Australian beef processing industry. The results suggest that there is a strong

link from some supply chain practices to Competitive Advantages, with trust and information quality being important drivers of the process.

Abdallah, et. al. (2014) study titled: "**The impact of supply chain management practices on supply chain performance in Jordan: the moderating effect of competitive intensity**" The study examined the effect of supply chain practices on supply chain efficiency and effectiveness. By analyzing data for 104 firms in Jordan, the researchers recommend that the implementation of supply chain management will enhance the supply chain efficiency and effectiveness. Moreover, supplier integration and information sharing significantly influence effectiveness.

Saber, et. al. (2014) study titled: "**Analysis of the Impact of Supply Chain Management Techniques: A Competitive Advantages in the Market**", attempted to study the impact of supply chain management partnership on achieving the organizational Competitive Advantages. The results of 167 of the surveyed managers shows a positive relationship between supply chain management partnership and achieving the organizational Competitive Advantages.

Azfar, et. al. (2014) study titled: "**Performance Measurement: A Conceptual Framework for Supply Chain Practices**", attempted to categorize the supply chain practices and the measurement systems for supply chain performance, and based on that a framework was formulated for the supply chain paradigm (Lean, Agile, Resilient and green) to measure the sustainable supply chain performance. Based on this structure the industries and academia may use it for supply chain measurement system: Operational Performance, Economic Performance and Environmental Performance.

Brusset (2016) study titled: "**Does supply chain visibility enhance agility?**", the study based on empirical survey for 171 supply chain managers

in France. The survey asked about the managerial process in supply chain and agility and the operational capability, the results analyzed using the factor analysis to show that the supply chain agility enhanced by internal and external capabilities and did not impact by visibility.

Chan, et. al. (2017) study titled: "**The effects of strategic and manufacturing flexibilities and supply chain agility on firm performance in the fashion industry**", attempted to assign the critical supply chain agility antecedents. Based on literature review they found that the main two factors are strategic and manufacturing flexibility and both are the key drivers for firms' performance. Moreover, 141 garment manufacturers were surveyed and the results revealed that strategic flexibility and manufacturing flexibility positively enhances supply chain agility

Trzuskawska-Grzesińska (2017) study titled: "**Control towers in supply chain management – past and future**", aimed to investigate different views of Supply Chain Control Tower. This study used literature analysis, and selected three companies as a case study. The results indicated that using control tower's processes enhance time optimization, reduce the cost and added value to both organization and customer.

Palandeng, et. al. (2018) study titled: "**Influence Analysis of Supply Chain Management and Supply Chain Flexibility to Competitive Advantages and Impact on Company Performance of Fish Processing in Bitung City**", attempt to examine the impact of supply chain management and flexibility on organizational performance mediated by Competitive Advantages. The authors adopted the model as the relationship among the supply chain management elements as following: internal supply chain management, supplier relationship management, customer relationship management and supply chain flexibility and the dependent variables

Competitive Advantages and firm performance. About 21 of fishing firms surveyed and the data analyzed using partial least square method. The study concluded that the supply chain management and flexibility have positive impact on Competitive Advantages and firm performance, and they recommended implementing the full elements to achieve and maximize the Competitive Advantages and organizational performance.

Singh, et. al. (2018) study titled: "**Supply Chain Management Practices, Competitive Advantages and Organizational Performance: A Confirmatory Factor Model**", the study utilized the structural equation molding to investigate the relationship between the supply chain practices and Competitive Advantages and industrial performance. Five dimensions (technology utilization, speed, Customer satisfaction, integration, and Inventory management) were used to test supply chain practices, and four sub-variables used for Competitive Advantages (Inventory management, Customer satisfaction and base identification and Profitability), while for testing the industrial performance, the following indicators were used (Financial and Market performance, supply chain competencies, Customer and Stakeholder satisfaction, and Innovation and learning). Data collected from top 10 Indian retailers. The results showed that the Indian retailers aware about the influence of supply chain practices on Competitive Advantages but they need to focus on matching the practices with organizational performance.

Kwak, et. al. (2018) study titled: "**Investigating the relationship between supply chain innovation, risk management capabilities and Competitive Advantages in global supply chains**", investigated the relationship between the supply chain innovation and supply chain risk management capabilities (robustness and resilience) and to what extend they will influence the Competitive Advantages. A survey conducted for South

Korean manufacturers and logistics intermediaries. The data processed using confirmatory factor analysis. The study concluded that the innovative supply chain has a significant impact on all elements of risk management capabilities and this had a positive impact on Competitive Advantages.

In summary, from the previously revised literatures, it is clear that there is a significant impact by supply chain functions and practices on the corporate Competitive Advantages. It seems that only very limited literatures discussed the topic of Supply Chain Control Tower and its impact on the Competitive Advantages. Moreover, most of previous studies studied supply chain practices its relationship with partnership capabilities. This study attempt to investigate the recently developed framework for supply chain management, called Supply Chain Control Tower, which mainly based on practicing supply chain functions on real life. Therefore, the significance of this study is coming from its dedication to explore the impact of implementing the Supply Chain Control Tower functions on Jordanian Pharmaceutical Manufacturing Organizations' Competitive Advantages.

2.6 Expected Contributions of the Current Study as Compared with Previous Studies:

1- Supply Chain Control Tower concept: It seems that the current study is one of the few studies, which considers Supply Chain Control Tower elements. Therefore, it aims to increase awareness about the role of Supply Chain Control Tower in improving organizations' performance.

2- Purpose: Most of the previous study works were conducted to test the impact of supply chain practices from traditional viewpoint (supplier, internal operations and customer's integrations) on Competitive Advantages; the current study is carried out to study the impact of the Supply Chain Control Tower components on the Competitive Advantages.

3- Environment: Most previous studies have been carried out in different countries outside the Arab region. The current study is carried out in Jordan, as one of the Arab-World countries.

4- Industry: It seems that this study is the first study, which implements Supply Chain Control Tower in pharmaceutical industry. Therefore, the current study is dedicated to pharmaceutical industry.

5- Methodology: Most previous studies were based on annual reports of different organizations and industries. The current study is based on managers' perception related to actual implementation.

6- Population: Most all previous researches considered public shareholder organizations that listed in the stock markets, while the current study covered both public and private shareholder organizations.

7- Comparison: The current study results are compared with previous studies results to highlight similarities and differences that might be there and why.

Chapter Three: Study Methodology (Methods and Procedures)

3.1 Introduction:

This chapter includes study design, population and sampling, data collection methods, data collection analysis, study tool and validity and reliability test. In addition to respondent demographic description.

3.2 Study Design:

The current study is considered as a descriptive and cause-effect study. It aims of studying the impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry. It starts with literature review to develop model for measuring the impact of Supply Chain Control Tower on Jordanian Pharmaceutical Manufacturing Industry. Then, a panel of judges used to improve the measurement tool i.e. questionnaire. Afterward, the survey carried out and the data collected from the managers working at Jordanian Pharmaceutical Manufacturing organizations. After that, the data coded against SPSS 20. Then after checking normality, validity and reliability, descriptive analysis carried out, and correlation among variables checked. Finally, the impact tested by multiple regressions.

3.3 Study Population, Sample and Unit of Analysis:

The Pharmaceutical Manufacturing industry that are registered in Jordanian Association of Pharmaceutical Manufacturers at 2018 in Jordan are 14 organizations (The Jordanian Association of Pharmaceutical Manufacturers (JAPM). All Pharmaceutical Manufacturing organizations targeted and this negate the need for sampling.

Unit of Analysis: The survey unit of analysis composed from 164 managers working at Pharmaceutical Manufacturing industry, who was

available at the time of distributing the questionnaires and ready to participate.

3.4 Data Collection Methods (Tools):

For fulfilling the purposes of the study, the data collected from two sources: secondary and primary data as follows:

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

Primary Data: To actualize this study primary data collected from managers working in Pharmaceutical industry by a questionnaire, which built and developed for this purpose.

3.4.1 Study Instrument (Tool):

The Questionnaire:

To actualize this study, the questionnaire was used as a main tool, which contains two parts, as follows:

First part contains the demographic dimensions related to gender, age, experience, education, position, division. Second part includes both independent and dependent variables as follows:

Independent Variable (Supply Chain Control Tower): contains the following sub-variables Procurement and Sourcing, Demand Planning, operation, In-bound and Out-bound logistics, and Warehousing and Inventory. Seven items were used to measure each sub-variable.

Dependent Variable (Competitive Advantages): contains the following dimensions: Cost, Quality, Responsiveness, Reliability and Innovation. Five items were used to measure each dimension.

All items measured by five-point Likert-type scale to rate respondent's actual perceptions regarding each item as follows: 1 (strongly unimplemented) to 5 (strongly implemented).

3.4.2 Data Collection and Analysis:

Hundred thirty-two questionnaires collected out of 164 questionnaires distributed to supervisors and managers. Data collected from 13 companies out of 14 companies registered at Jordanian Association of Pharmaceutical Manufacturers, during the period of March to June 2018.

All collected questionnaires were complete and suitable, and coded against SPSS 20.

3.4.2.1 Validity Test:

The tool`s validity confirmed by using three methods: content, face and construct. The content validity confirmed through collecting the data from multiple literatures resources such as books, journals, working papers, researches, thesis, dissertations, articles and worldwide Web and Jordanian Pharmaceutical Manufacturing organizations. Moreover, the face validity confirmed through board of judge, which judged the questionnaire (see appendix 1). Finally, construct validity confirmed by Principal Component Factor Analysis with Kaiser Meyer Olkin (KMO).

Construct Validity (Factor Analysis):

The construct validity confirmed using Principal Component Factor Analysis with Kaiser Meyer Olkin (KMO). The data explanatory and conformity examined using Principal Factor Analysis. Factor loading more than 0.50 is good and accepted if it is exceeding 0.40 (Hair, et. al. 2014). However, Kaiser Meyer Olkin (KMO) is used to measure sampling adequacy, harmony and inter-correlations, KMO values between 0.8 and 1 indicate that a high sampling is adequacy, and accepted if it is exceeding 0.6.

Another indicator is Bartlett's of Sphericity used for the determination of suitability of data and correlation, where if the significant value of data is less than 0.05 at 95% confidence level, that's indicates for a useful factor analysis. Variance percentage shows explanation power of factors (Cerny & Kaiser, 1977).

Procurement and Sourcing:

Table (3.1) shows that the loading factor of Procurement and Sourcing items scored between 0.448 and 0.718. Therefore, the construct validity is assumed. KMO has rated 64.2%, which indicates good adequacy, and the Chi^2 is 192.111, which indicates the fitness of model. Moreover, variance percentage is 54.384, so it can explain 54.38% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.1): Principal Component Analysis Procurement and Sourcing

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	The company develops standard criteria for supplier selection.	0.718	0.642	192.311	21	54.384	0.000
2	The company standardizes the requisitions procedure.	0.611					
3	The company updates approved venders list including alternative.	0.696					
4	The company negotiates payment terms.	0.448					
5	The company signs long-term contracts with suppliers.	0.566					
6	The company evaluates suppliers' performance regularly.	0.624					
7	The company uses E-procurement with all suppliers.	0.535					

Principal Component Analysis.

Demand Planning:

Table (3.2) shows that the loading factor of Demand Planning items scored between 0.628 and 0.797. Therefore, the construct validity is assumed. KMO has rated 81.5%, which indicates good adequacy, and the Chi^2 is 441.461, which indicates the fitness of model. Moreover, variance percentage is 57.148, so it can explain 57.15% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.2): Principal Component Analysis Demand Planning

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	The company examines market indicators related to demand.	0.774	0.815	441.461	21	57.148	0.000
2	The company uses different technique for demand forecasting.	0.788					
3	The company develops long-term demand plan.	0.772					
4	The company uses demand forecast for materials requisition.	0.746					
5	The company synergizes demand with operation processes.	0.773					
6	The company integrates orders within Demand Planning.	0.797					
7	The company shares demand forecast with partners.	0.628					

Principal Component Analysis.

Operations:

Table (3.3) shows that the loading factor of Operations items scored between 0.524 and 0.812. Therefore, the construct validity is assumed. KMO has rated 77.7%, which indicates good adequacy, and the Chi^2 is 372.369, which indicates the fitness of model. Moreover, variance percentage is 66.386, so it can explain 66.39% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.3): Principal Component Analysis Operations

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	The company designs smooth manufacturing processes.	0.738					
2	The company produces products according to specifications.	0.721					
3	The company commits to continues process improvement.	0.721					
4	The company maximizes production lines capacities.	0.716	0.777	372.369	21	66.386	0.000
5	The company schedules production according demand priorities.	0.779					
6	The company controls production activities through ERP system.	0.524					
7	The company implements preventive maintenance.	0.812					

Principal Component Analysis.

In-bound and Out-bound logistics:

Table (3.4) shows that the loading factor of In-bound and Out-bound logistics items scored between 0.614 and 0.793. Therefore, the construct validity is assumed. KMO has rated 77.9%, which indicates good adequacy, and the Chi^2 is 337.440, which indicates the fitness of model. Moreover, variance percentage is 64.513, so it can explain 64.51% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.4): Principal Component Analysis In-bound and Out-bound logistics

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	The company designs efficient distribution network.	0.684					
2	The company selects the efficient shipping route.	0.793					
3	The company uses alliances for its logistics activity.	0.614					
4	The company schedules shipments with partners.	0.665	0.779	337.440	21	64.513	0.000
5	The company considers risks during shipping carrier selection.	0.723					
6	The company standardizes procedures during transportation.	0.742					
7	The company monitors environmental conditions for shipments.	0.704					

Principal Component Analysis.

Warehousing and Inventory:

Table (3.5) shows that the loading factor of Warehousing and Inventory items scored between 0.563 and 0.818. Therefore, the construct validity is assumed. KMO has rated 81.8%, which indicates good adequacy, and the Chi^2 is 411.338, which indicates the fitness of model. Moreover, variance percentage is 69.887, so it can explain 69.89% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.5): Principal Component Analysis Warehousing and Inventory

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	The company considers an efficient warehouses location.	0.818	0.818	411.338	21	69.887	0.000
2	The company designs warehouses according to usage rate.	0.760					
3	The company stores materials based on usage rate	0.563					
4	The company tracks stock activities through ERP system.	0.609					
5	The company monitors materials storage conditions.	0.786					
6	The company uses security systems in warehouse facilities.	0.781					
7	The company uses well-trained manpower in warehouses.	0.786					

Principal Component Analysis.

Cost:

Table (3.6): Principal Component Analysis Cost

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	The company maximizes production output.	0.786	0.722	211.582	10	54.754	0.000
2	The company aggregates production in campaigns.	0.856					
3	The company uses wages labor when needed.	0.521					
4	The company reduces production waste, as much as possible.	0.767					
5	The company receives material within suitable time in suitable place.	0.726					

Principal Component Analysis.

Table (3.6) shows that the loading factor of cost items scored between 0.521 and 0.856. Therefore, the construct validity is assumed. KMO has rated 72.2%, which indicates good adequacy, and the Chi^2 is 211.582, which indicates the fitness of model. Moreover, variance percentage is 54.754, so it can explain 54.75% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Quality:

Table (3.7) shows that the loading factor of quality items scored between 0.757 and 0.845. Therefore, the construct validity is assumed. KMO has rated 83.5%, which indicates good adequacy, and the Chi^2 is 336.447, which indicates the fitness of model. Moreover, variance percentage is 67.264, so it can explain 67.26% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.7): Principal Component Analysis Quality

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	The company implements GMP guidelines strictly.	0.757	0.835	336.447	10	67.264	0.000
2	The company implements in depth Product Quality Review (PQR) system.	0.841					
3	The company uses quality control charts for trend identification.	0.845					
4	The company adapts common quality specification with partners.	0.840					
5	The company conducts quality-training programs continuously.	0.815					

Principal Component Analysis.

Responsiveness:

Table (3.8) shows that the loading factor of responsiveness items scored between 0.690 and 0.846. Therefore, the construct validity is assumed. KMO has rated 84.4%, which indicates good adequacy, and the Chi^2 is 262.876, which indicates the fitness of model. Moreover, variance percentage is 62.652, so it can explain 62.65% of variation. Finally, the significance of

Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.8): Principal Component Analysis Responsiveness

No.	Item	F1	KMO	Chi²	BTS	Var%	Sig.
1	The company uses logistics carriers to minimize shipping time.	0.690	0.844	262.876	10	62.652	0.000
2	The company shortens the materials handling time in their warehouses.	0.809					
3	The company shortens manufacturing cycle time.	0.846					
4	The company responds to markets changes as fast as possible.	0.815					
5	The company delivers customer orders on time.	0.789					

Principal Component Analysis.

Reliability:

Table (3.9) shows that the loading factor of reliability items scored between 0.712 and 0.788. Therefore, the construct validity is assumed. KMO has rated 80.9%, which indicates good adequacy, and the Chi^2 is 206.500, which indicates the fitness of model. Moreover, variance percentage is 57.896, so it can explain 57.90% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.9): Principal Component Analysis Reliability

No.	Item	F1	KMO	Chi²	BTS	Var%	Sig.
1	The company coordinates delivery changes with its customers.	0.712	0.809	206.500	10	57.896	0.000
2	The company depends on logistics to respond to sudden orders.	0.782					
3	The company develops flexible processes to fulfil sudden orders.	0.788					
4	The company develops plan production according to forecasting.	0.763					
5	The company adapts its processes according to required product varieties.	0.756					

Principal Component Analysis.

Innovation:

Table (3.10) shows that the loading factor of innovation items scored between 0.732 and 0.847. Therefore, the construct validity is assumed. KMO has rated 78.6%, which indicates good adequacy, and the Chi^2 is 305.570, which indicates the fitness of model. Moreover, variance percentage is 63.987, so it can explain 63.99% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.10): Principal Component Analysis Innovation

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	The company encourages creativity thorough employees' participation.	0.847	0.786	305.570	10	63.987	0.000
2	The company implements incentive system to reward valuable ideas.	0.828					
3	The company uses customers' complaints to improve its activities.	0.732					
4	The company conducts innovation training continuously.	0.791					
5	The company adopts new technologies within its processes.	0.797					

Principal Component Analysis.

Supply Chain Control Tower:

Table (3.11) shows that the loading factor of innovation items scored between 0.812 and 0.850. Therefore, the construct validity is assumed. KMO has rated 86.9%, which indicates good adequacy, and the Chi^2 is 330.377, which indicates the fitness of model. Moreover, variance percentage is 68.581, so it can explain 68.58% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.11): Principal Component Analysis Supply Chain Control Tower

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	Procurement and Sourcing	0.824	0.869	330.377	10	68.581	0.000
2	Demand Planning	0.814					
3	Operations	0.812					
4	In-bound and Out-bound logistics	0.850					
5	Warehousing and Inventory	0.841					

Principal Component Analysis.

Competitive Advantages:

Table (3.12) shows that the loading factor of innovation items scored between 0.673 and 0.876. Therefore, the construct validity is assumed. KMO has rated 84.2%, which indicates good adequacy, and the Chi^2 is 314.729, which indicates the fitness of model. Moreover, variance percentage is 65.580, so it can explain 65.58% of variation. Finally, the significance of Bartlett's Sphericity is less than 0.05, which indicates the factor analysis is useful.

Table (3.12): Principal Component Analysis Competitive Advantages

No.	Item	F1	KMO	Chi^2	BTS	Var%	Sig.
1	Cost	0.843	0.842	314.729	10	65.580	0.000
2	Quality	0.807					
3	Responsiveness	0.835					
4	Reliability	0.876					
5	Innovation	0.673					

Principal Component Analysis.

3.4.2.2 Reliability Test:

The data reliability examined through Cronbach's alpha, the reliable tools have a Cronbach's alpha above 0.70, and accepted if it is exceeding 0.60 (Hair, et. al. 2014). Table (3.13) shows that reliability coefficient for Supply Chain Control Tower sub-variables ranges between 0.707 and 0.870, and for Competitive Advantages dimensions is between 0.787 and 0.870.

Table (3.13): Reliability Test for all Variables

Variable	Items/Sub-Variables	*Cronbach's Alpha*
Procurement and Sourcing	7	0.707
Demand Planning	7	0.870
Operations	7	0.834
In-bound and Out-bound logistics	7	0.829
Warehousing and Inventory	7	0.848
Supply Chain Control Tower	**5 Sub-Variable**	**0.882**
Cost	5	0.787
Quality	5	0.877
Responsiveness	5	0.849
Reliability	5	0.818
Innovation	5	0.856
Competitive Advantages	**5 Dimensions**	**0.857**

3.4.2.3 Demographic Analysis:

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

Gender: Table (3.14) shows that the majority of respondents are males, where 103 (78.0%), and only 29 (22.0%) are females. This is justified since the female's proportion is low within the scope of tested divisions and this percentage is much higher within other division i.e. R&D, Regulator affairs and HR.

Table (3.14): Respondents Gender

		Frequency	Percent
Gender	Male	103	78.0
	Female	29	22.0
	Total	**132**	**100.0**

Age: Table (3.15) shows that the majority of respondents ages are between (30-39 years) 59 (44.7%) out of the total sample and this is matching with study scope, which is the managerial` level, then those ages between (40-49 years) 39 (29.5%), after that the respondents younger than 30 years 23 (17.4%), finally those older than 50 years 11 (8.3%).

Table (3.15): Respondents Age

		Frequency	Percent
Age	Less than 30	23	17.4
	Bet. 30-39	59	44.7
	Bet. 40-49	39	29.5
	Above 50	11	8.3
	Total	**132**	**100.0**

Experience: Table (3.15) shows that the majority of respondents are having experience between (10-19 years) 55 (41.7%) which matches with the study sample that targets managerial` level, then respondents experience between (20-29 years) 39 (29.5%), followed by those with experience less

than 10 years 36 (27.3%). Finally, respondents have more than 30 years' experience were very few 2 (1.5%).

Table (3.16): Respondents Experience

		Frequency	Percent
Experience	Less than 10	36	27.3
	Bet. 10-19	55	41.7
	Bet. 20-29	39	29.5
	More than 30	2	1.5
	Total	**132**	**100.0**

Education: Table (3.17) shows that the majority of respondents holds a high educational level and this came from the nature of pharmaceutical industry, which emphasizing on continuous learning and improvements, where the majority 94 (75.3%) have a bachelor degree, after that 36 (27.3%) have a master degree, finally 2 (1.5%) have Ph.D. degree.

Table (3.17): Respondents Education

		Frequency	Percent
	Bachelor	94	75.3
	Master	36	27.3
	Ph.D.	2	1.5
	Total	**132**	**100.0**

Position: Table (3.18) shows that the majority of respondents are managers 68 (51.5%) out of the total respondents, after that 35 (26.5%) are supervisors, the third category is team leaders 15 (11.4%), finally the director's position 14 (10.6%) out of total respondents.

Table (3.18): Respondents Position

		Frequency	Percent
Position	Team Leader	15	11.4
	Supervisor	35	26.5
	Manager	68	51.5
	Director	14	10.6
	Total	132	100.0

Division: Table (3.19) shows that the majority of respondents are working in supply chain division 69 (52.3%) and this is because of the scope of this study is supply chain activities, then whose working in operations and

quality division 56 (42.4%), after that sales and marketing 5 (3.8%), finally Finance and Accounting were very few 2 (1.5%).

Table (3.19): Respondents Division

		Frequency	**Percent**
Division	Operations and Quality	56	42.4
	Supply Chain	69	52.3
	Sales and Marketing	5	3.8
	Finance and Accounting	2	1.5
	Total	132	100.0

Chapter Four: Data Analysis

4.1 Introduction:

This chapter includes data descriptive statistical analysis of respondents' perception, Pearson Bivariate Correlation matrix to test the relationships among Supply Chain Control Tower sub-variables with each other, Competitive Advantages dimensions with each other; and between Supply Chain Control Tower variable and sub-variables with Competitive Advantages dimensions. Finally, multiple regressions to check hypothesis: the impact of Supply Chain Control Tower on Competitive Advantages.

4.2 Descriptive Statistical Analysis:

The mean, standard deviation, t-value, ranking and implementation level are used to describe the respondents' perception and the degree of implementing of each variable, dimension and items.

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

$$\frac{5-1}{3} = 1.33$$

Therefore, the implementation to be considered high if it is within the range 3.67-5.00 and medium if it is between 2.34 and 3.66 and low implementation is between 1.00 and 2.33.

Independent Variable (Supply Chain Control Tower):

Table (4.1) shows that the means of Supply Chain Control Tower sub-variables ranges from 3.60 to 4.16 with standard deviation between 0.57 and 0.78. This indicates that respondents agree on medium to high implementation of Supply Chain Control Tower sub-variables that is supported by high t-value compared to T-tabulated. The average mean is 3.90 with standard deviation of 0.57, indicates that the respondents highly

aware and concern about Supply Chain Control Tower, where t-value is 18.12>T-tabulated = 1.960.

Table (4.1): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Supply Chain Control Tower

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	Procurement and Sourcing	3.83	0.57	16.67	0.00	3	High
2	Demand Planning	3.60	0.78	8.87	0.00	5	Medium
3	Operations	4.16	0.62	21.34	0.00	1	High
4	In-bound and Out-bound logistics	3.83	0.72	13.18	0.00	4	High
5	Warehousing and Inventory	4.08	0.72	17.19	0.00	2	High
	Supply Chain Control Tower	**3.90**	**0.57**	**18.12**	**0.00**		**High**

T-tabulated=1.960

Procurement and Sourcing:

Table (4.2) shows that the means of Procurement and Sourcing items ranges from 3.17 to 4.08 with standard deviation between 0.87 and 1.01. This indicates that respondents agree on medium to high implementation of Procurement and Sourcing items, this is supported by high t-value compared to T-tabulated value for items from 1 to 6, except t-value for item 7 is less than T-tabulated, which indicates that E-procurement is poorly implemented. The average mean is 3.83 with standard deviation of 0.57, indicates that the respondents highly aware and concern about Procurement and Sourcing, where t-value is 16.67>T-tabulated = 1.960.

Table (4.2): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Procurement and Sourcing

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company develops standard criteria for supplier selection.	4.05	1.00	11.98	0.00	2	High
2	The company standardizes the requisitions procedure.	3.96	0.94	11.71	0.00	4	High
3	The company updates approved venders list including alternative.	4.08	0.91	13.53	0.00	1	High
4	The company negotiates payment terms.	4.04	0.87	13.73	0.00	3	High
5	The company signs long-term contracts with suppliers.	3.61	0.95	7.35	0.00	6	Medium
6	The company evaluates suppliers' performance regularly.	3.92	0.96	11.04	0.00	5	High
7	The company uses E-procurement with all suppliers.	3.17	1.01	1.89	0.06	7	Medium
	Procurement and Sourcing	**3.83**	**0.57**	**16.67**	**0.00**		**High**

T-tabulated=1.960

Demand Planning:

Table (4.3) shows that the means of Demand Planning items ranges from 3.24 to 3.89 with standard deviation between 0.92 and 1.22. This indicates that respondents agree on medium to high implementation of Demand Planning items, this is supported by high t-value compared to T-tabulated. The average mean is 3.60 with standard deviation of 0.78, indicates that the respondents highly aware and concern about Demand Planning, where t-value is 8.87>T-tabulated = 1.960.

Table (4.3): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Demand Planning

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company examines market indicators related to demand.	3.64	1.04	7.06	0.00	4	Medium
2	The company uses different technique for demand forecasting.	3.53	0.98	6.24	0.00	5	Medium
3	The company develops long-term demand plan.	3.34	1.22	3.22	0.00	6	Medium
4	The company uses demand forecast for materials requisition.	3.74	1.01	8.46	0.00	3	High
5	The company synergizes demand with operation processes.	3.81	0.92	10.15	0.00	2	High
6	The company integrates orders within Demand Planning.	3.89	0.93	10.98	0.00	1	High
7	The company shares demand forecast with partners.	3.24	1.14	2.44	0.02	7	Medium
	Demand Planning	**3.60**	**0.78**	**8.87**	**0.00**		**Medium**

T-tabulated=1.960

Operations:

Table (4.4) shows that the means of operations items ranges from 3.86 to 4.42 with standard deviation between 0.78 and 1.07. This indicates that respondents agree on high implementation of Operations items; this is supported by high t-value compared to T-tabulated. The average mean is 4.16 with standard deviation of 0.62, indicates that the respondents highly aware and concern about Operations, where t-value is 21.34>T-tabulated = 1.960.

Table (4.4): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Operations

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company designs smooth manufacturing processes.	3.86	0.88	11.27	0.00	7	High
2	The company produces products according to specifications.	4.42	0.80	20.41	0.00	1	High
3	The company commits to continues process improvement.	4.16	0.78	17.08	0.00	5	High
4	The company maximizes production lines capacities.	4.08	0.86	14.35	0.00	6	High
5	The company schedules production according demand priorities.	4.23	0.85	16.77	0.00	2	High
6	The company controls production activities through ERP system.	4.17	1.07	12.51	0.00	4	High
7	The company implements preventive maintenance.	4.20	0.83	16.75	0.00	3	High
	Operations	**4.16**	**0.62**	**21.34**	**0.00**		**High**

T-tabulated=1.960

In-bound and Out-bound logistics:

Table (4.5) shows that the means of In-bound and Out-bound logistics items ranges from 3.49 to 4.11 with standard deviation between 0.84 and 1.12. This indicates that respondents agree on high implementation of In-bound and Out-bound logistics items; this is supported by high t-value compared to T-tabulated. The average mean is 3.83 with standard deviation of 0.72, indicates that the respondents highly aware and concern about In-bound and Out-bound logistics, where t-value is 13.18>T-tabulated = 1.960.

Table (4.5): Mean, Standard Deviation, t-value, Ranking and Implementation Level of In-bound and Out-bound logistics

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company designs efficient distribution network.	3.85	0.84	11.57	0.00	4	High
2	The company selects the efficient shipping route.	3.89	0.97	10.53	0.00	6	High
3	The company uses alliances for its logistics activity.	3.49	0.99	5.70	0.00	1	High
4	The company schedules shipments with partners.	3.76	1.12	7.77	0.00	2	High
5	The company considers risks during shipping carrier selection.	3.86	1.12	8.78	0.00	5	High
6	The company standardizes procedures during transportation.	3.83	1.09	8.76	0.00	3	High
7	The company monitors environmental conditions for shipments.	4.11	1.02	12.45	0.00	7	High
	In-bound and Out-bound logistics	**3.83**	**0.72**	**13.18**	**0.00**		**High**

T-tabulated=1.960

Warehousing and Inventory:

Table (4.6) shows that the means of Warehousing and Inventory items ranges from 3.77 to 4.45 with standard deviation between 0.79 and 1.16. This indicates that respondents agree on high implementation of Warehousing and Inventory items; this is supported by high t-value compared to T-tabulated. The average mean is 4.08 with standard deviation of 0.72, indicates that the respondents highly aware and concern about Warehousing and Inventory, where t-value is 17.19>T-tabulated = 1.960.

Table (4.6): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Warehousing and Inventory

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company considers an efficient warehouses location.	4.04	0.96	12.42	0.00	4	High
2	The company designs warehouses according to usage rate.	3.79	1.16	7.81	0.00	6	High
3	The company stores materials based on usage rate	3.77	1.07	8.32	0.00	7	High
4	The company tracks stock activities through ERP system.	4.26	1.05	13.82	0.00	3	High
5	The company monitors materials storage conditions.	4.45	0.79	21.29	0.00	1	High
6	The company uses security systems in warehouse facilities.	4.30	0.96	15.65	0.00	2	High
7	The company uses well-trained manpower in warehouses.	3.95	0.98	11.19	0.00	5	High
	Warehousing and Inventory	**4.08**	**0.72**	**17.19**	**0.00**		**High**

T-tabulated=1.960

Dependent variable (Competitive Advantages):

Table (4.7) shows that the means of Competitive Advantages items ranges from 3.35 to 4.04 with standard deviation between 0.67 and 0.88. This indicates that respondents agree on medium to high implementation of Competitive Advantages items; this is supported by high t-value compared to T-tabulated. The average mean is 3.77 with standard deviation of 0.61, indicates that the respondents highly aware and concern about Competitive Advantages, where t-value is 14.57>T-tabulated = 1.960.

Table (4.7): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Competitive Advantages

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	Cost	3.85	0.67	14.70	0.00	2	High
2	Quality	4.04	0.80	14.88	0.00	1	High
3	Responsiveness	3.81	0.75	12.41	0.00	4	High
4	Reliability	3.82	0.70	13.41	0.00	3	High
5	Innovation	3.35	0.88	4.54	0.00	5	Medium
	Competitive Advantages	**3.77**	**0.61**	**14.57**	**0.00**		**High**

T-tabulated=1.960

Cost:

Table (4.8) shows that the means of cost items ranges from 3.61 to 4.04 with standard deviation between 0.84 and 0.98. This indicates that respondents agree on medium to high implementation of cost items; this is supported by high t-value compared to T-tabulated. The average mean is 3.85 with standard deviation of 0.67, indicates that the respondents highly aware and concern about cost, where t-value is 14.70>T-tabulated = 1.960.

Table (4.8): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Cost

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company maximizes production output.	4.04	0.79	15.18	0.00	1	High
2	The company aggregates production in campaigns.	3.93	0.98	10.90	0.00	2	High
3	The company uses wages labor when needed.	3.61	0.84	8.45	0.00	5	Medium
4	The company reduces production waste, as much as possible.	3.86	0.95	10.48	0.00	3	High
5	The company receives material within suitable time in suitable place.	3.82	0.97	9.68	0.00	4	High
	Cost	**3.85**	**0.67**	**14.70**	**0.00**		**High**

T-tabulated=1.960

Quality:

Table (4.9) shows that the means of quality items ranges from 3.80 to 4.29 with standard deviation between 0.92 and 1.06. This indicates that respondents agree on high implementation of quality items; this is supported by high t-value compared to T-tabulated. The average mean is 4.04 with

standard deviation of 0.80, indicates that the respondents highly aware and concern about quality, where t-value is 14.88>T-tabulated = 1.960.

Table (4.9): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Quality

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company implements GMP guidelines strictly.	4.29	0.92	16.07	0.00	1	High
2	The company implements in depth Product Quality Review (PQR) system.	4.11	0.95	13.52	0.00	2	High
3	The company uses quality control charts for trend identification.	3.80	1.05	8.77	0.00	5	High
4	The company adapts common quality specification with partners.	3.98	0.92	12.24	0.00	4	High
5	The company conducts quality-training programs continuously.	4.02	1.06	11.05	0.00	3	High
	Quality	**4.04**	**0.80**	**14.88**	**0.00**		**High**

T-tabulated=1.960

Responsiveness:

Table (4.10) shows that the means of responsiveness items ranges from 3.69 to 3.89 with standard deviation between 0.86 and 1.06. This indicates that respondents agree on high implementation of responsiveness items; this is supported by high t-value compared to T-tabulated. The average mean is 3.81 with standard deviation of 0.75, indicates that the respondents highly aware and concern about responsiveness, where t-value is 12.41>T-tabulated = 1.960.

Table (4.10): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Responsiveness

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company uses logistics carriers to minimize shipping time.	3.69	0.87	9.05	0.00	5	High
2	The company shortens the materials handling time in their warehouses.	3.79	0.99	9.16	0.00	4	High
3	The company shortens manufacturing cycle time.	3.87	0.94	10.69	0.00	2	High
4	The company responds to markets changes as fast as possible.	3.80	1.06	8.61	0.00	3	High
5	The company delivers customer orders on time.	3.89	0.86	11.97	0.00	1	High
	Responsiveness	**3.81**	**0.75**	**12.41**	**0.00**		**High**

T-tabulated=1.960

Reliability:

Table (4.11) shows that the means of reliability items ranges from 3.74 to 3.88 with standard deviation between 0.89 and 0.96. This indicates that respondents agree on high implementation of reliability items; this is supported by high t-value compared to T-tabulated. The average mean is 3.82 with standard deviation of 0.70, indicates that the respondents highly aware and concern about reliability, where t-value is 13.40>T-tabulated = 1.960.

Table (4.11): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Reliability

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company coordinates delivery changes with its customers.	3.88	0.89	11.33	0.00	1	High
2	The company depends on logistics to respond to sudden orders.	3.77	0.95	9.39	0.00	4	High
3	The company develops flexible processes to fulfil sudden orders.	3.74	0.95	8.94	0.00	5	High
4	The company develops plan production according to forecasting.	3.83	0.96	9.99	0.00	3	High
5	The company adapts its processes according to required product varieties.	3.88	0.87	11.55	0.00	2	High
	Reliability	**3.82**	**0.70**	**13.40**	**0.00**		**High**

T-tabulated=1.960

Innovation:

Table (4.12) shows that the means of innovation items ranges from 3.20 to 3.56 with standard deviation between 1.02 and 1.16. This indicates that respondents agree on medium implementation of innovation items; this is supported by high t-value compared to T-tabulated for all items except item number 2. For item number 2 the t-value is exceeding T-tabulated and this indicates the inconsistency among respondents about rewarding system implementations. The average mean is 3.35 with standard deviation of 0.88, indicates that the respondents highly aware and concern about innovation, where t-value is 4.54>T-tabulated = 1.960.

Table (4.12): Mean, Standard Deviation, t-value, Ranking and Implementation Level of Innovation

No.		M.	S.D.	t	Sig.	Rank	Impl.
1	The company encourages creativity thorough employees' participation.	3.26	1.02	2.89	0.00	3	Medium
2	The company implements incentive system to reward valuable ideas.	3.20	1.14	1.98	0.05	4	Medium
3	The company uses customers' complaints to improve its activities.	3.56	1.16	5.55	0.00	1	Medium
4	The company conducts innovation training continuously.	3.20	1.16	2.03	0.04	5	Medium
5	The company adopts new technologies within its processes.	3.52	1.02	5.83	0.00	2	Medium
	Innovation	**3.35**	**0.88**	**4.54**	**0.00**		**Medium**

T-tabulated=1.960

Relationship between Independent and Dependent Variables:

Bivariate Pearson Correlation Test has been used to check the relationship between variables. Table (4.13) shows that the relationships among supply chain control tower sub-variables are strong, where r ranges from 0.520 to 0.660. Moreover, the relationships among Competitive Advantages dimensions are also strong, where r ranges between 0.435 and 0.720. Finally, the relationship between independent and dependent variables is very strong, where r equals 0.812.

Table (4.13): Relationship between Independent and Dependent Variables

No.		1	2	3	4	5	6	7	8	9	10	11	12
1	Procurement and Sourcing												
2	Demand-Planning	.620**											
3	Operation and Production	.607**	.520**										
4	In-bound and Out-bound logistics	.618**	.612**	.619**									
5	Warehousing and Inventory	.569**	.624**	.622**	.660**								
6	Supply Chain Control Tower	.810**	.830**	.797**	.850**	.848**							
7	Cost	.634**	.559**	.601**	.650**	.562**	.723**						
8	Quality	.555**	.628**	.499**	.694**	.691**	.747**	.608**					
9	Responsiveness	.493**	.603**	.626**	.593**	.556**	.693**	.599**	.557**				
10	Reliability	.662**	.592**	.655**	.653**	.621**	.763**	.721**	.613**	.720**			
11	Innovation	.336**	.342**	.327**	.397**	.217*	.390**	.442**	.481**	.471**	.435**		
12	Competitive Advantages	.655**	.670**	.661**	.735**	.647**	.813**	.819**	.812**	.824**	.851**	.727**	

****. Correlation is significant at the 0.01 level (2-tailed).*. Correlation is significant at the 0.05 level (2-tailed).**

4.3 Hypothesis Testing:

After confirming validity, reliability and the correlation between independent and dependent variables, the following tests should be carried out to ensure the validity of regression analysis. (Sekaran, 2003):

Normality: Figure (4.1) shows that the shape follows the normal distribution, in such case the model does not violate this assumption.

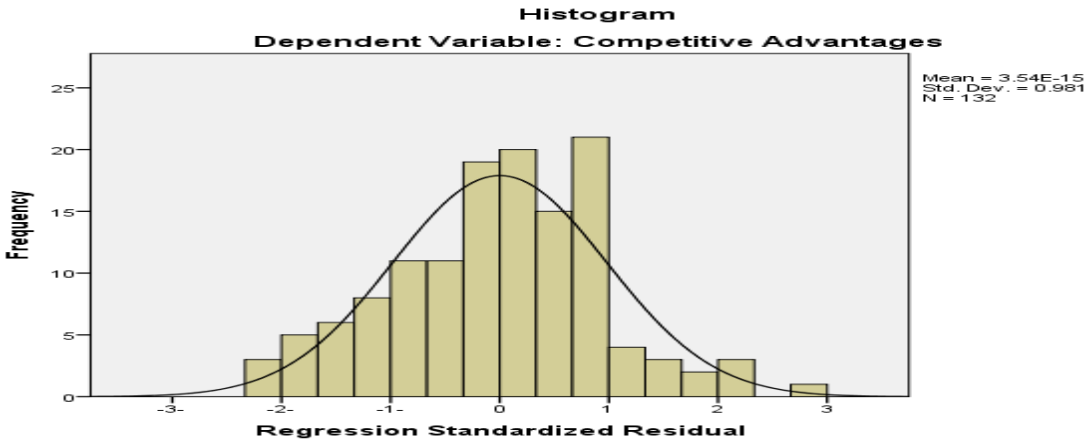


Figure (4.1): Normality Test

Linearity test: figure (4.2) shows that there is a linear relationship between independent and dependent variables. In such case, the model does not violate this assumption.

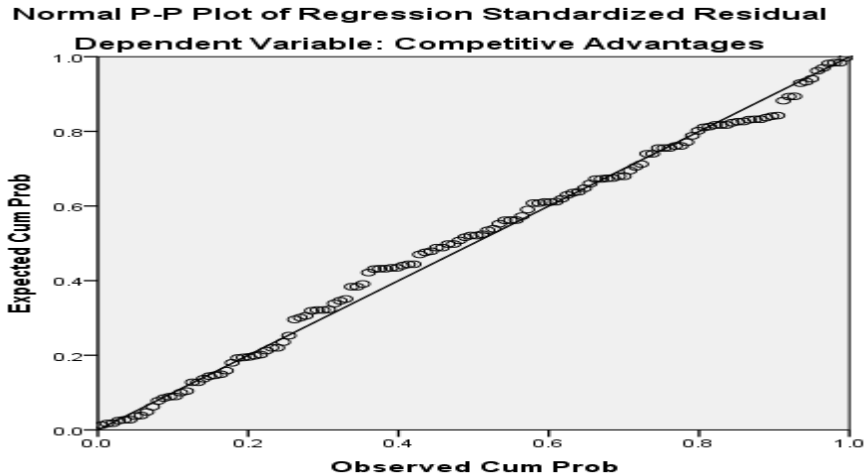


Figure (4.2): Linearity Test

Equal variance (homoscedasticity): figure (4.3) shows that the errors are scattered around the mean, therefore there is no relation between errors and predicted values, in such case the model does not violate this assumption.

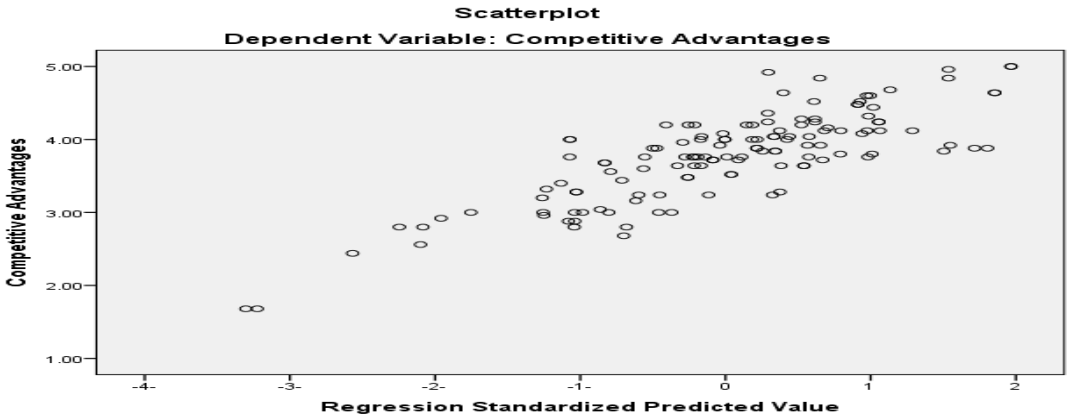


Figure (4.3): Linearity Test

Multi-Collinearity: the VIF (Variance Inflation Factor) value is less than 10, and tolerance is more than 10%, in such case the Collinearity model does not violate this assumption.

Table (4.14): Durbin-Watson value and Variance Inflation Factor

Sub-Variables	Collinearity Statistics	
	Tolerance	VIF
Procurement and Sourcing	0.473	2.112
Demand Planning	0.484	2.066
Operations	0.489	2.045
In-bound and Out-bound logistics	0.432	2.316
Warehousing and Inventory	0.440	2.274

Main Hypothesis:

H_{01}: Supply Chain Control Tower sub-variables (Procurement and Sourcing, Demand Planning, Operations, In-bound and Out-bound logistics and Warehousing and Inventory) do not affect Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.15) shows that when regressing the five sub-variables of Supply Chain Control Tower against the total of Competitive Advantages, the model shows that Supply Chain Control Tower can explain 67.3% of the variation of Competitive Advantages, where (R^2=0.673, F=51.828, Sig.=0.000). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that Supply Chain Control Tower sub-variables (Procurement and Sourcing, Demand Planning, Operations, In-

bound and Out-bound logistics and Warehousing and Inventory) impact Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.15): Multiple Regressions of Supply Chain Control Tower Sub-variables on Competitive Advantages.

Model	r	R^2	Adjusted R^2	F	Sig.
1	0.820[a]	0.673	0.660	51.828	0.000[b]

a. Predictors: (Constant), Warehousing and Inventory, Procurement and Sourcing, Operations, Demand Planning, In-bound and Out-bound logistics, b. Dependent Variable: Competitive Advantages

Based on the components of Supply Chain Control Tower, table (4.16) shows the impact of each sub-variable on Competitive Advantages, where four of them impacted Competitive Advantages, the highest impact was for In-bound and Out-bound logistics with 33.0% of the total impact, and followed by Demand Planning with an impact of 22.3% on Competitive Advantages, then Operations rated 20.3%, and finally Procurement and Sourcing rated 14.2%. While, the Warehousing and Inventory do not significantly affect Competitive Advantages.

Table (4.16): Multiple Regressions of Supply Chain Control Tower sub-variables on Competitive Advantages (ANOVA).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.380	0.236		1.675	0.096
	Procurement and Sourcing	0.152	0.079	0.142	1.980	0.049
	Demand Planning	0.175	0.058	0.223	3.040	0.003
	Operations	0.199	0.072	0.203	2.728	0.006
	In-bound and Out-bound logistics	0.279	0.066	0.330	4.280	0.000
	Warehousing and Inventory	0.070	0.065	0.083	1.054	0.283

a. Dependent Variable: Competitive Advantages, T-tabulated=1.960

H_{02}: Supply Chain Control Tower elements do not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.17) shows that when regressing Supply Chain Control Tower against the Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation), the model shows that Supply Chain Control Tower can explain 75.1% of the variation of Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation), where (R^2=0.751, F=76.045, Sig.=0.000). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that the Supply Chain Control Tower impact on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.17): Multiple Regressions of Supply Chain Control Tower on Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation).

Model	r	R^2	Adjusted R^2	F	Sig.
1	0.867[a]	0.751	0.741	76.045	0.000[b]

a. Predictors: (Constant), Cost, Quality, Responsiveness, Reliability and Innovation, b. Dependent Variable: Supply Chain Control Tower

Based on the components of Competitive Advantages, table (4.18) shows the impact of Supply Chain Control Tower on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) Jordanian Pharmaceutical Manufacturing Industry, where four of them impacted Supply Chain Control Tower, the highest impact was for Quality with 39.1% of the total impact, and Reliability with an impact of 26.5% on Competitive Advantages, followed by Cost rated 21.7%, and finally Responsiveness rated 20.5%. While, the Innovation does not significantly affect Supply Chain Control Tower.

Table (4.18): Multiple Regressions of Supply Chain Control Tower on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) (ANOVA).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.874	0.163		5.363	0.000
	Cost	0.186	0.058	0.217	3.227	0.002
	Quality	0.276	0.043	0.391	6.391	0.000
	Responsiveness	0.156	0.051	0.205	3.061	0.003
	Reliability	0.213	0.062	0.265	3.435	0.001
	Innovation	-0.067	0.034	-0.103	-1.939	0.055

a. Dependent Variable: Supply Chain Control Tower, T-tabulated=1.960

$H_{02.1}$: Procurement and Sourcing does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.19) shows that when regressing Procurement and Sourcing against the Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation), the model shows that Procurement and Sourcing can explain 51.1% of the variation of Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation), where (R^2=0.510, F=76.045, Sig.=0.000). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that the Procurement and Sourcing impact on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.19): Multiple Regressions of Procurement and Sourcing on Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation).

Model	r	R^2	Adjusted R^2	F	Sig.
1	0.714[a]	0.510	0.490	76.045	0.000[b]

a. Predictors: (Constant), Cost, Quality, Responsiveness, Reliability and Innovation, b. Dependent Variable: Procurement and Sourcing

Table (4.20): Multiple Regressions of Procurement and Sourcing on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) (ANOVA).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.326	0.231		5.745	0.000
	Cost	0.246	0.082	0.284	3.011	0.003
	Quality	0.133	0.061	0.186	2.169	0.032
	Responsiveness	-0.034	0.072	-0.044	-0.469	0.640
	Reliability	0.314	0.088	0.385	3.564	0.001
	Innovation	-0.015	0.049	-0.023	-0.305	0.761

a. Dependent Variable: Procurement and Sourcing, T-tabulated=1.960

Table (4.20) shows the impact of Procurement and Sourcing on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) Jordanian Pharmaceutical Manufacturing Industry, where three

of them impacted Procurement and Sourcing, the highest impact was for Reliability with 38.5% of the total impact, and Cost rated 28.4% and Quality rated 18.6%. While, the Responsiveness and Innovation do not significantly affect Procurement and Sourcing.

$H_{02.2}$: Demand Planning does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.21) shows that when regressing Demand Planning against the Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation), the model shows that Demand Planning can explain 50.7% of the variation of Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation), where (R^2=0.712, F=75.960, Sig.=0.000). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that the Demand Planning impact on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.21): Multiple Regressions of Demand Planning on Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation).

Model	r	R^2	Adjusted R^2	F	Sig.
1	0.712[a]	0.507	0.488	25.960	0.000[b]

a. Predictors: (Constant), Cost, Quality, Responsiveness, Reliability and Innovation, b. Dependent Variable: Demand Planning

Table (4.22) shows the impact of Demand Planning on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) Jordanian Pharmaceutical Manufacturing Industry, where two of them were impacted Demand Planning, the highest impact was on Quality with 36.5% of the total impact, and Responsiveness rated 28.2%. While, Cost, Reliability and Innovation do not significantly affect Demand Planning

Table (4.22): Multiple Regressions of Demand Planning on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) (ANOVA).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.248	0.314		0.790	0.431
	Cost	0.144	0.111	0.123	1.298	0.197
	Quality	0.353	0.083	0.365	4.241	0.000
	Responsiveness	0.293	0.098	0.282	2.991	0.003
	Reliability	0.116	0.120	0.105	0.970	0.334
	Innovation	-0.057	0.066	-0.065	-0.868	0.387

a. Dependent Variable: Demand Planning, T-tabulated=1.960

$H_{02.3}$: Operations does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.23) shows that when regressing Operations against the Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation), the model shows that Operations can explain 50.1% of the variation of Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation), where (R^2=0.501, F=25.262, Sig.=0.000). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that the Operations impact on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.23): Multiple Regressions of Operations on Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation).

Model	r	R^2	Adjusted R^2	F	Sig.
1	0.708[a]	0.501	0.481	25.262	0.000[b]

a. Predictors: (Constant), Cost, Quality, Responsiveness, Reliability and Innovation, b. Dependent Variable: Operations

Table (4.24) shows the impact of Operations on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) Jordanian Pharmaceutical Manufacturing Industry, where two of them were impacted Operations, the highest impact was on Responsiveness with 29.3% of the total impact, then Reliability rated 28.5%, followed by Cost rated 18.9%. While, Quality and Innovation do not significantly affect Operations.

Table (4.24): Multiple Regressions of Operations on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) (ANOVA).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.472	0.253		5.821	0.000
	Cost	0.178	0.090	0.189	1.984	0.049
	Quality	0.057	0.067	0.074	0.853	0.395
	Responsiveness	0.244	0.079	0.293	3.084	0.003
	Reliability	0.252	0.096	0.285	2.611	0.010
	Innovation	-0.037	0.053	-0.052	-0.687	0.493

a. Dependent Variable: Operations, T-tabulated=1.960

$H_{02.4}$: In-bound and Out-bound logistic does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.25) shows that when regressing In-bound and Out-bound logistic against the Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation), the model shows that In-bound and Out-bound logistic can explain 59.7% of the variation of Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation), where (R^2=0.597, F=37.291, Sig.=0.000). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that the In-bound and Out-bound logistic impact on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.25): Multiple Regressions of In-bound and Out-bound logistic on Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation).

Model	r	R^2	Adjusted R^2	F	Sig.
1	0.772[a]	0.597	0.581	37.291	0.000[b]

a. Predictors: (Constant), Cost, Quality, Responsiveness, Reliability and Innovation, b. Dependent Variable: In-bound and Out-bound logistic

Table (4.26) shows the impact of In-bound and Out-bound logistic on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) Jordanian Pharmaceutical Manufacturing Industry, where two of them were impacted In-bound and Out-bound logistic, the highest impact

was on Quality with 40.0% of the total impact, and Cost rated 22.3%. While, Responsiveness, Reliability and Innovation do not significantly affect In-bound and Out-bound logistic.

Table (4.26): Multiple Regressions of In-bound and Out-bound logistic on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) (ANOVA).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.381	0.263		1.447	0.150
	Cost	0.244	0.093	0.223	2.612	0.010
	Quality	0.359	0.070	0.400	5.138	0.000
	Responsiveness	0.131	0.082	0.136	1.590	0.114
	Reliability	0.164	0.100	0.160	1.632	0.105
	Innovation	-0.021	0.056	-0.025	-0.374	0.709

a. Dependent Variable: In-bound and Out-bound logistic, T-tabulated=1.960

$H_{02.5}$: Warehousing and Inventory does not affect Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.27) shows that when regressing Warehousing and Inventory against the Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation), the model shows that Warehousing and Inventory can explain 75.1% of the variation of Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation), where (R^2=0.591, F=36.477, Sig.=0.000). Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted, which states that the Warehousing and Inventory impact on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) of Jordanian Pharmaceutical Manufacturing Industry, at $\alpha \leq 0.05$.

Table (4.27): Multiple Regressions of Warehousing and Inventory on Competitive Advantages dimensions (Cost, Quality, Responsiveness, Reliability and Innovation).

Model	r	R^2	Adjusted R^2	F	Sig.
1	0.769[a]	0.591	0.575	36.477	0.000[b]

a. Predictors: (Constant), Cost, Quality, Responsiveness, Reliability and Innovation, b. Dependent Variable: Warehousing and Inventory

Table (4.28) shows the impact of Warehousing and Inventory on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) Jordanian Pharmaceutical Manufacturing Industry, where two of them were impacted Warehousing and Inventory, the highest impact was on Quality with 53.2% of the total impact, and Reliability rated 22.4%. While, Cost, Responsiveness and Innovation do not significantly affect Procurement and Sourcing.

Table (4.28): Multiple Regressions of Warehousing and Inventory on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) (ANOVA).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.992	0.266		3.733	0.000
	Cost	0.093	0.094	0.085	0.986	0.326
	Quality	0.478	0.070	0.532	6.782	0.000
	Responsiveness	0.161	0.083	0.166	1.936	0.055
	Reliability	0.230	0.101	0.224	2.266	0.025
	Innovation	-0.206	0.056	-0.251	-3.684	0.000

a. Dependent Variable: Warehousing and Inventory, T-tabulated=1.960

In summary, the result of multiple regressions analysis shows that the Supply Chain Control Tower sub-variables together affect the Competitive Advantages, where (R^2=0.673, F=51.828, Sig.=0.000). Moreover, only four sub-variables of Supply Chain Control Tower affect Competitive Advantages. In-bound and Out-bound logistics has highest impact rated 33.0%, then Demand Planning rated 22.3%, followed by Operations rated 20.3%, and finally Procurement and Sourcing rated 14.2%. While, the Warehousing and Inventory does not significantly affect Competitive Advantages. It seems respondents believe that the warehouse and inventory function do not significantly affect Competitive Advantages dimensions.

Chapter Five: Results' Discussion, Conclusion and Recommendations

5.1 Results' Discussion:

The results of this study reveals the high implementation of Supply Chain Control Tower sub-variables in Jordanian Pharmaceutical Manufacturing Industry. The Operations have the highest implementation rate among the sub-variables, then Warehousing and Inventory, after that Procurement and Sourcing, followed by In-bound and Out-bound logistics, except Demand Planning which has a medium implementation rate. The medium rate for implementing Demand Planning resulted from pharmaceuticals organizations which not using techniques for sensing/forecasting the market indicators in order to be translated for long-term demand and strategies, beside the weak relationship with partners. Second, the findings show that the high implementation of Competitive Advantages dimensions, as a pharmaceutical industry no wonder the quality is the highest implemented dimension, followed by cost, then reliability, after that responsiveness, but innovation has a medium implementation level, moreover, it has the lowest implementation level among the Supply Chain Control Tower sub-variables and Competitive Advantages dimensions. The medium implementation rate for innovation due to the lack of participation of employees in creativity programs, the absent of conducting a continuous training for innovation topics, not contributing employee's complaints/Employees ideas within improvements processes, the lack for adoption new technologies.

Table (5.1) summarizes the impact matrix among the Supply Chain Control Tower sub-variables on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) via ANOVA analysis, the results as follow:

Table (5.1): Summary of Multiple Regressions of Supply Chain Control Tower sub-variables on Competitive Advantages (Cost, Quality, Responsiveness, Reliability and Innovation) (ANOVA)

	Competitive Advantages	Cost	Quality	Responsiveness	Reliability	Innovation
Supply Chain Control Tower	+	+	+	+	+	
Procurement and Sourcing	+	+	+		+	
Demand Planning	+		+	+		
Operations	+	+		+	+	
In-bound and Out-bound logistics	+	+	+			
Warehousing and Inventory			+		+	

+: Significant Impact

1. The significant impact of the total Supply Chain Control Tower on the total Competitive Advantages, which supported by previous studies Trzuskawska-Grzesińska (2017) and Palandeng, et. al. (2018).

2. The significant impact of Supply Chain Control Tower sub-variables for most of Competitive Advantages dimensions except Innovation, which resulted by the medium implementation rate for innovation.

3. The significant impact of Supply Chain Control Tower sub-variables on the total Competitive Advantages except Warehousing and Inventory (although it has a high implementation rate), which resulted by the lack of implementation of inventory management system and Just In Time principles JIT.

4. Procurement and Sourcing has a significant impact on Cost, Quality and Reliability, which supported by previous study (Jie, et. al., 2013). The outcomes are complying with functional duties of Procurement and Sourcing for having the economic cost with a reliable supplier.

5. Demand Planning has a significant impact on Responsiveness and Quality, which supported by previous studies (Stadtler, 2005; Brusset, 2016). The outcomes are complying with functional duties of Demand

Planning for having the required techniques for sensing/forecasting markets to adequate responsiveness with right quality of goods.

6. Operations has a significant impact on Quality and Cost, which supported by previous study (Agus, 2011). The outcomes are complying with functional duties of Operations to have the right quality of goods beside maintaining the economic cost for operation processes via continuous improvements projects.

7. In-bound and Out-bound logistics has a significant impact on Quality and Cost, which supported by previous studies (Parast & Spillan, 2013; Scheer, 1994; Thatte, et. al., 2013). The outcomes are complying with functional duties of In-bound and Out-bound logistics to maintain the quality of goods beside securing the economic cost of logistics.

5.2 Conclusion:

This study is dedicated to answer the study main question: Do Supply Chain Control Tower sub-variables (Procurement and Sourcing, Demand Planning, Operations, In-bound and Out-bound logistics and Warehousing and Inventory) impact Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry? Data collated via questionnaire, which tested for its validity and reliability. Then correlation and multiple regressions used to test the hypothesis.

The results of this study show the high implementation of Supply Chain Control Tower sub-variables in Jordanian Pharmaceutical Manufacturing Industry. The Operations have rated highest implementation, followed by Warehousing and Inventory, then Procurement and Sourcing, then In-bound and Out-bound logistics, Demand Planning, respectively. Moreover, the findings show that high implementation of Competitive Advantages dimensions, where quality rated highest implementation, followed by cost, then reliability, responsiveness, and innovation, respectively.

Finally, results indicate that there is a significant impact of the total Supply Chain Control Tower on total Competitive Advantages of Jordanian Pharmaceuticals Manufacturing industries. Moreover, In-bound and Out-bound logistics has rated the highest impact on Competitive Advantages, then Demand Planning, followed by Operations, and finally, Procurement and Sourcing. While, Warehousing and Inventory does not show a significant impact on total Competitive Advantages.

5.3 Recommendations:

5.3.1 Recommendations for Jordanian Pharmaceutical Manufacturing Industries.

- The study recommends that Jordanian Pharmaceuticals Manufacturing organizations have to integrate the control tower tool for supply chain management within their strategic plans and practices.

- The study recommends that Jordanian Pharmaceuticals Manufacturing organizations to implement Supply Chain Control Tower components together because they affect each other.

- The study recommends that Jordanian Pharmaceuticals Manufacturing organizations should have methods, tools and KPIs to check supply chain development through evaluating, benchmarking and comparing its components with other organizations within pharmaceutical industry.

- This study recommends that Jordanian Pharmaceuticals Manufacturing organizations establishing a separate office that control audit the supply chain management continuously.

- This study recommends that Jordanian Pharmaceuticals Manufacturing organizations have to focus more on implementing long-term contracts and E-Procurement for Procurement and Sourcing, as well as, shares demand forecasting with partners to develop long-term demand plan.

- This study recommends that Jordanian pharmaceuticals manufacturing organizations have focus more on implementing and encouraging creativity thorough employees' continuous training, involving (participation), and empowering. Supported by reliable incentive system.

- This study recommends that Jordanian pharmaceuticals manufacturing organizations have to reevaluate the Warehousing and Inventory and its impact on their Competitive Advantages.

5.3.2 Recommendations for Academics and Future Research:

- Since this study is carried out on managers who are working at Jordanian Pharmaceutical Manufacturing Industry, the study recommends including other level of employees.

- This study is carried out on Jordanian Pharmaceutical Manufacturing Industry located in Jordan. To be able to generalize the current study results, it is recommended to conduct such study on same industry in other countries, especially, Arab Countries because they have similar social and cultural lifestyle.

- This study is carried out on one industry pharmaceutical industry; therefore, it is advised to apply same variables on other manufacturing industries.

- This study carried out within limited period; therefore, it is advised to repeat this study after a suitable time to check industry development.

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

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Appendices:

Appendix (1): Panel of Referees Committee:

No.	Name	Qualification	Organization
1	Prof. Mohammad Khair Abu Zeid	Professor of Management	Al-Balqa'a University
2	Prof. Ahmed Ali Saleh	Professor of Management	Middle East University
4	Prof. Heba Nasereddin	Prof.	Middle East University
5	Dr. Abdelraheem Qadoumi	Associate Prof.	Middle East University
6	Dr. Amjad Etwaiqat.	Associate Prof.	Middle East University
7	Dr. Sameer Al-Jabali	Associate Prof.	Middle East University
8	Dr. Abdullah Abdullah	Associate Prof.	German Jordanian University
9	Mohammad Alramahi	Manager	Tabuk pharmaceuticals company
10	Deima Aljundi	Manager	Tabuk pharmaceuticals company
11	Yazan Al-Tamimi	Director	Tabuk pharmaceuticals company
12	Rasha Ma`aya	Manager	Tabuk pharmaceuticals company

Appendix (2): Letter and Questionnaire of Respondents:

Dear Mr./Dr……..

May I request you to answer the below questionnaire, which related to master thesis titled:

"**The Impact of Supply Chain Control Tower on Competitive Advantages of Jordanian Pharmaceutical Manufacturing Industry"**.

This questionnaire includes 60 paragraphs, which may take only 15 minutes to answer all related questions. Please, rate your actual perception related to actual implementation of each question. The responses will treated as confidential data, and will be used only for academic purposes. Therefore, the collected data will not be exposed to anybody.

Finally, I would like to thank you for your participation and support. If do you have any question or comment, please call me (0797261336).

Thank you for your contribution and support.

Prepared by: Shareif Ahmad Al-Atrash

Supervised by: Dr. Abdel-Aziz Ahmad Sharabati

Part one: Demographic information

Company (optional):

Gender: □Male □Female

Age (years): □Less than 30 □ Bet. 30-39 □Bet. 40-50 □Above 50

Experience (years): □Less 10 □Bet.10-20 □Bet.21-30 □More than 30

Education: □Diploma □ Bachelor □Mater □Ph.D.

Position: □ Officer □ Supervisor □Manager □Director □V. P □G.M

Division: □Operations & Quality □Supply Chain □Sales & Marketing □ Finance

Part two: The following 60 questions tests the perception of Jordanian Manufacturing Companies employees about the implementation of Supply Chain and Competitive Advantages. Please, rate each question according to actual implementation and not based on your belief, as follows: 1 = Never Implemented, 2 = Slightly Implemented, 3 = Sometimes, 4 = Almost Implemented, 5 = Frequently Implemented.

No.	Item	Never Implemented	Slightly Implemented	Sometimes	Almost Implemented	Frequently Implemented
	Supply Chain Control Tower					
	Procurement and Sourcing					
1.	The company develops standard criteria for supplier selection.	1	2	3	4	5
2.	The company standardizes the requisitions procedure.	1	2	3	4	5
3.	The company updates approved venders list including alternative.	1	2	3	4	5
4.	The company negotiates payment terms.	1	2	3	4	5
5.	The company signs long-term contracts with suppliers.	1	2	3	4	5
6.	The company evaluates suppliers' performance regularly.	1	2	3	4	5
7.	The company uses E-procurement with all suppliers.	1	2	3	4	5
	Demand Planning					
8.	The company examines market indicators related to demand.	1	2	3	4	5
9.	The company uses different technique for demand forecasting.	1	2	3	4	5
10.	The company develops long-term demand plan.	1	2	3	4	5
11.	The company uses demand forecast for materials requisition.	1	2	3	4	5
12.	The company synergizes demand with operation processes.	1	2	3	4	5
13.	The company integrates orders within Demand Planning.	1	2	3	4	5
14.	The company shares demand forecast with partners.	1	2	3	4	5
	Operations					
15.	The company designs smooth manufacturing processes.	1	2	3	4	5
16.	The company produces products according to specifications.	1	2	3	4	5
17.	The company commits to continues process improvement.	1	2	3	4	5

18.	The company maximizes production lines capacities.	1	2	3	4	5
19.	The company schedules production according demand priorities.	1	2	3	4	5
20.	The company controls production activities through ERP system.	1	2	3	4	5
21.	The company implements preventive maintenance.	1	2	3	4	5
	In-bound and Out-bound logistics					
22.	The company designs efficient distribution network.	1	2	3	4	5
23.	The company selects the efficient shipping route.	1	2	3	4	5
24.	The company uses alliances for its logistics activity.	1	2	3	4	5
25.	The company schedules shipments with partners.	1	2	3	4	5
26.	The company considers risks during shipping carrier selection.	1	2	3	4	5
27.	The company standardizes procedures during transportation.	1	2	3	4	5
28.	The company monitors environmental conditions for shipments.	1	2	3	4	5
	Warehousing and Inventory					
29.	The company considers an efficient warehouses location.	1	2	3	4	5
30.	The company designs warehouses according to usage rate.	1	2	3	4	5
31.	The company stores materials based on usage rate	1	2	3	4	5
32.	The company tracks stock activities through ERP system.	1	2	3	4	5
33.	The company monitors materials storage conditions.	1	2	3	4	5
34.	The company uses security systems in warehouse facilities.	1	2	3	4	5
35.	The company uses well-trained manpower in warehouses.	1	2	3	4	5
	Competitive Advantages					
	Cost					
36.	The company maximizes production output.	1	2	3	4	5
37.	The company aggregates production in campaigns.	1	2	3	4	5
38.	The company uses wages labor when needed.	1	2	3	4	5
39.	The company reduces production waste, as much as possible.	1	2	3	4	5
40.	The company receives material within suitable time in suitable place.	1	2	3	4	5
	Quality					
41.	The company implements GMP guidelines strictly.	1	2	3	4	5
42.	The company implements in depth Product Quality Review (PQR) system.	1	2	3	4	5
43.	The company uses quality control charts for trend identification.	1	2	3	4	5
44.	The company adapts common quality specification with partners.	1	2	3	4	5
45.	The company conducts quality-training programs continuously.	1	2	3	4	5
	Responsiveness					
46.	The company uses logistics carriers to minimize shipping time.	1	2	3	4	5
47.	The company shortens the materials handling time in their warehouses.	1	2	3	4	5
48.	The company shortens manufacturing cycle time.	1	2	3	4	5
49.	The company responds to markets changes as fast as possible.	1	2	3	4	5
50.	The company delivers customer orders on time.	1	2	3	4	5
	Reliability					
51.	The company coordinates delivery changes with its customers.	1	2	3	4	5
52.	The company depends on logistics to respond to sudden orders.	1	2	3	4	5
53.	The company develops flexible processes to fulfil sudden orders.	1	2	3	4	5
54.	The company develops plan production according to forecasting.	1	2	3	4	5
55.	The company adapts its processes according to required product varieties.	1	2	3	4	5

	Innovation					
56.	The company encourages creativity thorough employees' participation.	1	2	3	4	5
57.	The company implements incentive system to reward valuable ideas.	1	2	3	4	5
58.	The company uses customers' complaints to improve its activities.	1	2	3	4	5
59.	The company conducts innovation training continuously.	1	2	3	4	5
60.	The company adopts new technologies within its processes.	1	2	3	4	5

Appendix (3): Letter and Questionnaire of Respondents (Arabic version):

جـــامـعـــة الـــشـرق الأوسـط
MIDDLE EAST UNIVERSITY
Amman - Jordan

حضرة الدكتور.....المحترم

أرجوا من حضرتكم التكرم بالإجابة على الاستبيان المرفق حول رسالة ماجستير بعنوان:

"أثر برج مراقبة سلسلة التوريد على الميزات التنافسية لصناعة الأدوية الأردنية"

يتضمن هذا الاستبيان 60 فقرة، قد يستغرق الإجابة عنه 15 دقيقة فقط. نرجو من حضرتكم التكرم بالإجابة حول التطبيق الفعلي على جميع الأسئلة. ونعدك بأنه سيتم التعامل مع الإجابات بشكل سري، وسوف تستخدم لأغراض البحث العلمي فقط. ولن يسمح لأحدبالاطلاع عليها.

وأخيرا، أود أن أشكركم على مشاركتكم ودعمكم، وإذا كان لديكم أي سؤال أو تعليق، يرجى الاتصال على الرقم (0797261336).

أكرر جزيل شكري لكم لمساهمتكم ودعمكم لإنجاح هذه الدراسة

اعداد الباحث: شريف احمد الاطرش

اشراف الدكتور: عبد العزيز احمد الشرساتي

الجزء الاول: المعلومات الديموغرافية:

اسم الشركة (اختياري):

الجنس: □ ذكر □ انثى

العمر: □ اقل من 30 □ 30-39 □ 40 – 50 □ أكبر من 50

الدرجة العلمية: □ سلوم □سكالوريوس □ماجستير □ دكتوراه

الوظيفة: □ ضلط □ مشرف □ مدير □مدير اعلى □ مدير عام □ نائب الرئيس

الدائرة: □ الانتاج والجودة □ سلسله التوريد □مبيعات وتسويق □ المالية

الجزء الثاني: الأسئلة 60 التالية تختبر تصورات موظفي شركات التصنيع الأردنيين حول تنفيذ سلسلة التوريد والميزات التنافسية. من فضلك، قم بتقييم كل سؤال وفقًا للتنفيذ الفعلي وليس استنادًا إلى اعتقادك، كما يلي: 1 = لم تنفذ مطلقًا، 2 = نفذت قليلًا، 3 = احيانا، 4 = نفذت تقريبًا، 5 = نفذت بشكل متكرر.

الرقم .	العنصر	لم تنفذ مطلقًا	نفذت قليلًا	احيانا	نفذت تقريبًا	نفذت بشكل متكرر
	برج مراقبة سلسلة التوريد					
	المشتريات والمصادر					
1.	تضع الشركة معايير قياسية لاختيار الموردين.	1	2	3	4	5
2.	تقوم الشركة بتوحيد إجراءات طلب الشراء.	1	2	3	4	5
3.	تقوم الشركة بتحديث قائمة الموردين المعتمدين متضمنا البدائل.	1	2	3	4	5
4.	الشركة تفاوض شروط الدفع.	1	2	3	4	5
5.	تقوم الشركة بتوقيع عقود طويلة الأجل مع الموردين.	1	2	3	4	5
6.	تقوم الشركة بتقييم أداء الموردين بشكل منتظم.	1	2	3	4	5
7.	تستخدم الشركة المشتريات الإلكترونية مع جميع الموردين.	1	2	3	4	5
	تخطيط الطلب					
8.	تقوم الشركة بفحص مؤشرات السوق المتعلقة بالطلب.	1	2	3	4	5
9.	تستخدم الشركة تقنيات مختلفة للتنبؤ بالطلب.	1	2	3	4	5
10.	تقوم الشركة بتطوير خطة طويلة الأجل للطلب.	1	2	3	4	5
11.	تستغل الشركة مخرجات تنبؤ الطلب لشراء المواد.	1	2	3	4	5
12.	توائم الشركة مؤشرات الطلب مع عمليات الإنتاجية.	1	2	3	4	5
13.	تقوم الشركة بدمج الطلبيات ضمن خطط الطلب.	1	2	3	4	5
14.	الشركة حصة توقعات الطلب مع الشركاء.	1	2	3	4	5
	العمليات					
15.	تصمم الشركة عمليات التصنيع سلسة.	1	2	3	4	5
16.	تنتج الشركة منتجات وفقا للمواصفات.	1	2	3	4	5
17.	تلتزم الشركة بتطبيق عملية التحسين المستمر.	1	2	3	4	5
18.	تعظم الشركة من قدرات خطوط الإنتاج.	1	2	3	4	5
19.	تقوم الشركة بجدولة الإنتاج وفقًا لأولويات الطلب.	1	2	3	4	5
20.	تتحكم الشركة في أنشطة الإنتاج من خلال نظام ERP.	1	2	3	4	5
21.	تقوم الشركة بالصيانة الوقائية.	1	2	3	4	5
	اللوجستيات الداخلية والخارجية					
22.	تصمم الشركة شبكة توزيع فعالة.	1	2	3	4	5
23.	تختار الشركة طريق الشحن الفعال.	1	2	3	4	5
24.	تستخدم الشركة تحالفات لنشاطها اللوجستي.	1	2	3	4	5
25.	تقوم الشركة بجدولة الشحنات مع الشركاء.	1	2	3	4	5

26.	تعتبر الشركة المخاطر أثناء اختيار الناقل الشحن.	1	2	3	4	5
27.	تقوم الشركةبوضع معايير لإجراءات أثناء النقل.	1	2	3	4	5
28.	تقوم الشركةبمراقبة الظروف البيئية للشحنات.	1	2	3	4	5
	التخزين والمخزون					
29.	الشركة تختار موقع فعالة للمستودعات.	1	2	3	4	5
30.	تصمم الشركة المستودعات حسب معدل الاستخدام.	1	2	3	4	5
31.	تقوم الشركةبتخزين الموادبناء على معدل الاستخدام.	1	2	3	4	5
32.	تقوم الشركةبتتبع أنشطة المخزون من خلال نظام ERP.	1	2	3	4	5
33.	تراقب الشركة ظروف تخزين المواد.	1	2	3	4	5
34.	تستخدم الشركة أنظمة الأمان في مرافق المستودعات.	1	2	3	4	5
35.	تستخدم الشركة القوى العاملة المدربةبشكل جيد في المستودعات.	1	2	3	4	5
	الميزات التنافسية					
	التكلفة					
36.	الشركة تعظيم مخرجات الانتاج.	1	2	3	4	5
37.	تجمع الشركة الإنتاج في الحملات.	1	2	3	4	5
38.	تستخدم الشركة عمال المياومة عند الحاجة.	1	2	3	4	5
39.	تقلل الشركة من فواقد الإنتاج، قدر الإمكان.	1	2	3	4	5
40.	تستلم الشركة المواد خلال الوقت المناسب في المكان المناسب.	1	2	3	4	5
	الجودة					
41.	تنفذ الشركة إرشادات GMPبشكل صارم.	1	2	3	4	5
42.	تطبق الشركةبشكل معمق نظام مراجعة جودة المنتج (PQR).	1	2	3	4	5
43.	تستخدم الشركة الرسوم البيانية لتحديد التغيرات في الجودة.	1	2	3	4	5
44.	تتشارك الشركةبمواصفات الجودة مع الشركاء.	1	2	3	4	5
45.	تجري الشركةبرامج تدريب على الجودةباستمرار.	1	2	3	4	5
	الاستجابة					
46.	تستخدم الشركة شركات النقل اللوجستي لتقليل وقت الشحن.	1	2	3	4	5
47.	تقصر الشركة وقت تداول المواد في مستودعاتها.	1	2	3	4	5
48.	الشركة تقصير وقت التصنيع.	1	2	3	4	5
49.	تستجيب الشركة لتغيرات الأسواق في أسرع وقت ممكن.	1	2	3	4	5
50.	تقدم الشركة طلبات العملاء في الوقت المحدد.	1	2	3	4	5
	الاعتمادية					
51.	تقوم الشركةبتنسيق التغييرات في وقت التسليم مع عملائها.	1	2	3	4	5
52.	تعتمد الشركة على جدارة الخدمات اللوجستية لتلبية الطلبيات المفاجئة.	1	2	3	4	5
53.	تقوم الشركةبتطوير عمليات مرنة لتلبية الطلبات المفاجئة.	1	2	3	4	5
54.	تقوم الشركةبتطوير خطط الإنتاج وفقاسمؤشرات التنبؤ.	1	2	3	4	5
55.	تتكيف الشركة عملياتها وفقًا للتطور في الأصناف المطلوبة.	1	2	3	4	5
	الابتكار					
56.	تشجع الشركة الإبداع من خلال مشاركة الموظفين.	1	2	3	4	5
57.	تقوم الشركةبتطبيق نظام المكافأة الأفكار القيمة.	1	2	3	4	5
58.	تستخدم الشركة شكاوى العملاء لتحسين أنشطتها.	1	2	3	4	5
59.	تجري الشركة التدريب على الابتكارباستمرار.	1	2	3	4	5
60.	تعتمد الشركة تقنيات جديدة في عملياتها.	1	2	3	4	5