The Impact of Enterprise Resource Planning System, E-Business Technologies, and their Integration on Supply Chain Agility: Examining the Mediating Role of Inter and Intra-Organizational Collaboration at Hikma Pharmaceuticals Company

أثر نظم تخطيط موارد المنظمة وتكنولوجيا الأعمال الإلكترونية والتكامل بينهما على ذكاء سلسلة التوريد: اختبار الدور الوسيط للتعاون التنظيمي الداخلي والخارجي في شركة أدوية الحكمة.

Prepared by: Ala' Shawqi Hourani

Supervised by: Dr. Soud Al-Mahamid

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AUTHORIZATION

I, the undersigned Ala' Shawqi Hourani authorize Middle East University to provide copies of my thesis for all and any university libraries and/or institutions or related parties interested in scientific research upon their request.

Name: Ala' Shawqi Hourani

Signature: 

Date: 21/ 1/ 2015

DISCUSSION COMMITTEE DECISION

This dissertation was discussed under the title of:

The Impact of Enterprise Resource Planning System, E-Business Technologies, and their Integration on Supply Chain Agility: Examining the Mediating Role of Inter and Intra-Organizational Collaboration at Hikma Pharmaceuticals Company

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Discussion Committee	Title	University	Signature
Dr. Raed Salah Algharabat	External Examiner	The University of Jordan	
Dr. Mohammed Khair Abu Zaid	Internal Examiner	Middle East University	
Dr. Soud Al-Mahamid	Supervisor	Middle East University	

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DEDICATION

Words are short to express my deep sense of gratitude towards my whole family. I would extremely like to express my heart-felt gratitude to them for their unconditional love, concern, support, encouragement and inspiration.

I dedicate this work to my beloved Mother and Father.

To my sweet brothers and sisters.

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Abstract

This study aimed to understand the impact of enterprise resource planning system (ERP), e-business technologies, and the integration between them on internal and external organizational cooperation which in turns influence supply chain agility.

In order to achieve the study objectives a self- administered questionnaire was designed based on the extant literature. The questionnaire consists of 37 statements (anchored on Likert Five Point Scale). The population of this study consists of all ERP system users located at Top, Middle, and Lower level management at Hikma Pharmaceuticals company. The study targets ERP system users because it is believed that they have a good knowledge about how the company utilizes the system and how well the system integrated with e-business technologies in order to facilitate internal and external collaboration to achieve high level of supply chain agility. Out of 155 questionnaires were circulated to the research sample only 115 questionnaires were obtained, 10 questionnaires were excluded for missing data and inaccurate answers which left 105 questionnaires have valid data for further analysis.

To analyses the data that has been collected and test research hypotheses, a set of statistical techniques where used, such as (arithmetic mean, standard deviation, simple

regression, multiple regression, and path analysis). The study arrived to some significant results among them are: there is a statistical significant impact for integration between ERP system and E-business technologies on both inter and intra organizational collaboration; there is no statistically significant impact of ERP system utilization on intra-and inter organizational collaboration; there is a statistical significant impact for E-Business technologies on both intra and inter organizational collaboration.

The study recommends that companies in Jordan which utilize ERP system should devote more effort to encouraging employees to use e-business technologies channels to interact with their business counterparts if they intend to respond on time to any changes in business environment and satisfy their customers' needs. They also need to integrate tightly ERP system with e-business technologies in order to be able to respond to changes in business environment on real time and achieve supply chain agility.

Keywords: ERP system, E-business technologies, supply chain agility, inter organizational collaboration, inter organizational collaboration.

أثر نظم تخطيط موارد المنظمة وتكنولوجيا الأعمال الإلكترونية والتكامل بينهما على ذكاء سلسلة التوريد: اختبار الدور الوسيط للتعاون التنظيمي الداخلي والخارجي في شركة أدوية الحكمة

اعداد

الباحثة ألاء شوقي حوراني

اشراف

د. إسعود المحاميد

ملخص الدراسة

هدفت هذه الدراسة الي دراسة أثر التكامل بين نظم تخطيط موارد المنظمة وتكنولوجيا الأعمال الالكترونية واختبار الدور الوسيط للتعاون الداخلي والخارجي للمنظمة على ذكاء سلسلة التوريد في شركة أدوية الحكمة في الأردن. وتكون مجتمع الدراسة من جميع العاملين في شركة أدوية الحكمة ، أمّا عيّنة الدراسة فقد شملت المديرين ونوابهم ورؤساء الأقسام الذين يستخدمون نظم تخطيط موارد المنظمة، ولتحقيق أهداف الدراسة تم تم تصميم استبانة خاصة لجمع البيانات من عينة الدراسة بناءً على أحدث الدراسات التي أجريت في الموضوع إذ تكونت من 37 فقرة، تم توزيع 155 استبيان وتم اختيار 115 استبيان وكان من بينها 105 استبيان مناسب للتحليل الاحصائي. تم استخدام الأدوات و الأساليب الإحصائية مثل (المتوسط الحسابي، الإنحراف المعياري، الإنحدار البسيط، الإنحدار المتعدد، تحليل المسار) لتحليل البيانات واختبار فرضيات البحث. وتوصلت نتائج التحليل الإحصائي الى مجموعة من النتائج أهمها وجود أثر ذو دلالة إحصائية لتكامل نظام تخطيط موارد المنظمة مع تكنولوجيا الأعمال الإلكترونية على التعاون التنظيمي الداخلي والخارجي، بينما لا يوجد أثر ذو دلالة إحصائية لنظام تخطيط موارد المنظمة مع تكنولوجيا على التعاون التنظيمي الداخلي والخارجي، يوجد أثر ذو دلالة إحصائية لتكنولوجيا الأعمال الإلكترونية على التعاون التنظيمي الداخلي والخارجي.

وبناءً على النتائج التي تم التوصل إليها، تم صياغة مجموعة من التوصيات أهمها ضرورة تشجيع الموظفين على استخدام قنوات تكنولوجيا الأعمال الالكترونية للتعامل مع شركاء الأعمال لتحقيق الاستجابة الفورية لأي تغيرات في بيئة الأعمال و ضمان رضا الزبائن، وضرورة التكامل بين نظم تخطيط موارد المنظمة وتكنولوجيا الأعمال الإلكترونية لتحقيق الاستجابة في الوقت المناسب للتغيرات في بيئة الأعمال ولتحقيق ذكاء سلسلة التوريد.

الكلمات الدالة: نظم تخطيط موارد المنظمة، تكنولوجيا الأعمال الإلكترونية، ذكاء سلسلة التوريد، التعاون التنظيمي الداخلي و التعاون التنظيمي الخارجي.

Chapter One

1-1Introduction

Today's marketplace is characterized by uncertainty of business environment, harsh competition and high levels of turbulence. Organizations require agility in their supply chains to provide superior value as well as to enable the firm to respond rapidly to changes in marketplace. On the other hand, internal and external integration were found to be direct antecedents of a firm's supply chain agility (Braunscheidel & Suresh 2009). The core of this study is to examine the impact of ERP system, e-business technologies, and their integration on supply chain agility: mediating by inter and intra-organizational collaboration if any.

There is consensus between researcher like (Hsu & Chen 2004; Su & Yang 2010; Sukati et al., 2012; DeGroote et al., 2013 and Shahateet, 2014) that information sharing improves the decision-making of supply chain actors**.** As enterprise resource planning system (ERP) enables internal coordination by enhancing better information flow among the enterprise boundary which in turn enables firm to distribute and use information more effectively and encourage communications. ERP focus on intra organizational collaboration while e-business technologies make ERP more transparent and outward focusing on inter organizational collaboration by enhance working more closely with suppliers and partners and better satisfy needs and expectations of their customers**.** Integration between ERP system and e-business technologies provide internally and external integration to the companies which in turn enable the enterprise to sense and respond in a speedy manner to marketplace changes which create firm's supply chain agility**.**

1-2 Study Problem and Questions

Although ERP systems were introduced to fulfill some of the technological requirements across functional areas within a corporate boundary, companies are now in a need to build a bridge between companies and their business partners and to engage in business with customers, suppliers and business partners to extend the integrated functional focus beyond the company's boundaries to suppliers, customers, and other partners in the supply chain. On the other hand, e-business is focused on efficiency and effectiveness of external cross enterprise processes. It comprises the external part of the extended enterprise, while ERP comprises the internal portion. This research investigates the complementary effect of integrating ERP system and e-business technologies, and the impact of such integration on the agility of the supply chain. The main purpose is to find out the effect of organizational practices in terms of internal firm integration, integration with suppliers and integration with customers on supply chain agility at Hikma Pharmaceuticals Company. We propose and test a model of the relationship between ERP system, e-business technologies, and their integration mediated by inter and intra organizational collaboration and their affect on supply chain agility using empirical data to investigate their effects in the Jordanian market.

Based on the above argument the research questions can be formulated as follows:

1- What is the impact of ERP utilization on inter and intra organizational collaboration?

2- What is the impact of e-business technologies on inter and intra organizational collaboration?

3- What is the impact of ERP and e-business technologies integration on intra and inter organizational collaboration?

4- What is the impact of intra and inter- organizational collaboration on supply chain agility?

5- What type of role the intra and inter organizational collaboration can play in the impact of ERP system, e-business technologies, and their integration on supply chain agility?

1-3 Study Hypotheses

Based on the research questions, the following hypotheses set forth:

H01 There is no statistically significant impact of ERP system utilization on intra - organizational collaboration at $\alpha \leq 0.05$.

H02: There is no statistically significant impact of ERP system utilization on inter-organizational collaboration at $\alpha \leq 0.05$.

H03: There is no statistically significant impact of e-business technologies on inter-organizational collaboration at $\alpha \leq 0.05$.

H04: There is no statistically significant impact of e-business technologies on intra-organizational collaboration at $\alpha \leq 0.05$.

H05: There is no statistically significant impact of the integration between ERP system and E- Business Technologies on intra- organizational collaboration at $\alpha \leq 0.05$.

H06: There is no statistically significant impact of the integration between ERP system and E- Business Technologies on inter- organizational collaboration at $\alpha \leq 0.05$.

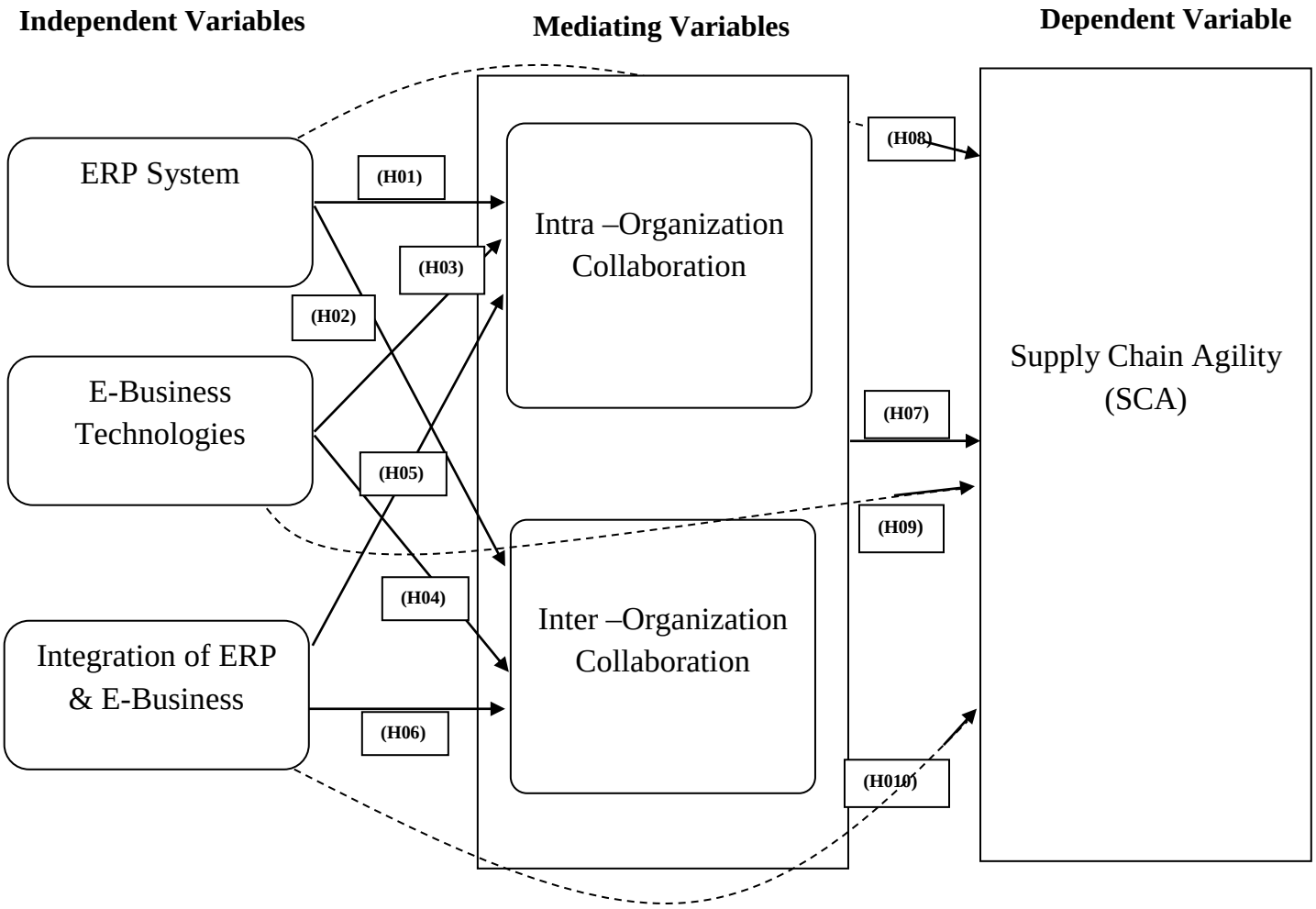
H07: There is no statistically significant impact of the organizational collaboration (intra and inter collaboration) on the supply chain agility at $\alpha \leq 0.05$.

H08: There is no statistically significant impact of the ERP system on the supply chain agility with the existence of the organizational collaboration (intra and inter collaboration) as a mediator at $\alpha \leq 0.05$.

H09: There is no statistically significant impact of the E Business Technologies on the supply chain agility with the existence the organizational collaboration (intra and inter collaboration) as a mediator at $\alpha \leq 0.05$.

H10: There is no statistically significant impact of the integration between ERP system and E Business Technologies on the supply chain agility with the existence of the organizational collaboration (intra and inter collaboration) as a mediator at $\alpha \leq 0.05$.

1-4 Study Model



The research model developed by the researcher and based on the following studies:
Independent Variables: based on Hsu, P. F. (2013); Mediating Variables based on Sanders, Nada R. (2007); Dependent Variable based on Gligor, et al. (2012) and Braunscheidel, et al. (2009),

1-5 Study objectives

This study achieved the following objectives:

1- Identifying the impact of ERP utilization on inter and intra organizational collaboration.

2- Determining the impact of e-business technologies on inter and intra organizational collaboration.

3- Understanding the impact of ERP system and e-business integration on intra and inter organizational collaboration.

4- Clarifying the impact of intra and inter- organizational collaboration on supply chain agility.

5- Understanding the role of the intra and inter organizational collaboration in the impact of ERP system, e-business technologies, and integration between ERP system and e-business technology on supply chain agility.

1-6 Study Significance:

The importance of this study is to highlight the impact of ERP system, e-business technology and their integration on supply chain agility: examining the mediating role of inter and intra-organizational collaboration at Hikma Pharmaceuticals company in general, and the following points in particular:

1- Lack of studies in Arab Libraries which addresses the role of integration between ERP system and e-business and its impact on supply chain agility mediating role of inter and intra-organizational collaboration. Although several studies analyze e-business technologies and ERP system as a whole, but as far as the researcher know there is lack

of the research that study the impact of their integration on the supply chain agility and examining the mediating role of intra- and inter-organizational collaboration.

2 - Emergence of organization supply chain agility as an important strategy in 21th century in facing unpredictable and unprecedented changes in the current business environment. Thus, it is important to understand how to achieve and enhance supply chain agility through this study.

3- The majority of previous studies about this subject are conducted in developed countries like: (Swafford et al., 2005; Sanders, 2007; Braunscheidel & Suresh 2009, Kisperska-Moron & Swierczek, 2009; Lu & Ramamurthy, 2011; Gligor and Holcomb 2012; DeGroote et al., 2013; Hsu, 2013; Qrunfleh & Tarafdar, 2014 and Lucia-Palacios, et al. 2014). Consequently, this does not necessarily reflect the experience of companies in one of the third world countries such as Jordan, for example, because of cultural, economic, social, political and religious dramatic differences.

1-7 Significant Features of the Study:

1. This study, to the best of the researcher knowledge, might be the first of its kind in terms of examining the impact of the Integration between ERP system and e-business technologies on the supply chain agility mediating role of inter and intra-organizational collaboration worldwide.

2. This study provides a direct relationship between the integration of ERP system and e-business technologies on the supply chain agility

3. According to the in-depth research, there wasn't any prior study examined the relationship between the current research variables together.

1-8 Study Terminologies

An Enterprise Resource Planning (ERP) System: is large commercial software packages that standardize business processes and integrate financial, human resources, sales and purchasing, manufacturing and finally inventory in one system to help information flow through a company easily, along with an easy access to archived data and the ability to back all the information throughout an organization into a single database delivering some degree of cross-functional integration among the enterprise (Wagner & Sweeney, 2010; Hsu, 2013; Ekman, et al., 2014 and Marciniak, et al., 2014).

E-Business Technologies: The internet-based technologies such as extranets, websites, and electronic data interchange (EDI) communication technologies that link the organization with its outside environment around the world; they facilitate utilizing intra and internet technologies to conduct business transactions, ensure smooth information flow between organization and its business partners and customers and they help complete transaction online such as online selling, online purchasing and online collaboration. E-business technologies area new business logic that exists in the world without borders (Kolarić et al., 2012; Bhardwaj, 2013 and Hsu, 2013).

Integration between ERP system and E-Business Technologies: ERP system focuses on internal integration and improves efficiency within the boundary of the enterprise while e-business technologies focus on external, cross-enterprise process efficiency. Their integration builds business process coordination capabilities and system integration which streamline the flow of materials and information in supply chains. (Turner & Chung 2005 and Hsu, 2013).

Supply Chain Agility: **Supply Chain Agility**: is the ability of supply chain as a whole and its members to quickly and effectively sense and respond to uncertain and turbulent markets in a flexible and speedy manner. The main distinctive features of the agile supply chain are: responsiveness, competency, flexibility and speed. Supply chain agility is measured by its ability to sense and respond to market changes (Blome, et al., 2013; DeGroote & Marx, 2013 and Yang, 2014).

Intra organization collaboration: is the coordination cross-functional planning in an affective mutual shared process where two or more departments work together, have a mutual understanding, common vision, share resources, and achieve collective goals. This application can lead to enhance business aspects such as agility, better decisions, higher creativity and new possibilities (Sanders, 2007; Troshani & Rao, 2007 and Mena et al., 2009).

Inter organization collaboration: it refers to the collaboration between two or more organizations, rather than departments. It requires sharing of information across the full range of supply chain participants, as well as sharing internal cross-functional processes. (Kim, 2001 and Sanders, 2007).

(1-9): Study Limitations

1. Location limitations: The current study will be conducted at Hikma Pharmaceuticals Group.

2. Human resource limitations: The current study targets only managers and heads of departments.

3. Timeline limitations: The study is expected to be accomplished during the academic year (2014-2015).

4. This study was conducted on Hikma Pharmaceuticals Company and the findings may or may not apply to other companies.

1.10 Study Delimitations:

1. The accuracy of research results depends on the perception of managers towards the research subject.

2. Generalization of results will be limited to Hikma Pharmaceuticals Groups managers in Jordan.

3. Implementing the study results could be restricted only Hikma Pharmaceuticals Groups in Jordan.

1-11 Hikma Pharmaceuticals

Founded in Amman, Jordan in 1978 by the current Chairman, Mr. Samih Darwazah, Hikma has steadily evolved as a leading multinational pharmaceutical company, with a steadfast reputation for quality. The Company's initial focus was on developing a branded pharmaceuticals business across the Middle East and North Africa region (MENA).. However, in the early 1990s, Hikma acquired a generic pharmaceuticals business in the United States and established an injectable pharmaceutical operation in Portugal, thereby expanding the Company's outreach beyond the MENA region. The Company has since continued to expand significantly, through organic growth and acquisition. As of Dec. 2013, Hikma's global team was made up of 7,067 employees, 27 manufacturing facilities in 11 countries, FDA approved facilities in 5 countries, More than 1800 sales representatives across MENA region.

Hikma has a clear vision and mission to improve people's lives through their existing products and pending approvals across their markets, their aim is to provide patients with better access to high-quality, cost-effective medicines in key therapeutic areas.

Their vision is to build Hikma into a world class and leading specialty pharmaceutical company, with presence across the globe. Through organic growth and by acquisitions which are aligned with their strategy, they will continue to develop the business and maintain the high standards of ethics and responsibility which are central to the way we operate.

Chapter Two

Literature Review and Previous Studies

2.1 ERP System:

The business environment has become increasingly complex and the marketplace has changed from local setting to a global one. Constant pressure is applied on the management to improve competitiveness by lowering operating cost and improving logistic. Organizations therefore have to continuously realign their operations to meet all these challenges by being responsive to the customer and competitors. A useful tool that businesses are turning to in order to build strong capabilities, improve performance, undertake better decision-making and achieve competitive advantage is Enterprise Resource Planning (ERP) (Ahmed, et al., 2006). ERP is one of the most popular software technologies for supporting operational organization. It emphasizes business transformation which will lead to process change in its effort to maximize the company's benefit (Dantes and Hasibuan 2011).

2.1.1 ERP System Evolution

Understanding the history and evolution of Enterprise Resource Planning system (ERP) is essential to understand its importance to operations. ERP system was designed to overcome the operational problems that companies experienced with previous information systems. One of the earliest computerized information systems for operations management was Material Requirement Planning (MRP). MRP sought to automate manual procedures for planning and controlling production schedules and designed to work back from the sales orders to determine the raw material required for production. Companies often experienced difficulty implementing MRP systems. In addition, the technology frequently failed to yield the expected benefits (Abdinnour-Helm et al., 2003).

Manufacturing Resource Planning II (MRP II) was introduced as a follow-up to MRP to resolve some of the most obvious operational problems. MRP II software was more sophisticated and included a set of modules for each of the different functional aspects of the production process. However, there was implementation challenges persisted with MRPII. In some respects, ERP system may be considered as the next generation of MRPII systems because it blends the functionality of MRPII with other application areas as quality, maintenance and marketing. ERP system advocates believe that ERP system combines both business processes in the organization into one integrated solution (Chung and Snyder, 2000 and Abdinnour-Helm et al., 2003).

ERP systems were finally introduced to the market to integrate business processes including manufacturing, distribution, accounting, financial, human resource management, project management, inventory management, service and maintenance, and transportation to provide accessibility visibility and consistency across the enterprise, Different sized companies are now turning towards information technology in general and ERP system in particular to improve their performance and productivity to be able to provide their customers with faster responses and better services, and be more in control of their accounting, supply chain and inventories. Information can never be lost when using ERP systems because they can be backed up to a server and restored when the need arises (Mazzawi, 2014).

It is so important to understand how ERP system works across the entire organization, and how the unified database works. For example, when a salesperson enters an order, the transaction immediately flows through to other functional areas within and beyond the firm. The order might trigger an immediate change in production plans, inventory

stock levels, or lead to the automated generation of invoices and credit evaluations for the customer and purchase orders from suppliers. The ability of ERP system to disseminate timely and accurate information improve managerial and worker decision-making. Managers can make decisions based on current data; workers can have greater access to information, enabling increasing delegation of authority for production decisions and improving communications with customers (Hitt et al., 2002).

2.1.2 ERP System Definition:

ERP systems are a software systems encompass a wide range of software products supporting day-to-day business operations and decision-making. ERP system attempts to integrate all departments and functions across a company into a single computer system and to automate operations from supply chain management, inventory control, manufacturing scheduling and production, sales support, customer relationship management, financial and cost accounting, and human resources (Somers & Nelson 2001). ERP systems are a popular implementation of IT in the changing business environment (Turner & Chung 2005). While (Ehie & Madsen, 2005) defined ERP system as an integrated software solution that spans the range of business processes that enables companies to gain a holistic view of the business enterprise.

Wagner & Sweeney (2010) defined ERP system as a comprehensive transaction management system that integrates many kinds of information processing abilities and place data into a single database. According to Brooks (2013) ERP system is the software and tools that businesses can use to process and manage information from all parts of the organization, and store that information in one database system giving businesses a simplified look at how all their systems are running. (Ekman, et al., 2014) defined ERP system as a system designed to support the core processes of the

organization, such as finance, human resources, operations and logistics, sales and marketing and the virtual central database integrates all transactional data which offers accurate and up-to-date information accessible.

In this study the researcher adopted the definition of (Hsu, 2013) for ERP system as are a large commercial software packages that standardize business processes and integrate business data throughout an organization. These systems codify and organize an enterprise's business data into an integrated database, and transform the data into useful information that supports business decisions. The ability to access information from various parts of an organization has helped firms to streamline their business processes and reduce inefficiencies.

2.1.3 ERP System Benefits

Prior to ERP system, data were distributed across several separate databases and information processed through multiple disconnected information systems as organizations typically maintained separate systems for purchasing, order management, human resources, and accounting (Wagner & Sweeney, 2010). Basically, the improvements in processes brought by an ERP system have evolved from its information-integration role as ERP system provides the organization with consistent, reliable, timely and accurate data about internal operation and processes since all business transactions are entered, recorded, processed, monitored, and reported in one unified database which leads to increasing the cooperation, coordination, communication and responsiveness within the company (Umble, et al., 2003).

According to previous research like (Shang & Seddon 2000; Cheng & Wang 2006; Ekane & Khan, 2009 and Wagner & Sweeney, 2010) ERP system implementation

benefits could be classified into five dimensions which show the relationship between strategic goals, objectives, and critical factors

1. Operational: arise from unified data to better plan and manage production manpower, inventory and physical resources, cost reduction, cycle time reduction, productivity improvement, quality improvement, and customer services improvement.

2. Managerial: ERP system is expected to improve the day-to-day business process, resulting in long-term benefits such as better resource management, improved customer responsiveness and satisfaction, improved decision making and planning, and performance improvement.

3. Strategic: arise from the system's ability to supporting business growth, business alliance, building business innovations, building cost leadership, generating product differentiation, and building external linkages.

4. IT infrastructure: involves building business flexibility, IT cost reduction, and increased IT infrastructure capability.

5. Organizational: related to supporting organizational changes, facilitating business learning, empowering, and building common visions, shifting work focus and increased employee morale and satisfaction.

Hsu (2004) points that there are tangible and intangible benefits of ERP system, Tangible benefits like: support production capacity planning, provide more accurate market demand forecast, facilitate mass customization and improve manufacturing flexibility, increase inventory turnover rate, decrease inventory level and cost, control and improve product quality, speed up new product development cycle and time to market, reduce the cycle time of order fulfillment, achieve operational excellence. On

the other hand, intangible benefits like: better allocate of enterprise resource, increase communications among departments, integrate information across the enterprise, increase the availability of critical operational and decision, support information to provide visibility of enterprise planning activities, access to real time business intelligence, improve information flow among departments, increase response time to customer order and inquiries, improve service quality and improve customer satisfaction and loyalty.

Marciniak, et al., (2014) state that ERP system manage overcoming data quality problems by integrating the organization's disparate data stores which lead to better information access, faster transaction processing, real time data quality, increased automation of routine tasks and consequent improvements in decision-making and process visibility, reduce number of errors in the transactional data of the firm, which in turn reduce the occurrence of distortion in data and the persistence of data-related conflicts between organizational levels. Above all of that ERP system deliver some degree of cross-functional integration by ensuring that data created in one area of the business is suitable to use in other areas of the business, which in turn develop cross functional awareness among the organization

2.1.4 ERP System Critical Success Factors

There are critical successes factors for ERP system implementation, the most common factors identified by the researchers to implement successful ERP system are:

1) Commitment and support of top management: as they are responsible for developing organization strategy, approve the project, make decisions, and legitimize new goals and objectives. Their role is vital since the implementation of ERP system involves

modification to existing business processes and require huge amount of capital investment, top managers must be engaged from the start and not just involved in some ERP system phases (Nah et al 2001 and Finney & Corbett 2007).

2) Qualified and excellent project manager: according to Umble, et al., (2002), successful ERP system implementation requires qualified manager who has previous experience in managing projects and should be able to set clear objectives and scope, develop both work and resource plan, perform careful tracking of project progress, and has to be firm about requiring satisfactory performance from his team.

3) Clear goals and organizational vision are prerequisites for ERP system success, key decision makers have to specify their goals and define an organizational vision prior to implementing the ERP system solution. There must be clear definitions of goals, expectations, and deliverables. In other words; they should clearly outline the future shape of the organization and the scenarios for implementing the change. Furthermore, the organization must carefully define why the ERP system is being implemented and what are the critical business needs of the system that will be addressed (Marciniak, et al., 2014).

4) User training and education: Lack of user training and failure to completely understand how ERP system applications change business processes frequently appear to be responsible for problem ERP system implementations and failures. Everyone who uses ERP systems needs to be trained on how they work and how they relate to the business process early on in the implementation process. The main reason for education and training program for ERP system implementation is to make the user comfortable with the system and increase the expertise and knowledge level of the employees who use ERP system. Training is not only using the new system, but also understanding the

integration within the system – how the work of one employee influences the work of others (Somers & Nelson 2001).

5) The skills and competence of the project team: composing a highly skilful and competent project team is very important, because it saves time and money needed to ensure smooth implementation with minimal errors. Experienced teams also have good contingency and risk management plans to help successful ERP system implementation. ERP system team should be balanced, or cross functional and comprise a mix of external consultants and internal staff so the internal staff can develop the necessary technical skills for design and ERP system implementation.

6) Effective communication: is one of most challenging and difficult tasks in any ERP system implementation project. Communications are essential for creating an understanding, an approval of the implementation and sharing information like the results and goals in each implementation stage over the whole organization. Communication involves covering the scope, objectives and task of ERP system implementation projects, advertising of project progress, expectations, requirements, and approval of objectives, activities and updates (Nah & Shang 2001 and Bhatti, 2005).

7) Business Process Reengineering (BPR): Cheng & Wang (2006) defined BPR as a fundamental redesign of business processes in order to achieve dramatic improvements in critical areas such as cost, quality, service and speed. Organizations should be willing to change their businesses to fit the ERP system software in order to minimize the degree of customization needed. ERP system requires introducing essential modification to business processes that are molded to fit the new system. Organizations should change their business operations in order to fit the software with minimum

customization. BPR is supposed be done as a required precedent step for the implementation of ERP system (Ekane &Khan 2009 and Bhatti, 2005).

8) Finding the best ERP system software solution: careful selection of the appropriate package as most of the top ERP system software providers give businesses the option to customize the software to fit their needs by choosing the parts of the operations they want to include (Brooks, 2013). The choice of the package involves important decisions regarding budgets, timeframes, goals, and deliverables that will shape the entire project. Choosing the right ERP system packaged software that best matches the organizational information needs and processes is critical to ensure minimal modification and successful implementation and use. Selecting the wrong software may mean a commitment to architecture and applications that do not fit the organization's strategic goal or business processes (Somers & Nelson 2001).

9) Employees cooperation and satisfaction: employees have a significant influence on the success of ERP system implementation. As they are involve on ERP system implementation process and also accept the changes that occur, even the very best system in the world will fail if end users resist it. ERP system implementations force involuntary changes and frequently lead to different power and resource allocations which usually trigger a diverse group of overt and covert opponents within the organization, so early user involvement in the design and implementation of new business processes as well as extensive top-down and cross-functional communication may generate enthusiasm for ERP system (Ahmed, et al., 2006 and Dantes & Hasibuan 2011).

10) Use of consultants: Due to the complexity of implementing an ERP system, many organizations use consultants to facilitate the implementation process. Consultants may

have experience in specific industries, comprehensive knowledge about certain modules, and may be better able to determine which suite will work best for a given company. Consultants may be involved in various stages of the implementation, recommending a suitable solution, and managing the implementation Consultants maybe internal or external experts who are knowledgeable about the installation and software. Many companies prefer or must have external consultants to perform ERP system implementation (Somers & Nelson 2001 and Bhatti, 2005).

2.1.5 ERP system Success Definition and Measurement

The definition and measurement of ERP system implementation success is dizzy, given that success can be defined differently depending on who defines it. For instance, project managers and implementation consultant will find an ERP system implementation successful when the project can meet the deadline within the allocated budget and the implementation meets the requirements. But people whose job is to adopt ERP systems and use them to achieve business results tend to emphasize having a smooth transition to stable operations with the new system, achieving intended business improvements like inventory reductions, and gaining improved decision support capabilities. Other researcher see that optimal success refers to the best outcomes the organization could possibly achieve (Collado & Salgado 2000).

On the other hand, directly measuring the success of an information system has been found to be impractical and perhaps impossible because of intangible costs, and benefits of information systems are difficult to recognize and convert to monetary equivalent. (Ahmed, et al., 2006) suggest the following point to take into consideration when evaluating ERP system implementation success:

1. ERP system implementation success could be measured in terms of the perceived deviation from the expected project goals such as cost overrun, schedule overrun, system performance deficit and failure to achieve the expected benefit.

2. Achieving the objectives on time and within budget are successful factors for ERP system implementation.

3. Successful ERP system implementation measurement should be evaluated based on quantifiable benefits taking into consideration the time required to implement the system and the user acceptance in terms of satisfaction.

4. User satisfaction is feasible and practical to be used as a tool for evaluating information systems success.

Some of the ERP system projects are over budget others are terminated before completion. ERP system projects often fail to achieve business objectives even a year after the system has been implemented. Despite the benefits that can be achieved from a successful ERP system implementation, there is already evidence of high failure risks in ERP system implementation projects. According to Ahmed, et al., (2006) there are five critical impediments which were in order of criticality: conflict of interest, inadequate human resources commitment, lack of organizational change management expertise, business processes not redesigned to take advantage of ERP system and resistance to change

2.1.6 Critical Factors Contributing to ERP System Implementation Failure

Hawari & Heeks (2010) explained that failure could be simply measured in terms of a set of factors such as: lack of skills and technology, absence of good quality data, lack

of money, user resistance, and cultural issues which characterize as most common findings related to ERP failures.

In his research Mazzawi (2014) listed other factors which often contribute to the ERP implementation failure like: over-reliance on heavy customization, poor knowledge transfer, poor project management effectiveness, unclear concept of the nature and use of ERP system from the users' perspective, unrealistic expectations from top management concerning the ERP system, users' resistance to change as ERP system may results in employees feeling threatened that the systems replaces them and subsequently lose their jobs, which causes them to become resistant to the change, instead of understanding that such systems could make their jobs easier with less paper work and more focus on producing efficient flow of information and improved customer satisfaction

2.1.7 ERP System in Jordan

The World Bank's classification of Jordan as a country of "upper-middle income", and its reputation as a safe and stable country in a turbulent region were enough reasons to attract various investors to set foot, and build companies of various industries. This economic boom left the Jordanian market with multiple options and ideas to choose from in order to achieve their desired output of integrated information, reduced and controlled inventory, speed information and improved customer satisfaction which led multiple business owners to refer to information technology in general and ERP system in particular. ERP systems however embed business processes which do not necessarily fit with traditional cultural practices, and implementation success is not assured.

ERP systems embed western assumptions about organizational practices and that impose specific, homogeneous ways of communication through technology there is clear potential for a cultural clash when these do not fit the adopting culture's norms, for example, ERP system implementation in China was unsuccessful due to national cultural factors. According to Rabaa'i & Gammack (2008) the traditional style of management in Jordan may not fit well with the requirements for successful implementation. (Hawari & Heeks, 2010) mentioned that there are some critical characteristics in Jordanians community might affect ERP system implementation, such as:

1. Uncertainty avoidance: like many in other developing countries, Jordanians are rated as having a high level of uncertainty avoidance. Unlike Western cultures, they feel threatened by ambiguous situations. Jordanians give a high value to job security; any change project brings uncertainty with it, and will thus be threatening to those with high uncertainty avoidance. So when employees had a lot of uncertainty and anxiety toward new project; they resisted it as a way to protect their jobs. ERP projects perhaps particularly do this in developing countries because of the significant change in current working practices that they demand.

2. Power distance: Jordanians are seen to accept an inequality of power distribution and, hence, to accept centralized decision making as the norm, and that information will be used as a component of power rather than shared as an organization wide resource, they restricted access to information for themselves. Likewise, as already noted, ERP designed assumptions of devolved decision making run directly counter to a culture of centralization

2.2 E-Business Technologies

2.2.1 E-Business Technologies Evolution

IBM was a pioneer to use the e-business term. It started with e-business in 1993 when their market share dropped. Consequently, they re-entered the market as one integrated global organization instead of 20 different companies began with "value-added processes" such as speeding up the order-entry system, inventory management. E-business change the way companies interact, characterized by rapid exchange of information within a virtual network of customers and suppliers working together to create value-added process (Ash & Burn, 2003). The internet, web, and web-based applications, termed by (Sanders, 2007) as e-business technologies, has a particularly significant impact on managerial practices due to their interoperability and open-standard settings for the transfer of data among organizations.

2.2.2 E-Business Technologies Definition

Wu, et al. (2003) defined e-business technologies as the use of internet technologies to link customers, suppliers, business partners and employees using at least one of the following: e-commerce websites that offer sales transactions, customer-service websites, intranets and enterprise information portals, extranets and supply chains. E-business technologies can potentially transform a firm into a networked entity with seamless supply chains and value creation processes, helping to build and manage relationships with customers, suppliers, employees, and partners. (Zhu & Kraemer, 2005) defined e-business technologies as the using the Internet to conduct or support business activities along the value chain.

According to Kumar & Thapliyal (2010) and Bhardwaj (2013) e-business technologies are the use of electronic communication networks that allow business enterprise to

transmit and receive information. It can significantly improve business performance by strengthening the linkages in the value chain between businesses (B2B: Business to Business) and consumers (B2C: Business to Consumer). According to Kolarić et al., (2012) e-business definition is the management of relationships, electronic data interchange, collaboration, communication and the establishment of workflow processes with business partners, customers, employees, and other business agents, as long as these tasks or processes are performed by electronic means. E-business technology is new business logic that exists in the world without borders.

In this study the researcher adopted Hsu (2013) definition for e-business technologies which is the internet-based technologies, such as extranets, websites, and electronic data interchange that link two firms for performing e-business technologies functions such as online selling, online purchasing, online coordination and online information sharing because of their lower cost and greater ease of implementation/use. (Lucia-Palacios, et al. 2014) defined E-business technologies as a new way to manage business and relationships between partners and customers, which involve the use of internet-based technologies such as intranet, extranet, customer relationship management and web page in order to share information, improve customer service, facilitate transactions and improve back-office activities.

2.2.3 E-Business Technologies Benefits

E-business technologies stands for “electronic business”, involves communications and conducting business electronically through the internet, not only buying and selling but also servicing customers and collaborating with business partners. External and internal electronic communication become everyday unavoidable part of business processes in

many organizations, regardless of their activity and size. Through e-business the enterprises use internet, intranet and extranet, both for the purpose of placing new products and services and for gathering the necessary information, or for consultant's services. E-business has a pervasive impact through all the fields of organizational structure, starting from procurement and sale in the field, through a series of its business processes (Kolarić et al., 2012).

The adoption of e-business implementation has an impact on performance across the entire span of the organization's structure from the procurement department to the sales force and from internal administration to supply-chain coordination, and can result in benefits (Wagner & Sweeney, 2010; Chaffey, 2011 and Lucia-Palacios, et al., 2014) mentioned from these result such as:

- Increase sales and decrease service costs and customer loss, by allow firms to have access to relevant information. Both internal and external information helps the firm to know its clients more deeply, so firms can customize the shopping experience, provide special offers, better predict buying patterns, evaluate customer value and build long-term relationships (Lucia-Palacios, et al., 2014).

- Market cost reductions from reduced time in customer service (Chaffey, 2011).

- Raised new opportunities for small and large organizations to compete in the global market (Chaffey, 2011).

- Use the internet to implement supply-chain management (SCM) capabilities, which enable them to link their operations virtually with customers and suppliers (Lucia-Palacios, et al., 2014).

- Cost reduction by delivering services electronically, reducing operational and purchasing costs (Chaffey, 2011).

- Effective e-marketing: Improve external product promotion and internal communication (Lucia-Palacios, et al., 2014).

-A closer link with business partners and customers help to build and manage relationships with customers, suppliers, employees and partners (Chaffey, 2011 and Lucia-Palacios, et al., 2014).

- Supply chain cost reductions from: reduced levels of inventory and shorter cycle time in ordering (Chaffey, 2011).

- Improve customer-relation-management by using CRM (Customer Relationship Management) systems to track and monitor interactions with prospects and clients, which will enhance the loyalty of customers and maximizing revenues (Lucia-Palacios, et al., 2014).

- Accelerate the abolition of the trade-off between richness and reach of information, which means that communication can occur at almost zero cost, without constraints on the richness of information and higher transparency (Wagner & Sweeney, 2010).

- Involves greater internal and external process integration (Lucia-Palacios, et al., 2014).

- Facilitate collaboration and supply chain information sharing, such as order forecasts and inventory planning; automate requisition and purchase order creation and integrate payment processes (Wagner & Sweeney, 2010).

- Opportunities in new markets, new distribution channels, higher visibility (Lucia-Palacios, et al., 2014).

E-business technologies enable the customers to gather the information about the availability of a desired product or service, assessment of its performances, as well as

the possibilities of negotiating about additional benefits related to that product or service, in an effective and efficient way in accordance with the above-mentioned. E-business has a pervasive impact through all the fields of organizational structure, starting from procurement and sale in the field, through a series of its business processes to internal administration and coordination, indicates that electronic communication facilitates the information exchange, reduces business costs, saves time and resources, improves customer service and generally improves business relations (Kolarić et al., 2012).

2.2.4 E-Business Technologies Models and Categories

There is an agreement among researchers on e-business technologies models. For example (Burinskienė & Burinskas, 2010) mentioned three main e-business models:

– Business-to-Business (B2B) model is described as the realization of electronic links between two or more enterprises. It is the most prevalent e-business model all around the world, being developed since the origins of e-business and all the time being one of the main e-business development stimulators.

– Business-to-Consumer (B2C) model which includes transactions between the trader and consumers of final goods. The main principle of this business model is connected with the efforts, which the company makes in order to give complete necessary information about its products to present or potential consumers, allowing them to order them, to pay for them and expect future services.

– Business-to-Employee (B2E) model which described as the usage of electronic network with the aim to provide information to company's employees. Typically,

companies use electronic networks to automate internal business processes. Such model sometimes is also called business-to internal.

There are two types of enterprises, which use e-business technologies:

– Enterprises which manufacture and sell material products, they use e-business technologies for marketing and seeking to increase on-line sales and for business adaptation.

– Enterprises, which start to manufacture and sell digital products. The possibility to manufacture and sell digital products appeared when material products had changed their type into digital (for example, books). So, enterprises, which took this such opportunity (talking about enterprises, which "moved" from material to digital products), invested into e-business technologies, spent money for marketing and reorganization, and invested into other information technologies.

According to Whang (2001) e-business technologies applications can be divided into three categories: E- Commerce, E-Procurement, and E-Collaboration.

1- E-commerce: is a subset of e-business technologies encompasses online transactions, helps a network of supply chain partners to identify and respond quickly to changing customers demand captured over the internet.

2- E-procurement: allows companies to use the internet for procuring direct or indirect materials, as well as handling value-added services like transportation, warehousing, customs clearing, payment, quality validation, and documentation.

3- E-collaboration: facilitates coordination of various decisions and activities beyond transactions among the supply chain partners, both suppliers and customers, over the

internet. For example, coordination of engineering changes in the bill-of-materials for a product that is manufactured by an outsourced partner ERP system.

Devaraj, et al., (2007) classify e-business technologies into three categories depending on their focus.

The first category focuses on the demand side, and relates to allowing customers to order online, configure or customize products online, and check the status of orders online.

The second set of technologies focuses on the supply side, and addresses the capabilities of the company to find and select suppliers online and purchase material through online auctions.

The third set of technologies focuses on collaboration with customers or suppliers and relates to web-based EDI, forecasting, inventory replenishment, and scheduling capabilities. A company invests in e-business technologies to facilitate more information sharing and collaboration with either its suppliers or its customers in the value chain.

2.2.5 Critical Success Factors for E-Business Technologies

- Rapid growth of e-business imposes a growing need for employees that possess appropriate knowledge and skills in the use of internet tools. Therefore, e-business requires digital training of employees for transactions and other processes within the company that include information systems under the control of organization. Another critical success factor is cooperation and commitment from top management's (Kolarić et al., 2012).

2.3 Integrating E- Business Technologies with ERP System

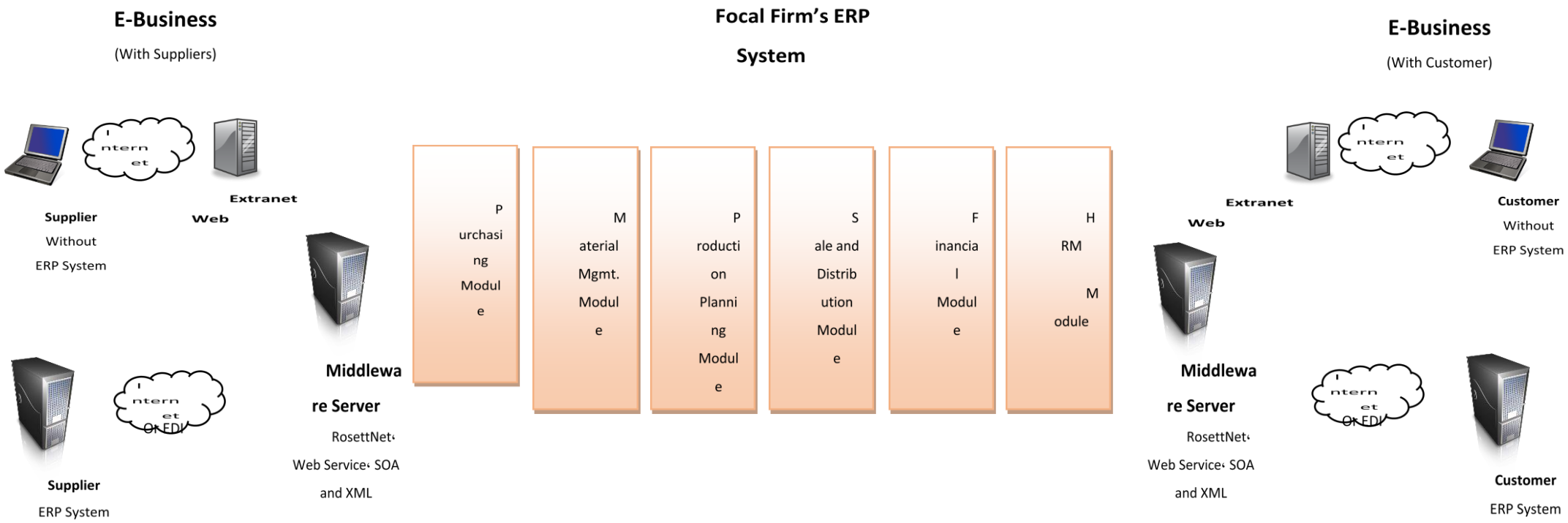
As more and more established organizations realize that they need to form alliances with their customers, partners and suppliers over the internet. E-business technologies integration with ERP systems becomes a critical issue (Ash & Burn, 2003). ERP systems deal with internal value chain (i.e. within a company) whereas e-businesses technologies establish the value chain across the market and the industries (Kumar & Thapliyal, 2010). By integrating ERP system with e-business technologies, a new extended ERP system emerges that create business which is more lively, more focused and highly competitive than traditionally structured business. Integration of ERP system with e-business pushes activities within a business to the network edge and helps in expanding their market values, relationship with their customers and suppliers (Bhardwaj, 2013).

ERP systems are required nowadays to address what goes beyond the processes occurring within the walls of an enterprise. Extending ERP system means unleashing critical information and making it accessible to employees, customers and business partners, so that the multiple entities all over the entire value chain can take better decisions (Kuma, 2010). Hsu (2013) mentioned that the results show the complementary effect between ERP system and e-business technologies is stronger than the main effects of ERP system or e-business technologies by themselves because of intra organizational focus of ERP system.-business makes ERP system more transparent and outward to make complete systems connected and web based, e-business technologies comprises the external part of the extended enterprise, while ERP system comprises the internal portion.

According to Bhardwaj (2013) e-business and ERP system both include electronic data interchange (EDI) for exchange of information among several enterprises over the internet. ERP systems are basically backbones of e-business in respect of implementing inter and intra organizational business activities such as order to cash, production planning, financial management, requisition to cash process chains, logistics etc. These business activities are necessary to provide the communication channel between internal enterprise activities with external entities. ERP system presents companies with the opportunities to standardize and automate business processes throughout the organization, thus reducing cycle time and increasing productivity.

Hsu (2013) explains how ERP system fits with e-business (Figure A). In the middle is a focal firm's ERP system that was originally used only inside the firm. From the left hand side, with middleware software, information generated by ERP systems can be shared via the Internet/EDI directly with suppliers' ERP systems. If a supplier does not have an ERP system, it can still receive and exchange business information through an extranet website. Therefore, useful information such as inventory levels, production planning and materials purchasing can be exchanged between the focal firm and suppliers via ERP system and e-business technologies, as referred to business to business integration. Similarly, on the right hand side, the focal firm can exchange valuable business data with its customers, such as order status, invoice, and online order fulfillment.

الشكل (3): كيف يمكن لنظام ERP أن يتوافق مع E-Business



College of Technology ، Integrating ERP and e-business: Resource complementarity in business value creation ، (2013) ، Pei-Fang،Hus

Taiwan، Hsinchu 30013، Kuang-Fu Road، Section 2، No. 101، National Tsing Hua University،Management

E-business technologies focus on external, cross-enterprise process efficiency and effectiveness such as online selling, online purchasing, online coordination and online information sharing about inventory levels, production planning and materials purchasing generated from ERP system. Without clean internal processes and data that are provided by ERP systems, e-business may be just flashy web pages with no real substance behind them. E-business technologies comprise the external part of the extended enterprise, and ERP system comprises the internal portion (Hsu, 2013).

Most e-business solutions could be built on exiting ERP systems regarding the technology characteristics most ERP system has four distinct features in their architecture. These integrated ERP system features could facilitate e-business between the business and technology requirements for a corporation, according to Turner & Chung (2005) these features are:

The first distinctive feature is ERP system data dictionary, which specifies thousands of domains that are associated with supporting fields and arranged in numerous tables. This data dictionary could be used across all functional areas within an organization. Once data is entered into the ERP system, it could be shared across the entire value chain of the firm with partners, and facilitate the real time update for them. For example, sharing manufacturing data with suppliers would allow them to participate in services and products required by the manufacturer without adding costs. By integrating workflow, messaging, security, directory services, rapid development and data exchange through a server, users with web browsers and other types of client software tools should be able to access or update the repository.

The second distinct feature is middleware, which could make distributed systems possible by allowing users to set up application components and databases at different locations. Data could be moved from a central system to a remote system, permitting the components to exchange information. An ERP system can have scores of generic application components. Some ERP system components can be adopted by almost all companies while others can be selectively adopted only by some companies. Understanding integration of these components should be considered before extending an ERP system to an e-business solution.

The third distinct feature is the repository. This is the foundation of the business framework of a firm, because the repository captures all semantics in the business processes, business objects, and organization model. It contains a comprehensive description of the ERP system applications, including all information about models, technical programming objects, and business objects.

The fourth distinct feature is the internet functionality for web-based applications. It is reported that the. The web-based SCM and CRM systems with Internet functionality are necessary to connect to suppliers and customers from an ERP system platform. According to the researchers major ERP system vendors have started to adjust web technologies that integrate customers and suppliers via the internet.

These four technology characteristics that discussed above can be applied to coordinate all related functions both inside and outside the boundaries of the firm. With an integrated ERP system platform in place, a firm could build whole enterprise applications on top of it for e-business.

On the other hand, integrating ERP system and e-business technologies is extremely complex since implementing ERP system alone requires introducing fundamental to the business process. Going a further step to integrate ERP system and e-business technologies to build a digitalized platform that link business partners to perform business processes electronically is more complicated. In other words, firms want to integrate ERP system and e-business technologies to link key suppliers and customers, to do so they have to reengineer business processes and IT systems not only for the firm itself, but also all the business partners in the supply chain (Hsu, 2013).

2.4 Intra and inter organizational collaboration

2.4.1 Collaboration Definition and Benefits

Collaboration means working jointly to bring resources into a required relationship to achieve effective operations in harmony with the strategies and objectives of the parties involved, thus resulting in mutual benefit. In particular, there have been a number of publications promoting the benefits of collaborative approaches. Some of the claimed benefits include, lower cost and inventory, higher efficiency, improved customer service, reduced cycle times, faster time to market, increased risk sharing, improved learning and knowledge exchange, higher profit margins, improved shareholder value and increased competitive advantage over other supply chains (Mena et al., 2009).

This view posits that competitive advantage in the relationship can be achieved in four different ways: by sharing risk and investment in assets that are specific to the relationship; by improving learning, through better knowledge exchange that lead to joint learning; by allowing synergy to take place through the combination of resources and capabilities, and through efficiency, leading to lower transaction costs. Many authors have provided empirical evidence of these claims supporting the view that

collaboration can improve customer service, reduce waste and generate mutual benefits by sharing risks and rewards (Mena et al., 2009).

2.4.2 Intra Organization Collaboration Definition and Benefits

In this study the researcher adopted the definition of Sanders (2007) for Intra-organizational collaboration which is the affective, mutual shared process where two or more departments work together, have a common vision mutual understanding, share resources, and achieve collective goals". Intra-organizational collaboration requires coordination cross-functional planning, and sharing of integrated data bases. This application can lead to enhance business aspects such as agility, better decisions, higher creativity and new possibilities. (Spin, 2012) defined intra-organizational routines as the routines that exist within each partner firm and are brought into the collaboration. According to Chen et al., (2013) coordination of internal task procedures and activities enables an organization to respond more effectively to its external partners.

Intra-organizational systems connect various departmental units within the organization was emphasized as well. Information sharing and accessibility, as well as staff collaboration, were identified to be the primary benefits (Troshani & Rao 2007). According to Mena et al., (2009) and Chen et al., (2013) an organization with internal coordination on task procedures and guidelines across various departments can:

- Respond quickly to customer demands and market changes
- Helps firms to gather, distribute and use information more effectively
- Improve firm’s flexibility and adaptability in problem solving
- Leading to a more efficient development process
- Respond to the requirements of external partner faster

-. Helps a firm remove the barriers to information flows that exist among functional units, which in turn enhances disseminate and utilize knowledge across intra-organizational boundaries more quickly.

- Improve customer service,
- Improve inventory management and forecast accuracy
- Increasing customer and employee satisfaction.
- Improved new product introduction

Lack of intra-organizational collaboration would have serious consequences on the compatibility and duplication of functionality, and always leaves negative impact on the overall policy implementation process such as failing to meet deadline of a project. As the time limit exceeds, the cost of the projects increases (Troshani & Rao 2007). Firms that are poorly coordinated internally are more likely to create ambiguity and unexpected delays; this might thereby damage the inter-organizational cooperation. From (Panday, 2007) point of view lack of intra-organizational collaboration is a result of:

- Lack of institutionalization of settings of rules.
- The problematic working environment within the corporation which affects the policy implementation process.
- Lack of communications.
- Lack of rules and standard operating procedures.
- Inadequate division of labor (who will do what when and how?).

2.4.3 Inter Organization Collaboration Definition and Benefits

Just as the departments and groups which comprise an organization depend on each other to achieve the organization’s goals, likewise the organizations in a supply chain

must cooperate with each other to achieve a collective goal. A lack of coordination at either of these levels can result in poor performance and high coordination costs. In addition, changes in inter organizational dependencies can affect the dependencies within the affected organizations. The lack of coordination across two levels results in transition gap in transforming the inter-organizational design to the intra-organizational design (Kim, 2001). Inter- or intra organizational collaboration might enable firms to more easily create, transfer, and utilize the knowledge required in the process of product development (Chen et al., 2013).

In this study the researcher adopted the definition of (Sanders, 2007) for inter-organizational collaboration which is similarly to internal collaboration, with the exception that the focus of collaboration is between two or more organizations, rather than departments. Inter-organizational collaboration requires sharing of information across the full range of supply chain participants, as well as sharing of internal cross-functional processes. Kim (2001) defined inter-organizational as a result from communications among organizations. The focus of inter-organizational is channel design. (Koulikoff-Souviron & Harrison, 2006) defined inter-organizational relationships as the relatively enduring transactions, flows and linkages that occur among or between an organization and one or more organizations in its environment.

Inter organizational collaboration is an effective way for firms to distribute risk and gain access to intangible and tangible resources. Therefore, firms acquiring more resources from external partners are more likely to develop innovative products of high costs and risks. According to Chen et al. (2013) firm's ability to manage inter organizational collaboration activities is significantly related to the likelihood of engaging into product innovation. So firms with greater inter organizational collaboration expertise may have

a better ability to speed up the product development process. Recent research shows that greater inter-organizational cooperative abilities can enhance firms to release new products to market in a timely manner.

Organizations with greater inter-organizational collaboration have a superior ability to understand alliance partners' ideas and perspectives which may enable organizations to avoid devoting resources to unworthy alliance activities. In this regard, collaboration may improve resource usage and render more slack resources for organizations, (Chen et al., 2013). The organizations employed inter-organizational systems to forge strong linkages with their partners. Automating communication and maintaining on-going interactions with partners (Troshani & Rao 2007). According to Kim (2001) there are at least three important factors in an inter-organizational dependency items like:

- Goods and information that are being exchanged,
- Spatial factors like places or organizations,
- Temporal factors such as process flow.

2.4.4 Advantages of Inter and Intra Organization Collaboration

Firms with greater capabilities in inter functional collaboration are more likely to do a better job in their internal communications and reduce overlapped phases within cooperative processes. Likewise, inter functional collaboration allows a firm to exchange knowledge efficiently among its internal units. This efficiency reduces the costs of information processing and thus spares the firm with more slack resources. Likewise, alliance coordination enables a firm to learn more effectively from its partners. Such learning effects help the firm become more efficient by utilizing fewer resources on the same activities, beside that companies may benefit from more effective

exploitation of resources within their organizations and achieve better results (Chen et al., 2013).

Most authors argue that internal coordination is the essential precursor to external coordination. But internal divisional boundaries are often inhibitors to the flow of materials and information as much as are boundaries with external supply partners. Multidivisional corporations often decentralize control over internal buyer-supplier relationships and adopt market-like incentives to govern interdivisional supply relationships. Thus, co-ordination within divisions can be favored over co-ordination between them and relationships with external suppliers are found easier to manage than internal relationship (Harrison & Koulikoff-Souviron 2007).

High levels of inter- and intra-organizational collaboration may help a project team to:

- Better communications and more smooth work flows inside/outside the team's boundary.
- Reduce the resources required in exchanging information with various work partners.
- Saves firm resources, which can be further redirected to more productive areas in regard to new product development
- Improves the level of inter-organizational integration and the ability of solving problems with its external partners (Chen et al., 2013).
- Improved client service, cost reduction, and revenue growth were the main advantages experienced (Troshani & Rao 2007).

In their conclusion, (Chen et al., 2013) find that inter and intra-organizational collaboration may be related to each other rather than existing separately. In other words, inter functional collaboration not only is useful for managing the intra-

organizational division of labor but also may assist in inter-firm collaborative projects The importance of inter and intra-organizational collaboration to product development has long been identified. In fact, researchers have pointed out inter and intra-organizational collaboration could be mutually affected rather than independently existing. Although (Chen et al., 2013) suggest that intra-organizational collaboration could be a prerequisite for developing inter-organizational collaboration. However, empirical evidence for his viewpoint has been very limited

Internal and external integration influence each other. (Mena et al., 2009) argue that internal integration has a positive effect on external integration because better collaboration among internal functions facilitates collaboration with external companies. Similarly, external integration incentivizes internal integration by emphasizing the benefits of working together. Hence, it is suggested that, to properly increase a firm's spare resources, managers could strengthen its external ties and/or enhance its internal collaboration. Importantly, managers need to think about bridging inter and intra-organizational boundaries to acquire and utilize the resources in an effective and/or efficient manner (Chen et al., 2013).

From (Chen et al., 2013) point of view managers may consider intra-organizational collaboration as a starting point for firms to effectively develop their alliance collaboration. As based on effective communications and interactions among different functional units, firms could interpret information from their partners more effectively/efficiently. In other words, enhanced intra organization collaboration improves the inter-organizational integration and the ability of solving problems with its external partners

2.5 Supply Chain Agility

At the beginning of the 21st Century, the world faces significant changes in almost all aspects, especially marketing competition, technological innovations and customer demands. Mass markets are continuing to fragment as customers become increasing demanding and their expectations rise. Companies have realized that agility is essential for their survival and competitiveness. To achieve a competitive edge in the global market, companies must align with suppliers and customers to streamline operations and work together to achieve a level of agility beyond the reach of individual companies, which has come to be termed agility supply chain (ASC). To define the term supply chain agility, I would like first to discuss supply chain term then agility term (Lin et al., 2006).

2.5.1 Supply Chain Definition

The term "supply chain" is used to describe the flow of goods from the very first process encountered in the production of a product right through to the final sale to the end consumer (Bruce & Towers 2004). According to Yusuf et al. (2004) and Ketchen et al. (2007) supply chain is a series of linked activities amongst companies that contribute to the process of design, manufacture and delivery of products and services. The effectiveness of strategic supply chain management is closely tied to three attributes: agility, adaptability, and alignment. (Ellram & Cooper, 2014) defined supply chain as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from them to a customer, and return.

According to Lin et al. (2006) supply chain is a loosely related group of companies (suppliers, designers, producers, logistics) formed to enable collaboration to achieve

mutually agreed on goals so different companies with different characteristics and in different circumstances experience different specific changes that may be unique to them the general areas of business environment change are categorized as: market volatility, intense competition, changes in customer requirements, accelerating technological change, change in social factors. They go on to say that the structure of the agile supply chain is supported by four principles: 1) Mastering change and uncertainty, 2) Innovative management structures and virtual organization, 3) Cooperative relationships, and flexible and 4) Intelligent technologies.

2.5.2 Agility Definition

Agility concept was developed by a group of researchers who describe the activities that should be considered as essential aspects of the production process. They concluded that company's production system must constantly adapt to the changing business environment and needs such as speed, flexibility, responsiveness and to be able to quickly redirect the production process (switch from one product model production for the other models of production). (Prater et al., 2001) defined agility as the ability of an organization to thrive in a continuously changing, unpredictable business environment. An agile firm has designed its organization, processes and products such that it can respond to changes in a useful time frame.

According to Vinodh & Prasanna (2011) agility implies the usage of market knowledge and a virtual cooperation to exploit profitable opportunities in a volatile market place. (Rimienė, 2011 and DeGroote & Marx, 2013) defined agility as the ability to sense and respond to environmental changes in a timely manner, it is also recognized that effectively responding to these environmental changes often extends beyond the single firm requiring a coordinated supply chain strategy. Agile firms are quick to sense

market changes, and execute coordinated responses that can achieve critical first-mover and other competitive advantages over rivals. On the other hand, firms that lack agility can ultimately suffer losses in market share and profitability.

2.5.3 Agility Benefits and Dimensions

According to Gunasekaran (1998) and Gligor & Holcomb (2012) agile companies can achieve the following benefits:

- Lower production costs
- Increase market share
- Meet customers' demands
- Facilitate the rapid launch of new products on the market
- Eliminate the no value-added activities
- And increase the company's competitiveness.

According to Rimienė (2011) there are four dimensions to measure agility: cost, time, quality and scope, the company's agility is achieved by the balance score of these four dimensions.

2.5. Supply Chain Agility Definition

According to Swafford et al. (2005) supply chain agility is derived from the interactive synergies among the flexibilities in the three supply chain processes: (Procurement/sourcing, Manufacturing and Distribution/logistics). Procurement/ sourcing: the firms should focus on selecting flexible suppliers, as when it faced with uncertain market conditions, the firm depends on its suppliers to adjust material supply in response to sudden changes in customer demand for manufactured products. While manufacturing flexibility: the extent to which manufacturing can alter its capacity and

product mix, which enables the firm to offer product variety that meet the needs of changing marketplace. Finally the distribution/logistics flexibility: is the ability to manage distributing product variety.

Rimienė (2011) state that there are fifteen variables defining the supply chain agility: market sensitiveness, delivery speed, data accuracy, new product introduction, centralized and collaborative planning, process integration, use of IT tools, lead time reduction, service level improvement, cost minimization, customer satisfaction, quality improvement, minimizing uncertainty, trust development, minimizing resistance to change. (Blome, et al., 2013) defined supply chain agility as the firm's ability, in conjunction with its key suppliers and customers, to quickly and effectively react to changes in its environment. Inherent in this definition the firm ability and flexibility to rapidly and successfully reconfigure key resources in an attempt to remain competitive.

Yang (2014) defined supply chain agility as operational and relational cap ability in quick response to uncertain and turbulent markets. In such partnerships, both the buyer and supplier stress the relationship outcome through information sharing and joint relationships effort to achieve superior relationship outcomes. An agile supply chain enables exchange partners in the supply chain to sense, respond quickly to, and exploit anticipated or unexpected changes in market demand and in the business environment. Improving supply chain agility is a potential strategy for mitigating supply chain disruption risks which are risks related to the collaboration and uncertainty of supply chain and the impact of natural disasters, terrorism and labor strikes.

In this study the researcher adopted the definition of (Braunscheidel & Suresh 2009) of firm's supply chain agility which is the firm capability both internally and in

conjunction with its key suppliers and customers to respond in a speedy manner to marketplace changes as well as to potential and actual disruption. All three organizational practices, internal integration, external integration with key suppliers and customers, and external flexibility have significant positive impact on the firm's supply chain agility.

DeGroote & Marx (2013) measure supply chain agility by the ability to sense and respond to market changes. They defined sensing market changes as the quality of information on market changes communicated throughout the supply chain. While, responding is the ability to respond to market changes, and the ability to develop and execute a coordinated plan with the supply chain in response to changes in the market. The abilities to sense market changes quickly and accurately and to share this information with firms throughout the supply chain are critical to improve firm performance. The fast responses with which a firm's supply chain functions adapt to changes in the market, improves competitive business performance. Their study concluded that supply chain agility improves return on assets, market share, profit margins, and sales per employee.

Effective information flow is crucial for an efficient supply chain. The supply chain needs to transmit value and demand information up the chain and cost and supply information down the chain with sufficient detail and timeliness to avoid instability. The success a supply chain depends on its ability to intercept and respond to these two information flows, and the clarity and speed of the overall information flows. This information, if timely and sufficient, provides the feed forward and feedback necessary to maintain stability in the system. The use of information technology to share data between buyers and suppliers is crucial for agile supply. This will improve visibility of

requirements and reduce the amount of stock held in anticipation of predicted and often distorted demand (Bal et al., 1999 and Bruce & Towers 2004).

2.5.4 Capabilities, Key Enablers and Strategies of the Agile Supply Chain

An agile supply chain requires various distinguishing capabilities, or ‘‘finesses’’, these capabilities include four main elements which are very important for dealing or coping with uncertainty and changes in business environment, which are:

1- Responsiveness: is ability to identify changes and respond to them quickly, reactively or proactively and to recover from them. This impacts its ability to produce, and deliver innovative products to their customers in a timely and cost effective manner.

2- Competency: the ability to effectively and efficiently implement firm goals, such as: strategic vision, sufficient technological capability and cost-effectiveness.

3-Flexibility/ Adaptability: the ability to implement various processes and apply different facilities to achieve the same goals. It consists of items such as: product volume flexibility, people flexibility.

4-Speed: the ability to complete an activity as quickly as possible, quickness to introduce new products to market, quickness and timeliness in products and service delivery (Lin et al., 2006 and Rimienė, 2011).

According to Lin et al. (2006); Moron & Swierczek (2008) and Rimienė (2010) a truly agile supply chain must possess a number of distinguishing enable attributes such as:

1- Customer/marketing sensitivity: as the mechanism of the supply chain, includes the ability to read and respond to real customer requirements, and to master change and uncertainty: This means that the supply chain is able to understand and respond to real

demand. Many organizations used to follow the forecasts, assessing the sales and supply volumes of previous years and turning this information into stock, rather than the real needs, while using the advanced technology actual customer requirements are identified from data derived from fixed sales points almost as soon as it is loaded.

2- Process integration refers to cooperation between buyers and suppliers, joint production, joint systems and information sharing. The information interchange between supply chain partners can be maximized through process integration. Companies always concentrate on core activities, while other services are outsourced. Process integration as a form of cooperation in the supply chain is constantly increasing.

3- Collaborative relationship: is the ability to attract the buyers and suppliers to work collaboratively, jointly develop products and share information.

4- Information integration: as the infrastructure of the supply chain, it includes the ability to use information technology to share data between buyers and supplies, thus effectively creating a virtual supply chain. Virtual supply chains are information based rather than inventory.

Li et al., (2009) identified three key enablers of supply chain agility which are:

1. Quality of supplier relationships;
2. A high level of shared information
3. A high level of connectivity between firms in the supply chain

Researcher proposed some different strategies for agility increasing:

• Virtual manufacturing – a strategy that enables companies' core competences integration to achieve more efficient operation of the company in agile environment (Rimienė, 2011 and Yang & Li 2002).

• Agile product design – a strategy that allows companies to adapt to the changed consumers' requirements by changing the modular structure solutions in technical conditions (Rimienė, 2011 and Gunasekaran, 1998).

• Knowledge management – a strategy that, if chosen by agile manufacturers will be strongly based on knowledge management, particularly on implementing innovative solution in design and production processes (Rimienė, 2011).

• Mass customization – a strategy that focuses on the possibility to offer customized products and services to customers, thanks to technological innovations (Rimienė, 2011).

There is a relation between internal and external firm integrations on supply chain agility. Internal integration is the coordinated management of the company's internal operations as: marketing, finance, human resources, production/operations and logistics. It is related to easy access to information systems and integrated databases that connect various internal departments within an organization, such as easy access to inventory information throughout the supply chain, using computer-based systems planning between marketing and production. The external integration is the integration of a firm with key suppliers and customers provided that it occurs simultaneously, the level of external firm integration will be able to generate supply chain agility (Sukati et al., 2012).

According to Blome, et al. (2013) there are two fundamental building blocks of supply chain agility: supply-side competence and demand-side competence. Supply-side competence defined as a firm's proficiency in managing its upstream (supply-related) activities (e.g., supplier and production management). While demand-side competence is defined as the firm's ability to effectively manage downstream (demand-related) aspects (e.g., demand and distribution management). Both aspects have become critical importance due to a firm's increasing reliance on supply chain partners, heightened supply chain vulnerability, and the rising power of customers. While supply- and demand-side competence are both considered as substantial for the success in supply chain management.

2.6 The Relationships between the Research Constructs:

There is consensus that information sharing improves the decision-making of supply chain actors with regard to ordering, capacity allocation, and production / materials planning, enabling the supply chain as a whole to reduce costs and respond more quickly to end-consumer demand. Information about consumer needs and inventory store-level is related to a positive change in profit margins. Complete intra and inter-organizational collaboration results in the best profit for the supply chain activities and decisions in a value chain (within and between firms) are inconsistent and uncoordinated; the value chain loses its competitive advantage. Researchers in several business disciplines have recommended intra and inter-organizational collaboration for the effective management of a supply chain (Legner & Schemm, 2008).

2.6.1 The Relationship between ERP System and Supply Chain Agility

ERP system enhances better information flow among all of the entities in the supply chain which leads to cycle time reduction; the supply chain will be better equipped to

answer customers' real-time demands. Answering real time demands in turn leads to an overall increase of productivity, and product and delivery quality. Furthermore, such firms strip redundancy and duplication of materials from supply chain operations. The managerial benefits of ERP, which include better resource management and improved decision making and planning, performance improvement, partnership management, scheduling, and quality management, are the most important factors impacting the operational process (Su & Yang, 2010).

As ERP system enabling internal collaboration which enables firm to distribute and use information more effectively, encourage communications and interactions among different functional units, interpret information from its partners more effectively. This leads to improving the level of inter-organizational integration, the ability to solve problems with their external partners, and enable firms to respond quickly to the external partner requirements. On the other hand, firms with poor internal collaboration are more likely to create ambiguity and unexpected delay. This might accordingly damage the inter-organizational cooperation (Chen et al., 2011).

A critical aspect of successfully managing the supply chain lies in measuring and monitoring information about its key operational and performance parameters (e.g. inventory, delivery schedules and lead times). Inventory tracking has enabled real time demand forecasting and inventory management, leading to higher inventory turnover and reduced inventory costs. As ERP system monitoring and controlling day to day intra and inter firm processes which facilitate operational efficiency in the supply chain by registering transactions, making information about them easily available, structuring intra and inter-firm workflows around standard activities and using standard protocols to facilitate information exchange between them (Qrunfleh & Tarafdar, 2014).

2.6.2 The Relationship between E-Business Technologies and Supply Chain Agility

According Devaraj, et al. (2007) there is a relationship between e-business technologies and supplier integration that leads to better performance. The thrust of investment in e-business technologies is to create a seamless integration of entities in a supply chain, which calls for the sharing of accurate and timely information and coordinate activities between business entities, as capturing and sharing real-time information has become essential to improving supply chain performance. E-business technologies also facilitate the collaboration of supply chain entities.

Nurmilaakso (2008) states that supply chain integration and e-business technologies are interrelated with each other. E-business technologies function, such as online sales, purchases, demand forecasting or resource management is a business function in the supply chain in which a company shares information with its business partners through computer-mediated networks, such as the Internet or value-added networks.

E-business technologies enhance supply chain effectiveness and efficiency through the automation of business processes, facilitate collaboration and supply chain information sharing, such as order forecasts and inventory planning; automate requisition and purchase order creation and integrate payment processes (Wagner & Sweeney, 2010).

Today almost all organizations are in the process of adopting some type of e-business technology to streamline SCM activities. For example, e-procurement has automated and streamlined many corporate purchasing processes. As most successful manufacturers have tight coordination with their supply chain partners, enabling real-time information to travel immediately up and down the supply chain and well coordinated movement of inventories. The results are products that are delivered

quickly and reliably when and where they are needed, high responsiveness to short lead times. As partners permitting strong customer and supplier integration for inventory planning, demand forecasting, order scheduling, and customer relationship management (Sanders, 2007).

2.6.3 ERP System and E-Business Technologies Integration with Supply Chain Agility

Bhardwaj (2013) considered ERP systems are basically backbones of e-business in respect of implementing inter and intra organizational business activities such as productions planning, financial management, requisition to cash process chains, logistics etc. These business activities are necessary to provide the communication channel between internal enterprise activities with external entities. On the other hand, e-business enables companies to link their internal and external data processing systems more efficiently and flexibly to work more closely with suppliers and partners and to better satisfy the needs and expectations of their customers. E-business is focused on efficiency and effectiveness of external cross enterprise processes. ERP system focus on intra organizational, e-business makes ERP system more transparent and outward.

The conclusion form all the above that ERP system enhances the internal integration by combining all the business functions and all the data in one center database which leads to intra-organizational collaboration. E-business technologies enhance the inter-organizational collaboration, thus integrating ERP system and e-business means that the organization is internally and externally integrated. This makes the supply chain more agile because it is internally and externally integrated which will enable higher responsiveness to the changing environment of the marketplace. And this is the purpose

of this study is to examine the impact of ERP system, e-business, and their integration on supply chain agility: mediated by inter and intra-organizational collaboration.

2-2- Previous Studies

Previous researches in the literature have been conducted to discuss the relationships between one or more variables of this study. The researcher has selected the following researches as previous researches:

1. **Abdinnour-Helm et al., (2003)** conducted a study titled **"Pre-Implementation Attitudes and Organizational Readiness for Implementing an Enterprise Resource Planning System"**. The study aimed to investigate the pre implementation attitudes and organizational readiness for implementing an enterprise resource planning system. They depend on a quantitative methodology through a survey questionnaire to 946 employees. The results of this study indicate that, contrary to conventional wisdom, extensive organizational investments in shaping pre-implementation attitudes do not always achieve the desired effects. Despite extensive time, money and effort, length of time with the firm and position had a greater impact on attitudes toward ERP system capabilities, value, acceptance and timing than high levels of pre-implementation involvement.

2. **Marnewick and Labuschagne (2005)** conducted a study titled **"A Conceptual Model for Enterprise Resource Planning (ERP)"**. The study aimed to provide a conceptual model that explains the complexity of an ERP system to general and project managers in a non-technical manner. To reach this objective the 4Ps business model serves as a starting-point to derive the ERP system model because most managers are familiar with it and can therefore relate to it with ease. An ERP system is divided into four major components, namely, the software, the customer mindset, change management, and the flow of processes within it. A fifth component methodology

encircles these four components to ensure that they are integrated and implemented in an organized manner. The findings reveal that ERP system is more than just software. Unless a clear understanding exists of the different components and their integration, ERP system projects will continue to be plagued by failure.

3. Velcu (2005) conducted a study titled **"Impact of the Quality of ERP Implementations on Business Value"**. His study aimed to compare the financial performance trend between successful and less successful ERP system implementers over three years after the implementation. To reach this objective, he performed a comparative analysis of the change in financial performance after implementation amongst 17 less successful ERP system adopters and 32 successful ERP system adopters. They were using the following financial impact indicators: ROA, ROI, Profit Margin, Assets Turnover, Capital Turnover and Wages / Total Costs. The findings revealed no significant difference in the financial performance change after implementation between the two groups of ERP system adopters in terms of ROA and ROI. However, the further decomposition of ROA and ROI indicated that the successful ERP system adopters do have significant better efficiency benefits than the less successful ERP system adopters in terms of Assets Turn-over and Capital Turnover in the first two years after implementation. The post implementation trend in Profit Margin did not differ significantly between the two groups of companies, although it continued to decline over the three years for both groups.

4. **Devaraj et al., (2007)** conducted a study titled **"Impact of E-Business Technologies on Operational Performance: The Role of Production Information Integration in the Supply Chain."** There study aimed to hypothesize that while there may be no direct

benefit of e-business technologies on performance, these technologies might support customer integration and supplier integration in the supply chain, which in turn might impact operating performance. To examine their hypotheses, they collected data from 120 survey .The study analyses showed that there was no direct benefit of e-business technologies on performance; however these technologies supported customer integration and supplier integration. Further, supplier integration was found to positively impact cost, quality, flexibility, and delivery performance; however there was no relationship between customer integration and performance. Consequently, there is a relationship between e-business technologies and supplier integration that leads to better performance. Further, there is an interactive effect between customer integration and supplier integration that supports the notion that firms that have both forms of integration, supported by e-business technologies, significantly outperform the others.

5. **Sanders (2007)** conducted a study titled "**An Empirical Study of the Impact of E-Business Technologies on Organizational Collaboration and Performance**". The study tested the relationship between organizational use of e-business technologies, intra and inter-organizational collaboration and performance. This study deployed the quantitative methodology depending on surveys as tools for collecting data from 2000 U.S. manufacturing firms. Their findings show that using e-business technologies impacts performance both directly and indirectly by promoting both measures of collaboration. Intra-firm collaboration is also found to have a direct impact on organizational performance. But, the impact of inter-organizational collaboration on performance is found to be only indirect through the impact of intra-organizational collaboration.

6. **Rabaa'i and Gammack (2008)** conducted a study titled **"A Hiccup or a Rift? ERP Implementation Success in Jordan."** The study aimed to look at the perceptions of both public and private sector ERP system implementations in Jordan and assesses these on various measures of success. They depend on a quantitative methodology through a survey questionnaire to 297 employees from Jordanian public and private organizations with ERP system implementation experience (project managers and team members). The results of this study indicate that, and the traditional style of management in Jordan did not fit well with the requirements for successful implementation of ERP system. As according to the researchers the recent studies from various countries that show cultural fit is a particularly neglected factor in assessing ERP system success.

7. **Smart (2008)** conducted a study titled **"E-Business and Supply Chain Integration"**. His study aimed to examine how four large organizations have approached the implementation of new e-business mechanisms: namely online order processing, eProcurement, reverse auctions, and a private exchange. The objectives are to establish whether supply chain integration is an identified goal for the firms involved and to evaluate the extent of integration achieved through these projects. To reach his objective a case study approach is used, with four separate cases being examined, leading to cross-case analysis and conclusions. The primary form of data collection was interviews with managers participating in the implementations. The findings revealed that in three of the cases it is established that there is very little, or nil integration at supply chain level and only in one case is there evidence of a supply chain perspective contributing to the project. Three of the firms did not consider the supply chain implications of implementing their e-business applications.

8. **Braunscheidel and Suresh (2009)** conducted a study titled **"The Organizational Antecedents of a Firm's Supply Chain Agility for Risk Mitigation and Response"**. This study aimed to investigates the impact of two cultural antecedents, market orientation and learning orientation, and three organizational practices, all aimed at augmenting the supply chain agility of a firm. To reach this objective they depended on a quantitative methodology through a survey questionnaire of 218 questionnaires. The findings revealed that strong linkages exist among the cultural antecedents, the three organizational practices considered, and the firm's supply chain agility. All three organizational practices, internal integration, external integration with key suppliers and customers, and external flexibility are shown to have significant positive impact on the firm's supply chain agility. Market orientation is shown to significantly impact both internal and external supply chain integration, along with the two elements of external flexibility. Learning orientation, on the other hand, is shown to have a strong and direct influence only on the level of internal integration. Firms with high levels of external integration are also shown to have high levels of internal integration, consistent with past research. Internal and external integration efforts are also seen to be unrelated to the levels of external flexibility present. The results serve to establish a set of key drivers for augmenting supply chain agility as a risk management initiative.

9. **Kisperska-Moron and Swierczek (2009)** conducted a study titled **"The Agile Capabilities of Polish Companies in the Supply Chain: an Empirical Study".** This study aimed to explores the main agile capabilities of Polish companies in supply chains. The variables, which have an impact on the inter-organizational agility in the supply chains were identified. To reach this objective they depended on quantitative methodology, they used questionnaires, sent to 96 companies. The results of the study

show that the examined companies can be grouped into four classes having distinct characteristics. The conclusions of the paper indicate which attributes of companies in specific industries may influence more positive or negative attitude to the agility concept

10. **Li, et al., (2009)** conducted a study titled **"Supply Chain Agility: Scale Development"**. The study aimed to develop an instrument to measure supply chain agility. The data for this paper were collected in dyadic conversations between the authors of the paper and the supply chain executive(s) of each of 66 firms. As a result of their research the instrument has been rigorously tested and validated, which generates a high degree of confidence in the scale's validity and reliability. This paper fulfills an identified need for the development of an empirically validated instrument to measure supply chain agility. This reliable and validated instrument enables and facilitates future studies in the supply chain agility research stream.

11. **Mena et al., (2009)** conducted a study titled **"A Comparison of Inter-And Intra-Organizational Relationships".** The study aimed to question the validity of the assumption that intra-organizational relationships are more collaborative that inter-organizational ones by comparing the levels of collaboration in two cases that comprise both types of relationship. To reach this objective two case studies in the UK food industry were conducted, in each two relationships were analyzed: one inter- and one intra-organizational. Data were collected through a questionnaire followed by semi-structured interviews. This exploratory research indicates that in both case studies intra-organizational relationships have lower levels of collaboration than inter-organizational

ones. This appears to contradict the commonly held assumption that intra-organizational relationships involve closer collaborations than inter-organizational ones.

12. **Andreu et al., (2010)** conducted a study titled **"An Analysis of E-Business Adoption and its Impact on Relational Quality in Travel Agency–Supplier Relationships"**. The study aimed to analyzes how managers of retail travel agencies perceive the antecedents and consequences of adopting e-business in their supplier relationships. A comprehensive model integrating its antecedents and relational effects is developed and empirically tested using SEM. The study surveyed 101 travel agents in Spain. The research findings indicate that customer pressure has a strong influence on e-communication practices. E-communication with the travel agency's supplier and the pressure exerted by the sector are the main antecedents for e-procurement. Effects of e-business on relational quality are contradictory. E-procurement influences negatively on trust. Conversely, e-communication has a positive impact on trust, thus having a favorable impact on perceived reciprocity and travel agent's commitment to its supplier. Main findings indicate that the use of the Internet is largely driven by normative pressures, and this coercive power has a detrimental impact on trust.

13. **(Hawari & Heeks, 2010)** conducted a study titled **"Explaining ERP Failure in Developing Countries: A Jordanian Case Study"** The study aimed to address the question of why ERP projects fail in developing countries, To reach this objective a qualitative analysis followed by a quantitative rating that is a composite from interviewee questioning, documentary evidence**.** The paper draws conclusions about good practice in ERP implementation relating to both risk identification and risk mitigation, and offers examples of both specific and generic actions that can be

undertaken**.** It finds sizeable gaps between the assumptions and requirements built into the ERP system design, and the actual realities of the client organization.

14. **Mehta (2010)** conducted a study titled **"Critical Success Factors for Successful Enterprise Resource Planning Implementation at Indian Small and Medium-Size Enterprises (SMEs)"**. The main objectives of this paper are to identify and rank the critical success factors that influence the success of ERP system implementation at Indian SMEs. The paper presented quantitative methodology by using two close ended questionnaires to collect the data from 50 Indian ERP system consultants who have experience in ERP system implementation in India. Results of this study showed that the top most critical success factor for the successful ERP system implementation at Indian SMEs is the clear business plan and vision followed by top management commitment and support.

15. **Su & Yang (2010)** conducted a study titled **"Why Are Enterprise Resource Planning Systems Indispensable to Supply Chain Management?"** The study aimed to propose a conceptual framework featuring the ERP system benefits and SCM competencies, and examines the impacts of the ERP system benefits on the SCM competencies. To reach this objective they depended on a quantitative methodology through a survey questionnaire delivered to 334 firms, 285 usable responses were received from 76 IT or ERP/SCM related managers, 158 lower-middle IT or ERP/SCM related managers and 51 others (who gave their job titles as ''Director" or ''Vice-President") employed by 138 companies. Accordingly the results confirm the operational, managerial, and strategic benefits of ERP system for the SCM

competencies, but not the IT infrastructure and organizational benefits as significant predictors of them. Moreover, more than 80% of respondents think it necessary to first adopt an ERP system as the backbone of company operations before deploying other enterprise systems (ES), such as the SCM system

16. **Chan, et al., (2011)** conducted a study titled **"ERP II Readiness in Jordanian Industrial Companies"**. His study aimed to investigates the readiness of Jordanian industrial companies for ERP II implementation via an empirical study using a self-administered questionnaire The population of the study consists of 103 Jordanian industrial companies taking into the consideration the availability of IT departments in these companies, One hundred three questionnaires were sent; fifty one were received in usable format. The study results revealed that the Jordanian industrial companies have all of the ERP II components with the exception of CRM and PRM, while suffering from significant integration deficiency, and lacking business intelligence support. The findings of this study shall encourage the Jordanian industrial companies to review their ERP II integration strategies to maximize the IT investment return.

17. **Dantes and Hasibuan (2011)** conducted a study titled **"The Impact of Enterprise Resource Planning (ERP) System Implementation on Organization: Case Study ERP Implementation in Indonesia."** The study aimed to focus on the exploration of strategical and tactical impact induced by the implementation of ERP. To reach this objective thirty-five respondents from seven companies became the samples that represent four different industrial sectors (oil & service, manufacturing, telecommunication, automotive). The study shows that ERP system implementation gave more impact to tactical level than to strategical level. ERP system implementation

acted only as a support toward the core business instead of creating a competitive advantage. The reasons behind these findings are: (1) the companies were not ready to make big investment for implementing all modules in ERP system including the specific modules; (2) the companies were afraid to fail in their implementation, so they chose to implement the modules only for supporting the core business; (3) the ERP system implementations were not driven by the organizations' business needs, but by the technology itself; (4) there were other external factors which forced the companies to implement ERP, such as: government policy, bank policy and political issue.

18. **Dezdar and Ainin (2011)** conducted a study titled "**Examining ERP Implementation Success from a Project Environment Perspective**" The aim of this study is to analyze factors (related to ERP system project environment) that affect the implementation of ERP systems in Iran. The factors are: project management, team composition and competence, and business process reengineering. They depended on a quantitative methodology through a survey questionnaire to 384 ERP system users in Iranian organizations. Accordingly, the results showed that there is significant relationship between project management and team composition with ERP system implementation success. The better the project management activities are, the more successful the implementation will be. Likewise, the possibility of successful implementation is higher when the ERP system team is more coordinated and experienced.

19. **Kolarić et al., (2011)** conducted a study titled **"Application of E-Business in Modern Operation Of Public Companies in Serbia"**. This study aimed to examine

the efficiency of e-business application in public companies in Serbia and identification of familiarity with significance of e-business, as well as the level of efficient application of Internet technology in present conditions of Serbian public enterprises' functioning. Depending on quantitative methodology the study employed a questionnaire method and data were collected from 164 from 6 dominant public companies. The results show that besides solid familiarity of employees with the significance of e-business, the current functioning of electronic communication does not provide full support to the operation of public enterprises in Serbia. Scientific information obtained by research could be purposeful to the management of public services in Serbia, as well as other countries in transition.

20. **Lu and Ramamurthy (2011)** conducted a study titled **"Understanding the Link between Information Technology Capability and Organizational Agility: An Empirical Examination."** The study understudied IT–agility contradiction by which IT may enable or impede agility. The researchers develop the premise that organizations need to develop superior firm-wide IT capability to successfully manage their IT resources to realize agility. To reach this objective the researchers conduct a matched-pair field survey of business and information systems executives in 128 organizations to empirically examine the link between a firm's IT capability and agility. Their results show a significant positive relationship between IT capability and the two types of organizational agility. The researchers also find a significant positive joint effect of IT capability and IT spending on operational adjustment agility but not on market capitalizing agility. The findings suggest a possible resolution to the contradictory effect of IT on agility: while more IT spending does not lead to greater agility, spending it in such a way as to enhance and foster IT capabilities does.

21. Rimienė (2011) conducted a study titled **"Supply Chain Agility Concept Evolution (1990-2010)"**. His study aimed to reveal origins of agility paradigm and the concept of supply chain agility, summarize the terms and content maturity, review the input of different authors into the theory development, as well as define supply chain agility characteristics and enablers. To reach this objective methods include nonfiction and special literature comparative analysis and synthesis, the generalization of the research results. The findings revealed as the result of the survey paper presents empirical research on the evolution of supply chain agility during the period of 1990 – 2010, identifying background theories, presenting different various authors' attitudes and definitions for agility, reviewing agility concept adaption for supply chain competitive ability acquisition, as well as definition of supply chain agility forming factors or evaluation criteria.

22. Gligor and Holcomb (2012) conducted a study titled **"Understanding the Role of Logistics Capabilities in Achieving Supply Chain Agility: a Systematic Literature Review"**. The study aimed to explore the role of logistics capabilities in achieving supply chain agility through a multi-disciplinary review of the relevant research. The systematic literature review aims to provide the basis for formulating a conceptual framework of the relationship. To reach this objective systematic, comprehensive review of the literature on manufacturing, organizational and supply chain agility from 1991 through 2010 was conducted. The literature on logistics capabilities was also examined to identify the various elements that contribute to supply chain agility. The findings revealed that supply chain agility has primarily been explored in the literature through a focus on manufacturing flexibility, supply chain speed, or lean

manufacturing. The role of logistics capabilities in achieving supply chain agility has not been addressed from a holistic conceptual perspective. This research addresses that gap using a multi-disciplinary approach. As such, it is the first phase in theory building on the concept of supply chain agility.

23. **Shatat and Udin (2012)** conducted a study titled **"The Relationship between ERP System and Supply Chain Management Performance in Malaysian Manufacturing Companies".** Their research aimed to examine the relationship between ERP system and supply chain management (SCM) performance. They used a quantitative methodology represented with a questionnaire survey posted to 80 Malaysian manufacturing companies that use ERP system. Their findings imply that the successful implementation and the effective usage of ERP system may contribute to enhancing supply chain management performance in many ways, such as integrating internal business processes, enhancing information flow within the company, improving the company's relationships and collaboration with outsourcing suppliers, customers, and supply chain partners.

24. **Sukatia et al., (2012)** conducted a study titled "**The Effect of Organizational Practices on Supply Chain Agility: An Empirical Investigation on Malaysia Manufacturing Industry"**. Their study aimed to investigate the relationship between organizational practices and supply chain Agility. Depending on quantitative methodology; they distributed questionnaires over a total sample of 150 executive officers, directors, presidents, vice presidents, managers, and senior staff from 40 manufacturing firms in Malaysia. Their findings showed that supply organizational practices have a significant relationship with supply chain agility. The research also

shows that supporting technology moderates the relationship between organizational practices and supply agility.

25. **Spin, M. (2012)** conducted a study titled **"The Effect of Intra-Organizational Routines and Inter-Organizational Routines on Collaborative Innovation Performance."** The aim of this study is to examine the effects of intra-organizational routines and inter-organizational routines on collaborative innovation and efficiency performance. Also the effects of inter-organizational routines on collaborative innovation and efficiency performance were studied. To reach this objective data of 190 participants were included in the dataset. The results showed that a complementary intra-organizational routines alignment affected the collaborative performance (innovation and efficiency) more positively than a supplementary intra-organizational routines alignment. Inter-organizational routines were found to have an U-shaped effect on collaborative innovation performance. For inter-organizational routines, no effects were found

26. **Trinh and Peszynski (2012)** conducted a study titled **"Enterprise System-Enabled Organizational Agility Capability: a Construct and Measurement Instrument".** This paper refers to the capabilities that organizations can leverage from their enterprise system like CRM, ERP system and SCM in supporting to organizational agility as the enterprise system -enabled Organizational Agility , and develops a set of variables to measure this construct. To reach this objective they conducted 986 surveys on medium to large Australian and New Zealand organizations that have implemented and used enterprise systems for at least 1 year. They focused on three main enterprise systems: ERP, CRM and SCM. The research is significant to provide researchers the

metrics as part of nomological network of factors to explain the post-implementation impacts of enterprise system on organizational performance. It at the same time provides practitioners feasible tools in analyzing the enterprise system capabilities in their organizations.

27. **Yang & Liu (2012)** conducted a study titled "**Boosting Firm Performance Via Enterprise Agility and Network Structure"**. This study aimed to explore whether firms with superior network structure not only may be better able to generate direct effect on firm performance, but whether a superior network structure may also help firms to create better firm agility and thus enhance their performance. Depending on quantitative methodology the study employed a survey method and data were collected from 250 companies in Taiwan's glass industry. The results show that a firm's agility capability and its network structure are a critical competitive strategy source of firm performance. Moreover, network structure also partially mediates the impact of enterprise agility on firm performance.

28. **Yusuf et al., (2012)** conducted a study titled **"A Relational Study of Supply Chain Agility, Competitiveness and Business Performance in the Oil and Gas Industry"**. The main goal of this research is to assess the link between dimensions of agile supply chain, competitive objectives and business performance in the UK North Sea upstream oil and gas industry. Depending on quantitative methodology, they used questionnaires, covering important criteria of agility, sent to a sample of 880 supply chain managers within the UK oil and gas industry. Results of this study demonstrated that agility has a significant influence on competitive objectives and business performance of the sampled firms used in this study.

29. **DeGroote and Marx (2013)** conducted a study titled **"The Impact of IT on Supply Chain Agility and Firm Performance: An Empirical Investigation"**. The study aimed to investigates the impact of information technology (IT) on supply chain agility measured by the ability to sense and respond to market changes, and the impact supply chain agility has on firm performance. To reach this objective data were collected from supply chain executives at 193 U.S. manufacturing firms. The results suggest that IT improves the supply chain's ability to sense market changes by improving the adequacy, accuracy, accessibility, and timeliness of the information flows among members of the supply chain. IT also increases the supply chain's ability to respond to market changes by reducing the cost, and improving the quality and timeliness of developing and executing coordinated plans to respond to market changes throughout the supply chain. Importantly, the results indicate that enhanced supply chain agility has positive impacts on the firm's sales, market share, profitability, speed to market, and customer satisfaction.

30. **Schniederjans and Yadav (2013)** conducted a study titled **"Successful ERP Implementation: an Integrative Model."** This study aimed to present a conceptual model that better defines critical success factors to ERP system implementation organized with the technology, organization and environment framework. The paper also adds to current literature the critical success factor of trust with the vendor, system and consultant which has largely been ignored in the past The paper uses past literature and theoretical and conceptual framework development to illustrate a new conceptual model that incorporates critical success factors that have both been empirically tied to ERP system implementation success in the past and new insights into how trust impacts

ERP system implementation success. The paper finds a lack of research depicted in how trust impacts ERP system implementation success and likewise a lack of a greater conceptual model organized to provide insight into ERP system implementation success. But proposes a holistic conceptual framework for ERP system implementation success and discusses the impact that trusts with the vendor, system and consultant has on ERP system implementation success.

31. **Pei-Fang Hsu (2013)** conducted a study titled **"Integrating ERP and E-Business: Resource Complementarity in Business Value Creation".** He investigated the complementary effect between ERP system and e-business technologies, and the impact of such effect on business value creation. Depending on quantitative methodology, they used questionnaires, sent to 150 interviews from U.S. manufacturing industry sector that use ERP system in their business. The study provides empirical evidence that the complementary effect between ERP system and e-business technologies in creating business value is stronger than the main effects of ERP system or e-business technologies alone.

32. **Ekman et al., (2014)** conducted a study titled "**Extending the ERP System: Considering the Business Relationship Portfolio**". The study aimed to consider business relationships as a resource but also a limitation when companies strive to get an extended ERP system as the research has shown that companies focus their internal processes when they adopt ERP systems. However, the ERP systems need to expand their functionality to include customers and suppliers (with e-commerce functionality) to reach their full potential. To reach this objective the paper presents an illustrative case study of an industrial company's process of developing an extended ERP system

and how the company's portfolio of business relationships has affected the solution. The analysis is supported by the markets-as-networks theory. The findings revealed that the process of developing an extended ERP system needs to incorporate the company's business partners (customers and suppliers). It is a simultaneously bottom-up and top-down process given that the operative frontline staff hold the knowledge about the company's business relationships while the corporate management has the means of extending the ERP system functionality and align it with the focal company's strategy.

33. **Hudnurkar et al., (2014)** conducted a study titled **"Factors Affecting Collaboration in Supply Chain".** The study aimed to analyzed in the context of the role of information sharing in supply chain collaboration as according to them supply chain information sharing found to be highly talked factors for effective supply chain collaboration. To reach these objective 69 randomly selected papers on supply chain collaboration and the role of information sharing on supply chain collaboration is performed. Based on the analysis of reviewed papers a total number of 28 factors affecting supply chain collaboration have been identified. The findings revealed that after analysis of the 69 randomly selected research publications, it is quite evident that no study has been found in the Indian context with respect to supply chain collaboration. In the reviewed papers a balance between empirical study type papers and conceptual study type papers has been observed. The major focus of the papers is on manufacturing and a retailer organization has been observed. Based on analysis of the reviewed papers, 28 factors affecting the supply chain collaboration have been identified. The supply chain collaboration and supply chain coordination are interchangeably used in the extant literature. In the reviewed papers, the development framework to measure supply chain collaboration and, testing of empirical association

between supply chain collaboration and increased supply chain performance are two most highly research themes has been traced. In the reviewed papers the collaboration between manufacturing organization and their suppliers has been highly dominated. In very few papers, the downstream to manufacturing organization collaborations has been discussed. Therefore, here as research gap can be found to address the downstream supply chain collaboration as well as collaboration with more than one tier supplier. Further, the most of the authors argued that the role of information sharing is found to be highly significant in effective supply chain collaborations. The main identified benefits are; cost saving, inventory reduction, increase visibility, reduction in bullwhip effect etc. So, and they conclude that there is a greater need to study: collaboration in supply chain, the antecedents and benefit of information sharing in Indian manufacturing organizations.

34. Mazzawi (2014) conducted a study titled **"Enterprise Resource Planning Implementation Failure: a Case Study from Jordan".** The paper studies the critical factors, which caused ERP implementations to fail in four Jordanian companies of different sizes that were implementing three different ERP systems, their similarities exist in the fact that they all deal with customers. To reach this objective a case study was conducted on four companies in the Jordanian market. The results of the case study revealed that, each company had its own set of failure factors depending on the relation between the installed ERP and company's requirement, vision and goals. It also showed that collaboration between the top management and the hired consultant is essential for the success of the system's implementation process. It also highlighted the common failure factors between the companies, which would have been avoided if the hired consultant paid more attention to them.

35. **Ram and Corkindale (2014)** conducted a study titled **"How "Critical" are the Critical Success Factors (Csfs)? Examining the Role Of Csfs for ERP".** The study aimed to examine the literature on ERP system to establish whether the Critical Success Factors (CSFs) for achieving stages of an ERP system project have been empirically shown to be 'critical'. To reach this objective the authors used a systematic approach to review 627 refereed papers published between 1998 and 2010 on ERP, from which 236 papers related to CSFs on ERP system were selected for analysis. The authors employed procedures from qualitative and interpretive research methods, to analyze and interpret the material using five-step procedure of gathering, categorizing, coding, analyzing and comparing the data. The study finds that prior studies have identified a large number of CSFs for ERP system implementation success or improved performance outcomes. The authors have shown that a limited number of CSFs have been empirically investigated for their role in, and effect on, implementation success or post-implementation performance outcomes. While reporting the factors that have some evidence to support them, the authors question the utility of the general concept of CSFs.

36. **Yang (2014)** conducted a study titled **"Supply Chain Agility: Securing Performance for Chinese Manufacturers"**. The study argues that technical (IT capability) and relational factors (information sharing and trust, and operational collaboration) are the antecedents of a manufacturers supply chain agility, the study also posits that cost efficiency mediates the relationship between agility and performance based on transaction cost economics. To reach this objective the study develops and empirically tests a conceptual framework to investigate the antecedents of manufacturer, supply chain agility and the connection of their agility with performance in an emerging economy. Results of this study shows that strong associations exist between a

manufacturing firms IT capability and operational collaboration with suppliers and its supply chain agility, the results also indicate the significant mediating effect of cost efficiency between the manufacturers supply chain agility and performance.

37. **Qrunfleh and Tarafdar (2014)** conducted a study titled **"Supply Chain Information Systems Strategy: Impacts on Supply Chain Performance and Firm Performance"**. This study aimed to examines the relationship between supply chain strategy and supply chain information systems strategy, and its impact on supply chain performance and firm performance. This study deployed the quantitative methodology depending on surveys as tools for collecting data from members of senior and executive management in the purchase/materials management/logistics/supply chain functions, from 205 firms. The findings revealed that the supply chain information system for Efficiency (supply chain information systems for Flexibility) and supply chain information systems strategy enhances the relationship between Lean (Agile) supply chain strategy and supply chain performance. The findings also show a positive association between supply chain performance and firm performance, and a full (partial) mediation effect of supply chain performance on the relation between Agile (Lean) supply chain strategy and firm performance.

38. **Yusuf et al., (2014)** conducted a study titled **"A Study of the Diffusion of Agility and Cluster Competitiveness in the Oil and Gas Supply Chains"**. This study aimed to look at the diffusion of agility in the oil and gas industry and examines, empirically, the agility advantage, competitiveness gain and performance benefits of cluster members over non-members, the role of clusters as a strategy for economic exploitation of oil and gas resources. To reach this objective the researchers depended on

quantitative methodology; they distributed questionnaires to 880 recipients. The findings suggest that clusters enhance and enable higher levels of agile practices. The findings indicate that there is no strong empirical basis to make a direct link between clusters and competitiveness, at least in the oil and gas industry. It follows from this that the universality of the attribution of competitiveness to clusters as espoused by the proponents of cluster theory is questionable and empirical evidence certainly does not support their position in the context of the oil and gas clusters.

Chapter Three: Research Method

This chapter presents the study sample, methods of collecting data, the sources of data and methods of data analysis.

3.1 Study Method Approach and Procedures

This study deployed the quantitative methodology through investigating the related prior studies, and by using questionnaires presented to the unit of analysis. The questionnaire validity was examined by panel of judgment includes 7 academics whom field of specialty is connected to the subject of the current study (shown in appendix number 2). The questionnaire was constructed by four sections which are demographic section that aimed to collect some demographic data about research respondents, ERP system utilization section, e-business technologies section; integration of ERP system & e-business technologies section; intra-organization collaboration section; inter-organization collaboration section; and the last section was for the supply chain agility.

3.2 Study Population

The study population consisted of all ERP system users working at Hikma Pharmaceuticals Company. Because the population of the current research is small, it negates any need for sampling.

3.3 Study Unit of Analysis

The research unit of analysis consisted of ERP system users in all managerial levels (Top, Middle, and Low) because it is believed that they have good knowledge about how the organization utilize ERP system and connected it with e-business technologies. The questionnaire was sent to a contact point within the company who assigned by the

top management and knows who utilized the ERP system and 155 questionnaires were handed in to the contact point and this number was determined according to companies' permission. Only 115 responded to the questionnaire. Out of the returned questionnaires, 10 responses were excluded due to missing values and multiple answers to questions. Accordingly, only 105 responses were valid for data analysis.

3.4 Study Tools and Data Collection

First: Secondary Data

Secondary data was collected from articles, books, theses, etc. This way facilitated building strong theoretical background to clarify the problem definition, testing, and comparing study results with literature results.

Second: Primary Data

The primary data was collected through questionnaire as mentioned earlier which was divided into five sections representing demographics variables and research model variables. The first section is meant to collect demographic data of research respondents to be able to understand the characteristics of respondents and give further information to the reader about the research respondents. The second section presented the ERP system utilization which tries to dig deeper about how the sampled organization actually utilized ERP system, in order to ensure high level of reliability, the measurement items for ERP system were adopted from (Hsu, 2013). The third section presented the e-business technologies which aimed to know what type of channels the sampled organization used to interact with its external business partners and whether these channels are connected with backend system such as ERP system, items for measuring e-business technologies were adopted from (Hsu, 2013). The fourth section related to integration of ERP system with e-business technologies which intends to understand

how well the ERP system is integrated with e-business technologies. Items for measuring integration between ERP system and e-business technologies were adopted from (Hsu, 2013). The fifth section described the intra-collaboration process between the sampled organization and external business partners. Items for measuring intra-organization collaboration were adopted from (Sanders, 2007). The sixth section details inter-organization collaboration process among internal functional departments. Items for measuring inter-organization collaboration were adopted from (Sanders, 2007). The last section set forth supply chain agility and its measurement items were adopted from (Braunscheidel et al. (2009) and Gligor et al. 2012)). All the questionnaire items were anchored according to the Five Point Likert Scale (1 strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree). The questionnaire instrumental sections are as follows:

Section One: **Demographic variables.** The demographic information was collected with closed-ended questions, through **(5)** factors (Gender; Years of experience; Age; Education level, and Occupational level).

Section Two: **Independent Variables**: This section measured the ERP system utilization through **(7)** statements; e-business technologies measured through (3) statements, and integration between ERP system & e-business technologies was measured through (8) statements on a 5 point Likert-Scale.

Section Three: **(Mediating Variables) Organizational collaboration.** This Section was divided into tow sub-section intra and inter-organizational collaboration. The intra-organizational collaboration was measured through (4) statements while inter-

organizational collaboration was measured through **(**3) statements, on a 5 point Likert-scale.

Section Four: **(Dependent Variable) Supply Chain Agility.** This Section was measured through **(**12**)** statements, on a 5 point Likert-scale.

3.5 Data Validity and Reliability

3.5.1: Data Validity

To validate the data collection instrument used in this study in terms of its readability, format, and ability to measure the study's constructs; the researcher distributed the questionnaire instrument to a number of professors those who have specializations and expertise in the field of this study in public and private universities in Jordan, as shown in Appendix 2: (Dr. Abdel-Bari Durra; Dr. Abd Al Azez Al Nedawi; Dr. Ahmad Ali AlSaleh; Dr. Goerge Samour; Dr. Samir Al Daheyat; Dr. Mahmoud Meqdady; Dr. Zu'by Al Zu'by). The questionnaire instrument was then updated and refined to reflect the comments and suggestions received by the domain experts. Moreover, the experts showed interest and interact with the researcher concerning the questionnaire instrument which adds to its validity.

3.5.2: Data Reliability

In order to measure the internal consistency and reliability of the study's constructs. Cronbach's alpha (α) measure was used. The scales' reliabilities were measured and the Cronbach's alphas of all scales as in Table 1 were ranged between (0.58) and (0.89); indicating good reliabilities of the scales (Hair et al., 2006) a part from e-business technologies. The e-business technologies result which is (0.58) can be justified by the fact that there are only three questions to measure e-business technologies in the

questionnaire. However, the reliability of the instrument as a whole is very good (α=0.90).

Table 1
Data Reliability Analysis

Construct	Number of Items	Cronbach's alpha (α)
Enterprise Resource planning system(ERP)	6	0.77
E-business Technologies	3	0.58
Integration of ERP system and e-business technologies	8	0.79
Intra-organization collaboration	4	0.79
Inter-organization collaboration	3	0.68
Supply Chain Agility(SCA)	12	0.89
All The Questionnaire items		**0.90**

3.6 Study Statistical Techniques:

According to Hair et al. (2013), the researcher used the suitable statistical methods that consist of:

- Percentage and Frequency used to describe the characteristics of research respondents.
- Cronbach's Alpha reliability (α) used to measure strength of the correlation and coherence between questionnaire items.
- Arithmetic Mean used to identify the level of response of study sample individuals to the study variables.
- Standard Deviation used to measure the responses spacing degree about Arithmetic Mean.

- Simple Regression and Multiple Regression analysis used to testing the direct impact of independent variables on mediating and dependent variables.
- Path Analysis used to test the direct and indirect impact of independent variables on dependent variable through mediating variable. The path analysis has several built in ready formulas based on the structural equation modeling. The structural equation modeling (SEM) is a collection of statistical models that seeks to explain causal relationships among multiple variables. It enables researchers to examine interrelationships among multiple dependent and independent variables simultaneously (Hair et al., 2006). The reasons for selecting SEM for data analysis were, firstly; SEM has the ability to test causal relationships between constructs with multiple measurement items (Hair et al., 2006). Secondly, it offers powerful and rigorous statistical procedures to deal with complex models (Tabachnick and Fidell, 2001; Hair et al., 2006). The relationships between the research constructs are tested using the structural model (Hair et al., 2006). A one–step approach was adopted to perform SEM analysis as recommended by (Anderson and Gerbing, 1988) and the mediating role of intra and inter-organizational collaboration were tested in a two-step approach according to the suggestion of (Hair et al., 2013). In the next chapter, details of data analysis will be introduced.

3.7 Descriptive Statistics for Research Constructs

In this section, we rely mainly on the descriptive analyses to get the means and the standard deviations for the study constructs along with their items. The items were measured using a likert-type scale as follows.

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

Based on the aforementioned details, the means of the study's constructs will be dealt with according to the following formula.

Interval Length = (Highest Value – Lowest Value) / Number of Levels

Interval Length = (5-1) / 3 = 4/3 = 1.33 and thus;

- **Low Level** = 1+1.33 = 2.33 and Less
- **Medium Level** = 2.34+1.33 = 3.67 so this level range is from 2.34 to 3.67
- **High Level** = 3.68 and above

We have calculated the means and the standard deviations for the study constructs along with the items based on the responses the researcher has collected from the study's sample who actually are users of ERP systems.

Chapter Four: Data Analysis

4.1: Statistical Analysis

In order to answer the research questions and test the hypotheses, the researcher utilized a first generation statistical package; that is a Statistical Package for Social Sciences (SPSS) in addition to a third generation statistical package which is Partial Least Squares (PLS); more specifically SmartPLS 3.0 M1.5 SmartPLS package adopts Structural Equation Modeling (SEM) for data analysis. To answer research questions, the researcher utilized means, frequencies, and standard deviations. The Cronbach's Alpha test was also utilized to test the reliability and consistency of the data collection tool (i.e. questionnaire). To test the research hypotheses, the researcher utilized simple regression analysis, multiple regression analysis, stepwise multiple regression analysis, and path analysis.

4.1.1: Demographic Analysis

The population of this study includes all ERP system users in Hikma Pharmaceuticals Company which is successfully implemented ERP system. Because the researcher was unable to interact with respondents directly and the actual users of ERP system are limited within the sampled organization, a decision was taken to sample all the ERP system users in the sampled company. The sampled respondents can be simply described as users who interact with and utilized ERP system frequently to do their daily job tasks. The following is the descriptive analysis for the research respondents based on their demographic characteristics. Table 2 shows the descriptive analysis in terms of frequencies and percentages for respondents' gender.

Table 2
Descriptive Statistics of respondents' Gender

Respondents Gender	Frequency	Percentage
Male	94	89.5%
Female	11	10.5%
Total	**105**	**100%**

Table 2 shows that the majority of respondents (89.5%) are male whilst the remaining (10.5%) are female. This results indicates that the pharmaceutical industry still dominant by male workers rather than females. This is not a surprising result as still the Middle East culture does not accept women to work out of the education services and considered working at companies most likely is only for men. Table 3 presents the descriptive statistics of respondents' age.

Table 3
Descriptive Statistics of respondents' age

Respondents Age	Frequency	Valid Percent
Less than 20 years	0	3.8%
20-24 years	4	28.6%
25-29 years	30	30.5%
30-34 years	32	14.3%
35-39 years	15	22.9%
More than 40 years	24	3.8%
Total	**105**	**100%**

Table 3 shows that the majority of respondents aged between 25 to 34 (44.48%). However, none of our respondent aged less than 20 years old while only (3.8%) who aged more than 40 years old. This indicates that our respondents are mature enough to appreciate filling the questionnaire carefully will lead to valid results for the researcher and their company. Table 4 provides details of respondents' level of education.

Table 4
Descriptive Statistics of Respondents Educational Level

Domain of Business	Frequency	Percentage
Secondary School	0	0%
College Diploma	77	73.3%
Bachelor degree	25	23.8%
Postgraduate	3	2.9%
Total	**105**	**100%**

Table 4 shows that the majority of research respondents have a college diploma (73.3%). Followed by (23.8) who has bachelor degree while only (2.9%) who completed his/her postgraduate. This result indicates that the pharmaceutical sector starts to aware the importance of employing workers who have good level of education bachelor degree or above. At the same time, the sectors still keep its skillful workers who have college diploma combined with excellent practical experience. Table 5 provides respondents years of experience.

Table 5
Descriptive Statistics of respondents' years of experience

Respondents years of Experience	Frequency	Percentage
Less than 5 years	24	22.9%
5-9 years	33	31.4%
10-14 years	25	23.8%
15-19 years	12	11.4%
More than 20 years	11	10.5%
Total	**105**	**100%**

Table 5 shows the distribution of research respondents according to years of experience as follows: (22.9%) less than 5 years; (31%) between 5-9 years, from 10 t0 14 is (23.8%) years of experience; (11.4) from 15 to 19 years of experience, and only (10.5%) who have more than 20 years of experience. A quick glance on table 5 shows that more

than half of research respondents hold between 5 to 14 years of experience (55.2%). This result indicates that the research respondents have sufficient experience allow them to fill the research questionnaire objectively. As they have a good knowledge about ERP system utilization and how well it is connected with available e-business technologies. Table 6 give more details about the occupation level of research respondents.

Table 6
Descriptive Statistics of Respondents Occupational Level

Occupational level	Frequency	Percentage
User (Employee)	52	17.2%
Department Head	35	33.3%
Manger	18	49.5%
Total	**105**	**100%**

Table 6 shows that the majority (49.5) of research respondents are normal users of ERP system. Followed by (33.3%) heads of departments while only (17.2) managers. This indicates that the research respondents represent a wide spectrum of ERP system users which gives the research results more validity rather than surveying one type of respondents such as employees, managers, and head of departments. In the next section, details descriptive statistics will be provided to show how the research respondents perceived and answered the questionnaire items.

Next, we present the means and the standard deviations for each of the study's constructs along with their items.

1. Enterprise Resource Planning System (ERP)

This construct is measured by seven items in the research instrument (the questionnaire). The means and standard deviation for each item is shown below:

Table 7
Descriptive Analysis for the Construct: Enterprise Resource Planning System

Items		Mean	STD	Rank	Level
Q9	The ERP system contains sales/order entry module.	4.46	0.88	1	High
Q7	The ERP system contains an inventory /material management module.	4.42	0.92	2	High
Q6	The ERP system contains a purchasing module	4.32	1.11	3	High
Q8	The ERP system contains a manufacturing module.	4.28	0.96	4	High
Q11	The ERP system contains advanced planning and scheduling module.	3.95	0.94	5	High
Q10	The ERP system contains data warehouse / business intelligence module.	3.90	1.12	6	High
Q12	The ERP system contains customer relationship management module.	3.32	1.11	7	Medium
Overall Mean		**4.09**	**1.06**		**High**

Table 7 shows that means of (Enterprise Resource planning) items are (4.46) and (3.32) with an overall mean of (4.09). The level of such an overall mean is high. Item number (9) got the highest mean which is (4.46) with a standard deviation of (0.88). The statement concerning item number (9) is as follows: (The ERP system contains sales/order entry module). On the other hand, item number (12) came last on the basis of mean values. The mean of this item is (3.32) and its standard deviation is (1.11) and thus is considered medium in terms of level. The statement of this item is as follows: (The ERP system contains customer relationship management module). Accordingly, the descriptive statistics concerning the construct (Enterprise resource planning system) indicate that the research respondents perceived their ERP system as a high multi-

modules system (Sales, purchasing, planning and scheduling, manufacturing, etc.) when considers the implementation and operations of ERP Systems.

2. E-Business Technologies

This construct is measured by three items in the research instrument (the questionnaire). The means and standard deviation for each item is shown in table 8 below:

Table 8
Descriptive Analysis for the Construct: E-business technologies

Items		Mean	STD	Rank	Level
Q15	The firm uses Electronic Data Interchange.	3.48	0.94	1	Medium
Q13	The firm uses extranet in its communications	3.44	1.13	2	Medium
Q14	The firm uses a website to communicate with the clients.	3.18	1.00	3	Medium
Overall Mean		**3.37**	**1.02**		**Medium**

Table 8 shows that means of (E-business technologies) items range between (3.48) to (3.18) with an overall mean of (3.37). The level of such an overall mean is medium. Item number (15) got the highest mean which is (3.48) with a standard deviation of (0.94). The statement concerning item number (15) is about the firm uses Electronic Data Interchange. On the other hand, item number (14) came last on the basis of mean values. The mean of this item is (3.18) and its standard deviation is (1.00) and thus considered medium in terms of level. The statement of this item is about the firm uses a website to communicate with the clients. Accordingly, the descriptive statistics concerning the construct (E-Business technologies) indicate that utilization of e-business technologies within the sampled organization is considered medium in terms of level when it comes to the utilization and operations of e-business technologies.

3. Integration of ERP System & E-Business Technologies.

This construct is measured by eight items in the research instrument (the questionnaire). The means and standard deviation for each item is shown in table 9 below:

Table 9
Descriptive Analysis for the Construct: ERP System & E-business integration

Items		Mean	STD	Rank	Level
Q16	The ERP system is integrated with the front-end e-business systems	3.51	1.15	1	Medium
Q17	The ERP system is integrated with the business partners' information systems.	3.49	1.07	2	Medium
Q19	The firm uses electronic networks to communicate with the suppliers.	3.18	1.10	3	Medium
Q18	The ERP system is electronically accessible by your business partners via a web-site, Electronic Data Interchange, or other electronic networks	3.08	1.08	4	Medium
Q22	The firm uses electronic networks with its suppliers to share demand and forecasting information.	3.04	0.99	5	Medium
Q23	The firm and the customers use electronic networks to conduct customer orders.	3.00	0.98	6	Medium
Q20	The firm uses electronic networks with its suppliers to share inventory availability or stock level.	2.99	1.01	7	Medium
Q21	The firm uses electronic networks with its suppliers to share production planning or schedule capacity.	2.91	1.02	8	Medium
Overall Mean		**3.15**	**1.05**		**Medium**

Table 9 shows that means of (ERP system & e-business technologies integration) items range between (3.51) to (2.91) with an overall mean of (3.15). The level of such an

overall mean is high. Item number (16) got the highest mean which is (3.51) with a standard deviation of (1.15). The statement concerning item number (16) is about whether the ERP system is integrated with the front-end e-business technologies, or not. On the other hand, item number (21) came last on the basis of mean values. The mean of this item is (2.91) and its standard deviation is (1.02) and thus considered medium in terms of level. The statement of this item is as follows: The firm uses electronic networks with its suppliers to share production planning or schedule capacity. Accordingly, the descriptive statistics concerning the construct (ERP system & e-business integration) indicate that the integration of ERP system with e-business technologies within the sampled organization is considered medium in terms of level when it comes to the integration of ERP System with e-business technologies.

4. Inter –Organization Collaboration.

The inter-organization collaboration construct is measured by four items in the research instrument. The means and standard deviation for each item is shown in table 10 below:

Table 10
Descriptive Analysis for the Construct: Inter-Organization Collaboration

Items		Mean	STD	Rank	Level
Q28	There is real -time sharing of cross-functional processes with suppliers.	3.03	0.92	1	Medium
Q30	The firm shares cost information with suppliers.	2.98	1.14	2	Medium
Q27	There is real-time sharing of operations information with suppliers.	2.97	0.98	3	Medium
Q29	The firm engages in collaborative planning with suppliers.	2.92	0.91	4	Medium
Overall Mean		**2.98**	**0.99**		**Medium**

Table 10 shows that means of (inter-organization collaboration) items range between (3.03) to (2.92) with an overall mean of (2.98). The level of such an overall mean is medium. Item number (28) got the highest mean which is (3.03) with a standard deviation of (0.92). The statement concerning item number (28) is as follows: There is real -time sharing of cross-functional processes with suppliers. On the other hand, item number (29) came last on the basis of mean values. The mean of this item is (2.92) and its standard deviation is (0.91) and thus considered medium in terms of level. The statement of this item is as follows: The firm engages in collaborative planning with suppliers. Accordingly, the descriptive statistics concerning the construct (intra-organization collaboration) indicate that inter-organization collaboration within the sampled organization is considered medium in terms of level when it comes to internal collaboration among the functional departments.

5. Intra –Organization Collaboration.

The intra-organization collaboration construct is measured by three items in the research instrument. The means and standard deviation for each item is shown in table 11 below:

Table 11
Descriptive Analysis for the Construct: intra-organization collaboration

Items		Mean	STD	Rank	Level
Q26	The firm shares operations information among all departments.	3.42	0.99	1	Medium
Q25	The firm utilizes an integrated database for information sharing.	3.32	0.98	2	Medium
Q24	The firm has cross-functional collaboration in strategic planning	3.30	1.05	3	Medium
Overall Mean		**3.35**	**1.00**		**Medium**

Table 11 shows that means of (intra-organization collaboration) items range between (3.42) to (3.30) with an overall mean of (3.35). The level of such an overall mean is medium. Item number (26) got the highest mean which is (3.42) with a standard deviation of (0.99). The statement concerning item number (26) is as follows: The firm shares operations information among all departments. On the other hand, item number (24) came last on the basis of mean values. The mean of this item is (3.30) and its standard deviation is (1.05) and thus considered medium in terms of level. The statement of this item is as follows: The firm has cross-functional collaboration in strategic planning. Accordingly, the descriptive statistics concerning the construct (intra-organization collaboration) indicate that the sampled organization internal collaboration among functional departments is considered medium.

6. Supply Chain Agility.

The supply chain agility construct is measured by twelve items in the research instrument. The means and standard deviation for each item is shown below: Table 12 summarizes the means and standard deviations of the items of supply chain agility in a descending order on the basis of their means.

Table 12
Descriptive Analysis for the Construct: Supply Chain Agility

Items		Mean	STD	Rank	Level
Q35	The firm detects changes in supply/demand in a timely manner	3.35	0.91	1	Medium
Q32	The firm uses many channels to keep aware of strategic opportunities/challenges	3.31	1.10	2	Medium
Q31	The firm detects strategic opportunities/ challenges in a timely manner (e.g. new	3.22	0.98	3	Medium

	competitor movement, new economic tendency, new technology, and new market).				
Q34	The firm reconfigures supply chain resources in a flexible manner to respond to strategic opportunities/challenges	3.21	1.00	4	Medium
Q42	The firm reconfigures supply chain resources in a flexible manner to respond to changes in daily supply chain execution	3.20	0.99	5	Medium
Q38	The firm reconfigures supply chain resources in a flexible manner to respond to changes in supply/demand	3.14	0.97	6	Medium
Q37	The firm reconfigures supply chain resources in a timely manner to respond to changes in supply/ demand	3.15	1.02	7	Medium
Q39	The firm detects changes in supply chain daily execution in a timely manner.	3.13	0.95	8	Medium
Q40	The firm uses many channels to keep aware of changes in supply chain daily execution.	3.12	0.91	9	Medium
Q33	The firm reconfigures supply chain resources in a timely manner to respond to strategic opportunities/challenges.	3.11	0.96	10	Medium
Q41	The firm reconfigures supply chain resources in a timely manner to respond to changes in daily supply chain execution.	3.10	0.97	11	Medium
Q36	The firm uses many channels to keep aware of changes in supply/demand	3.09	0.95	12	Medium
Overall Mean		**3.18**	**0.98**		**Medium**

Table 12 shows that means of (supply chain agility) items range between (3.35) to (3.09) with an overall mean of (3.18). The level of such an overall mean is medium.

Item number (35) got the highest mean which is (3.35) with a standard deviation of (0.91). The statement concerning item number (35) is as follows: The firm detects changes in supply/demand in a timely manner. On the other hand, item number (36) came last on the basis of mean values. The mean of this item is (3.09) and its standard deviation is (0.95) and thus considered medium in terms of level. The statement of this item is as follows: The firm uses many channels to keep aware of changes in supply/demand. Accordingly, the descriptive statistics concerning the construct (supply chain agility) indicate that the supply chain agility of sampled organization is considered medium in terms of its capabilities to respond to changes in business environment.

The Readiness and Validity of Data for Regression Analyses

To answer research questions and test the study hypotheses, regression analyses need to be run. However, there are three main prerequisites that should be satisfactorily met so as to ensure that the use of regression analyses is valid. Otherwise, non-parametric tests should be employed.

1. The data should be normally distributed.
2. Multicollinearity amongst constructs should not be high so as to ensure independency of constructs.
3. The correlation among research constructs should not be higher than (80%) to ensure that each construct is independent and not part of any other construct (Hair et al., 2013).

Test of Normality

Both Skewness-Kurtosis and Kolmogorov-Smirnov tests were utilized to test normality of collected data. For data to be normally distributed, values of Skewness-Kurtosis should be between ± 2.54. Using Kolmogorov-Smirnov tests, data need to be

significant so as to ensure its validity (Hair et al., 2006). Table 13 shows the results of Skewness –Kurtosis test while Table 14 shows the results of Kolmogorov-Smirnov test of normality.

Table 13
Test of Normality: Skewness-Kurtosis

Construct	Skewness	Kurtosis
ERP system	-0.81	0.48
E-business technologies	-0.07	-0.55
Integration of ERP system & e-business technologies	0.54	-0.03
Intra-organization collaboration	-0.13	-0.92
Inter-organization collaboration	0.65	-0.19
Supply Chain Agility	-0.20	-0.49

Table 13 indicates that data is normally distributed as the Skewness and kurtosis values are all within the range ± 2.54.

Table 14
Test of Normality: Kolmogorov-Smirnov

Research Construct	Sig. (p value)
ERP system	0.01*
E-business technologies	0.03*
Integration of ERP system & e-business technologies	0.18
Intra-organization collaboration	0.01*
Inter-organization collaboration	0.02*
Supply Chain Agility	0.04*

*****Significant at $p \leq 0.05$

Table 14 indicates and confirms that the data is normally distributed given that most constructs are significant at $p \leq 0.05$. Therefore, normality of data as one of the prerequisites for regression analyses is assured in this study (Hair et al., 2013).

Test of Multicollinearity

Both Tolerance and Variance Inflation Rate (VIF) values are utilized to make sure that constructs are independent and multicollinearity is not a likely threat (Hair et al., 2013). The tolerance values should be more than (0.20) and VIF values should be less than (5) for constructs to be independent and for assuring that multicollinearity is not available amongst constructs. Table 15 confirms the independency of constructs given that the measured values meet the conditions of tolerance and VIF. Hence, the study constructs are independent and thus the second prerequisite for regression analyses is assured.

Table 15
Multicollinearity Test among independent variables

Construct	Tolerance	VIF
ERP system	0.85	1.18
E-business technologies	0.69	1.45
Integration of ERP system & e-business technologies	0.50	1.10
Intra-organization collaboration	0.72	1.40
Inter-organization collaboration	0.52	1.92

Bivariate Pearson Correlation

Bivariate Pearson Correlation test was conducted to assure the independency of data. The rule is that the correlation between each pairs of constructs should not be higher than 80% (Hair et al., 2006). Otherwise, the two constructs should be merged to form one construct. If this rule applied to the correlation coefficients in Table 16, then all the research constructs were independent from each other and the data is ready and valid to be used for regression analyses. Based on the values in Table 16, the constructs are independent as they do not correlate with each other more than 80% which indicates

that all the research constructs are independent from each other and the data is valid for further analysis.

Table 16
Bivariate Pearson Correlation

	ERPS	EB	IERP&EBT	INTRAOC	INTEROC	SCA
ERPS	**1.00**					
EBT	0.34**	**1.00**				
IERPS&EBT	0 .11	0.27**	**1.00**			
INTRAOC	0.19	0.45**	0.38**	**1.00**		
INTEROC	-0.03	0.21*	0.68**	0.32**	**1.00**	
SCA	0.01	0.31**	0.39**	0.61**	0.47**	**1.00**

*****Significant at $p \leq 0.05$; ******Significant at $p \leq 0.01$

ERPS: Enterprise Resource Planning System; EBT: E-Business Technologies; IERPS & EBT: Integration of Enterprise Resource Planning System and E-Business Technologies; INTRAOC: Intra-Organization Collaboration; INTEROC: Inter-Organization Collaboration; SCA: Supply Chain Agility.

Based on the results of the three tests above, the researcher can now utilize regression analyses to test the research hypotheses.

Hypotheses Testing

H01: **There is no statistically significant impact of ERP system utilization on intra - organizational collaboration at $\alpha \leq 0.05$.**

To test the first hypothesis, a simple regression analysis was utilized in order to test the impact of ERP system utilization on intra-organizational collaboration as shown in Table 17.

Table 17
Simple Regression Analysis for H01

R	Beta	R^2	Adjusted R^2	F Value	P Value
0.19	**0.19**	**0.05**	**0.03**	**3.65**	**0.06***

***Not Significant at p≤0.05

Table 17 shows that F Value is equal to 3.65 which is not significant at level (p≤0.05). This indicates that there is no impact for ERP system utilization on intra-organizational collaboration; thus the null hypothesis is accepted. The Beta value (0.19) indicates that the impact of ERP system utilization on intra-organizational collaboration is minimal and positive but not significant (p≤0.05). In addition, based on the value of adjusted R^2, the ERP system utilization explains only (3%) of the variance in intra-organizational collaboration. This result is expected as the implementation of the ERP system is to consolidate the data of the internal functional departments in one central data rather than to make external connections with business partners.

H02: There is no statistically significant impact of ERP system utilization on inter-organizational collaboration at $\alpha \leq 0.05$.

To test the second hypothesis, simple regression analysis was utilized in order to test the impact of ERP system utilization on inter- organizational collaboration as shown in Table 18.

Table 18
Simple Regression Analysis for H02

R	Beta	R^2	Adjusted R^2	F Value	P Value
0.03	**-0.03**	**0.01**	**-0.01**	**0.08**	**0.78***

***Not Significant at p≤0.05

Table 18 shows that F Value is equal to 0.08 which is not significant (p≤0.05). This indicates that there is no impact for ERP system utilization on inter-organizational collaboration; thus the null hypothesis is accepted. The Beta value (-0.03) indicates that

the impact of ERP system utilization on inter-organizational collaboration is negative and not significant at ($p \leq 0.05$). In addition, based on the value of adjusted R^2, the ERP system utilization explains only 1% of the variance in inter-organizational collaboration. This result is unexpected and counterproductive as the implementation of the ERP system is expected to streamline the workflow and make data available for other tasks in the real time. However, strict ERP system utilization might lead to negative perceptions by employees as it increases the management control and surveillance on individual's work tasks.

H03: **There is no statistically significant impact of E-Business Technologies on intra- organizational collaboration at $\alpha \leq 0.05$.**

To test the third hypothesis, simple regression analysis was utilized in order to test the impact of e-business technologies on intra- organizational collaboration as shown in Table 19.

Table 19
Simple Regression Analysis for H03

R	Beta	R^2	Adjusted R^2	F Value	P Value
0.45	**0.45**	**0.21**	**0.20**	**26.20**	**0.000***

***Significant at $p \leq 0.05$

Table 19 shows that F Value is equal to 26.20 which is significant ($p \leq 0.05$). This indicates that there is impact for e-business technologies on intra-organizational collaboration; thus the null hypothesis is rejected. The Beta value (0.45) indicates that the impact of e-business technologies on intra-organizational collaboration is positive and significant at ($p \leq 0.05$). In addition, based on the value of adjusted R^2, the e-business technologies explain about 20% of the variance in intra-organizational collaboration.

This result is expected as e-business technologies orientation is to link organizations effectively with their external context such as, customers, suppliers, competitors, etc.

H04: There is no statistically significant impact of E-Business Technologies on inter- organizational collaboration at α≤ 0.05.

To test the forth hypothesis, simple regression analysis was utilized in order to test the impact of e-business technologies on inter- organizational collaboration as shown in Table 20.

Table 20
Simple Regression Analysis for H04

R	Beta	R^2	Adjusted R^2	F Value	P Value
0.21	**0.21**	**0.05**	**0.03**	**4.79**	**0.03***

***Significant at p≤0.05

Table 20 shows that F Value is equal to 4.79 which is significant (p≤0.05). This indicates that there is impact for e-business technologies on inter-organizational collaboration; thus the null hypothesis is rejected. The Beta value (0.21) indicates that the impact of e-business technologies on inter-organizational collaboration is positive and significant (p≤0.05). In addition, based on the value of adjusted R^2, the e-business technologies explain only 3% of the variance in inter-organizational collaboration. This result is surprising, although the e-business technologies implementation intended aim is to connect the organization with external business partners, the respondents of the current research believe that it can improve collaboration among internal functional departments.

H05: There is no statistically significant impact of the integration between ERP system and E- Business Technologies on intra- organizational collaboration at α≤ 0.05.

To test the fifth hypothesis, simple regression analysis was utilized in order to test the impact of integration between ERP system and e-business technologies on intra-organizational collaboration as shown in Table 21.

Table 21
Simple Regression Analysis for H05

R	Beta	R^2	Adjusted R^2	F Value	P Value
0.38	**0.38**	**0.15**	**0.14**	**17.565**	**0.000***

***Significant at $p \leq 0.05$

Table 21 shows that F Value is equal to 17.565 which is significant ($p \leq 0.05$). This indicates that there is impact for integration between ERP system and e-business technologies on intra- organizational collaboration; thus the null hypothesis is rejected. The Beta value (0.38) indicates that the impact of integration between ERP system and e-business technologies on intra- organizational collaboration is positive and significant at ($p \leq 0.05$). In addition, based on the value of adjusted R^2, the integration between ERP system and e-business technologies explain 14% of the variance in intra-organizational collaboration. This result is expected, connecting internal system such as ERP system with external communications channels enables effective collaboration among business partners regardless of the geographical location.

H06: There is no statistically significant impact of the integration between ERP system and E- Business Technologies on inter-organizational collaboration at $\alpha \leq$ 0.05.

To test the sixth hypothesis, simple regression analysis was utilized in order to test the impact of the integration between ERP system and E- Business Technologies on inter-organizational collaboration as shown in Table 22.

Table 22
Simple Regression Analysis for H06

R	Beta	R^2	Adjusted R^2	F Value	P Value
0.68	**0.68**	**0.47**	**0.46**	**88.941**	**0.000***

***Significant at $p \leq 0.05$

Table 22 shows that F Value is equal to 88.941 which is significant ($p \leq 0.05$). This indicates that there is impact for integration between ERP system and e-business technologies on inter- organizational collaboration; thus the null hypothesis is rejected. The Beta value (0.68) indicates that the impact of integration between ERP system and e-business technologies on inter- organizational collaboration is positive and significant ($p \leq 0.05$). In addition, based on the value of adjusted R^2, the integration between ERP system and e-business technologies explain 46% of the variance in inter-organizational collaboration. This result is expected, the integration between ERP system and e-business technologies improves collaboration between internal functional units especially in organizations that have several functional unites dispersed geographically.

In order to know which of the independent variables has more impact on organizational collaboration than others, the researcher used stepwise multiple regression analysis as shown in table 23 below.

Table 23
Stepwise Multiple Regression Analysis for ERP, E-Business, Integration between ERP & E-business on intra-organization collaboration.

Order of Constructs in the Regression Model	Adjusted R^2	F Value	T Value	Beta	P Value
E-business technologies.	0.20	26.201	4.292	0.38	0.000*
Integration between ERP system & e-business technologies.	0.26	19.477	3.220	0.28	0.002*

***Significant at $p \leq 0.05$

Dependent Variable: **Intra-Organizational Collaboration**

Table 23 shows that e-business technologies came first and explain 20% of the variance in intra-organizational collaboration. Afterwards, the integration between ERP system and e-business technologies came second in the rank of effect together with e-business technologies explains about 26% of the variance in intra-organizational collaboration. On contrast, the ERP system was excluded and did not have any impact (α=0.7) on intra-organizational cooperation which is above α=0.05. In addition, the stepwise multiple regression also used to know which of independent variables has more impact on inter-organizational collaboration as shown in Table 24.

Table 24
Stepwise Multiple Regression Analysis for ERP, E-Business, Integration between ERP & E-business on inter-organization collaboration.

Order of Constructs in the Regression Model	Adjusted R^2	F Value	T Value	Beta	P Value
Integration between ERP system & e-business technologies.	0.46	88.941	9.431	0.68	0.000*

*****Significant at p≤0.05

Dependent Variable: **Inter-Organizational Collaboration**

Table 24 shows that integration between ERP system &e-business technologies only remains in the regression model whilst ERP system and e-business technologies were excluded. The integration between ERP system & e-business technologies explains 46% of the variance in inter-organizational collaboration. On contrast, neither the ERP system nor e-business technologies have any impact and were excluded.

H07: There is no statistically significant impact of the organizational collaboration (intra and inter collaboration) on the supply chain agility at α≤ 0.05.

To test the seventh hypothesis, multiple regression analysis was utilized in order to test the impact of the organizational collaboration (intra and inter collaboration) on the supply chain agility as shown in Table 25.

Table 25
Multiple Regression Analysis of organizational collaboration Dimensions on supply chain agility

R^2	Adjusted R^2		F Value		P Value
0.68	**0.45**		**41.956**		**0.000***
Constructs	**B Value**	**St. Error**	**Beta**	**T Value**	**P Value**
Intra-organizational collaboration	1.62	0.24	0.51	6.63	0.000*
Inter-organizational collaboration	0.81	0.21	0.30	3.93	0.000*

***Significant at $p \leq 0.05$

Dependent Variable: **Supply Chain Agility**

Table 25 indicates that the dimensions of organizational collaboration (intra and inter-organizational collaboration) altogether explain about 45% of the variance in supply chain agility on the basis of the Adjusted R^2 Value. The F Value is equal to 41.956 and thus significant ($p \leq 0.05$). This assures that there is a significant impact for organizational collaboration dimensions on supply chain agility. Moreover and on the basis of t values, one can tell that both intra and inter-organization collaboration have positive impact on supply chain agility ($p \leq 0.05$). The researcher also utilized the stepwise multiple regression to determine the weight of importance of each dimension of organization collaboration in the regression model in explaining supply chain agility. As shown in Table 26, Intra-organization collaboration came first and explains 36.4% of the variance in supply chain agility. Inter-organization collaboration was second in

rank and together with intra-organization collaboration explains about 44.3% of the variance in supply chain agility.

Table 26
Stepwise Multiple Regression Analysis of organization collaboration Dimensions on supply chain agility

Order of Constructs in the Regression Model	Adjusted R^2	F Value	T Value	Beta	P Value
Intra-organization collaboration	0.364	59.980	6.628	0.513	0.000*
Inter-organization collaboration	0.443	41.956	3.929	0.304	0.000*

*****Significant at $p \leq 0.05$

Dependent Variable: **Supply Chain Agility**

H08: There is no statistically significant impact of the ERP system on the supply chain agility with the existence of the organizational collaboration (intra and inter collaboration) as a mediator at $\alpha \leq 0.05$.

Before testing hypothesis eight, first we test the impact of ERP system on supply chain agility with the existence of organization collaboration in the macro-level first. In order to test the impact of the ERP system on the supply chain agility with the existence of organizational collaboration, the researcher used Smart PLS structural equation modeling Version 3.The use of PLS-SEM is preferred especially when the sample size is small and when there is more than one dependent variable (Hair et al., 2006). Also testing the mediating roles of several variables can be done (Hair et al. 2013). The testing is done in two stages as follows: Stage 1: The impact of independent variables on dependent variable is done first. Afterwards, in stage 2, the impact of independent variables on dependent variable is done through the mediator/mediators as shown in Figure 1 and 2:

Figure .1, shows the direct impact of ERP system; e-business technologies, and integration between ERP system and e-business technologies on supply chain agility. The three independent variables explained about (R^2=0.35) of the variance in the supply chain agility. While e-business technologies and integration between ERP system & e-business technologies have significant positive statistical impact (β=0.29; p=0.001; β=0.43; p=0.000) on supply chain agility respectively, the ERP system has insignificant impact (β =0.007; p=0.95) on supply chain agility. This result provides credential to the results of regression analysis mentioned above that show the ERP system does not influence supply chain agility.

Stage 1: Direct Impact

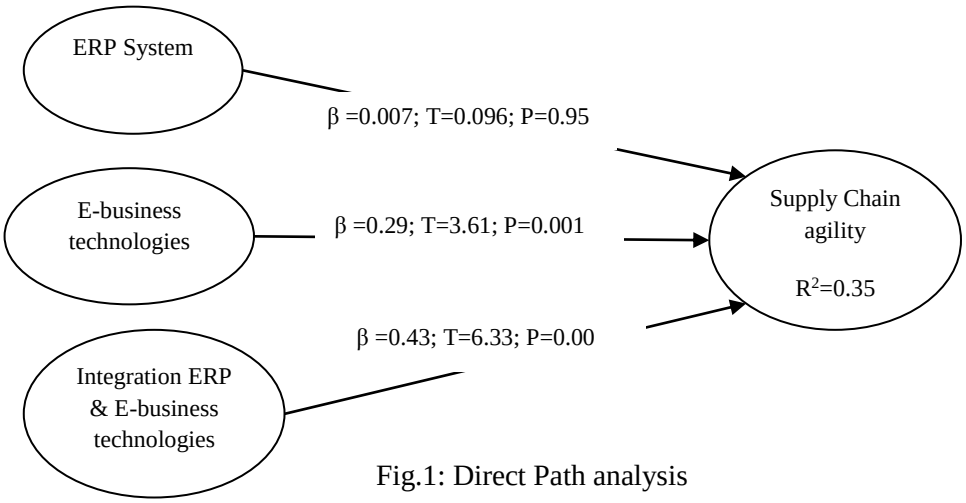


Fig.1: Direct Path analysis

Stage 2: Indirect Impact

Figure .2, shows the indirect impact of ERP system; e-business technologies, and integration between ERP system and e-business technologies on supply chain agility through organizational collaboration. The three independent variables explained about (R^2=0.62) of the variance in organizational collaboration and together with mediating variable (organizational collaboration) explained about (R^2=0.48) of the variance in supply chain agility which is higher than what the three independent variables together

can explained(R2=0.35) variance in supply chain. The direct relationship coefficients between ERP system and integration between ERP system & e-business technologies and supply chain agility become less (β=-0.11; β=0.03) and insignificant (p=0.43;p=0.79) respectively which indicates that the organizational collaboration plays a mediating role in the impact of ERP system, e-business technologies, and integration between ERP system & e-business technologies on supply chain agility.

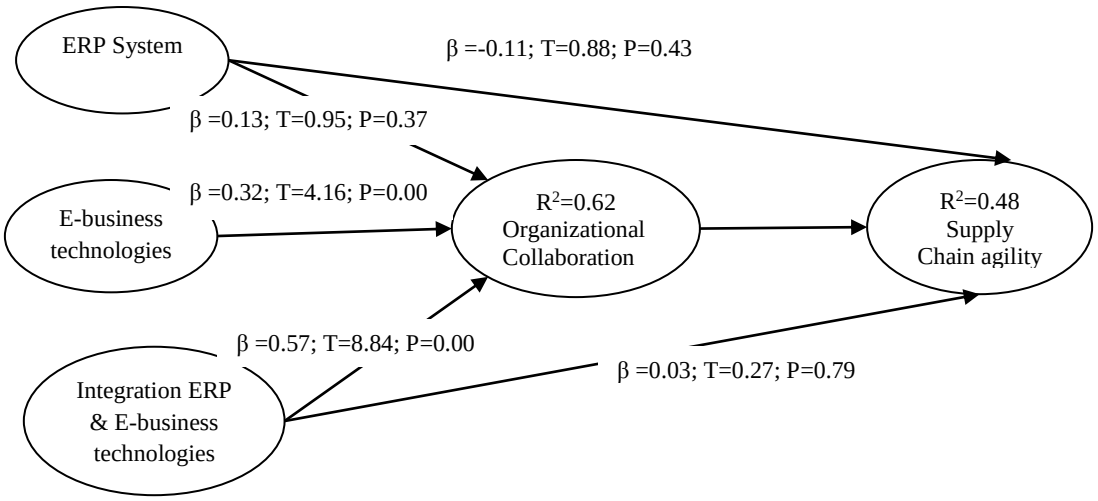


Fig.2: Indirect path analysis

As the results on figure 1 and 2 showed that the organizational collaboration does not play any mediating role in the impact of ERP system on supply chain agility because part of indirect impact is insignificant(the path coefficient between ERP system and organizational collaboration p=0.37) . However, to determine if organization collaboration plays any mediating role, the Variance Accounted for (VAF) should be calculated. The VAF indicates how much of the variance of independent variable can be absorb by the mediating variable. The VAF takes three levels of value: less than 20% and one can conclude that no mediation take place; more than 20% and less than 80% indicates that partial mediation is existed, 80% and above showed that full mediation usually taken place (Hair et al. 2013). The (VAF) can be calculated by multiplying the

coefficients of indirect paths then divided by the product of indirect paths plus the coefficient of direct path. The VAF for organizational collaboration in the impact of e-business technologies on supply chain agility can be calculated as follows: VAF= (0.32*0.70)/ (0.32*0.70) +29=0.44 which indicates that there is partial mediation taken place. In other words, the organization collaboration plays a partial mediating role in the impact of e-business technologies on supply chain agility. The VAF for organizational collaboration in the impact of the integration between ERP system & e-business technologies on supply chain agility can be calculated as follows: VAF=(0.57*0.70)/(0.57*0.70)+(0.03)=0.93 which indicates that the organization collaboration plays a full mediation role in the impact of the integration between ERP system and e-business technologies. Based on the above results, decision was made to probe deeper in the presumed relationship impact at the micro-level. Therefore, first the impact of ERP system on supply chain agility with the existence of intra and inter-organization collaboration can be tested in two steps as shown in Figure.3 and 4:

Step 1: Testing Direct Impact

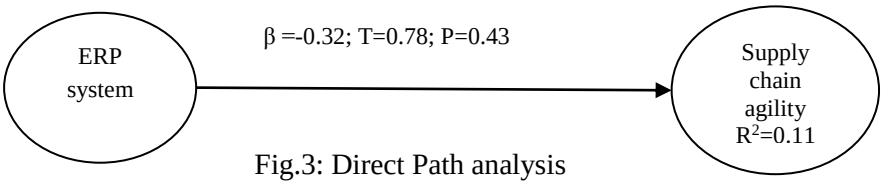


Fig.3: Direct Path analysis

Figure .3, shows the direct impact of ERP system on supply chain agility. The ERP system has a negative impact (β =-0.32) on supply chain agility but not significant (p value=0.43).

Step 2: Testing Indirect Impact

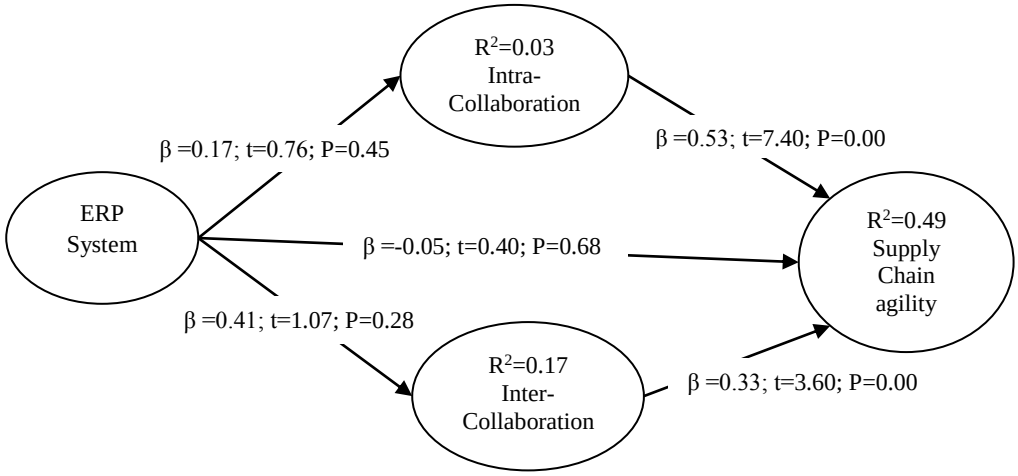


Fig.4: Indirect path analysis

Figure.4 shows the indirect impact of ERP system on supply chain agility through intra and inter-organizational collaboration. The direct impact of ERP system on supply agility becomes even more negative and not significant (β =-0.05; P=0.68). The paths between ERP system, intra and inter-organizational collaboration is not significant (β=0.17; p=0.45); (β=0.41; p=0.28) respectively. In addition, the ERP system explain only (3%) from the variance in intra-organizational collaboration and (17%) inter-organizational collaboration. However, both intra and inter organizational collaboration has significant impact (β=0.53; p=0.00); (β=0.33; p=0.00) on supply chain agility respectively. The rule is for intra and inter-organizational collaboration to play a mediating role it has to be affected by independent variable and effects dependent variable (Hair et. al.2013). As Figure 4 shows that the aforementioned rule was violated, there is no significant impact for ERP system on intra and inter-organization collaboration; thus the null hypothesis cannot be rejected. This indicates that intra and inter-organizational collaboration do not play any mediating role in the impact of ERP system on supply chain agility. In other words, there is no impact for ERP system on supply chain agility with the existence of organization collaboration of both dimensions (intra and inter-collaboration).

H09: There is no statistically significant impact of the E Business Technologies on the supply chain agility with the existence the organizational collaboration (intra and inter collaboration) as a mediator at $\alpha \leq 0.05$.

In order to test the ninth hypothesis, the researcher used Smart PLS structural equation modeling Version 3 as shown in Figure 5 and 6. Testing the impact of e-business technologies on supply chain agility with the existence of organizational collaboration can be done in tow steps as follows:

Step 1: Testing Direct Impact

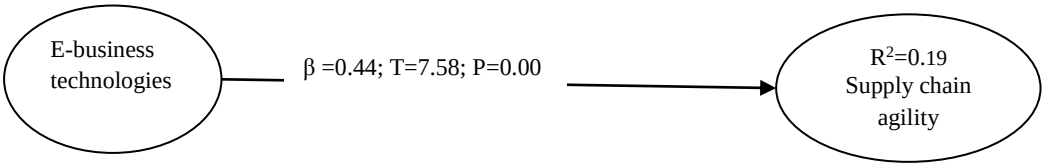


Fig.5: Direct Path Analysis

Figure 5 shows that e-business technologies have significant impact on supply chain agility (β=0.44; p=0.00). Thus, the null hypothesis can be rejected and accept the alternative hypothesis. In other words, there is statistical significant impact of e-business technologies on supply chain agility.

Step 2: Testing Indirect Impact

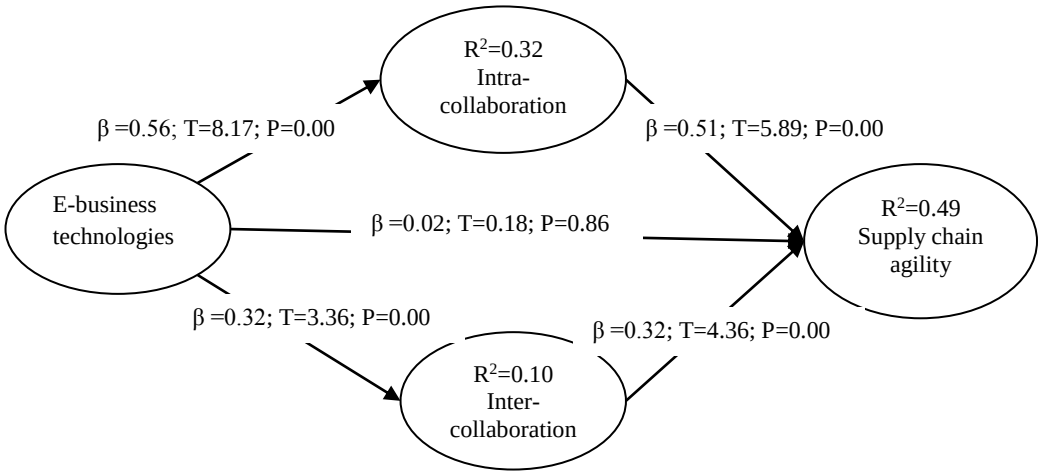


Fig.6: Indirect Path Analysis

Figure 6 shows that the paths between e-business technologies and intra and inter-organizational collaboration are significant (β=0.56; p=0.00);(β=0.32; p=0.00) respectively. At the same time, the paths between intra and inter-organization collaboration and supply chain agility are significant (β=0.51; p=0.00); (β=0.32; p=0.00) respectively. This result complies with the rule that assumed that all the relationship coefficients between independent and mediating variables and between mediating and dependent variable should be significant. In addition, the direct relationship between e-business technologies and supply chain agility becomes insignificant (β=0.02; p=0.00). Therefore, the null hypothesis can be rejected and accept the alternative one. Thus, intra and inter organization collaboration play a mediating role between e-business technologies and supply chain agility. For intra- organization collaboration VAF can be calculated as follows= (0.56*0.51)/(0.56*0.51)+(0.02)=0.94 this indicates that the intra-organization collaboration plays full mediation role in the impact of e-business technologies on supply chain agility according to the suggestion of Hair et al.(2013). The VAF for inter-organization collaboration as a mediator can be calculated as follows: (0.32*0.32)/(0.32*032)+(0.02)=0.84 which indicates also that the inter-organization collaboration plays a full mediating role in the impact of e-business

technologies on supply chain agility. Based on the above results, the null hypothesis that state there is no statistical significant impact of the E Business Technologies on the supply chain agility with the existence the organizational collaboration (intra and inter collaboration) as a mediator at $\alpha \leq 0.05$ can be rejected. In other words, the intra and inter-organization collaboration plays a full mediating role in the impact of e-business technologies on supply chain agility.

H10: There is no statistically significant impact of the integration between ERP system and E Business Technologies on the supply chain agility with the existence of the organizational collaboration (intra and inter collaboration) as a mediator at $\alpha \leq 0.05$.

In order to test the ninth hypothesis, the research used Smart PLS structural equation modeling Version 3 as shown in Figure7 and 8. Testing the impact of integration between ERP system and e-business technologies on supply chain agility with the existence of organization collaboration can be achieved in two steps as follows:

Step1: Testing Direct Impact

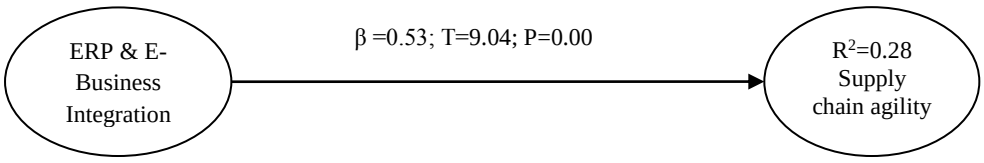


Fig.7: Direct Path Analysis

Figure 7 shows that the integration between ERP and e-business has a significant impact on supply chain agility (β=0.53; p=0.00). In addition, the integration between ERP and e-business explains (R^2=0.28) of the variance in supply chain agility. Therefore, the integration between ERP system and e-business technologies has a statistical significant impact on supply chain agility.

Step 2: Testing Indirect Impact

Figure 8 below shows that all the relationships between integration and intra and inter-organization collaboration are significant (β=0.44; p=0.00);(β=0.71; p=0.00) respectively.

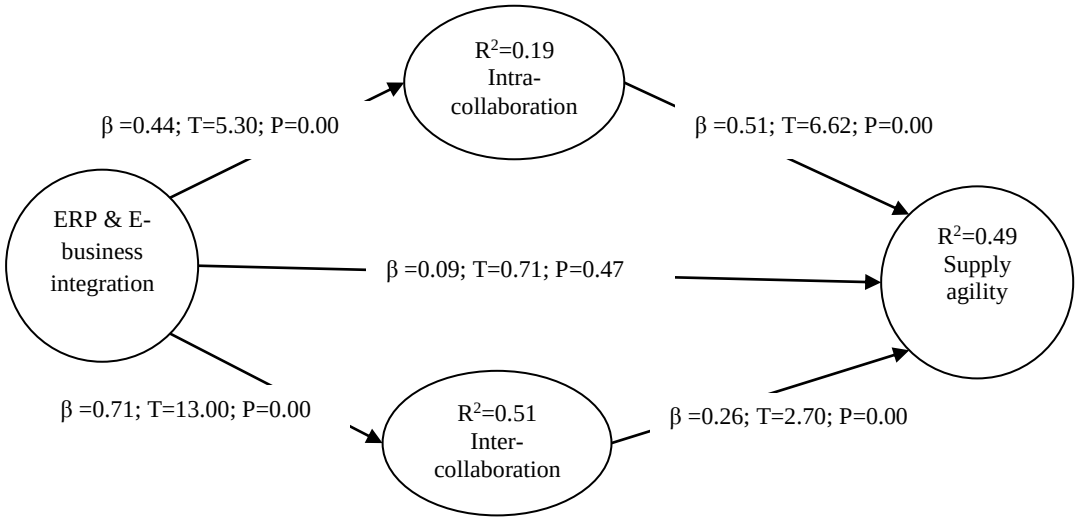


Fig.8: Indirect Path Analysis

In addition, the relationships between intra and inter-organization collaboration and supply chain agility are significant (β=0.51; p=0.00); (β=0.26; p=0.00) respectively. This complies with the first rule of the structural equation modeling that assumed that all the relationships between independent and mediating; and mediating and dependent should be significant. Furthermore, the figure shows the direct relationship between integration and supply chain agility is not significant (β=0.09; p=0.47) which is above 0.05. The VAF for intra-organization collaboration can be calculated as follows: VAF=(0.44*0.51) /(0.44*0.51) +(0.09) =0.72 which indicates that the intra-organization collaboration plays a partial mediating role in the impact of the integration between ERP system & e-business technologies on supply chain agility according to the suggestion of Hair et al.(2013). The VAF for inter-organization collaboration also can be calculated as follows: VAF=(0.71*0.26)/(0.71*0.26)+(0.09)=0.67 which indicates

that inter-organization collaboration plays a partial mediating role in the impact of the integration between ERP system & e-business technologies on supply chain agility. Based on the above results, the null hypothesis that assumed that there is no statistical significant impact for the integration between ERP system and E Business Technologies on the supply chain agility with the existence of the organizational collaboration (intra and inter collaboration) as a mediator at $\alpha \leq 0.05$ can be rejected. In other words, the intra and inter-organization collaboration plays a partial mediating role in the impact of integration between ERP system and e-business technologies on supply chain agility.

Chapter Five

Results discussion and recommendation

5.1 Research Conclusion

This study aimed to study the impact of ERP system, e-business technologies, and their integration on supply chain agility with the existence of intra and inter-organization collaboration. The study tries to determine the importance of ERP system utilization, e-business technologies, and the integration between them in achieving intra and inter-organization collaboration. In addition, testing how intra and inter-organizational collaboration can affect supply chain agility. In fact, in the new era of business that characterized by plethora of digital devices and business applications, the integration between ERP system and e-business technologies seems the right and necessary solution. This is because ERP system provides the organization with various benefits such as optimizing and integrating business processes, maximizing operational and managerial profits, and improving strategic and organizational benefits. At the same time, e-business technologies offer organizations various benefits such as streamline the work with business partners, enables two way interaction with customers, simplify dealing with changes in business environment. However, neither ERP system nor e-business technologies can work independently for organizations to achieve competitive advantage and being agile.

To achieve the objectives of this study, the researcher has developed a model to measure the impact of ERP system utilization, e-business technologies, and their integration on supply chain agility with the existence of intra and inter-organization collaboration. An Extensive literature review has been done to be able to build the research model. The model has three types of constructs: independent variables include ERP system utilization, e-business technologies, and integration between ERP system

and e-business technologies with mediating variable organizational collaboration with its two dimensions: intra and inter-organizational collaboration, and dependent variable are supply chain agility. The developed model was applied and tested in the context of Hikma Pharmaceuticals Company in Jordan. Hikma Pharmaceuticals Company is successfully implemented and utilized ERP system and e-business technologies. The study targets the actual users of ERP system in all managerial levels at Hikma Pharmaceuticals Company.

The questionnaire instrument was revised to reflect the comments and suggestions those received by the referees. Afterwards, the questionnaire was distributed to the sample of this study and 105 responses considered valid for data analysis. The analysis was conducted using both; Statistical Package for Social Sciences (SPSS 17.0); and Partial Least Square (PLS-SEM) and more particular Smart PLS V.3 which follows the Structural Equation Modeling (SEM) Technique. Following data analysis, results were obtained and reported in chapter four.

5.2 Research Results

The study explored a number of important and significant results that the researcher hopes that they would lead to contributions to theory and relevant literature. The researcher also hopes that such results would trigger a number of critical decisions by pharmaceutical companies and more specifically the company included in the current research. Based on the data analysis and hypotheses testing in Chapter 4, the research results generated from this work can be summarized as follows.

- The majority of research respondents (89.5%) are male whilst the remaining (10.5%) are female; have mature age (over than 25 years); hold minimum college

diploma of education, more than half of them have between 5 to 14 years of experience (55.2%), and they are actual users of ERP system.

- The implementation of Enterprise resource planning system within sampled organization is considered high in terms of how many modules are active within ERP system such as (Sales, purchasing, planning and scheduling, manufacturing, etc.)

- E-business technologies within the sampled organization are considered medium in terms of level when it comes to the utilization and operations of e-business technologies.

- There is no statistically significant impact of ERP system utilization on intra-organizational collaboration at ($p \leq 0.05$). This result in accordance with the results of (Al-Mashari & Zairi 2000 and Rabaa'i & Gammack 2008). However, this result differs from the results of (Hsu & Chen 2004; Su & Yang 2010; Sukati et al., 2012; DeGroote et al., 2013 and Shahateet, 2014)**.** This result can be justified by two reasons: the first is related to the fact that ERP system is an integrated system and its entire module should be fully activated in order to give an impact on the intra organizational collaboration but it seems that the system was not fully activated. The second reason could be that the respondents did not understand the questionnaire's questions, so the answers were not accurate.

- There is no statistically significant impact of ERP system utilization on inter-organizational collaboration at ($\alpha \leq 0.05$). This result in accordance with the results of (Al-Mashari & Zairi 2000 and Rabaa'i & Gammack 2008). However, this result differs from the results of (Hsu & Chen 2004; Su & Yang 2010; Sukati et al., 2012; DeGroote et al., 2013 and Shahateet, 2014)**.** This result can be justified that the ERP system

should be fully integrated with business partners' activated ERP system in order to have an impact on inter-organizational collaboration.

- There is a statistical significant impact for e-business technologies on intra-organizational collaboration at ($\alpha \leq 0.05$). This result in accordance with the results of (Sanders, 2007; Troshani & Rao 2007 and DeGroote et al., 2013).

- There is a statistical significant impact for e-business technologies on inter-organizational collaboration at ($\alpha \leq 0.05$)**.** This result in accordance with the results of (Devaraj et al. 2007; Sanders, 2007; Troshani & Rao 2007; DeGroote et al., 2013; Qrunfleh & Tarafdar 2014; Shahateet, 2014).

- There is a statistical significant impact for integration between ERP system and e-business technologies on intra- organizational collaboration at ($\alpha \leq 0.05$). This result in accordance with the results of (Chou et al., 2004; Sukati et al., 2012; Hsu, 2013 and Shahateet, 2014).

- There is a statistical significant impact for integration between ERP system and e-business technologies on inter- organizational collaboration at ($\alpha \leq 0.05$). This result in accordance with the results of (Chou et al., 2004; Sukati et al., 2012; Hsu, 2013 and Shahateet, 2014).

- E-business technologies can explain more than integration between ERP system and e-business technologies of variance in intra-organization collaboration at ($\alpha \leq 0.05$). This result is unexpected and counterproductive, it differs from (Hsu, 2013) who assumed that ERP system enhances intra-organization cooperation whilst e-business technologies facilitate inter-organizational cooperation. This result can be justified that the respondents may believe that the integration of business technologies with ERP

system exposes them not only to the surveillance and control of top management but also to the management of other business partners.

- The integration between ERP system & e-business technologies explains (46%) of the variance in inter-organizational collaboration. On contrast, neither the ERP system nor e-business technologies have any impact at ($\alpha \leq 0.05$). This result in accordance with the results of (Hsu, 2013).

- Both intra and inter-organization collaboration have positive impact on supply chain agility at ($\alpha \leq 0.05$). This result in accordance with the results of (Braunscheidel & Suresh 2009), (Sukati et al., 2012; Gligor, et al., 2012; Chen et al., 2013; Qrunfleh & Tarafdar 2014 and Yang, 2014).

- Intra-organization collaboration has more impact on supply chain agility than Inter-organization collaboration at ($\alpha \leq 0.05$)**.** This result unexpected and counterproductive and differs from the results of (Mena & Wilding, 2009 and Koulikoff- Souviron & Harrison, 2006). This can be attributed to three reasons: first, probably the targeted company has its own supply sub-companies then believes the intra-organizational cooperation more powerful than inter-cooperation. Second, it might the respondents of this study cannot make clear discrimination between inter and intra organization cooperation. Third, might the research respondents believe that higher level of intra-collaboration leads to higher level of inter organizational collaboration.

- There is no statistical impact for ERP system on supply chain agility with the existence of organization collaboration (intra and inter-collaboration) at ($\alpha \leq 0.05$). This result in accordance with the results of (Al-Mashari & Zairi 2000). However, this result differs from the results of (Sukati et al., 2012; DeGroote et al., 2013; Yang, 2014**;** Qrunfleh & Tarafdar 2014 and Shahateet, 2014**).**

- Intra and inter organization collaboration play a mediating role between e-business technologies and supply chain agility at ($\alpha \leq 0.05$). This result in accordance with the results of (Sukati et al., 2012; Qrunfleh & Tarafdar 2014 and Yang, 2014).

- The intra and inter-organization collaboration plays a mediating role in the impact of integration between ERP system and e-business technologies on supply chain agility at ($\alpha \leq 0.05$). This result in accordance with the results of (Sukati et al., 2012 and Yang, 2014).

5.3 Research Conclusions

Based on the research results, the following conclusions can be drawn as follows:

- The implemented ERP system within sampled organization has multi-modules such as purchasing, manufacturing, sales, etc.

- Despite the importance of e-business technologies for enhancing relationships with business partners, it is still modest in the sampled organization.

- Although the ERP system should be intertwined with e-business technologies for achieving supply chain agility, it is perceived by research respondents within sampled organization as modest.

- The perception of intra and inter-organization collaboration among research respondents is evenly, both dimensions perceived as in the medium level.

- The capability of supply chain to respond to changes in business environment is in the medium level.

- Regardless of how many ERP modules built in ERP system, but it did not influence intra-organizational collaboration. It is expected that as much as modules implement in ERP system enable effective intra and inter-organization collaboration.

- Usually organizations who execute more of ERP modules expect to reap more benefits such cutting cost, increase efficiency, and streamline the workflow. However, the case in the current study seems different and more likely the ERP system perceived as a control tool and surveillance used by top management to monitor the employees.

- The e-business technologies do influence inter-organizational collaboration. As it allow data flow and information exchange between functional unites and their business partners counterparts. Under dramatic changes in business environment, the internal data becomes insufficient to execute daily tasks and there is a need for external data that flow through e-business technologies channels.

- E-business channels allow data to flow among functional business units within organization and enables data and information of planning, scheduling, and manufacturing with business partners in real time.

- Integrating ERP system with e-business technologies is influence both intra-organization collaboration and inter-organization collaboration. Therefore, for organizations to get full benefits from ERP system or e-business technologies, both should be well connected to make data flow and communication easily done and on time.

- Despite the importance of integration between ERP system and e-business technologies to realize high level of intra-organizational collaboration, the case in the current research showed that the e-business technologies do influence intra-organization

collaboration more than integration. However, the integration seems more relevant to inter-organization collaboration.

- Intra and inter-organization collaboration do influence supply chain agility. It is expected that organizations who established well internal and external collaboration should be able to respond to any changes in business environment on time compare with others who focus only on intra or inter organization collaboration.

- Even if inter-organization collaboration play a critical role in achieving supply chain agility, the case in the current study seems to be that intra-organization collaboration has more impact on supply chain agility.

- The ERP system does not have any impact on supply chain agility with the existence of both dimensions of organization collaboration (intra and inter-collaboration). This is maybe because ERP system makes a lot of restrictions on how the business task should be executed and left no room for employees to innovate.

- The Intra and inter-organization collaboration mediates the relationship between e-business technologies and supply chain agility. As e-business technologies encourage more internally and externally collaboration so the supply chain would able to respond to changes in business environment.

- The integration between ERP system and e-business technologies facilitates intra and inter-organization collaboration which in turn improves supply chain agility.

5.4 Research Recommendations

A set of managerial and academics recommendations can be formulated as follows:

5.4.1 Managerial Recommendations

The researcher here aiming to offer some recommendations that would enhance the deployment and utilization of ERP system among companies in Jordan those have similar conditions to the sampled organization in the current study. The aspiration of the researcher is that such recommendations would be taken seriously into consideration so as to achieve maximum benefits from ERP system and e-business technologies deployment. Some of the recommendations are directed towards the practical community to improve organization collaboration and supply chain agility through effective ERP system utilization and integration with e-business technologies. Jordanian companies which utilized ERP system should take into consideration the following points:

- Pay more attention to the way the system utilized in order to improve both intra and inter-organization collaboration.
- All the implemented modules in ERP system should be active in order to get the maximum benefits of the system in order to increase supply chain agility.
- Effectively coordinate with ERP system vendor/vendors to understand which is the best way to use the ERP system to boost inter and intra-organization collaboration.
- Companies which are in the process of adopting new ERP system or upgrading the available one should focus on its compatibility with suppliers ERPs systems to get the full benefits.
- Devote more effort to encourage employees to use e-business technologies channels to interact with their business counterparts if they intend to respond on time to any changes in business environment and satisfy their customers' needs.

- Integrate tightly ERP system with e-business technologies in order to be able to respond to changes in business environment on real time and achieve supply chain agility.
- Measure how well ERP system integrated with e-business technologies on regular basis to ensure high level of supply chain agility.

Some of the research recommendations are directed towards the scientific community aiming to enhance the existing body of knowledge in large and that specifically related to the domain of this study as shown in the next section.

5.4.2 Academics Recommendations

This study like any others cross sectional studies is not free of limitations. However, these limitations should be understood as weak points but as paths for future studies. Therefore, this study depends mainly on the questionnaire as only method for data collection. The questionnaire is not free of bias; thus future research can utilize others approach such as interviews or focus group to understand fully the phenomena under investigation. This study was limited to Hikma Pharmaceuticals Company, which specialized in Pharmaceuticals field only, so service or manufacturing firms were not included. Although this study shed light on an important subject nowadays which is supply chain agility, but it does not claim the mutual factors that impact supply chain agility. Thus, future research can used the current research model as a base and added other independents, moderators, and mediators variables that might increase supply chain agility. Such as strength of relationship with suppliers and supply chain infrastructure as independent variables; suppliers IT self-efficacy, types of leadership, and turbulent business environment as moderator variables, and knowledge capabilities

as mediating variable. The current study failed to find any impact for ERP system on organization collaboration. This result is unexpected and different from other previous studies results. Therefore, future study can re-test and scrutinize the presumed impact by using longitudinal data to understand the phenomena under-investigation objectively.

Future study should try to develop valid and reliable measure for ERP system utilization and re-test the current research model at the same context or in others context. The current study depends on different informants (Managers, heads of departments, and employees) without make clear discriminations between users work needs. Combining the responses of different informants from different managerial level to construct one perception about ERP system utilization may obscure the results; each managerial level has different perception for ERP system utilization. Thus, future study should try to test the current research model in each managerial level within specific organization to further our understanding how ERP system utilization can impact organization collaboration and supply chain respectively. As we mentioned earlier the generalisability of the research results is limited to research sample and the results should be taken with caution. In order to increase the generalisability of the research results, future research can apply the same model but to wider number of organizations.

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Appendix 1: The Questionnaire

Dear Sir/Ms.,

I am conducting a study that aims at testing The Impact of Enterprise Resources Planning System, E-Business Technologies, and their Integration on Supply Chain Agility: Examining the Mediating Role of Inter and Intra organization collaboration: Hikma Pharmaceuticals Company as a case study, for the purpose of fulfilling a masters degree requirements in E-Business, your answers are high significance of the success of this study. I would like also to assure you that your answers will be treated with "extreme confidentiality" and for the purposes of scientific research only. Consequently, kindly answers the question of this questionnaire from the perspective of your current work responsibilities. Please note that this questionnaire is designed to be applicable to all companies working in the industrial sector of Jordan. Some questions may not apply to the company you work for. Please do your best to answer all the questions; however, if you are not sure about a certain answer, or believe that the answer would be misleading, please leave it blank.

First Section: General Background

Gender:

□Male □Female

Age:

□ 20-25 years old □ 26-30 years old

□ 31-35 years old □ 36-40 years old □More than 40 years old

Education:

□ Collage □ Bachelor □ Master □ PhD

Years in current position:

□ Less than 5 years. □ 5-10 years.

□ 11-15 years. □ More than 15 years.

Years of experience with the current organization:

□ Less than 5 years. □ 5-10 years.

□ 11-15 years. □ More than 15

Second Section: Study Variables

This section will be concerned about investigating study variables. Based on your experience and knowledge; please insert √ in the appropriate column. The options range from 1 (strongly disagree), 2(disagree), 3(neutral), 4 (agree), and 5 (strongly agree).

Enterprise Resources Planning System		strongly disagree				strongly agree
		1	2	3	4	5
1	The ERP system contains a purchasing module.					
2	The ERP system contains an inventory /material management module					
3	The ERP system contains a manufacturing module					
4	The ERP system contains sales/order entry module					
5	The ERP system contains data warehouse / business intelligence module.					
6	The ERP system contains advanced planning and scheduling module.					
7	The ERP system contains customer relationship management module.					
E-business Technologies		1	2	3	4	5
8	The firm uses extranet in its communications					
9	The firm uses a website to communicate with the clients					
10	The firm uses Electronic Data Interchange					
Enterprise Resources Planning System and E-Business Technologies Integration		1	2	3	4	5
11	The ERP system is integrated with the front-end e-business systems					
12	The ERP system is integrated with the business partners' information systems					
13	The ERP system is electronically accessible by your					

	business partners via a web-site, Electronic Data Interchange, or other electronic networks					
14	The firm uses electronic networks to communicate with the suppliers					
15	The firm uses electronic networks with its suppliers to share inventory availability or stock level					
16	The firm uses electronic networks with its suppliers to share production planning or schedule capacity					
17	The firm uses electronic networks with its suppliers to share demand and forecasting information					
18	The firm and the customers use electronic networks to conduct customer orders					
Intra organization collaboration		1	2	3	4	5
19	The firm has cross-functional collaboration in strategic planning					
20	The firm utilizes an integrated database for information sharing					
21	The firm shares operations information among all departments					
Inter organization collaboration		1	2	3	4	5
22	There is real-time sharing of operations information with suppliers.					
23	There is real -time sharing of cross-functional processes with suppliers.					
24	The firm engages in collaborative planning with suppliers					
25	The firm Shares cost information with suppliers					
Supply Chain Agility		1	2	3	4	5
26	The firm detects strategic opportunities/ challenges in a timely manner (e.g. new competitor movement, new economic tendency, new technology, and new market)					
27	The firm uses many channels to keep aware of strategic opportunities/challenges					
28	The firm reconfigures supply chain resources in a timely manner to respond to strategic opportunities/challenges					
29	The firm reconfigures supply chain resources in a flexible manner to respond to strategic opportunities/challenges					
30	The firm detects changes in supply/demand in a timely manner					
31	The firm uses many channels to keep aware of changes in supply/demand					
32	The firm reconfigures supply chain resources in a timely manner to respond to changes in supply/ demand					
33	The firm reconfigures supply chain resources in a					

	flexible manner to respond to changes in supply/demand					
34	The firm detects changes in supply chain daily execution in a timely manner					
35	The firm uses many channels to keep aware of changes					
36	The firm reconfigures supply chain resources in a timely manner to respond to changes in daily supply chain execution					
37	The firm reconfigures supply chain resources in a flexible manner to respond to changes in daily supply chain execution					

Appendix 2: Professors' Questionnaire Jury

No.	Prof. Name	University	Faculty
1.	Dr. Abdel-Bari Durra	MEU	Business Admin
2.	Dr. Samir Al Daheyat	MEU	Business Admin
3.	Dr. Goerge Samour	Princess Sumaya of Technology	Management Inf.System
4.	Dr. Zu'by Al Zu'by	Princess Sumaya of Technology	Business Admin
5.	Dr. Mahmoud Meqdady	Princess Sumaya of Technology	Management Inf. System
6.	Dr. Ahmad Ali AlSaleh	Al-Zaytoonah University	Business Admin
7.	Dr. Abd Al Azez Al Nedawi	Al-Zaytoonah University	Business Admin