Sudan University of Science&Technology

College Of Graduate Studies

كلية الدراسات العليا

The Relationship between Supply Chain Integration and Operational Performance: TheMediating Role Responsiveness and Technological Capabilities as Moderating Effect
(AStudy on private medical Sector in Khartoum State)

العلاقة بين تكامل سلاسل التوريدوالأداء التشغيلي : الدور الوسيط للإستجابة و القدرات التكنولوجية متغيرآ معدلآ
(دراسة علي القطاع الطبي الخاص بولاية الخرطوم)

Thesis Submitted in Fulfillment of the Requirements for
The Doctor of Philosophy in Business Administration

By: **Supervisor:**
NuseibaAzzam Ibrahim YousiefProf. Ahmed Ibrahim AbuSin

Co- Supervisor:

Dr.Abdalslam Adam

2018م

بسم الله الرحمن الرحيم

قال تعالي:

((و ما أوتيتم من العلم إلا قليلا))

[الإسراء:85]

DEDICATION

I dedicate this work to:

My beloved father

and to spirit of my mother's

To my husband
&
To my kids

To my sister
&
To my brothers

To my friends

your efforts for what I shall always be remembered.
I dedicate My Humble Efforts

ACKNOWLEDGEMENT

Abstract

Supply chain integration has shown to be the vital organizational capability, which endorses a relational view of supply chain relationships valuable way ofimproving operational performance and securing competitive advantage.

Drawing on the resource-based view and Resource and Dynamic capabilitiesTheresearch constructed a conceptual model hypothesizing a positive effect of supply chain integration on operational performance and a positive moderatingeffect of technological capabilities on the effect of SCI on responsiveness. Theresearch applied survey for data gathering from non-probability sample of service sector (medical field) in Khartoum state the 330 useable returned out of 307 survey wassent . The hypotheses tested by using Structural Equation Modeling analysis. TheFindings demonstrate that Sudanese medical field implement the Supplychain integrationas two dimensions of supply chain integration, namely, internal integrationand customer integration. Operational performance namely: service performance and cost performance to some extent level. The findings provided someempirical support for the theoretical framework. The results provided evidence thatmost of the Supply chain integration have significance and importantcontribute in operational performance and also the two dimensions of Supplychain integration have significance influence on Supply chain responsivenessdimensions (operation process, logistic process and supplier network) The results of the study demonstrate limited support for the effects of theSupply chain integration dimension on technological capabilities. The resultconfirms that SCR has positive effect on the two components of OP. This study revealed that there are some dimensions of Supplychain responsiveness have significance mediating effect on the relationship between theSupply chain integration components and two dimensions of operational performance. This study results conclude that there is partial evidence of supporting themoderating effect of technological capabilities. The provide, theoretical, practical implicationsand limitations were cleared.

iv

المستخلص

هدفت الدراسة الى معرفة مدى تكامل سلاسل التوريد على الاداء التشغيلي بالمؤسسات العلاجية بولاية الخرطوم. قامت الدارسة ببناء نموذج افتراضي‌يفترض التأثير الإيجابي للتكامل سلسلة التوريد على الأداء التشغيلي، وأثر إيجابي معدل للقدرات التكنولوجية على تأثير تكامل سلاسل التوريد على الاستجابة.ولقد تم بناء نموذج الدراسة وفرضياتها اعتماداً على الادبيات السابقة، ونظرية الموارد والكفاءات (RBV) كما اعتمد الدراسة على المنهج الوصفي التحليلي، واستخدمت الاستبانة كأداة رئيسية لجمع البيانات باستخدام عينة المسح الشامل للمؤسسات العلاجية بولاية الخرطوم (مستشفيات خاصة، ومركز علاجية، ومراكز الخدمات الصحية) من عينة الدراسة البالغ عددها (330) مؤسسة علاجية ولقد بلغت نسبة الاستبانات المستردة والصالحة للتحليل (93%) من عينة الدراسة، ولاختبار فرضيات الدراسة تم استخدام برنامج التحليل الاحصائي (Amos) . توصلت الدراسة الى أن تكامل سلسلة التوريد في المجال الطبي بالسودان يتكون من بعديين، وهما التكامل الداخلي، وتكامل العملاء.وايضاً خلصت الى ان الأداء التشغيلي يتكون من بعدين هما، أداء الخدمة، وأداء التكلفة. قدمت النتائج دليلاً على أن معظم تكامل سلسلة التوريد لها أهمية وتساهم في الأداء التشغيلي، كما أن لهذين العنصرين لتكامل سلسلة التوريد تأثير هام على أبعاد الاستجابة (عملية التشغيل ، العملية اللوجستية وشبكة الموردين). أظهرت‌للدراسة دعم‌اً محدود ًا لآثر تكامل سلسلة التوريد على القدرات التكنولوجية. تؤكد النتيجة أن الاستجابة لها تأثير إيجابي على بعدي الاداء التشغيلي. كشفت هذه الدراسة أن أبعاد الاستجابة تتوسط العلاقة بشكل كلي وجزئي بين تكامل سلسلة التوريد والأداء التشغيلي. كما اوضحتان القدرات التكنولوجية تعدل العلاقة جزئياً بين تكامل سلاسل التوريد والاستجابة.

TABLE OF CONTENTS

No	Content	Page
I.	Title page	
II.	البسملة	
III.	الاية	
IV.	Dedication	
V.	Acknowledgements	
VI.	3. Abstract	
VII.	المستخلص	
VII.	Table of Contents	
IX.	List of Tables	
X.	List of models	
1.	**CHAPTER 1 – INTRODUCTION**	
2.	Introduction	2
3.	The Statement of Problem	5
4.	Research Questions	11
5.	Research Objectives	12
6.	Significance of the Study	12
7.	The operationalization definition of Terms	14

CHAPTER I:

INTRODUCTION

Chapter I

1.0 Introduction:

Performance is one of the most important issues in the institutions establishments for its unique position in the business environment. This is due to the interplay of variables and the rapid spread of information on the one hand, as well as the performance evaluation process aimed to achieving efficiency using available resources. On the other hand, the success of achieving objectives planned, so most institutions strive to achieve success in their operations and activities constantly, to build a competitive advantage and improve performance in the environment which it operates (Abdelhamid, 2012) by operational performance because it affects how management thinks and works.

The changes in the modern environment of services and the accompanying increase in customer needs and the intensity of competition means that the process of measuring and evaluating performance does not merely seek to match the actual performance with the target performance and identify the deviations, but also seeks to evaluate the current situation in order to create a competitive advantage (Abdelhamid, 2012) Based on the above, it is clear that new measures of performance are needed to measure the operational objectives of organizations to suit the latest service objectives and cover the lack of short-term financial performance measures. This focuses on non-financial aspects, and based on the importance of large performance, since it reflects the level of success achieved by the organization or the level it seeks to achieve.

Operational performance is a concept that affects the performance of an organization because it affects how management thinks and works. Operational performance is useful because it focuses primarily on the organization and continuously gathers information about the needs of target groups and capacities.

Operational performance makes the senior management fully aware of what (Slater & Never 1995) (Based on Mr., 2015) the aims are, what are the areas of their external activities of the services that they provide, and helps them identify the structure and policies that govern their decision-making methods, their human and material needs and the overall requirements for development and growth. Modern institutions are required to develop the quality of their services, which will improve their services to meet the needs, wishes and tastes of the users of this service, which is considered to be the rapid change in the present. This is one of the important strategic that contribute to the survival, growth and expansion institutions to increase their capabilities in order to achieve its objectives (Akroush, 2004).

The efficient implementation of the supply chain is a key factor in the company's success and achievement of its goals, especially profitability. The effectiveness of supply chain management and integration improves the performance of the company and creates a competitive advantage. In the global competition, companies have sought to modify their strategies and look at customer satisfaction as a secret of their survival and continuity, requiring them to improve the delivery services to customers and to achieve the desired performance. One of the tools that can be used to achieve the desired performance is supply chain integration. The integration and responsiveness of supply chains has become prominent in recent years at the theoretical and applied levels, and many literature such as (Flynn, Huo, & Zhao, 2010; Huo, Ye, Zhao, & Shou, 2016; Wong, Boon-itt & Wong, 2011; Zhao, Feng, & Wang, 2015) has shown a great interest in the role of supply chain integration and response in improving corporate performance by integrating the internal and external functions of the company and effectively connecting them to suppliers, Customers, and other supply chain partners (Ashtiani and Bosakmm Otchere et al 2013). The integration and responsiveness of the supply chain is an

important tool for achieving the competitive advantage of companies and it helps them to achieve their objectives so they can compete at the local and global levels (Selim et al., 2008) (Kumar et al. 2014).

Service institutions is a system consisting of a group individuals and organized means, interacting with each other to produce an intangible value to satisfy the needs and desires of the client (Dalloul and Rokd, 2016). Service with a higher degree of responsiveness are approved to have higher work and financial performance, leading to greater overall business performance, However, the very nature of services, having a number of distinguishing features when compared to services, leads to a greater need to establish credibility with customers.

Service institutions (medical field) could also achieve greater business performance even through with less responsiveness services (Cheng & Krumwiede,2012). In this way, responsiveness should be studied in greater depth to see how they mediate the supply chain integration, operational performance relationship.

The service sector growth rate increased from 2.1% in 2015 to 3.2% in 2016. This was due to the increase in the growth rate of its sub-sectors. The contribution of this sector to the Gross Domestic Product dropped slightly from 47.9% in 2015 to 47.8% in 2016.

Healthcare providers have been slow in adoption they are supposed to work on framing a range of technological capabilities that are unique to them in order to have competitive advantages that contribute to the achievement of high performance results from competitors and direct interaction between different capacities will lead to high levels of performance (Al-Adwan et al., 2015) The service sector is considered the most important economic sector in Sudan due to its significant contribution to the GDP which reached 50.2% in 2016, which is higher than the contribution of the agricultural and industrial sectors together (30.1% for

the agricultural sector and 19.7% for the industrial sector) (Fifty-sixth report, 2016, Central Bank of Sudan), which shows the importance of studying this sector, which will be the leader in building the economies of peoples. Due to the incompatibility of the supply chain system with most types of services provided by service organizations in Sudan, this study will be limited to the health sector that identify the interplay between the integration of supply chains and operational performance, in Khartoum State medical field. Therefore, there is a need for a comprehensive review to reflect performance in healthcare environments. According to de Vries and Huijsman (2011), there is a fragmented interest in supply chains health services. The Government health system is a three-tiered network. Primary health care has been adopted as a main strategy for health care provision in Sudan in 1976 and reemphasized in the National Comprehensive Strategy for Health in 1992 and in the 25-Year Strategic Health Plan2003-2027. Based on the attention given to supply chain management and performance, this study was used to identify the interplay between supply chain integration and operational performance through responsiveness with the technological capability as moderating role between supply chain integration and responsiveness.

1.1 Problem Statement:

The services companies (medical field) have underwent significant changes in

the last three decades, these changes inculpate the top management approach, and customer anticipates supplier's capabilities and technologies used in process and service development (Ahuja et al., 2016). Today global environment and competition put numerous pressures on services companies (medical field) to achieve world class performance (Baea, 2017).

Internal integration and external integration play different roles in the context of SCI. While internal integration recognizes that the departments and functions within a manufacturer should function as part of an integrated process, external

integration recognizes the importance of establishing close, interactive relationships with customers and suppliers. Both perspectives are important in allowing supply chain members to act in a concerted way, to maximize the value of the supply chain. (Flynn et al.2010)

Due to the above fact that healthcare providers are under intense cost and quality pressures. While other industries and services have addressed these pressures by improving value creation through purchasing and supply chain management (SCM). There were many studies conducted in the field of supply chain integration, operational performance, responsiveness and technological capabilities with other variables while this study examine all this variable under the mediating role of responsiveness between the supply chain integration and operational performance the effect of technological capabilities as moderating. Therefore, this study addressed the gaps and limitations in the literature to formulate problem statement in Sudan.

1.2 Study Gaps:

Firstly, Most of the studies that addressed the operational performance or supply chain management in general focused on the manufacturing and production companies, where these studies neglected the service companies (medical field), which represent a true foundation of the national economy, as a play an active role in development of economic and social growth through providing and diversifying services, achieving developmental goals and creating job opportunities. previous studies regarding supply chain integration,responsiveness, operational performance have focused mainly on a specific sector, such as manufacturing (Sukati, 2012), (Gunasekaran et,al.2018) (Minich,2010) or production Pharmaceutical sector such as (Eltamimi,2015) Food industry such as (Kumar,et.al 2017) This study should covers service sectors (medical field) including private hospitals , private medical centers and private medical services.

Therefore, this research focused on the studying of operational performance and supply chain integration in service sector (medical field), and this is what the previous studies have failed to deal with.

Secondly, this study will explore the relationship between supply chain integration and operational performance. The previous studies such as (Chen,et.al 2018) (Kim,et.al 2018), (Liu, et al, 2018), (Prajogo, et al, 2018),(Wantao, 2017), (Baharanchi et ,al.2009 Fantazy et al., 2010) .(Eheshti et al., 2014) (B Liu et al., 2013) ،((Gimenezet al., 2012) (Moshkdanian and; Flynn et al., 2010)have been studied supply chain integration, as a customer integration, competitor integration, supplier integration and vertical integration, horizontal integration, strategic, SC patterns, practice , attitude, informational, manufacturing , this study focus on three types of supply chain integration: , internal integration, supplier integration and customer integration as a dimensions of supply chain integration influence operational performance.

internal integration is considered because it is an important and involves obtaining the goals when using and share organization information, thus, should be important for operational performance (Cheng, 2018). Customer integration is considered because they important for organization when it satisfied them, business activities and focus on affects that are important in operational performance (Huang, et.al 2018). Supplier integration is considered because it is creating and sustaining business partner loyalty through building partner satisfaction, which should be important for operational performance (Liu, 2018). It attempts to create and use new knowledge to develop new products/services, which should also be critical for operational performance (Melton & Hartline, 2013).

Thirdly, this study will examine the relationships between supply chain integration and operational performance with different dimensions that previous studied taken. on the other hand, there is no previous studies investigated the relationship

between supply chain integration and operation performance in services as general and with this dimension specific (services performance, cost quality performance , cost performance) but (Ding ,et.al 2018) investigated the relationship between SCI and OP without dimensions ,In addition (Kumar & Kushwaha, 2018) investigated the relationship between SCP and OP without dimensions.

(Kumar et, al. 2017) investigated the relationship between SCI and OP with (production flexibility, inventory turns, order fulfillment, total rate logistic costs. (Sinnandavar et,al.2018) investigated the relationship between SCI (information integration & operation integration) and OP (operational efficiency & environmental performance). (Shobayo , 2017), (Camara, 2018), (Makhdoom ,2016) investigated the relationship between SCI and OP without dimensions..

fourthly, besides exploring the relationships between supply chain integration and operational performance, this study will examine the relationships between supply chain integration and responsiveness. on the other hand, there is few previous studies investigated the relationship between supply chain integration and responsiveness, , (Sukati, 2012) investigated the relationship between supply chain integration without dimensions and responsiveness. In addition, (Alshaar,2014) investigated the relationship between supply chain integration with other dimensions (horizontal, vertical, strategic) and responsiveness without dimension (Thatte,2007) investigated the relationship between supply chain practice and responsiveness.

fifth, besides exploring the relationships between supply chain integration and responsiveness, this study will examine the relationships between responsiveness and operational performance. on the other hand, there is no previous studies investigated the relationship between responsiveness and performance, but (Gunasekaran,et.al 2018) investigated the relationship between responsiveness and speed & flexibility ,In addition (Sukati, 2012) investigated the relationship

between responsiveness and competitive advantage. (Thatte,2007) investigated the relationship between responsiveness and competitive advantage, (Al-Hawajreh et,al.2014) investigated the relationship between responsiveness and competitive advantage. (Danese et,al.2013) investigated the relationship between responsiveness and international supplier network.(Cheung & To, 2016) investigated the relationship between organizational responsiveness and customer satisfaction also (Livonen , 2017) investigate the relationship between organizational responsiveness and institutional complexity.

So there is no previous studies investigated the relationship between responsiveness and operational performance with supply chain integration, hence, this study was designed to address the relationships between supply chain integration with operational performance.

Sixth, Besides exploring the relationship between responsiveness and operational performance, this study will examining the mediating role of responsiveness between supply chain integration and operational performance in Sudanese service sector (medical field), Moreover, there are few previous studies considered the responsiveness as a mediating variables such as (Gunasekaran et,al.2018) considered that the mediating role of responsiveness on relationship between Information technology system and speed & flexibility linkage, while (Sukati, 2012) considered the mediating role of responsiveness on relationship between supply chain integration and competitive advantage , (Thatte , 2007) consider the mediating of responsiveness between supply chain practice and competitive advantage. (Cheung & To ,2016) consider the mediating on relationship between service failures and customer satisfaction. (Bertran & chi , 2017) consider the mediating of business responsiveness between fashion e – commerce and environmental impact.

Based on the above researchers ,the varied results between the variables and according to the theory of resource based view (RBV), this research, will examine the responsiveness as mediator in the relationship between supply chain integration and operational performance.

Seventh, Besides examine the mediating role of responsiveness between supply chain integration and operational performance, this study will also examine the moderating role of technological capability between supply chain integration and responsiveness in Sudanese service firms (medical field), Moreover, there are few previous studies considered the technological capability as a moderating variables such as (Oliveira , 2016) considered that the moderating role of technological capability on relationship between business value of information technology and firm performance, while (Colin & Chwen, 2017) , (Fernandez , 2012) considered the moderating role of technological capability, (Guerra & Camargo, 2016) consider the   moderating role of technological capability between firm internationalization and new product success .(Srivastastava ,et.al 2015) consider the   moderating role of technological capability between alliance network technology resource and firm technological innovation. (Ortega , 2010) consider the moderating role of technological capability between competitive strategies and firm performance. (Jie Wu , 2014) consider the moderating role of technological capability cooperation with competitors and product innovation.

Based on the above researchers and according to (Baroun & Keni) that when there is confused results between the variables and according to the theory of dynamic capability, this research will examine the technological capability as moderating in the relationship between supply chain integration   and responsiveness.

Finally, previous studies regarding supply chain integration ,responsiveness, operational performance have focused mainly on different cultures and

environment , such as America, India, Europe etc… or even in Arab area (Sukati, 2012), (Gunasekaran et,al.2018), (Minich,2010) such as (Eltamimi,2015) ,(Kumar,et.al 2017), (Alhajre,2017) , (Hamza,2015) This study should be in local environment that it is all (medical field) institutions in Khartoum State including private hospitals , private medical centers and private medical services.

This research will examine the mediating role of responsiveness between supply chain integration and operational performance the technological capability as moderating.

In Sudan, there is a lack of studies that Testing the level of practices and the outcome of the supply chain and supply chain integration.(Hamid,2013)also there are a lack to practice supply chain in services sector so recently there are a few of services institutions enter the supply chain department as one of the departments in the institution that related to the important of this managerial practice and basic department as one of the departments in the institutions.

Thus, this research addresses the gaps and limitations in the literature by investigating the link between supply chain integration operational performance, responsiveness and technological capabilities. Generally this research will examine the mediating role of responsiveness between supply chain integration and operational performance. In addition, the research will investigate the moderating effect of technological capabilities on the relationship between supply chain integration and responsiveness in services firms (medical field) of Sudan.

1.3 Research Questions:

The main question of this research is**: Does technological capabilities moderates the exchange of supply chain integration and responsiveness to enhance operational performance in Sudanese services firms (medical field)?** This question was operational as seven research questions to attain the aims of the study as follows:

1. What the level of supply chain integration among the service firms (medical field)?

2. What the level of operational performance among the service firms (medical field)?

3. What is the extend supply chain integration can contributes in operational performance?

4. What is the relationship between supply chain integration and responsiveness?

5. To what extend responsiveness can contributes in operational performance?

6. Does the responsiveness mediate the relationship between supply chain integration and operational performance?

7. Does the technological capabilities moderate the relationship between supply chain integration and responsiveness?

1.4 Research Objectives:

The study attempting to achieve the following objectives:

1. To explain the extent level of supply chain integration components.

2. To explain the extent level of operational performance components.

3. To examine the relationship between supply chain integration and operational performance.

4. To investigate the relationship between supply chain integration and responsiveness.

5. To identify the relationship between responsiveness and operational performance.

6. To assess the effect of responsiveness as mediate variable between supply chain integration and operational performance.

7. Find out the possibility of technological capabilities as moderator variable between supply chain integration and responsiveness.

1.5 Significant of the Study:

1.5.1.Theoretical significance:

This study is expected to add to the following areas of knowledge about supply chain integration:

The first sub-section represents the theoretical contribution of this research which can be considered in terms of the following areas of knowledge:

1. This study is trying to fill the gap through the process of mediating responsiveness between supply chain integration and operational performance dimensions.

2. The research contributes to bridging the knowledge gap that was failed in the previous studies, especially in Sudan, on the impact of the operation performance in supply chain integration on creating creative performance of workers.

3.Contributing to the scientific research the construction and composition of scientific knowledge through testing the concepts of research and its variables, the study test the theory of dynamic capability in supply chain integration and the theory of resources on which the model was built and to know the extent which these theories interpret through.

4. The study will examine mediating effect of responsiveness on the relationship between supply chain integration SCI and operation performance OP. This will contribute resource based view by demonstrating how SCI transform into operational performance and competitive advantages. Also SCI might provide more interpretation to how SCI resulting operational performance.

Therefore, it may be providing a new scientific addition especially that this study will combine different variables that diagnose the interaction of their variables, which contribute to the development of new concepts, data and relationships on their subjects.

1.5.2.Practical significance:

The practical importance from the subject of study to the organizations which reveal the quality of the administrative information systems, which is a major resource in the organizations because the good integration leads to the effective creativity of the individuals through their satisfaction. It is relatively new in the Sudanese administrative environment. Within the scientific framework of advanced management practices in acquiring knowledge, increasing creative skills and abilities using it to improve, differentiate and gain an effective competitive advantage for the organizations that seek it.

Several practical contributions are expected to emerge from the current research representing in.

1. Contribute to knowledge the level of dimensions in operation performance so that organizations can provide quality indicators in supply chain integration as indicators of quality measurement in performance.

2. The results of study and suggestions recommendations related to the supply chain integration, Contribute to creative operational performance and the possibility of benefiting from the outputs of study in the reality practical of the service organizations sector (medical field).

3. The study can also draw the attention of managers and decision makers to the importance of user satisfaction in the service organization sector (medical field), in order to enhance its role in operation performance, which helps to create performance.

4. Contribute to the knowledge importance of enabling employees to strengthen relationship between the supply chain integration and responsiveness so that decision makers in service organizations (medical field) can take care of it as an internal indicator leading to the improvement and correction relations.

1.6 Operational Ideation Definitions of key terms:

1.6.1. Supply chain integration:

is the ability of the organization to integrate its activities and internal operations and cooperate with its suppliers and customers. (**Flynn et, al.2010**)

1.6.2. Internal integration:

Refers to the system of cooperation between the various functions in the organization so that the organization can meet the needs of customers in a timely manner and at the appropriate cost. (**Flynn et, al.2010**)

1.6.3. Supplier integration:

Involves core competencies related to coordination with critical suppliers. (**Flynn et, al.2010**)

1.6.4. Customer integration:

Customer integration refers to the organization's ability to build, develop and maintain cooperative relationships and exchange information with customers. (**Flynn et, al.2010**)

1.6.5. Responsiveness:

Supply chain response refers to its ability to adapt to changes in the environment and market quickly and effectively. **Thatte(2007)**

1.6.6. Operation responsiveness:

Is the ability of a firm's services system to address changes in customer demand. **Thatte(2007)**

1.6.7. Logistic responsiveness:

Is the ability of a firm's outbound transportation, distribution, and warehousing system to address changes in customer demand. **Thatte(2007)**

1.6.8. Supplier Network responsiveness:

Supplier Network Responsiveness is the ability of a firm's major suppliers to address changes in the firm's demand. **Thatte(2007)**

1.6.9. Operational performance:

Operational performance refers to the desired results that the institution seeks to achieve and the inability of the organization to define its objectives through the efficient and effective use of its available resources. **Baea(2017)**

1.6.10. Services performance:

Service performance refers to the achievement of quality, high quality, and timely response to customer requirements. **Baea(2017)**

1.6.11. Quality performance:

Is the degree to which products and services meet service specifications. **Baea(2017)**

1.6.12. Cost performance:

Cost of performance refers to the provision of a service at the lowest cost and delivery to customers at the lowest price. **Baea(2017)**

1.6.13. Technological capabilities:

The technological capabilities of the information indicate that the company has systems, software and skills that help to work jointly between the company and its partners. **Agan (2005)**

1.7 Organization of the study chapters:

Organization of the study chapters :

```
Chapter one        Chapter        Chapter four      Chapter six
introduction       three          Research          discussion
                   Theoretical    methodology       And
                   framework                         conclusion

        Chapter two                      Chapter five
        Literature                       data analysis
        review
```
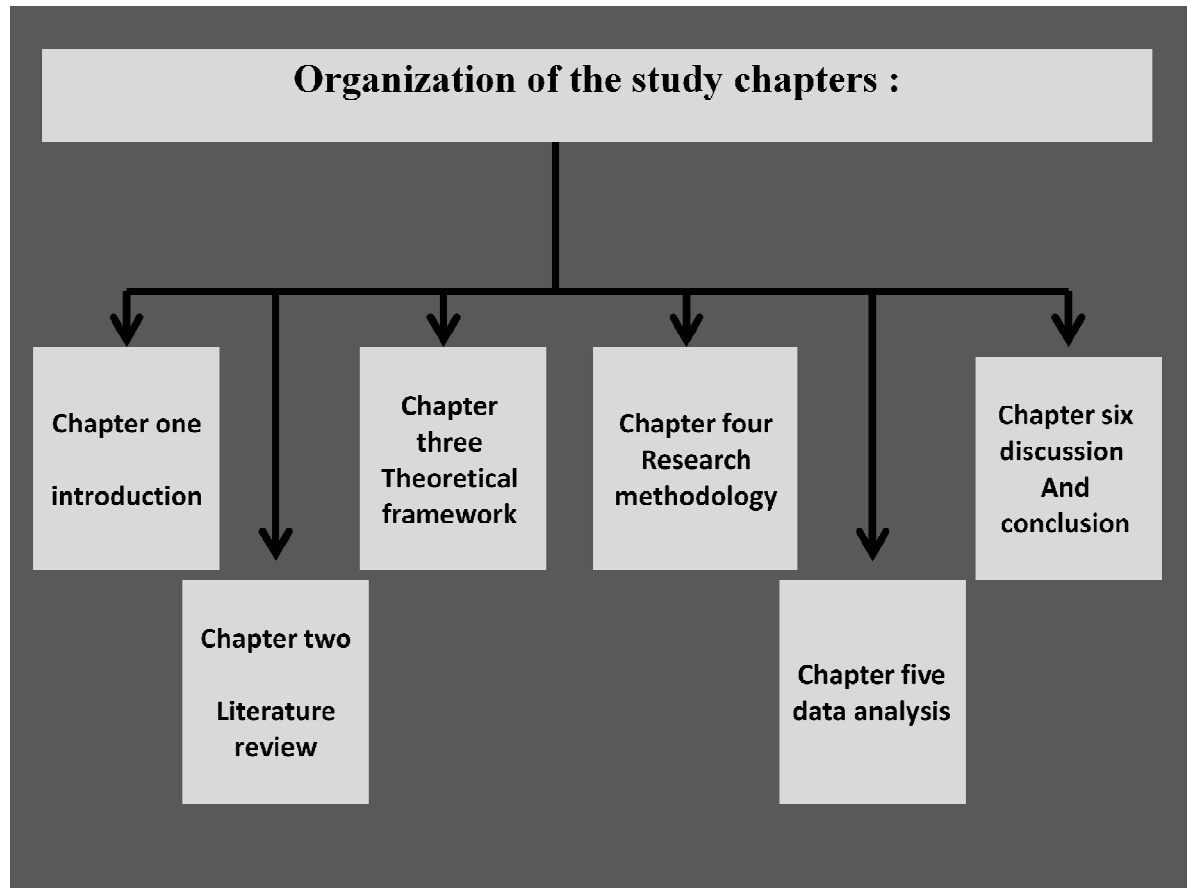
The research is divided in to six chapters as following:

Chapter One, Introduction: This chapter outlined, Background of the study, the research problem, research questions, the objectives, the significance, and the definition of terms and the organization of the study.

Chapter Two, Literature Review: presents the theoretical perspectives of supply chain integration, operational performance, responsiveness and technological capabilities, a detailed literature review.

Chapter three, theoretical framework and hypotheses: introduced the theoretical framework, conceptual framework and hypotheses of the study.

Chapter four, Research Methodology: describes the research design and methodology for empirically testing the hypotheses. The methodology includes the unit of analysis, data collection, and statistical techniques.

Chapter five: Data Analysis and findings: including an analysis of the collected data and testing the hypotheses.

Chapter six, Discussion and conclusions: including presentations of the results, that provides discussion of research implications, the limitations, and directions for future research.

The research process
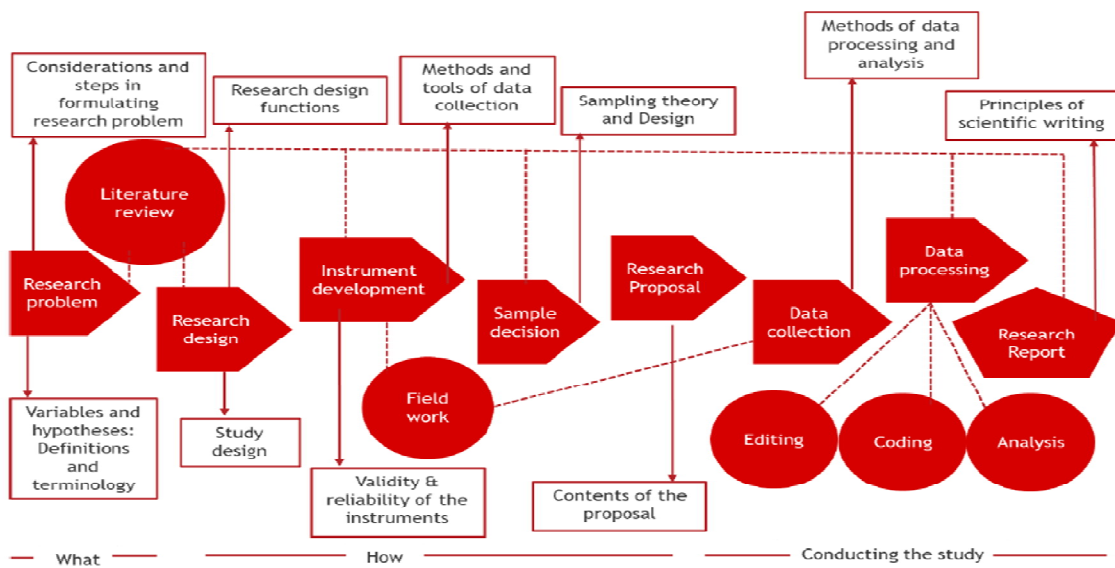
1.8 Summary of the chapter

The chapter presents the phenomena under the study, problem statement, research questions, research objectives, theoretical and practical contribution, operationalization definition of terms,

The following chapter consist the literature review of the study.

CHAPTER II:
LITERATURE REVIEW

Chapter II
Literature Review

2.0 Introduction

This chapter provides the theoretical background for the research by reviewing the relevant alignment literature and by presenting the theories that related to analyze the variables .This Chapter is divided into two major subsections. The first subs action presents relevant literature, focusing on the Supply chain integration, operation performance, responsiveness and technological capabilities.

2.1 Supply Chain Management:

Literature in context of SCM dated back to 1980s and it has received many definitions over the past years as It gained popularity, with most definitions describing it as a network of different entities (and its processes) interacting together to make materials and information flow (Lummus and Vokurka, 1999; Cooper *et al.*, 1997).Infect a literature review by Stock et al. (2010) revealed 166 unique definitions of SCM. To an extent, SCM suffers (or benefits) from being studied from a wide range of academic disciplines and diverse theoretical perspectives. On the other hand this encourages a rich and lively debate, but it may also lead to a fragmented literature, with overlapping constructs and a failure to produce consistent findings. Stock and Boyer (2010) provided a comprehensive examination of 166 SCM definitions which have appeared in the literature and summarized many of the points by concluding that, " Without the adoption of a uniform agreed upon definition of supply chain management (SCM), researchers and practitioners will not be able to "advance the theory and practice" of the discipline. An integrated definition of SCM would greatly benefit researchers' efforts to study the phenomenon of SCM and those practitioners attempting to implement SCM".

Several authors have defined supply chain management. Christopher (1998), New and Payne (1995), and Simchi-Levi et al. (2000) as "the integration of key business processes among a network of interdependent suppliers, manufacturers, distribution centers, and retailers in order to improve the flow of goods, services, and information from original suppliers to final customers, with the objectives of reducing system-wide costs while maintaining required service levels" (as cited in Stapleton et al., 2006). The Global Supply Chain Forum (GSCF) defines supply chain management as "the integration of key business processes from end user through original suppliers, that provides products, services, and information that adds value for customers and other stakeholders" (as cited in Lambert et al., 1998). The APICS dictionary (1995) describes SCM as – "the processes from initial raw materials to the ultimate consumption of the finished product, linking across supplier-user companies".

Mentzer et al. (2001) consider SCM as a systemic, strategic coordination of business functions within an organization and between organizations within the supply chain, for improving the long-term performance of individual companies and the supply chain as a whole. The emphasis of each of these definitions is on the objective of SCM to create a distinctive advantage by maximizing the total value of products and services (Stank et al., 2005).

Furthermore, Lummus and Vokurka (1999) add that SCM links all the departments within an organization as well as all its trading partners (viz: suppliers, customers, 3PL providers, and information systems providers). There is mutual collaboration and companies work together to make the whole supply chain competitive.

The concept of SCM has been studied from two perspectives, namely purchasing (supply management), and logistics (transportation, distribution, warehousing, and inventory management) (Tan et al., 1998). According to the purchasing perspective, SCM is synonymous with supplier integration and has evolved from

traditional purchasing and materials functions (Banfield, 1999; Lamming, 1993). From the logistics management perspective, SCM is synonymous with distribution, logistics, inventory management, and customer relationships (Alvarado and Kotzab, 2001; Bechtel and Jayaram, 1997; Romano and Vinelli, 2001; Rudberg and Olhager, 2003; Van Hoek, 1998). In due course, these two perspectives evolved into one single philosophy of SCM with integrated systems, processes, and practices between trading partners.

To better understand the influence of SCM practices and modularity based manufacturing practices on supply chain responsiveness, and the effect of supply chain responsiveness on competitive advantage, four constructs have been identified through a comprehensive literature review. A research framework is then developed that depicts the various causal relationships between these constructs.

2.1.1 The four proposed constructs in the model include:

SCM Practices: "A set of activities undertaken by an organization to promote effective management of its supply chain" (Li et al., 2006)

Modularity Based Manufacturing Practices: The application of unit standardization or substitution principles to product design, production process design and organizational design (Tu et al., 2004)

Supply Chain Responsiveness: The capability of promptness and the extent to which the supply chain addresses changes in customer demand.

Competitive Advantage: "The extent to which an organization is able to create a defensible position over its competitors" (Li et al., 2006).

According to the definition of SCM by the Global Supply Chain Forum (GSCF), SCM is ''the integration of key business processes from end user through original suppliers that provide products, services, and information that add value for customer and other stakeholders'' (Chan & Qi, 2003). We can only talk about SCM, if there is a proactive relationship between a buyer and supplier and the

integration is across the whole supply chain, not just first-tier suppliers (Cox, 2004). There are several important problems in SCM that need to be resolved for efficient operation. Most of those problems stem either from uncertainties or from inability to coordinate several activities and partners (Turban et al., 2004).

The supply chain of the healthcare industry is different from the manufacturing sector in terms of the level of customization of services provided, the degree of participation of a partner or consumer and the uncertainty underlying the basic process (Pitta and Laric, 2004). All these make the healthcare value chain more dynamic and complex (Evans and Berman, 2001) and this significantly impacts on the performance of the healthcare organizations.

Components of Supply Chain Management
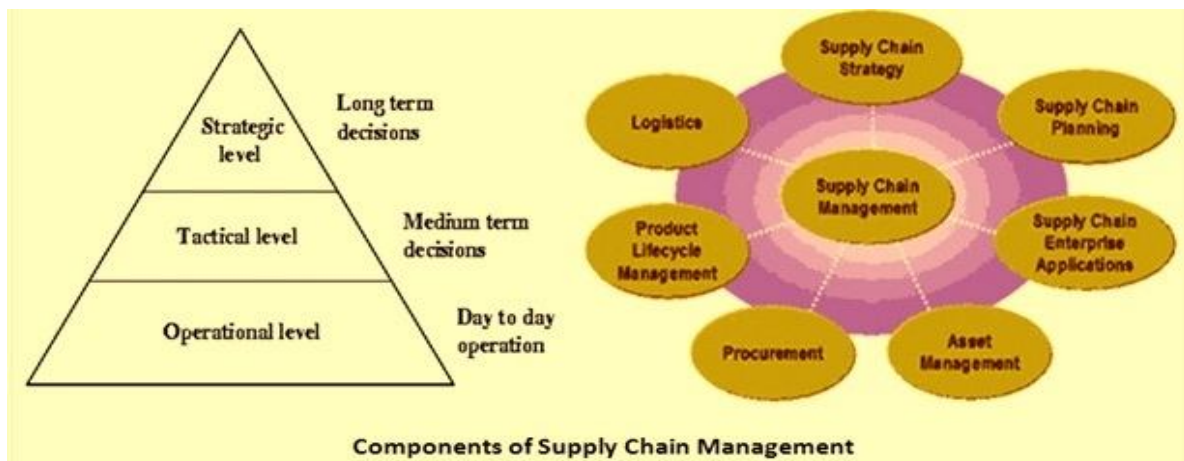
2.2 Healthcare SCM:

Supply chain provide a set of activities undertaken in an organization that helps the organization in the effective management of its supply chain by integrating its stakeholders such as manufacturers, distributors, suppliers and customers. Thus, helps in increasing the effectiveness of SCP and overall OP. SCM is the backbone of healthcare delivery. This arises from the fact that the quality of healthcare delivery is dependent on the availability of medical supplies, at the right time and in the right quantities to the patients, lack of which may create customer

dissatisfaction. Several research works have been done in literature, about healthcare supply chain practices to improve the performance of healthcare supply chain.

Gowen et al. (2008) proposed that healthcare practices, employee commitment and control initiatives are critical for healthcare supply chain. Chong et al. categorized SC practices into demand management, customer relationship management, supplier relationship management, capacity and resource management, service performance, information and technology management, service supply chain finance, and order process management.

According to Kritchanchai et al., the inventory management in hospitals should be fitted to equipment categories and demand characteristics, which are quite unique in the healthcare supply chain and that a single inventory management system cannot be effective for healthcare supply chain and thus could be done by its value and clinical importance.

Figure 2.Porter's value chain
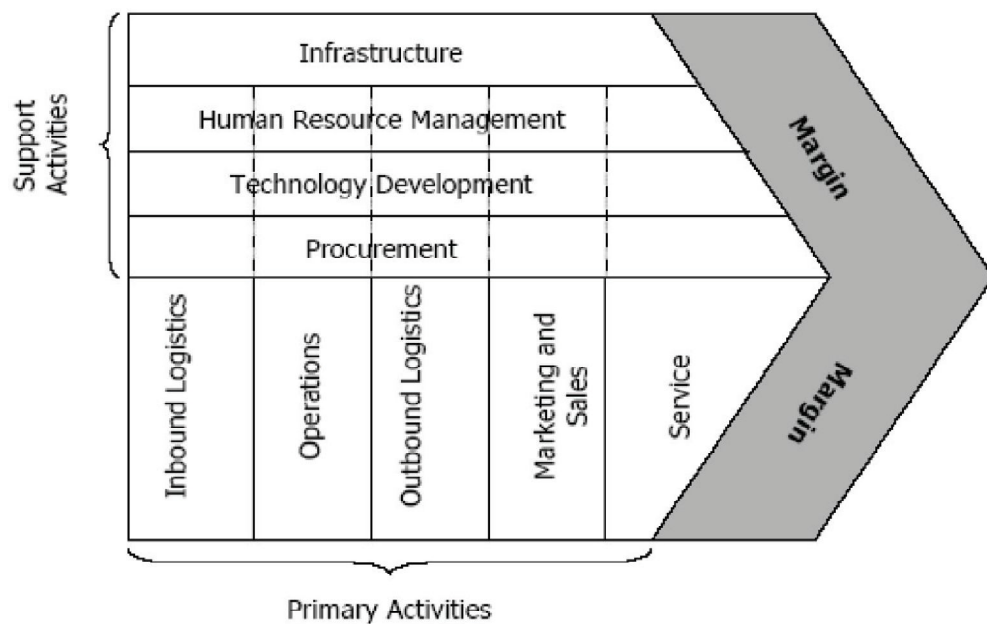
2.3 Strategic Supply chain Management:

Supply chain is now the field for competition for business globally and domestically Which is lead the firm's to depend on supply strategy as cornerstone for strategic supply?

Management and always should be integrated in the business strategy, and it should be based on the firm's objectives and strategic principles (Lintukangas., Kähkönen and Tuppura, 2013)therefore supply chains need to take a strategic approach toward relationship and capability building if they are to remain competitive in what is now a dynamic global market (Ketchen and Hult, 2007) although The origins of strategic supply chain management were founded in the1970s, where (Geoffrion and Graves (1974) developed a distribution Model, long before supply chain management was invented however limitedly integrated with supply chain practices and business strategy.(Fandel, and Stammen,2004).

Thus supply chain strategy can conceptualize as relate the supply strategy to the integration of supply activities within firms, in dyadic relationships, in chains of firms, and in inter organizational networks (Al-Shboul et al, 2017).

Strategic supply management it's more emphasizing on relationship with supplier &customers management .In addition to oriented Supply chain looking for long-term relationships and communication. Buyer's customer responsiveness indicators are considered as performance constructs.As mentioned the constituents for the strategy were derived from consideration of Little's law in a supply chain context. Numerous studies within supply chain and purchasing literature point out that the strategic importance of supplier relationship and supplier management have grown in prominence due to supply and purchasing becoming more strategic in nature (Cucchiella,Federica, and Massimo, 2006).

Strategic supply chain management is the long-term part of supply chain management, where the product program and supply chain network are determined (Fleischmann et al., 2000). As a component of strategic planning, strategic supply

chain management is focused towards the goals and tasks of company policy. The main goal of strategic supply chain management is to achieve profit optimization. The alignment of company activities towards customers is also of great importance. (Fandel, and Stammen 2004).

Researchers around the world have articulated the importance of the close relationship between the performance of manufacturing firms and their supply chain integration (Elmuti et al., 2008; Gibson et al., 2005).

While some research focuses on individual dimensions of SCI, in particular on customer and supplier integration (Cousins and Menguc, 2006; Homburg and Stock, 2004; Koufteros et al., 2007), others use various omnibus definitions (Rosenzweig et al., 2003) examining SCI as a single construct. In addition, many conceptualizations of SCI are incomplete, leaving out the important central link of internal integration. These incomplete and evolving conceptualizations have led to inconsistent findings leaving out the important role of internal integration in implementing supply chain integration and its role in performance (Das et al., 2006; Devaraj et al., 2007; Germain and Iyer, 2006; Stank et al., 2001a).

Some studies have found that integration across the supply chain has a positive impact on firms' performance (Bagchi and Chun Ha, 2005; Flynn et al., 2010; Kim, 2006; Zailani and Rajagopal, 2005) while others have proved that integration has a positive impact on supply chain performance (Lee et al., 2007; Narasimhan and Kim, 2002) and operational performance (Flynn et al., 2010; Frohlich and Westbrook, 2001). Lee (2007) views the main benefits of the integrated supply chain in terms of cost reduction, but also an increased value for the focal firm, its shareholders and members of it supply chain. Yeung et al., (2009) posit that, 'the rationale behind supply chain integration is to combine partners' resources and perspectives into a firm's value propositions thus allowing all firms in a supply chain to excel in performance.' Evans (2015) in a study on the impact of supply

chain integration strategies on the performance of the pork processing industry in Rwanda shows that there is a positive relationship between internal factors, supplier and customer integration and a firm's performance.

Figure 1: Concept of Supply Chain.
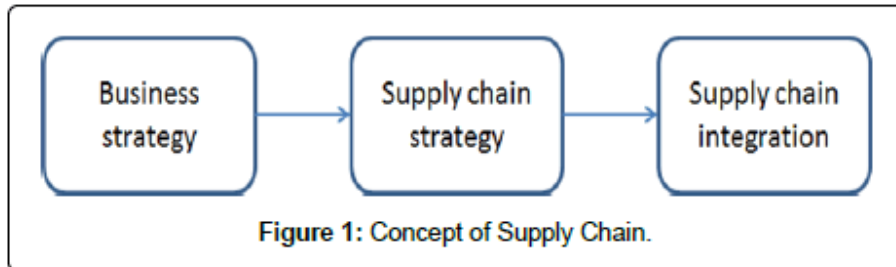
2.4 The role of integration in SCM:

It is evident that the concept of integration lies at the heart of SCM philosophy

(see, e.g. Christopher,1992; New, 1996; Lambert, 2004). Cooper et al.(1997) specifically describe SCM as "an integrative philosophy". Storey et al. (2006) in their discussion of the interlocking ideas and propositions of SCM declare that, "the central underpinning ideas relate to alignment and integration".

Perhaps most tellingly, Pagell (2004) declares that"in its essence the entire concept of SCM is really predicated on integration". If, as Mentzer et al. (2001) suggested, SCM can be regarded as a management philosophy then this philosophy is concerned first with integration.

The widely cited work of Bowersox and his collaborators at Michigan State University (see, for example, Bowersox et al., 1999), which describes a framework of six competencies (the *Supply Chain 2000Framework*) that lead to world-class performance in logistics and SCM, supports this view. The six competencies, grouped into three areas (operational, planning and relational) are

all concerned with integration.

2.4.1 The work of Fawcett and Magnan (2002) identified four levels of integration in practice:

1. Internal cross-functional integration.

2. Backward integration with valued first-tier suppliers.

3. Forward integration with valued first-tier customers.

4. Complete backward and forward integration('from the supplier's supplier to the customer's customer').

Furthermore, and as noted earlier, Harland et al. (1999) classifies research in this area according to the level of integration between supply chain activities.

2.4.2 The four levels are:

1. Internal level, which considers only on those activities which are entirely internal to the focal company.

2. Dyadic level, which considers single two party relationships (between, for example, supplier and manufacturer or manufacturer and distributor/retailer).

3. Chain level, which encompasses a set of dyadic relationships including a supplier, a supplier's supplier, a customer and a customer's customer.

4. Network level, which concerns a wider network of operations In each of these cases, the first level relates to integration of activities and processes which are carried out within a single organisation (i.e.*internal* or *micro-* or *intra-firm* supply chain integration).

The others describe varying degrees of integration of activities which span the boundaries of organisations (i.e. *external* or *macro-* or *inter-firm* supply chain integration), with the last one of Fawcett and Magnan (2002) often being viewed as the theoretical ideal. The following sections discuss internal and external integration in more detail.

The supply chain is an integrated process that involves the transformation of raw material to final product and finally to customer delivery. The complete process is divided into four levels – suppliers, producers, distributors and customers. McKone-Sweet et al. (2005) studied that the concept of SCM is expanding rapidly in industries in order to satisfy customers in effective and profitable manners.

Further, the concept of SCM has also gained momentum in the field of healthcare as a tool for increasing productivity and improving quality (Jarret, 1998; Radnor et al., 2006; Doerner and Reiman, 2007). SCM is more complex in the healthcare as it directly deals with patient care (Musttaffa and Potter, 2009; Turhan and Vayvay, 2009).

2.5 Supply Chain Integration (SCI)

This section explains the first concept of this study SCI which represent the independent variable, including the concept, the definitions and the dimensions of SCI.

2.5.1. The Concept and Definition of (SCI):

The concept of integrative relationships in the supply chain has been widely

studied under different concepts. Although integration has been the most commonly used, other concepts such as coordination or collaboration are usually used to describe integrative efforts alongthe supply chain (Ellinger et al., 2000; Pagell, 2004; Singh and Power, 2009). However, the latter are also used to describe some elements of SCI (Leuschner et al., 2013).

Thus, coordination comprises synchronization, planning and alignment of activities, while collaboration includes shared actions to improve processes and exploit resources (Wiengarten et al., 2014).

Although most of the expected benefits of SCI are cost savings (Madhok and Tallman, 1998), integrative processes may increase these for a time. Also, the increase in performance due to integration might not be sufficient to recover the high costs (Leuschner et al., 2013) Therefore, the concept of SCI, when referred to its link with performance, is complex and can be approached from different perspectives and theoretical fundaments.

In general, a strategic view of SCI is thought of as one of the managerial tools with the potential to generate competitive advantages in organizations (Flynn et al., 2010; Vickery et al., 2003).

The increasing global competence and the shortening product life-cycle are the two main factors that encourage organizations to change their focus from competitive rivalry to mutual beneficial relationship and cooperation (Lambert and Cooper, 2000; Wisner and Keah, 2000). In this sense, organizations within the supply chains would align their strategy with other supply chain members in an effort to be more responsive to the environment and,therefore, remain competitive (Richey et al., 2009). This can be carried out by focusing on a proactive search of efficient linkages, both among internal functions and external agents that comprise the supply chain (Qi et al., 2011; Narasimhan and Kim, 2002). Therefore, those organizations integrating their processes with external suppliers and customers within a single supply chain seem to be more successful (Frohlich and Westbrook, 2001;Zailani and Rajagopal, 2005).

The approach most used for these integrating processes was proposed by Flynn et al. (2010), which distinguishes between internal and external integration and where the external dimension can also be split into supplier and customer integration.

According to Flynn et al. (2010), supply chain integration (SCI) can be defined as the degree to which a manufacturer strategically collaborates with partners within its supply chain and collaboratively manages inter- and intra-organizational processes.

SCI may be considered as one of the managerial tools with the potential to generate competitive advantages for organizations (Flynn et al., 2010; Vickery et al., 2003).

This ability allows organizations to complement resources with others and, thus, to improve the performance of both the organizations. However, integration does not

always imply a balance in the mutual benefits. It might comprise additional coordination and control activities that could eventually increase managerial costs.

According to Kim (2013), most of the studies that address the direct relationship between SCI and performance refer to publications from 2000 to 2006. In the same vein, Mackelprang et al. (2014) founnd that more than half of the SCI/performance relationships analyzed are subject to unknown moderating effects. Thus, performance measurements associated with SCI might widely vary.

Previous studies concerning the SCI and performance use a restrictive criterion to select the sample, usually limited to publications with a certain impact factor (Fabbe-Costes and Jahre, 2008; Kim, 2013; van der Vaart and van Donk, 2008). Besides, results of effects vary when they are combined with different integration and performance dimensions. This has led to some confusion that this study tries to clarify. Although the importance of the moderating effect has been recognized (Mackelprang et al., 2014), the literature on the subject is scattered. Therefore, this study intends to develop and analyze them and propose a classification.

Supply chain integration is defined as 'the extent to which all activities within an organization, and the activities of its suppliers, customers, and other supply chain members are integrated together.' Customer and supplier integration are commonly referred to as external integration, which is the degree to which a manufacturer partners with its external partners to structure inter-organizational strategies, practices and processes into collaborative, synchronized processes (Stank et al., 2001). Customer integration involves core competencies derived from coordination with critical customers, whereas supplier integration involves core competencies related to coordination with critical suppliers (Kim,2006).

In contrast, internal integration focuses on activities within a manufacturing firm. It is the degree to which a manufacturer structures its own organizational strategies, practices and processes into collaborative, synchronized processes to fulfill its

customers' requirements (Cespedes, 1996; Kahn and Mentzer, 1996; Kingman-Brundage et al., 1995) and efficiently interact with its suppliers. While internal integration recognizes that the departments and functions within a manufacturing firm should function as part of an integrated process, external integration recognizes the importance of establishing close, interactive relationships with customers and suppliers. Both perspectives are important in allowing supply chain members to act in a concerted way so as to maximize the value of the supply chain. Researchers argue that a close relationship between customers and a services offers opportunities for improving the accuracy of demand information, which reduces the services design and services planning time, allowing it to be more responsive to customer needs. Because customer integration generates opportunities for leveraging the intelligence embedded in collaborative processes, it enables server to reduce costs, create greater value and detect demand changes more quickly.

Customer integration has been found to be related to customer satisfaction both directly (Homburg and Stock, 2004) and indirectly through its relationship with product development and innovation (Koufteros et al., 2007; Song and Di Benedetto, 2008).

Studies have also investigated the importance of supply chain integration on performance (Droge et al. 2004; Frohlich and Westbrook 2001; Zailani and Rajagopal 2005). Some authors have also questioned the validity of integration (Cousins and Menguc, 2006; Danese and Romano, 2011; Gominez et al., 2012) and suggest that external supplier integration does not improve a firm's operational performance. Supply chain integration increases performance only if supply complexity is high.

Bask and Juga (2001) argue that in their study conducted in China intensive integration was not necessarily the best solution in all cases; rather limited integration might be beneficial in some areas depending on different national and

industry contexts. Donaldson (2011) analyzed the impact of customer integration on efficiency and the moderating role of supplier integration. In a survey conducted in Thailand, Wong et al., (2011) argue that under environmental uncertainty the relationships between supplier/customer integration and delivery and flexibility performance and those between internal integration and product quality and production costs are high.

SCI refers to the degree to which a firm can strategically collaborate with its supply chain partners and collaboratively manage the intra- and inter-organisation processes to achieve effective and efficient flows of product and services, information, money and decisions with the objective of providing maximum value to customers at low cost and high speed. (Zhao et al. 2008).The literature has provided numerous definitions for SCI. While some studies defined SCI as a formalised process of partnership or collaboration (Cao et al., 2010), others viewed SCI as a set of practices that involve sharing of resources and information across internal departments and external organisations (Swink et al., 2007).

In spite of various definitions, scholars have come to a consensus that there are two recurring themes involving SCI. They are connectivity and simplification (Vickery and Dröge, 2010).

Connectivity emphasises linking of operations both internally between functional units, and externally between firms to synchronise the flow of materials, products, and information.

In general, connectivity can be enhanced from various mechanisms such coordination, collaboration, cooperation, and interaction (Leuschner et al., 2013). Simplification involves identifying and eliminating duplications and non-valuing adding activities and elements within processes (Chen et al., 2009). This can be achieved primarily through establishing and adhering to common operational

policies and procedures, inter-functional unification, and process standardisation (Bowersox et al., 2002).

Integration can occur at various levels or areas to achieve connectivity and simplification (Van der Vaart and van Donk, 2008). The areas for integration can occur at the information, operational, and relational level. Information integration refers to the sharing of strategic information, such as demand, for the purpose of forecasting and planning (Rai et al., 2006).

It also includes systems collaboration to ensure compatibility of intra- and inter-firm supply chain communications and technologies such as electronic data interchange, automatic replenishment systems, and warehouse management systems (Frohlich, 2002). Operational integration refers to any joint activities, work processes, and decisions that are collectively performed by a group of internal departments or firms in the supply chain. This includes practices such as co-makership, integrated production planning, and vendor-managed inventories (Devaraj et al., 2007). Lastly, before any firms or functions can successfully implement SCI, they must exhibit willingness to integrate their processes, which is reflected by their relationship commitment (Zhao et al., 2011). This can be enhanced through relational integration which refers to the adoption of a strategic connection between firms in the supply chain by improving trust, commitment, and long-term orientation (Dyer and Hatch, 2006).

There are two boundaries concerning SCI, namely, II and EI. According to Chen et al. (2009), both dimensions should be treated as separate constructs in their measurement due to variations in configuration sequence (Flynn et al., 2010), and differences in the involved parties.

II was defined as the level of collaboration among functional groups in a firm, and is measured by the degree to which a firm can structure its organisational strategies, practices, procedures and behaviours into collaborative, synchronised,

and manageable processes to fulfil its customers' requirements (Zhao et al., 2011). EI was defined as the degree to which a firm can partner with its key supply chain members (customers and suppliers) to structure their inter organisational strategies, practices, procedures, and behaviours into collaborative, synchronised, and manageable processes to fulfil their end users' requirements(Zhao et al., 2011). Both forward and backward integration (Fawcett and Magnan, 2002),and supplier and customer integration (Stank, Keller and Closs, 2001) fall under the broader theme of EI The relationship between II and EI has been extensively studied in the literature.

The previous studies such as (Chen,et.al 2018) (Kim,et.al 2018), (Liu, et al, 2018), (Prajogo, et al, 2018),(Wantao, 2017), (Baharanchi et ,al.2009 Fantazy et al., 2010) .(Eheshti et al., 2014) (B Liu et al., 2013) ʻ((Gimenezet al., 2012) (Moshkdanian and; Flynn et al., 2010)have been studied supply chain integration, as a customer integration, competitor integration, supplier integration and vertical integration, horizontal integration, strategic, SC patterns, practice , attitude, informational, manufacturing , this study focus on three types of supply chain integration: , internal integration, supplier integration and customer integration as a dimensions of supply chain integration influence operational performance. Internal integration is considered because it is an important and involves obtaining the goals when using and share organization information, thus, should be important for operational performance (Cheng, 2018). Customer integration is considered because they important for organization when it satisfied them, business activities and focus on effects that are important in operational performance (Huang, et.al 2018). Supplier integration is considered because it is creating and sustaining business partner loyalty through building partner satisfaction, which should be important for operational performance (Liu, 2018). it attempts to create and use

new knowledge to develop new products/services, which should also be critical for operational performance (Melton & Hartline, 2013).
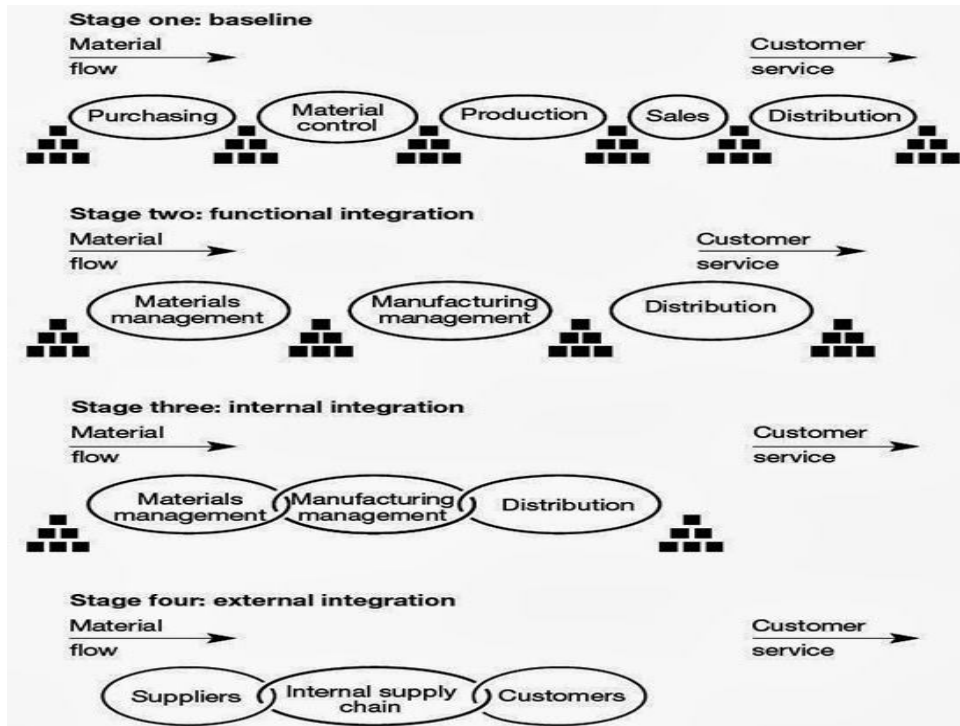
2.6 Dimensions of supply chain integration:

2.6.1.Internal integration:

Internal integration is defined as a process of inter-functional interaction, collaboration, coordination, communication and cooperation that brings functional areas together into a cohesive organization (Flynn et al., 2010; Zhao et al., 2011). Internal integration is defined as 'the degree to which a manufacturer structures its own organizational strategies, practices and processes into collaborative, synchronized processes, in order to fulfill its customers' requirements and efficiently interact with its suppliers' (Flynn et al., 2010).

Internal integration deals with integrating and linking information among different organizational departments, creating easy access to inventory information, developing an easily accessed integrated database that encompasses main

operational data, integrating production processes using advanced information systems and linking production and marketing departments using computerized planning systems (Lee et al., 2007).

Further, supply chain partners who exchange information regularly are able to work as a single entity and can understand the needs of the end customer better and hence can respond to market changes quicker (Stein, 1998). Companies with low internal integration strategies will achieve low levels of external integration and companies implementing the full internal integration strategies will have the highest levels of external integration (Gimenez and Ventura, 2005).
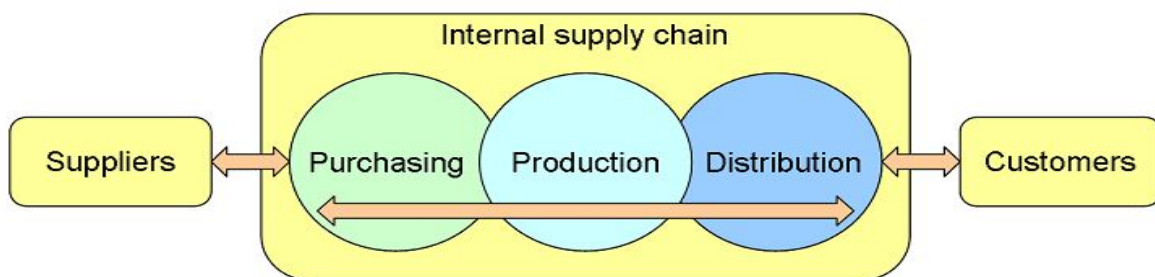
2.6.2 Supplier Integration:

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

From the literature review, Stank, et. al. (2001), defined supplier integration as "the degree to which a firm can partner with its key supplier members". Some authors

use the term downstream integration to express supplier integration. Scannell, et. al. (2000) have focused on upstream integration, analyzing the integration with suppliers. Flynn, et. al. (2010), also comment on supplier integration as it involves core competencies related to coordination with critical suppliers. Li et al., (2014) define supplier integration as 'The long-term relationship between the organization and its suppliers. It is designed to leverage the strategic and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits.'

Supplier integration is characterized by various aspects and activities such as information sharing, coordination, trust, shared technologies, integrated processes, long-term contracts, assisting suppliers in improving production processes, fostering quality improvements, investing in suppliers' assets including suppliers in new product development, improving suppliers' overall capabilities, risk and reward sharing and shared gains from development efforts (Echtelt et al., 2008). As such, integration results in improved decision making,

enhanced knowledge sharing, aligned capabilities, built learning routines and increased performance of supply chain (SC) partners (Echtelt et al., 2008). Trust enhances the degree of commitment between the two parties, reduces transactional costs, improves cooperation, enhances the satisfaction of the two parties, decreases formal contracts and reduces conflicts (Sahay, 2003).

Supplier integration, also called 'backward' integration (Frohlich and Westbrook, 2001) refers to the process of interaction and collaboration between an organization and its suppliers to ensure an effective flow of supplies (Zhao et al., 2011). Supplier activities include activities such as placing strategic activities with suppliers, involving suppliers' capabilities to generate new products during the design stages, production planning and inventory management, having a rapid response order processing system with suppliers, installing a supplier network that

ensures reliable delivery and exchanging information with suppliers. According to Yao et al., (2007), supplier integration has to do with data flow between two or more companies and constitutes a way towards achieving process integration under which a supplier takes control of the inventory and purchasing functions of the buyer.

Accordingly, current study defined supplier integration as the process of cooperation between supplier and organization that facilitate sharing of information, knowledge, materials and experiences. It was measured by specific items that reflect the nature of relationship, partnership, and other relevant issues between supplier and services institutions (medical field).
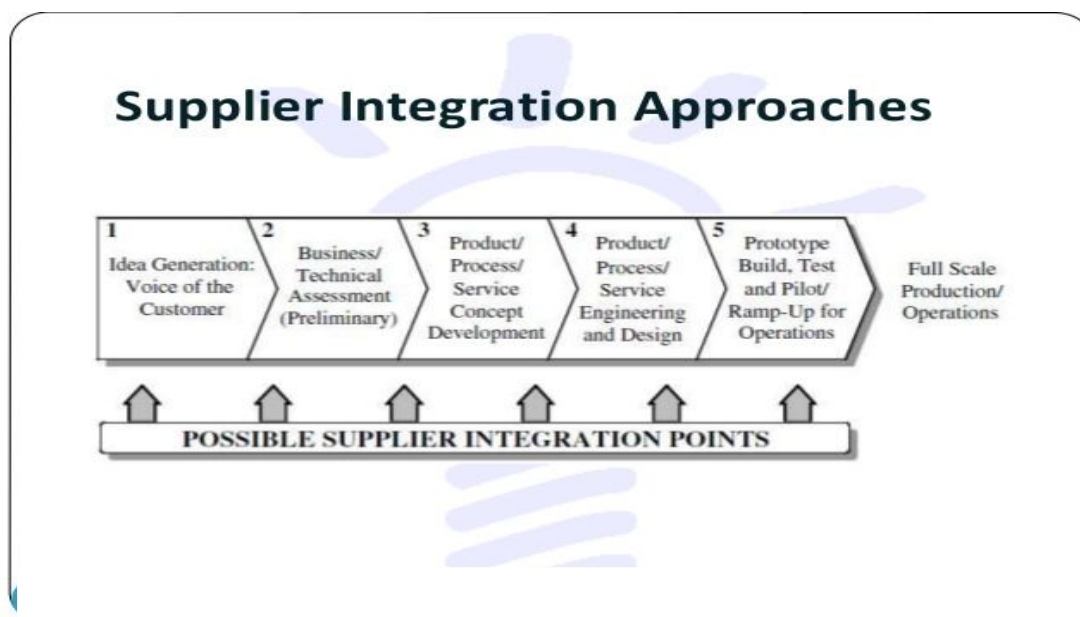
2.6.3 Customer integration:

Tan et al., (1998) define customer integration as 'demand management practices through long-term customer relationship, satisfaction improvement, and complaint management.'

The fundamental aspect of customer relationships is the focus on key customers to understand their needs and requirements and to satisfy them. Customer integration includes different activities and practices such as integrated problem-solving initiatives, direct customer contacts, managing customer complaints, increasing customer satisfaction and establishing long-range relations with customers (Sousa, 2003; Tan et al., 1998). Customer integration is expected to yield different benefits to organizations including the ability to differentiate their products from competitors, increased market share and retention of profitable customers, improved customer loyalty, quickly resolving potential problems, shared knowledge and expertise concerning new technologies, a deep understanding of customer needs and rapid responses to customers (Magretta, 1998; Wasti and Jeffrey, 1999).

Customer integration, also called 'forward' integration (Frohlich and Westbrook, 2001) refers to the process of interaction and collaboration between an organization and its customers to ensure an effective flow of products and/or services to customers. Customer integration involves sharing demand information, it helps the manufacturer in understanding customer needs better and forecasts better customer demand as well as the collaborative involvement of customers with respect to product design, provision of better quality products at a lower cost and more flexibility in responding to customer demands (Flynn et al., 2010) Customer activity concerns processes dealing with planning, implementing and evaluating relationships between service providers and service recipients. Customer relationship management (CRM) focuses not only on inbound customer relationships but also on outbound customer relationships in SCM. Customer activity involves the ability to communicate the delivery of products and services to end-user customers both locally and globally. Customer activity is principally about the sharing of product information with customers, accepting customer

orders, interacting with customers to manage demand, having an order placing protocol in the system, sharing order status with customers during order scheduling and providing information during the product delivery stage.
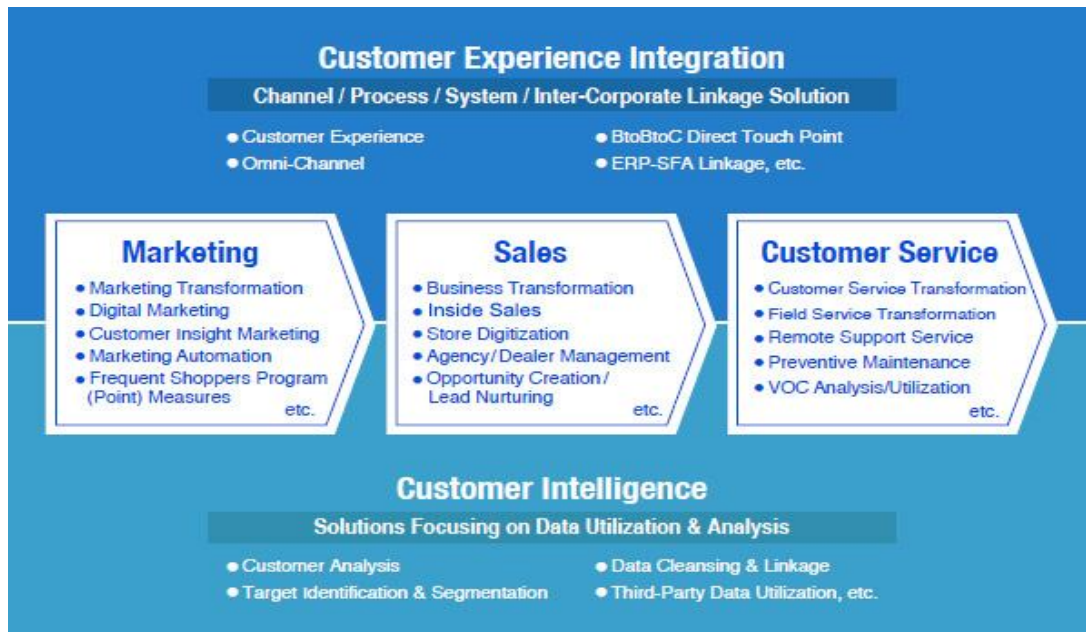
2.7 Performance Measurment:

Performance measurement is an area to which companies have paid much attention recently. Performance is regarded as a major competitive issue (Tranfield and Akhlaghi 1997). In a facilities management (FM) context, there is a wide range of choices in measuring facility management performance reflecting the varied nature of the field. The focus of FM skills and techniques should be in the area that contributes to the overall management of a business by relating accommodation and support infrastructures issues to business, financial and personal criteria (Barret 1992). As FM is concerned with all aspects of the services delivery, research in this area attempts to review the state of knowledge of performance measurement in FM and seeks to explore measurement of service performance linked to the innovation process in organisation. The discussion on performance measurement focuses on the the service business operation in the overall efficiency

of the FM function. Further the discussion will expound the appropriate way in measuring service and drive the framework of FM service performance measurement solution.

2.8 Performance measurment in service:

Service industries are an important and growing sector, functioning in an increasingly competitive environment (Fitzgerald *et al.* 1991). The focus of competition is changing in many cases has long since changed from simply competing on price to competing on a range of other factors such as quality, product and service innovation and flexibility of response to customer needs.

The service sector is diverse, embracing such things as tourism, financial services, health care, catering and communications. According to Fitzsimmons and Fitzsimmons (1998), service lie at the very hub of economy activity in any society and Looy, Gemmel and Dierdonck, (2003), determined service becomes a label covering a wide variety of business and have distinct the categories of service as follow:

• *Distribute services* include transportation, communication and trade.

• *Producer services* involve services such as investment banking, insurance engineering, accounting, bookkeeping and legal services.

• *Social services* include health care, education, non-profit organizations and government agencies.

• *Personal services* include tourism, dry cleaning, recreational services and domestic services.

As services in 1989 (Fitzgerald *et al.* 1991), it is an inescapable fact that services are critical cost dimension to the nation's competitiveness. Therefore performance measurement is a key factor in ensuring the successful implementations of company's strategy. The need for an alternative and more comprehensive performance measurement system has encouraged several researchers to explore

the alternative possibilities (Ghobadian and Ashworth, 1993). Ray and Sahu (1990) mentioned that organizational performance is a multidimensional entity and should be linked to the desired outcomes.
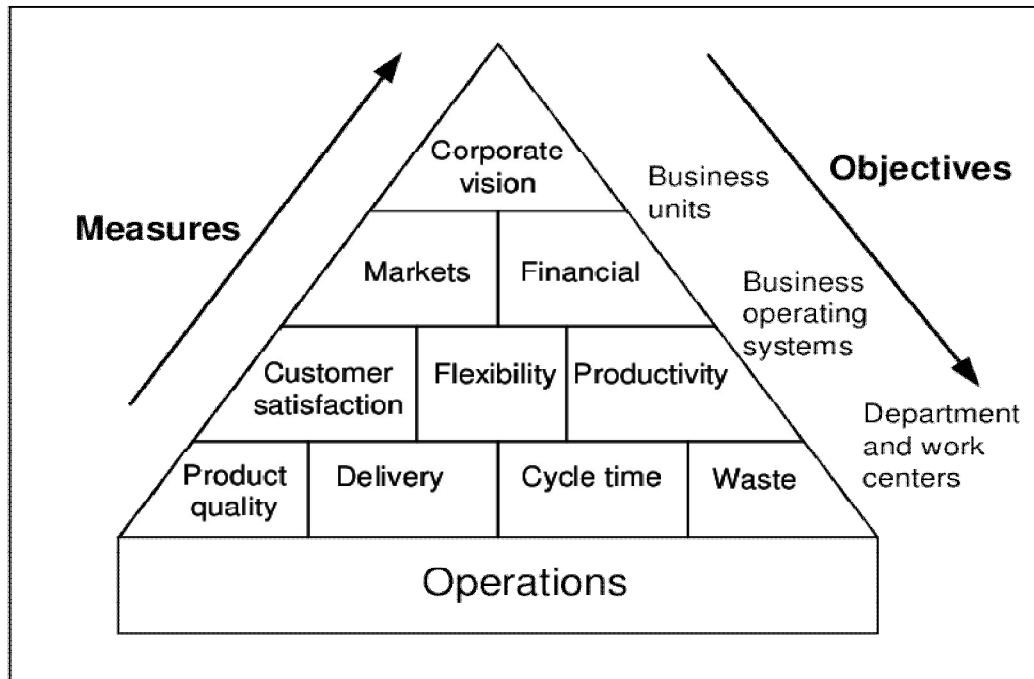
2.9 Operational performance (OP):

This section explains the second concept of this study OP which represent the dependent variable, including the concept, the definitions and the dimensions of OP.

2.9.1. The Concept and Definition of (OP):

According to Eccles (1991), there has been a revolution in performance measurement, urging organizations to place emphasis on non-financial performance measures. For many years, commentators have exhorted organizations to use more balanced measurement practices in an attempt to complement the traditional financial performance measurement.

There are compelling reasons for viewing business performance in terms broader than business economic performance (Venkatraman & Ramanujam, 1987). The

present study is based on the conceptualisation of operational performance by Venkatraman and Ramanujam (1986), where, the operational performance of the medical field is measured by the market share. However, financial measures of performance alone cannot guide an organization to market dominance. Non financial performance indicators also have to be measured and improved (Kaplan & Norton, 1996).

Operational performance (OP) is a key enabler to the overall supply chain performance, which usually is the amalgamated outcome from multiple factors and enablers in the system.

Van Hoek (1998) and Beamon (1999) suggested that performance measures for a supply chain should include indicators in the operational dimension, such as customer satisfaction and the operational responsiveness to the changing market demand. Similarly, Neely et al. (1995) enlisted cost, time, quality, delivery and flexibility as the basic measures of operational performance. While addressing the needs for supply chains to balance their attention to the environmental concerns, Jakhar (2015) developed a green supply chain operational performance framework. We choose OP as one of the constructs for this study for two reasons. One is because we see strong evidence that OP is a major enabler of supply chain performance, which draws great deal of attentions from the research community (Devaraj et al. 2007; C. Y. Wong et al. 2011); the other is because OP is a measurable construct, which could be influenced by the level of SCI. Furthermore, there is little doubt, OP is a critical and indispensable part of many performance measurement frameworks witnessed in today's literature (Yu et al. 2014; Ebrahimi 2015), albeit their findings are not always consistent with each other.

One may question why not use 'business performance' or 'supply chain performance' instead? Well, 'business performance' involves more environmental influences, including competitors, and infrastructure (Goldman 1995), while OP is

more internal and can be isolated relatively neatly to the effects from SCI. For 'supply chain performance', it is somewhat beyond our defined 'unit of analysis', which is the service; also the conceptual scope of 'supply chain performance' can be ambiguous and blurry. However, we admit, for the purpose of this study more constructs can be and should be explored in the future.

Porter(1985) wrote that, "Competition is at the core of the success or failure of firms. Competition determines the appropriateness of a firm's activities that can contribute to its performance... Competitive advantage grows fundament all you to f value a firm are able to create for its buyers that exceeds the firm's cost of creating it. Value is what buyers are willing to pay, and superior values tems from offering ower prices than competitors for equivalent benefits or providing unique benefits that more than offset a higher price. There are two basic types of competitive advantage: cost leadership and differentiation". The framework of RBV states that there sources forming the bases of one's competitive advantages should be valuable, rare, imperfectly imitable and sustainable (Barney, 1991). McIvor (2009) argues that it is important that the firm evaluate the contribution to competitive advantage of specific resources/activities when considering them for outsourcing. With the application of RBV in the development of competitive advantage, through either the cost leadership strategy or the differentiation strategy, the nature of the organization as a whole and/or the design of the firm's products and/or services are essential components. Cost leadership is typically achieved through the development of both highly effective and efficiency organization and production processes. Differentiation can be achieved through either the development of a superior organization or through the design of superior products and/or services. Given that product and service designs are created by the firm's marketing and engineering activities, when seeking to improve one's competitive advantages, manufacturing must focus up on the development of

superior production capabilities. Those manufacturing plants seeking to achieve advantage through differentiation must focus on exploiting the differences between their production and delivery systems and those of their competition (Porter, 1985). Thus, they must find and exploit all sources of cost and performance advantage; typically through standardized, no- frills products, and by placing considerable emphasis on reaping economies of scale(Porter,1985). Barney (2002) ties competitive advantage to performance in arguing that firms obtain above- normal performance by generating greater-than-expected value from there sources it employs. In application, RBV suggests that organizations should deploy assets and resources both internally and externally to create competitive advantage. Logically, the firm would then perform in- house only those activities for which it has demonstrated superior performance in comparison to competitors. By outsourcing those tasks that can be performed by organizations that specialize in that work, the firm may better focus their value-creating activities on core tasks, therefore maximizing their effectiveness. We expect then that manufacturing plants would outsource production activities not only to reduce costs below in-house production, but also to improve operational performance in one or more operational areas such as first pass yield rates, equipment utilization, equipment availability, cycle times, lead-times, on-time delivery rate, or other metrics as appropriate for their respective strategies, industry ,and markets. Given that earlier research found that the outsourcing of production activities did not lead to significant improvements in costs (Meixelletal. 2014), we focus here instead on the overall operational effectiveness of the firm's production processes. Competitive strategies aim at establishing a profitable and sustainable position in a chosen market space; which can only be achieved by acquiring and satisfying customers (Porter, 1985). White (1996) describes a number of variables for which changes in their respective performance will affect customer satisfaction. These operational variables include;

quality, , cost and services. Patil and Lawrence(2003) noted that as firms increasingly compete on the basis of delivery speed and reputation, their performance on quoted versus actual lead times will have a significant effect on whether the customer will place future orders or not. Thus, customer order lead-time is defined as the lapsed time between when a customer places an order to the time that there quested product or service is delivered. Manufacturing cycle time is a major component in determining customer order lead time and is defined as the lapsed time between when an order is received by manufacturing and the time it becomes a completed finished good. Delaysin deliver in gan order for a product or service typically occur because of delaysin either receiving the customer's order and/or delays in deliver inga completed order to a customer.
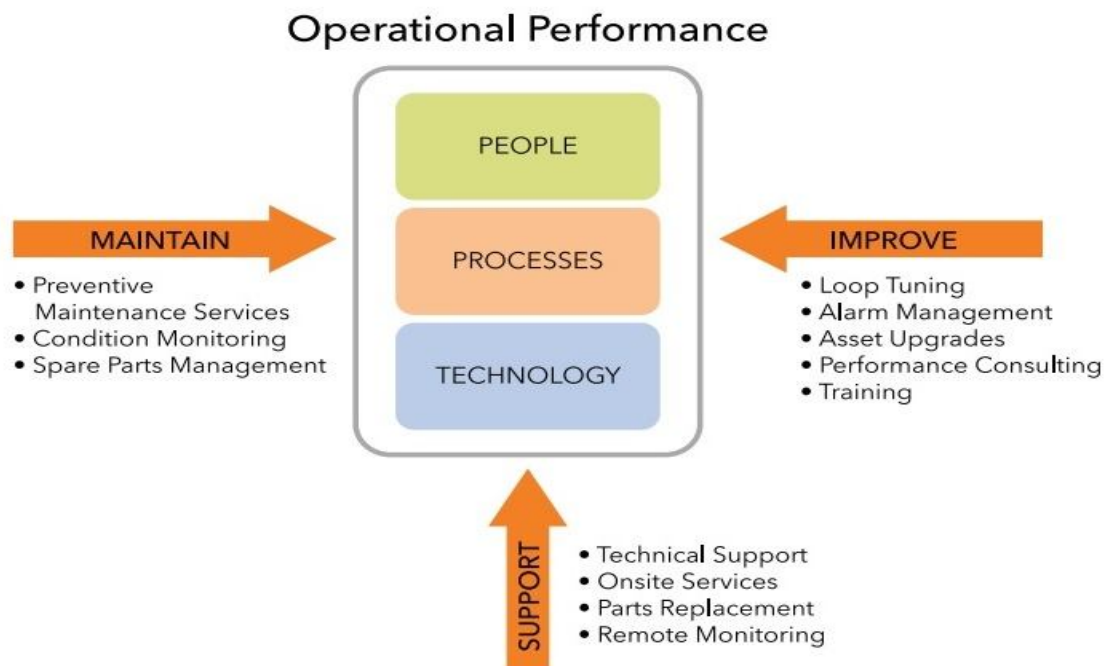
2.10 Dimensions of OP:

Following the conceptualization of earlier studies, most of the previous studies, discussed one components of operational performance such as(Bijuna, 2016; Yang Cheng, 2016; Xinping Shi, Ziqi Liao, 2015; Lillian Do Nascimento et al, 2015; Taiwen Feng, 2013; Daniel Prajogo et al, 2012; David et al, 2011; Karthik N.S.

Iyer, 2011) , Moreover, there are many previous studies have deals operational performance with multiple dimensions, this research focuses on quality, cost and services as key constructs of operational performance.

2.10.1 Service performance:

The main objective of a 3PL is to increase value for its customers with their logistics activities. The literature on firms and organizational performance has already provided ample information on companies' service performance. According to Huo et al. (2008), the manufacturing industry regards service performance as including all performance indicators that are related to customer service (including the quality of deliveries, customer satisfaction and service flexibility). Service performance, or customer value, refers to a company's current service outcomes relative to its industry average (Wieland and Wallenburg, 2012). In supply chain management, service performance includes timeliness of delivery, customer satisfaction, and the effectiveness of problem-solving for customers (Wieland and Wallenburg, 2013).

2.10.2 Quality:

Quality defined as the degree to which products and services meet service specifications (Lau Antonio and Tang, 2007).

the ability to offer products and services at the lowest cost and free of defects, and to ensure the achievement of discrimination to the organization under the existing competition in the market and represent the overall attributes and characteristics of the product and the service that meets the needs of customers (Gupta, Garg& Kumar, 2014) quality is known as one of the most important factors for the survival and growth of the organization and to maintain its competitiveness.

Quality is ability to satisfy the needs and expectation of customers (Bregman& Klesfsjo, 1994).

Quality is a competitive weapon in the marketplace. It engenders competitive advantage by providing products that meet or exceed customer needs and expectations (Narian& Cordeiro, 2000). Quality, as stated by 22 (Kazan& Cetin, 2006) is defined using different perspectives, as it is a subjective goal that has indefinable characteristics. Juran (1974) who defined quality as fitness for use definitions employs the customer's perspective in defining quality. It is the customer who decided what goods or services best satisfy his/her needs.

One way of defining quality is the extent to which to manufacturing enterprise is capable of offering product quality that would fulfill customers expectation (Koufteros   et   al,   2002).

2. 10.3 Cost performance:

Cost is one of the important variables in achieving competitive advantage by reducing the cost of production in a percentage that achieves the desires of a wide range of customers by reducing the total cost of service products, with the need to realize that the strategic goal of reducing cost is not absolute, but according to the governed conditions and regulations (Wheelen&Hunger, 2010).therefore, the organization that adopts the least cost should focus on the production process, starting from the supplier and the ending with the arrival of the product to customers and control overall products and costs associated with production and provide new value-inexpensive services.

The company can reach the cost leadership strategy through: (Tugce, 2013)

1. Improve the activities and cerate added value.

2. The elimination of unnecessary costs.

Cost defined as doing things cheaply, producing goods at a cost that enables them to be priced appropriately for the market while still allowing a return to the organization. Slack and Chambers, (2009). Cost is one of the most basic dimensions for competition and that many organization tried to rely on reducing their product cost to achieve competitive advantage, which means that the organization carry on the 23 product and marketing of products at the lowest possible cost compared to its competitors enabling it to sell at a lower price (Alhayali et al, 2013). Is defined as production of distribution at low cost (Dangayach& Deshmurkh, 2003).

Phusavat&Kanchana, (2007) competing on cost focuses on the ability to effective manage production cost, including its related aspects such as overhead, inventory and value-added. Zho et al, (2002) further describe this as the ability to reduce product cost by reducing overheads, labour, raw materials costs and production cycle time.

2.11 Healthcare OP:

Healthcare OP is the final outcome of the supply chain process. It refers to "How well an organization achieves its targeted goal as well as financial goal" (Deshpande, 2012). There is large number of research works in the literature discussing about OP but still no standardized definition has been evolved (Ou et al., 2010). Cao and Zang (2011) studied that supply chain practices improve collaborative advantage and indeed have an influence on firm performance; and collaborative advantage is an intermediate variable that enables supply chain partners to achieve synergies and create superior performance. Liu et al. (2013) found that operational coordination is positively associated with operational performance and OP. Giannakis (2007) argued that OP measures can be considered from various aspects in terms of the relative importance of the performance measures to the organization.

2.12 Supply chain responsiveness:

This part discusses the third concept of this study SCR which represents the mediate variable, including the concept, the definitions and the dimensions of SCR.

2.12.1. The Concept and Definition of SCR:

Agility can be interpreted as using market knowledge and virtual corporation to exploit profitable opportunities in a volatile market place (Naylor et al, 1999). Supply chain management incorporates the entire exchange of information and movement of goods between suppliers and end-customers, including all players within the extended supply chain. In an agile/virtual setting this includes (i) the development of an interconnected information network, (ii) an effective balance between low level stocks with high quality delivery service, (iii) the designing of innovative products with the active cooperation of suppliers and (iv) cost effective delivery of the right products to the right customer at the right time (Gunasekaran

et al, 2008). As mentioned earlier, agile manufacturing only aims on flexibility and speed, cost and quality are less important objectives. However, an effective supply chain demands all of these competitive performance objectives. Gunasekaran et al. define this responsive supply chain as "a network of firms that is capable of creating wealth to its stakeholders in a competitive environment by reacting quickly and cost effectively to changing market requirements (Gunasekaran et al., 2008).

Responsiveness can be defined as the "ability to react purposefully and within an appropriate time-scale to customer demand or changes in the marketplace, to bring about or maintain competitive advantage" (Holweg, 2005, p. 605). In contrast, a supply chain would be considered efficient if the focus is on cost reduction and no resources are wasted on non-value added activities (Naylor, Naim and Berry, 1999).

Companies have three principal means to buffer against changes in quantity demanded for specific products, namely inventory, capacity and time. Safety stocks, excess capacity and safety lead times all provide a time buffer to be able to react to demand variability (Hopp andSpearman, 2004). One could argue that one sensible approach to increase responsiveness could be to raise the inventory levels of finished goods or components, which would allow more flexibility for reactions to changes in customer demand. Increased inventory levels do, however, reduce the efficiency of the supply chain since they are costly, both in terms of storage cost and cost of capital. This suggests that such an increase in inventory may not be the optimal approach to increase responsiveness – or, as Hopp and Spearman phrased it: "inventory is the flower of all evil, and variability is its root" (i.e. high inventory levels are a sign that something is suboptimal in the supply chain, and other strategies such as variability reductions may be more beneficial than inventory increases.

Based on Prater et al. (2001), Duclos et al. (2003), and Lummus et al. (2003) who have identified the various components of supply chain flexibility and agility, we extend and modify those components to develop the construct supply chain responsiveness.

SCR is defined as the capability of promptness and the degree to which a supply chain can address changes in customer demand (Duclos, Vokurka, & Lummus, 2003; Holweg, 2005; Lummus, Duclos, & Vokurka, 2003; Prater, Biehl, & Smith, 2001). This responsiveness is aggregate of three first-order constructs operations system responsiveness (OSR), logistics process responsiveness (LPR), and supplier network responsiveness (SNR). SCR is the ability of the supply chain to rapidly address changes and requests in the marketplace (Holweg, 2005), which implies that speed combined with flexibility results in responsiveness (Prater et al., 2001). Thatte et al. (2013) conceptualized and operationalized OSR, LPR, and SNR as three sub-constructs of SCR. OSR is defined as the ability of a firm's manufacturing system to address changes in customer demand (Thatte et al., 2013). Although it encompasses manufacturing and service operations, this study focusses on firms within the manufacturing industry. In manufacturing operations, it includes the ability to rapidly configure or reconfigure assets and operations of a manufacturing system in order to cope with consumer trends (Lummus et al., 2003; Wu, 2001), respond to changes in product volume, respond rapidly to unexpected events, effectively expedite emergency customer orders, and an ability to swiftly accommodate special or non-routine customer requests. OSR at each node in a supply chain is an integral component of SCR, since each entity in a supply chain is required to deliver the product or service in a timely and reliable manner, to fulfill customer demands (Duclos et al., 2003; Lummus et al., 2003; Meehan & Dawson, 2002). The items under this category measure the responsiveness associated with a specific node or firm in a supply chain (Duclos et al., 2003;

Lummus et al., 2003). Measures used to operationalize the OSR construct are: operations system's ability to – respond rapidly to changes in product volume demanded by customers, effectively expedite emergency customer orders, rapidly reconfigure equipment to address demand changes, rapidly reallocate people to address demand changes, and rapidly adjust capacity to address demand changes. LPR is defined as the ability of a firm's outbound transportation, distribution, and warehousing system (including 3PL/4PL) to address changes in customer demand (Thatte et al., 2013). These activities include warehousing, packing and shipping, transportation planning and management (Duclos et al., 2003; Lummus et al., 2003; Ricker & Kalakota, 1999), inventory management, reverse logistics, order tracking and delivery. This study focuses on the outbound logistics of the

focal firm. The responsiveness in the logistic processes is a vital component in the success of a responsive supply chain strategy (Fawcett, 1992). Fuller, O'Conor, and Rawlinson (1993) suggest that a firm's logistics system is instrumental in creating value for its customers. This value creation for a firm's customers implies ensuring logistics flexibility (Duclos et al., 2003; Lummus et al., 2003) and speed within the supply chain to serve each distinct customer's needs. Responsiveness components in the logistics system include selecting logistics components that accommodate and respond to wide swings in demand over short periods, adjust warehouse capacity to address demand changes, handle a wide range of products, vary transportation carriers, have the ability to pack product-in-transit to suit discreet customers' requirements, and have the ability to customize products close to the customer (i.e. postponement), and do all of these speedily in order to gain a CA. Hise (1995) maintains that the logistics system of a firm needs to be flexible and responsive in order to be able to adjust its logistics resources rapidly for satisfying market needs. It is also important that firms have easy access to and are able to utilize different modes of transportation to be logistically flexible and

responsive (Prater et al., 2001). Lummus et al. (2003) present critical logistics process flexibility aspects of a supply chain, which are vital for SCR. These aspects have been adapted for LPR to form its measures: logistics system's ability to - rapidly respond to unexpected demand change, rapidly adjust warehouse capacity to address demand changes, rapidly vary transportation carriers to address demand changes, and effectively deliver expedited shipments. SNR is defined as the ability of a firm's major suppliers to address changes in the firm's demand (Thatte et al., 2013). The ability of firms to react quickly to customer demand is dependent on the reaction time of suppliers to make volume changes. A key to responsiveness is the presence of responsive and flexible partners upstream and downstream of the focal firm (Christopher & Peck, 2004). Supply chain networks must be ready to react to any ripple effects due to supply disruptions as well (Walker, 2005). In order to have a CA, organizations need to meet the changing needs of customers by being able to rapidly supply products, including any demand changes in terms of product volume, mix, product variations, and new product introductions. Meeting these needs requires responsiveness in the supply chain at various stages from the raw materials to finished products to distribution and delivery. Supplier networks are the essential building blocks of a flexible system and their flexibility is an important ingredient of being responsive to customers (Holweg & Pil, 2001; Slack, 1991). In order to be responsive, organizations should be able to select suppliers who can add new products quickly and have suppliers make desired changes. Fisher, Ramen, and McClelland (2000) found that for short lifecycle products, such as fashion apparel, retailers are most successful if they can work with suppliers who can provide initial shipments of product based on forecasts, but then rapidly increase production to the right style, color, size, etc. based on actual sales. Several studies (e.g. Choi & Hartley, 1996) suggest that supplier selection based on product development capabilities, rapid deployment

capabilities or product volume flexibility positively impact the delivery time of new products. Holweg (2005) found that the lack of supplier network flexibility hampered its customer's responsiveness capability. Supplier network flexibility (Slack, 1991) and thus SNR (Thatte et al., 2013) is an important part of SCR. The measures of SNR used in this study are: major suppliers' ability to - change product mix in a relatively short time, consistently accommodate the firm's requests, provide quick inbound logistics to the firm, and effectively expedite emergency orders.

We identify for the study these diminsions because its related to other diminsions ,operations system responsiveness, logistics process responsiveness, and supplier network responsiveness as the three main components of supply chain responsiveness.

2.13 Dimensions of responsiveness:

The sub-constructs for supply chain responsiveness consist of:

2.13.1 Operations system responsiveness*:*

 Defined as the ability of a firm's manufacturing system to address changes in customer demand. Operations system responsiveness includes both manufacturing and service operations. Duclos et al. (2003) and Lummus et al. (2003) in a conceptual study, emphasize that operations responsiveness at each node of the chain is an integral component of supply chain responsiveness. They further argue that in order to meet the end customer's needs, each entity in the supply chain must deliver the product or service in a timely and reliable manner.

The dimensions under this category would measure the responsiveness associated with a specific node (company) in the supply chain (Duclos et al., 2003; Lummus et al., 2003). This could be a supplier, a manufacturer, or a customer (or distributor). Anderson and Lee (2000) identified - the ability to be operationally responsive - as one of the components of successful supply chain strategy that add

value to a firm. This includes the ability to rapidly configure or reconfigure assets and operations of the manufacturing system to react to consumer trends (Wu, 2001; Lummus et al., 2003), respond rapidly to changes in product volume and product mix demanded by customers, and effectively expedite emergency customer orders. As the supply chain responds to customer demand, supply chain member companies may be required to move quickly from the production of one product to another, or quickly change production levels for a given product. The responsiveness of the operations system would be the ability of the manufacturing and production to rapidly respond to unexpected events, and ability to rapidly accommodate special or non-routine customer requests. In doing so the vital ingredients needed are flexibility and speed of response (Holweg 2005; Holweg and Pil, 2001; Meehan and Dawson, 2002; Williamson, 1991) of the manufacturing system of each of the organizations operating within a supply chain. Some of the operations system responsiveness measures that have been identified to operationalize the construct include:

operations system's ability to - rapidly adjust capacity to address demand changes, rapidly change manufacturing processes to address demand changes, rapidly reallocate people to address demand changes, rapidly reconfigure equipment to address demand changes, effectively expedites emergency customer orders, make rapid changes in product mix demanded by customers, and respond rapidly to changes in product volume demanded by customers.

2.13.2 Logistics process responsiveness*:*

 is defined as the ability of a firm's outbound transportation, distribution, and warehousing system (including 3PL/4PL) to address changes in customer demand. The responsiveness in the logistic processes is a vital component in the success of a responsive supply chain strategy (Fawcett, 1992). Logistics and distribution management includes the activities of transportation of goods from suppliers to

manufacturer to distribution centers to final point of consumption (Ricker and Kalakota, 1999; Duclos et al., 2003; Lummus et al., 2003). These activities include warehousing, packing and shipping, transportation planning and management, inventory management, reverse logistics, and order tracking and delivery. This study focuses on the outbound logistics of the focal firm. Fuller et al. (1993) suggest that a firm's logistics system is instrumental in creating value for its customers. This value creation for a firm's customers implies ensuring logistics flexibility (Duclos et al., 2003; Lummus et al., 2003)

and speed within the supply chain to serve each distinct customer's needs. A typical response to uncertainty is to build flexibility into the supply chain. However being flexible needs to be supplemented by being apt in responding too. Responsiveness components in the logistics system include selecting logistics components that accommodate and respond to wide swings in demand over short periods, adjust warehouse capacity to address demand changes, handle a wide range of products, vary transportation carriers, have the ability to pack product-in-transit to suit discreet customers' requirements, and have the ability to customize products close to the customer (i.e. postponement); and do all of these speedily in order to gain a competitive advantage.

It is vital that the firm has easy access to and is able to utilize different modes of transportation to be logistically flexible and thus responsive (Prater et al., 2001). Hise (1995) argues that flexibility is the key component of any logistics system configured to achieve responsiveness. He further states that companies need the capability to adjust logistic systems quickly to respond to changes in market needs and the necessitated product assortment. Prater et al. (2001) in his case study research presents the case study of Hewlett Packard, which reduced the uncertainty by designing the product appropriately so as to customize it only when individual orders arrive. Lummus et al. (2003) put forth some of the critical logistics process

flexibility aspects of a supply chain, which are vital for supply chain responsiveness. These aspects have been adapted for logistics process responsiveness and are as follows: logistics system's ability to – rapidly respond to unexpected demand change, rapidly adjust warehouse capacity to address demand changes, rapidly vary transportation carriers to address demand changes, accommodate special or non-routine customer requests, and effectively delivers expedited shipments.

2.13.3 Supplier network responsiveness:

Defined as the ability of a firm's major suppliers to address changes in the firm's demand. A key to responsiveness is the presence of responsive and flexible partners upstream and downstream of the focal firm (Christopher and Peck, 2004). The ability of firms to react quickly to customer demand is dependent on the reaction time of suppliers to make volume changes Whenever disruptive causes such new technology, terrorist threats (Walker, 2005) or cut-throat competition tend to throw the supply chain haywire, the supply chain networks must be ready to react to any ripple effect. Slack (1991) argues that supplier networks are the essential building blocks of a flexible system. Some interviews with operations managers conducted at the European vehicle assembly plants of Volvo revealed that the lack of supplier network flexibility hampered the company's responsiveness (Holweg, 2005). Supplier network flexibility (Slack, 1991) and thus supplier network responsiveness is an important part of the supply chain responsiveness.

Holweg and Pil (2001) argue that flexibility in the supplier network is an important ingredient of being responsive to changes in customer demand. Thus supplier network responsiveness is believed to be a dimension of supply chain responsiveness in this study.

In order to have a competitive advantage, organizations need to meet the changing needs of customers by being able to rapidly supply products, including any demand changes in terms of product volume, mix, product variations, and new product introductions.

Meeting these needs requires responsiveness in the supply chain at various stages from the raw materials to finished products to distribution and delivery. In order to be responsive the organizations should be able to select suppliers who can add new products quickly, and have suppliers make desired changes. Selecting suppliers who can introduce new products quickly can add responsiveness to a supply chain. Burt and Soukup (1985) suggested that failure to include suppliers' inputs in product development is a vulnerable aspect of supply chain management. McGinnis and Vallopra (1999) found that involving suppliers could make new product development a success. Fisher et al. (2000) found that for short lifecycle products, such as fashion apparel, retilers are most successful if they can work with suppliers who can provide initial shipments of product based on forecasts, but then rapidly increase production to the right style, color, size, etc. based on actual sales. They note that fast supply chains can produce products as they sell rather than worrying about accurate forecasts. These studies suggest that supplier selection based on product development capabilities and rapid deployment capabilities positively impact the delivery time of new products. Choi and Hartley (1996) found that the capability of suppliers to make product volume changes was a significant factor in supplier selection in the automotive industry. In certain industries, e.g. electronics; demand volatility poses a unique challenge to suppliers to vary output in line with demand. The increases or decreases in demand may come at a short notice and need to be sustained over some time period. Some of the measures of supplier network responsiveness include: major suppliers' ability to - change product volume in a relatively short time, change product mix in a

relatively short time, consistently accommodate the firm's requests, provide quick inbound logistics to the firm, have outstanding on-time delivery record, and effectively expedite emergency orders.
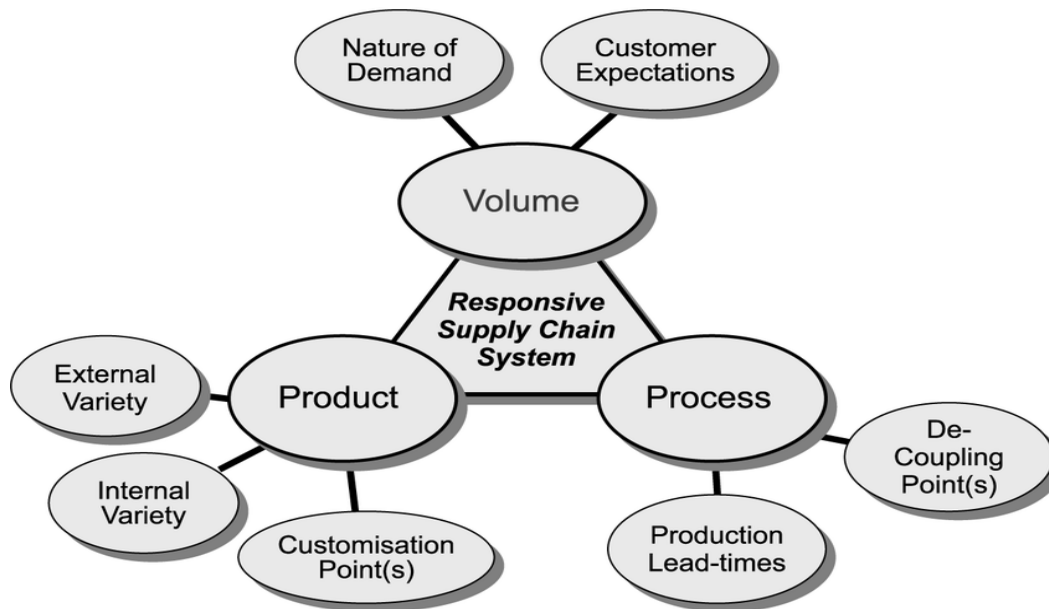
2.14 Technological Capabilities (TCs):

This part discusses the fourth concept of this study TCs which represents the moderator variable, including the concept, and definitions of TCs.

2.14.1. The Concept and Definition of TCs:

Rapid technological change or growth is witnessed in today"s competitive and dynamic economy around the globe. This is highly interlinked with utilization, transfer, adoption and even development of new and innovative technologies by stakeholders involved. In this regard, the technological capability of nations in general and firms in particular is crucial. Developing nations have low technological capability, which has the tendency to hinder their development. Understanding and mitigating this hindering factor is essential for self-sustained development and increased technological capability development.

Capabilities are defined as "a firm"s capacity to deploy resources, using organizational processes, to affect a desired end. (Amit and Schoemaker, 1993).

From this perspective, capabilities can be understood as a firm"s orientation to integrate and reconfigure its resources and processes and, even more importantly, transform its processes in response to foreign environments to achieve competitive advantage (Wang and Ahmed, 2007).

Technological capability is defined as the ability to perform any relevant technical function or volume activity within the firm including the ability to develop new products and processes and to operate facilities effectively, Teece et al., (1997).

Technological capability is the ability to make effective use of technological knowledge in production, engineering and innovation (Bell, 2007; Molina-Domene and Pietrobelli, 2012). It has the capacity to enable a firm in creating new technologies and to develop new products and processes in response to their changing economic environment. The various activities undertaken to acquire intangible assets for technological learning are a major process for building and accumulating these capabilities. Technological capability extends beyond having advanced technology and incorporates intangible asset of the firm in the form of knowledge about that technology (Bell, 2007; Molina-Domene and Pietrobelli, 2012).

Technological capability

Physical technicals systems:
- Equipments
- Database
- Software
- Blueprints
- Production systems

Organization, managerial and institutional systems:
- Organizational routines
- Management structures and techniques
- Procedures
- Institutional system (rules, beliefs and values)

Company's technological capability

People's minds:
- Tacit knowledge
- Experience and informal qualification
- Skills
- Talents
- Formal qualification

Products and services

2.15 Theoretical Background of the Study Relationships:

This part discusses the theoretical background of the study relationships, including, the relationship between SCI and OP, the relationship between SCI and SCR, the relationship between SCR and OP, the mediating role of SCR, and moderating effect of TCs.

2.15.1 Supply chain integration and operational performance:

The relationship between integration and performance is proved by a majority of previous studies. Supply chain integration is started from inter-functional integration and developed to inter-corporate integration (Stevens, 1989). Inter-functional integration is the inception of supply chain integration (Bae, 2014) and as a result, firms can remove overlaps and inefficiencies in inter-functional activities. Firms can also achieve standardized communication through inter-departmental integration and consequently, they can attain high performance (Matapoulos et al., 2007). In addition, efficient internal processes of each firm are the basis of making inter-corporate integration possible. The high level of

communication capability which firms have is the cause of creating customer needs in the market and applying to internal processes in firms.

In addition, the needs are shared with suppliers and as a result, it is achieved (Bagchi et al., 2005; Bae and Lee, 2015).

The relationship between supply chain integration and performance is explained by information processing theory. Firms create information in the market on the basis of environmental uncertainty, the information is disseminated to internal processes of firms and as a result, the internal processes is re-structured to fit customer needs through responding to the information. This is similar with processing information shown from market orientation (Bae, 2014). Form the viewpoint, prior research has ascertained the positive relationship between supply chain integration and performance (Bagchi et al., 2005; Boon-itt and Wong, 2011; Ghobakhloo et al., 2011; Rajaguru and Matanda, 2009; Schoenherr and Swink, 2012; Wong et al., 2011).

Performance excellence can be achieved through LP by benefiting healthcare administration, medical staff and patients. Kollberg et al. found that lean thinking is applicable in healthcare settings, and that the flow model is a suitable tool that measures changes toward lean thinking in healthcare.

customers and supplier integration with performance:

A close relationship between customers and a manufacturer offers opportunities for improving the accuracy of demand information which reduces the manufacturer's product design and production planning time and inventory obsolescence allowing it to be more responsive to customer needs. Because customer integration generates opportunities for leveraging the intelligence embedded in collaborative processes, it enables manufacturers to reduce costs, create greater value and detect demand changes more quickly. Customer integration involves sharing demand information; interacting with customers to set reliability, responsiveness and other

standards to understand customer needs better and to forecast better customer demand; and the collaborative involvement of customers with respect to product design, provision of better quality products at lower costs and more flexibility in responding to customer demands (Homburg and Stock, 2004).

To implement customer and supplier integration successfully, manufacturers need to be internally integrated well because internal integration functions as coordination and learning mechanisms in customer and supplier integration (Marquez et al., 2004). Customer and supplier integration extends internal integration by establishing a cross-functional team integrating external organizations.

Internal integration and performance:

Because internal integration breaks down hierarchical barriers and improves cooperation to meet customer requirements, rather than operating within the functional silos associated with traditional departmentalization and specialization, it is expected to be related to performance.

Internal integration also increases the amount and variety of information available to a manufacturer (Montaka et al., 2015). In addition, frequent interactions and confrontations with different perspectives may reduce mistakes and waste, acquire opportunities for simplification and achieve concurrent engineering. In this sense, internal integration is the base for SCI and is positively related to operational and financial performance. Previous studies have found that components of internal integration such as cross-functional collaboration and integrative inventory management systems have positive impacts on a firm's performance (O'Leary-Kelly and Flores, 2002; Rosenzweig et al., 2003; Vickery et al., 2003).

2.15.2 Supply chain integration and Responsiveness:

Supply chain integration is degree of all the activities within an organization, suppliers, and customers are integrated together (Stevens, 1990; Stock et al., 1998; Stock et al., 2000; Narasimhan and Jayaram, 1998). Supply chain integration involves effective communication among all supply chain members (Turner, 1993). Integration is the term used to describe the various relationships that exist between departments within one company or the relationship between various companies. For example, internally and externally, companies can integrate different activities within the operating company. This activity became apparent (such as product flow, finance, marketing, measurement, etc.) or intangible (such as relationships, information, etc.). Integration not only offers knowledge but also introduces many problems. Managers can design what kind of integration should be focused on, what action should be taken, when various types of overlapping of integration, and what procedures should be followed (Haozhe,2007). The level of supply chain integration will be able to generate competitive advantage of the firm. Mentzer *et al* (2001) Many previous studies have been focus on supply chain responsiveness. It is widely argued that the successful of business organization are largely depends on managing across all of supply chain parties (Christopher, 1992; Li et al., 2005; Vastag et al., 1994; Christopher and Peck, 2004; Academic Alliance Forum, 1999; Pelton et al., 1997). Lummus and Vokurka (1999). It is therefore need to dept investigate the responsiveness of a group of organization working together that called as supply chain. The field of study supply chain responsiveness is highly conceptual with little empirical research (Holweg, 2005; Storey et al., 2005). Most of study emphasizes the importance of supply chain integration (Frohlich and Westbrook, 2001; Clinton and Closs, 1997). By addressing supply chain management practices that can lead responsiveness, will make better understanding the scope and activities related with supply chain

management practices that create enhanced level of supply chain responsiveness in today's competitive market place.

2.15.3 Responsiveness and operational performance:

supply chain responsiveness and competitive advantage of the firm are positively related while operational performance is a source of competitive advantage for the enterprise to differentiate itself in the eyes of the customers from its competitors by operating at a lower cost and hence at a greater profit (Christopher, 1992). Yusuf et al. (2003) found high correlation between the responsiveness and time to market, dependability, product innovation and quality. Towill (2002) stated that the effective engineering of cycle time reduction will generate to significant improvements in manufacturing costs and productivity. Further he argued that reduction in lead times is the necessary condition for a responsive supply chain and which further reduces the time to market. Sharifi and Zhang (2001); Aitken et al. (2002), emphasize that responsiveness in the supply chain is a source of competitive advantage. (Allnoch, 1997) found that average companies required much more time to respond to changes in customer demand than did the leading manufacturers. In some cases, as much as eight times longer was required. Thatee, (2007) proposed that supply chain responsiveness shall reduce the costs, while leading to competitive advantage for firms on other dimensions as well. In operational level, responsiveness will enable organizations to compete based on cost, quality, time to market, and delivery dependability; responsiveness of a firm's logistics (transportation and distribution) process will enable organizations to introduce new products faster than major competitors and also lead to greater ability of a firm to provide on time the type and volu me of product required by customers (i.e. increasing delivery dependability); responsiveness of a firm's supplier network will improve - the ability of the firm to rapidly introduce new products and features in the market place (i.e. compete based on product

innovation and time to market), as well as improve a firm's ability to provide on time delivery (i.e. increase its delivery dependability) as these firms will be endowed with responsive suppliers. Li, (2002) proposed that a supply chain characterized by quick responsiveness to customer will competitive in term of time and quality. A supply chain consists of all stages involved, either directly or indirectly, in fulfilling a customer request. A supply chain includes manufacturer, supplier, transporters, warehouses, retailer, third-party logistic provider, and customer. The objective of supply chain management is to maximize the overall value generated rather than profit generated in a particular supply chain (Chopra, and P, Meindl, 2001). Robert Sturim (1999) stated that achieving competitive advantage through supply chain integration. Further more he argued that responsiveness to customer need requires high degree of supply chain integration and information sharing between partners in supply chain.

2.15.4. The medaiting role of responsiveness:

Due to the existence of discordant findings on the impact of SCI on performance, the dynamics between SCI and firm performance must be further explored. The level of SCI behaviors in a firm will affect its performance according to the extent of efforts and performance. Several studies have attempted to shed light on the links in the SCI-responsiveness-firm performance chain. Some examine the partial relationships between SCI and responsiveness, while others research the responsiveness-firm performance link, While the systems approach undoubtedly provides a strong theoretical framework for the responsiveness concept, within the management field a more specific definition is required. Initial definitions have been proposed by Kritchanchai and MacCarthy(1999), which however does not specifically mention the response to customer demand,or changes in the marketplace. Thus, based on Kritchanchai and MacCarthy (1999), the following definition is proposed:

Responsiveness is the ability to react purposefully and within an appropriate time-scale to customer demand or changes in the marketplace, to bring about ormaintain competitive advantage. Responsiveness in the wider supply chain context has been discussed by Fisher (1997), who argues that the product characteristics (innovative or functional) and life cycles need to be linked to the layout and functions (conversion and market mediation) of the supply chain. Fisher proposes a simple matrix, plotting the product characteristics against the supply chain characteristics. While this seminal contribution has been widely quoted in relation to responsiveness (Naylor et al., 1999; Kehoe et al., 2001), a concern with Fisher's matrix is that complex products, such as motor vehicles, can be either functional or innovative products (as Fisher himself acknowledges in the same paper), yet at present are using the same processes, are being built in the same factories and are using the same supply chain. Second, Fisher advocates the holding of stock in the form of parts or components as the means to move from an efficient to a responsive supply chain. Whilst this approach has had undoubted success in the electronics sector (e.g. Dell's "assemble-to-order" model, see Holweg and Pil, 2001), holding stock at either location seems unfeasible in the auto sector due to the component variety and risks of obsolescence, as will be shown below. Nevertheless, Fisher's and Mather's models arethe most commonly cited quantitative contributions to the discussion, whereas most of the related manufacturing and supply chain management concepts are still discussed qualitatively, a point which will be expanded in the following discussion.

The responsiveness of supply chains to changing market requirements and their overall efficiency are important issues in supply chain design and management and therefore currently receive wide attention in the scientific community as well as in practice.

while now scholars recognize that more participants are involved in physical and information flows across supply networks and, as a result, responsiveness can be improved also by involving suppliers and customers in integration efforts. Hence, literature agrees that SCI, both in terms of internal and external integration, can have a positive impact on responsiveness. Flynn et al. (2010) note that II breaks down functional barriers and engenders cooperation in order to meet the requirements of customers rather than operating within the functional silos associated with the traditional departmentalization. Information distortion leads to inaccurate demand forecasts and inefficient resource allocations that result in longer delivery times, delays in deliveries and in turn lack of responsiveness. Reducing this distortion requires fast and accurate information sharing between business partners in the supply network and alignment of plans to final demand (Nurmilaakso, 2008). For instance, EI practices, such as Vendor Managed Inventory (VMI), Continuous Replenishment Programs (CRPs) and Collaborative Planning, Forecasting and Replenishment (CPFR), that are based on information sharing and the coordination of supply network members' production and distribution plans, can positively influence responsiveness (Dong et al., 2007; Yao and Dresner, 2008; Danese, 2011).

2.15.5 The moderating role of TCs:

According to Srivastava & Donald (2015) a firm's technological capability is strong if it has traditionally generated more technological capabilities compared to other firms in the service. A firm's current technological capability is based on what the firm has done well in the past and is likely to make the firm stay in that successful path. At the same time strong technological capability could also make the firm more inward-looking (Cohen and Levinthal, 1990), which in turn would make the firm place less value on external knowledge is Firms with strong technological capabilities may be able to generate more value from cooperation

with competitors than firms with weak technological capabilities. Although access to information about a partner's technology and knowledge base should be useful, capitalizing on it is highly dependent on a firm's own technological capabilities (Luo et al., 2007). Because such capabilities are an important component of absorptive capacity a firm's ability to recognize the value of new information, assimilate it and apply it to commercial ends–they should help a firm understand and learn from a rival's technological expertise. This can be very helpful in realizing the full potential of research &development cooperation with competitors. The stronger a firm's technological capabilities, the more easily it can assimilate knowledge from outside sources, and the greater are the chances that such knowledge will prove useful in creating new products (Ritala & Hurmelinna Laukkanen, 2012). Moreover, a firm with strong technological capabilities may be better able to select trusting, capable partners who not 29 only provide access to needed resources, but also help the firm avoid technology leakage and opportunistic behavior (Gnyawali & Park, 2009). The benefits of cooperating with a competitor should therefore be enhanced by a firm's strong technological capabilities.

According to the theory of resource based view Srivastava & Donald (2015), and finding of the literature suggests that the technological capabilities is playing significant and positive moderating, strategic orientation and innovation, therefore few previous studies investigate technological capabilities as moderate variables such as Carolin Haeussler et al (2012) conducted Strategic alliances and product development in high technology new firms: The moderating effect of technological capabilities. María José Ruiz Ortega (2010) investigated competitive strategies and firm performance: Technological capabilities' moderating roles; the findings of this study indicate that technological capabilities enhance the relationships between quality orientation and performance, and cost orientation and performance,

respectively. The obtained results suggest that the theoretical prescriptions of RBV and competitive strategy must be strategically combined within the firm for maximum effect. Francisco García (2012) conducted learning from exporting: The moderating effect of technological capabilities; the results of this study show that some institutions stand to benefit more from exporting than others and hint at the importance of absorptive capacity for knowledge acquisition overseas. Manish &Donald (2015) conducted behavioral implications of absorptive capacity: The role of technological effort and technological capability in leveraging alliance network technological resources. Jie Wu (2014) conducted cooperation with competitors and product innovation: Moderating effects of technological capability and alliances with universities; the results support the existence of 30 bell-shaped relationship between co-opetition and product innovation performance. Technological capability and alliances with universities were shown to weaken the relationship.

2.16 Summary of the Chapter:

The above chapter indicated the theoretical foundation of aspects related to the research concepts and analyzes the empirical studies related to them. The beginning part of the chapter presents the foundation, conceptualization of supply chain integration. Furthermore, the chapter explained the constructs of supply chain integration that enable a firm to gain a competitive advantage. The conceptualization of supply chain integration constructs (internal integration,customer integration and supplier integration). in section two the chapter conceptualization of operational performance constructs (service performance,quality performance and cost performance). In section three the chapter conceptualization of supply chain responsiveness constructs (operation process, logistic process and supplier network). In the final part, the chapter illustrates the theoretical background of the study relationships including; the

mediating role of responsiveness between supply chain integration and operational performance, the moderating role of technological capabilities between supply chain integration and responsiveness in section four the chapter conceptualization technological capabilities . The proposed research framework designed the focus of next chapter

CHAPTER III:
THEORETICAL FRAMEWORK
AND
HYPOTHESIS DEVELOPMENT

<div align="center">

CAPTER: III

THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

</div>

3.0 Introduction

This chapter will present the research framework and the hypotheses that will test, the section in methodology highlights the sampling procedures ,the measurements of variables , the development of research instrument.

3.1 CONCEPTUAL FRAMEWORK

3.1.1Theoretical Background

Bacharach (1989) defines theory as a "statement of relationships between units observed or approximated in the empirical world The primary goal for a theory is to answer "how", "when" and "why" questions. The theory expression can be contrasted to a description, which primarily aims at answering "what" questions (Sandberg ,2007) theory is the building blocks of hypotheses. Hypotheses and their tests are the foundation of understanding (Schmenner et al., 2009).

3.2 The theory:

Is a formula related to the causal and causal relationships between two or more variables that may have been or have not been tested.

The importance of theory:

3.2.1 Theory used in research In order to:

1. Explain phenomena.

2. Analyse relationships.

3. Predict outcome.

4. Compare and generalise.

3.4 Theoretical Framework:

3.4.1 Resource Based View (RBV) Theory:

The resource-based view (RBV), or resource-based theory, is a classical and influential theory in the field of supply chain. The theory, derived from Edith Penrose's (1959) theory of firm growth, was introduced by Birger Wernerfelt (1984) and popularized by Jay Barney (1991). Since then, the seminal articles by the two RBV theorists—Wernerfelt and Barney—have been cited more than 85,000 times (as of December 20, 2017; see Google Scholar).

While most studies that use RBV are empirical, some scholars have chosen to review and propose ways forward for using RBV in future studies. The present research is similar to the latter in the sense that it reviews the extant literature on the RBV of supply chain. At the same time, it differs from the latter as it adopts and takes advantage of a resource-based approach by combining insights from existing reviews and recent studies on the RBV of supply chain. It does so in order to accelerate its endeavour to offer an overview of the theory's usage in the field and to chart new directions for advancing the understanding of supply chain from the RBV perspective.

The essence and logic of RBV can be clearly understood when broken down and organized as follows:

a. Firms possess heterogeneous resources.

b. Firm resources can be used to conceive, choose, and implement firm strategies.

c. Firm strategies are likely to be different, if not similar, but not identical.

d. Firm strategies contribute to and account for differences in firm performance.

e. Firm performance is predicated on firm resources.

f. Firm resources that are valuable, rare, inimitable, non-substitutable, durable, appropriable, and mobile (among others) can create and sustain competitive advantages.

g. Firms with competitive advantages can enjoy myriad benefits, such as premium and rent yields (Amit & Schoemaker, 1993; Barney, 1991; Collis & Montgomery, 1995; Wade &Hulland, 2004; Wernerfelt, 1984).

3.4.1.1 Supply chain integration as an internal firm resource:

Firm resources can be internal (or inside-out) and external (or outside-in) to the firm. Internal resources are assets owned and controlled by the firm, such as financial, human, physical, and technological resources; whereas external resources are assets that may be earned and controlled, to a certain extent depending on various factors like industry attractiveness and structural autonomy, but not necessarily owned by the firm, such as customers, competitors, and suppliers, among others (Anggraeni, 2014; Dierickx & Cool, 1989; Hulland et al., 2007; Wade & Hulland, 2004). This suggests that SCI are an internal firm resource because the acquisition, integration, and usage of its interrelated components are owned and controlled by firms.

3.4.1.2 Operational performance as a Strategic and Sustainable Competitive Advantage:

Competitive advantage is the advantage that a firm (a) has over its competitors, (b) develops using its resources, and (c) uses to drive superior performance (Barney, 1995; Peteraf, 1993). Generally SCI, as an internal firm resource, are considered to be more powerful than an external firm resource in establishing competitive advantage (Mahoney & Pandian, 1992; Ravichandran & Lertwongsatien, 2005). This may be attributed to the chain (or multiplier, spillover) effect that comes from having an information advantage, as an information advantage facilitates the creation of other competitive advantages, such as cost and differentiation advantages (Lubit, 2001; Porter & Millar, 1985). More importantly, the sustainability of information systems as a competitive advantage is difficult but

rewarding. It allows firms to detect and respond to market opportunities and threats, such as to counter and protect against resource imitation, transfer, or substitution (Wade & Hulland, 2004). The keys to sustaining the competitive advantage of information systems can come from greater alignment between alternative (e.g. business) and supply chain strategies (Choe, 2003; Liang & You, 2009), complementary synergies with other internal and external firm resources (Hulland et al., 2007; Ravichandran & Lertwongsatien, 2005), innovation (Grant, 1999; Shin, 2006), which may be incremental, or even better, ground-breaking (Coulthard & Keller, 2016; Lim, 2016), and systematic and timely upgrades of organizational (e.g. expertise, skills) and functional capabilities (e.g. hardware, software) (Kraaijenbrink et al., 2010; Liang & You, 2009; Ravichandran & Lertwongsatien, 2005; Seddon, 2014).

3.4.1.3 Supply chain responsiveness as a Driver of Firm Performance:

The concept of firm performance is simple—it relates to how well the firm performs (Bi et al., 2015; Cosic et al., 2015; Someh & Shanks, 2016). However, the extent to which information systems can effectively play a role as a firm resource that drives firm performance is rather complex due to its inconsistency, as demonstrated by Wade and Hulland (2004) in their seminal review and by Liang and You (2009) in their meta-analysis of the RBV of SC. Specifically, in some cases, direct effects are reported, where the relationship between SC responsiveness and firm performance tends to be positively rather than negatively related; in other cases, contingent effects have been reported, where SC ought to interact with other internal and external firm resources in order to effectively drive firm performance, especially in the long run (e.g. organizational commitment and investment; environmental complexity, munificence, and turbulence). Such effects, according to Wade and Hulland, are predicated upon Clemons and Row's (1991) "strategic necessity hypothesis," which suggests that whether or not SC

responsiveness will effectively play a role in driving firm performance, and the extent of performance as a result of that drive, is dependent on the strategic role of SC in relation to the firm and its competitors. In other words, SC responsiveness may be crucial for a firm's operations, but that does not imply that this firm resource is automatically translated into a competitive advantage, especially when firms face competitors whose strategies are substantially different from theirs. Nevertheless, the means to sustain firm performance through SC responsiveness is similar to that dedicated to sustaining competitive advantages (e.g. innovation, upgrades of capabilities; Cooper & Molla, 2014; Liang & You, 2009; Ravichandran & Lertwongsatien, 2005).

According to this theory, integration contributes to the provision of high quality raw materials from suppliers to the organization and to the end customer, which will be reflected positively in the operational performance. It will also increase the transparency of operational information and operational knowledge, increase the organization's ability to adapt to changing demand, and contribute to lower business and delivery costs (Kim et al., 2018) . Based on this, many studies have examined the impact of the level of integration in operational performance, as well as the impact of internal integration on the external to reflect performance (Xu et al., 2014). It was based on the Extensive Resource-Based Theory (ERBV), which emphasizes that the importance of internal and external assets for competitive advantage (Squire, et.al 2009)

This theory emphasizes that strategic resources and knowledge are not limited to what is available within and outside the organization, through integration within and outside the organization (Mathews, 2003). Integrity within the organization helps expand integration outside the organization. Collaboration and removal of barriers between the organization will enhance the organization's ability to absorb external resources both from consumers and suppliers (Xu et al., 2014; Lai et al. ,

2012). Accordingly, integration begins within the organization and then expands to integrate with the supplier and / or the consumer.

3.5 The Dynamic Capabilities:

Dynamic capability determination according to its meaning originated from Sumerian competition that was based on innovations, in this competition competitive advantage is gained by creatively destroying present resources and its reconfiguration to new opportunities. These ideas remained and were further developed in literature, for example, architectural innovations (Abernathy and Clark 1986), configuration capabilities (Henderson and Cockburn 1994) and combined opportunities (Kogut and Zander 1992). By expanding these researches, Teece et al. (1997) expanded the notion of dynamic capabilities, and this successful work of authors (together with structure of dynamic capabilities) is considered to be most integrated and influential source of dynamic capabilities (Teece 2007).

Significant progress has been made since the creation of dynamic capabilities approach. During recent 18 years of dynamic capabilities research, many important fields were found. Despite this progress, concept of dynamic capabilities created a chaos in scientific community (for example, Barreto, 2010).

Many scholars see dynamic capabilities as a process related to companies ability to reconfigure the basis of its resources, in order to respond to more efficiently changes in a field of its activity. Additionally, it is claimed that dynamic capabilities are focused on intentional changes of resource basis (Ambrosini and Bowman 2009).

Above mentioned structure underlines a concept of dynamic capabilities shown in figure 1: Snesing, Seizing, Reconfiguring (Teece, 2007).

With this expanded structure it can be easier for scholars to understand the basis of long-term competitive advantage and for managers to define appropriate strategic

circumstances and priorities. Mangers must accept these two things, in order to increase the efficiency of company and to prevent the tendency of zero profit, which is related to activities in global competition markets. (Teece, 2007). This structure recognizes all three types of dynamic capabilities and tries to separate minimal basis of mentioned capabilities from actual capabilities (Teece, 2007).

Reformation is significant for organization, where new products are a result of reformed operational capabilities (Henderson ir Clark 1990). Eisenhardt ir Martin (2000) proposed other concept of dynamic capabilities, which works as a tool for forming existing operational capabilities, are: *Sensing*, *Learning*, *Integrating* and *Coordinating*.

They are visually presented in figure 3, which concisely describes every capability and also explains the way of thinking that proposed dynamic capabilities helps reforming operational organizations abilities of business groups into reformed operational abilities that correspond to environment better (Eisenhardt and Martin 2000)

3.5.1 Dynamic capabilities and supply chain:

Supply chain tend to have even more dynamic changes than casual markets for such reasons as constant changeof customers behavior, or significant influence of non-governmental institutions (Hall, 2000). Also, strategy can provide competitive advantage when aiming to achieve long term development in technologies, machines, instruments of process management. Despite that supply chain management and dynamic capabilities are two expanding directions in field of research and both were at the center of scientific studies, relation between these topics was very weak. It was difficult for supply chain management study to grasp the notion of dynamic capabilities (Defee and Fugate, 2010). Approach that connects supply chain management and dynamic capabilities is implementing at a high rates. It reveals theoretical structure, based on supply chain management

practices, while using dynamic capabilities theory, and finding and connecting specific dynamic capabilities into specific repeated practices. Existing literature can be included in structure, which comprise the theory, and is a step towards creation of relation between supply chain management and dynamic capabilities (Meredith, 1993). This can be considered only a part of theory, because it lacks some of criteria, but it really helps the process of creating theory (Weick, 1995; Gold et al, 2010).

Conceptual model connects several separate publications on this topic and connects them into one work with new ideas (Meredith, 1993). Notion can be used for creation of theory, because it allows the researcher to connect the data with which Corbin and Strauss (2008) was working. Similarly to dynamic capabilities study, supply chain management study is also relatively new topic, based on logistics and literature of supply chains. In recent years, supply chain management became rally important. This is evident from increasing number of works conducted in this field in recent years (Seuring and Muller, 2008). Similarly to dynamic capabilities notion, supply chain management information is transmitted. Material and information moves up and down the supply chain. Supply chain management is integration of these actions by using improved communication of supply chain, in order to obtain competitive advantage.

Other such research on dynamics and supply chains, as dynamics of supply chains or flexibility of supply chains (Fisher, 1993; Duclos et al, 2003) is more focused on influencing the ability of supply chain to adapt to changes of market and less on forming the environment itself from the point of management and according to theory of dynamic capabilities. Untill now not so much researchers have used dynamic capabilities in a context of supply chain management. Some of them are specific works Defee and Fugate (2010). focuses on possibilities of supply chain management in every dynamic capability rather than on central companies, who

control dynamic capabilities Defee and Fugate (2010). Additionally, governmental support was described as strategic orientation, which is needed for all organizations that take part in supply chain. There are two strategic orientations: orientation of supply chain and teaching orientation. Strategic orientation is similar to integration part and mostly to orientation of processes control (Pagell and Wu, 2009). According to Zollo and Winter (2002), dynamic capabilities is used to adjust existing capabilities and to create new ones. Dynamic capabilities are more related to with creation of new capabilities (Zahra et al, 2006). Dynamic capabilities are used in new theories of supply chain management. These dynamic capabilities influence effective use of static capabilities in case of acquisition of knowledge in an organization and cases of creation of new capabilities. This leads to discovery of competitive advantage.

3.5.2 Approach Assumes that Successful Companies are Able to Demonstrate Timely Responsiveness to Supply chain integration Dynamics:

The DCT sets out to explain how competitive advantage is achieved argue that successful companies are able to demonstrate timely responsiveness to supply chain integration dynamics and speedy services innovation. Additionally, successful companies are able to effectively coordinate and redeploy internal and external competence The ability to achieve competitive advantage in this context is referred to as the DC (D. J. Teece et al., 1997).

define the term "dynamic" as "the capacity to renew competences so as to achieve congruence with the changing business environment; this is relevant in situations where time to market is critical and the nature of competition is difficult to determine". Capabilities are referred to as "the key role of strategic management in appropriately adapting, integrating and reconfiguring, internal and external organizational skills, resources, and functional competences to match the requirements of a changing environment" (D. J. Teece et al., 1997,). So dynamic

capabilities defined as the process and routines used to adapt , deploy and protect the firm's resources so to maintain them as a source of competitive advantage (Helfat , 2007).

Dynamic capabilities distinguish themselves from operational processes in that the dynamic capability of a firm influences the change and reconfiguring of existing operational processes (Ali, 2012) (Peters,& Lettice 2012) (Halfat & Peteraf,2003) (winter, 2003), (Day,2011) , (Hou, 2008) , (Teece, 2007). According to this theory the study assume that technological capability moderating the relation between the supply chain integration and the responsiveness.

Resource-based view RBV seeks the sources of competitive advantage from within the organization, analyzing its strengths and weaknesses. According to this view, companies can gain competitive advantage if they able to achieve superior resources and capabilities and these are valuable, rare, inimitable and non-substitutable. Thus the objective is to identify, develop and deploying key resources to maximize returns, the relational view finds the source of competitive advantage in the collaboration between firms and more specific, it identifies four sources of inter-organizational competitive advantage: relation specific assets, knowledge sharing routines, complementary resources / abilities and effective governance (Dyer and Hatch, 2006).

As organizations face continuous uncertainty, ambiguity and strategic discontinuities in this volatile and turbulent context, responsiveness to environmental changes has become a vital success factor for companies (Homburg, Grozdanovic & Klarmann, 2007). Thus, in the twenty-first century, adaptability has become a key factor in achieving competitive advantage (Reeves and Deimler, 2011). Adaptive capability or adaptability is considered as a new competitive capability in response to the uncertainty of the new century.

Morgan, Richey, Autry,(2016) RBV further suggests that the SCI as a strategic capability lies in its ability to create organizational processes that drive firms to prioritize supply chain relationships. SCI as an intangible capability allows managers to use both formal and informal relationship mechanisms among supply chain members to facilitate a long-term approach to SCM (Kozlenkova *et al*., 2014).

Responsiveness (Praest,1998), the firms' basic competence and dynamic capability, such as coordination of different types of knowledge and integration of multiple flow of technology (Prahalad and Hamel, 1990). One important form of capability is the SC responsiveness, i.e. SCR capability (Sari, 2008; Trkman et al., 2007; Maheshwari et al., 2006; Sanchez-Rodrıguez et al., 2005). Wu et al.(2006) stressed that supply chain responsiveness as a unique set of organizational capabilities and proposed four such capabilities namely, information exchange, coordination with partners, integration ability, and supply chain responsiveness.

The resource-based view (RBV) has also been used in value cocreation and coproduction studies (Zhang, et al., 2015). The RBV seems promising way to at least partially inform researchers to study the resources and capabilities needed for value cocreation.

However, the RBV is not able to provide explanations as to how some successful firms demonstrated timely responsiveness and rapid and flexible innovation in situations of rapid change (Teece et al.,1997). Building on the previous dominant strategic management paradigms, Dynamic Capabilities view (DCV) offers considerable value by explaining how certain firms achieve sustainable competitive advantage through continually adapting and reconfiguring resources.

The resource dependence model portrays the organization as active, and capable of changing, as well as responding to the environment"(Aldrich and Pfeffer, 1976). Early studies such as Aldrich and Pfeiffer's assumed that organisations initially

sought survival dependent on the variations of internal structures and actions of employees (Lynch, 2015)

3.6 The Research Conceptual Framework:

Based on the theoretical foundation study, the conceptual framework of this study designed and proposed the difference links between the variables such as of supply chain integration and operation performance.

Supply chain integration and operation performance. The framework also proposes the mediating role of responsiveness supply chain integration on the relationship between supply chain integration and operation performance the theoretical framework suggest technological capabilities as moderating variables between supply chain integration and operation performance.

3.7 Previous Models:

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

3.7.1 SUPPLY CHAIN INTEGRATION:

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

Model (1): Xu, et. al. (2014) Model
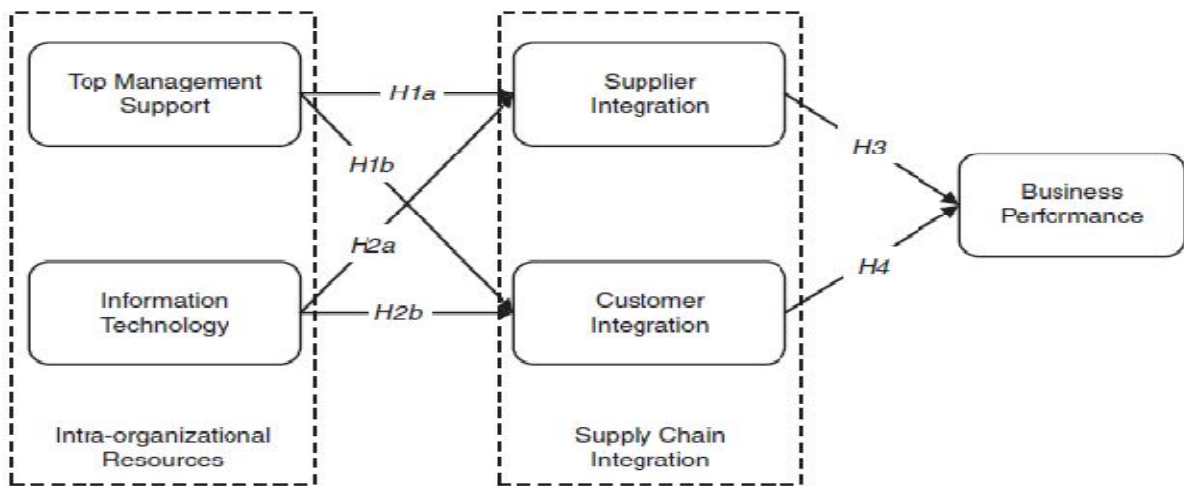
2- **Zhang and Huo (2012) Model:** Studied the impact of dependence and trust on supply chain integration (customer and supplier integration) as shown in model (2) below:

Model (2): Zhang and Huo (2012) Model
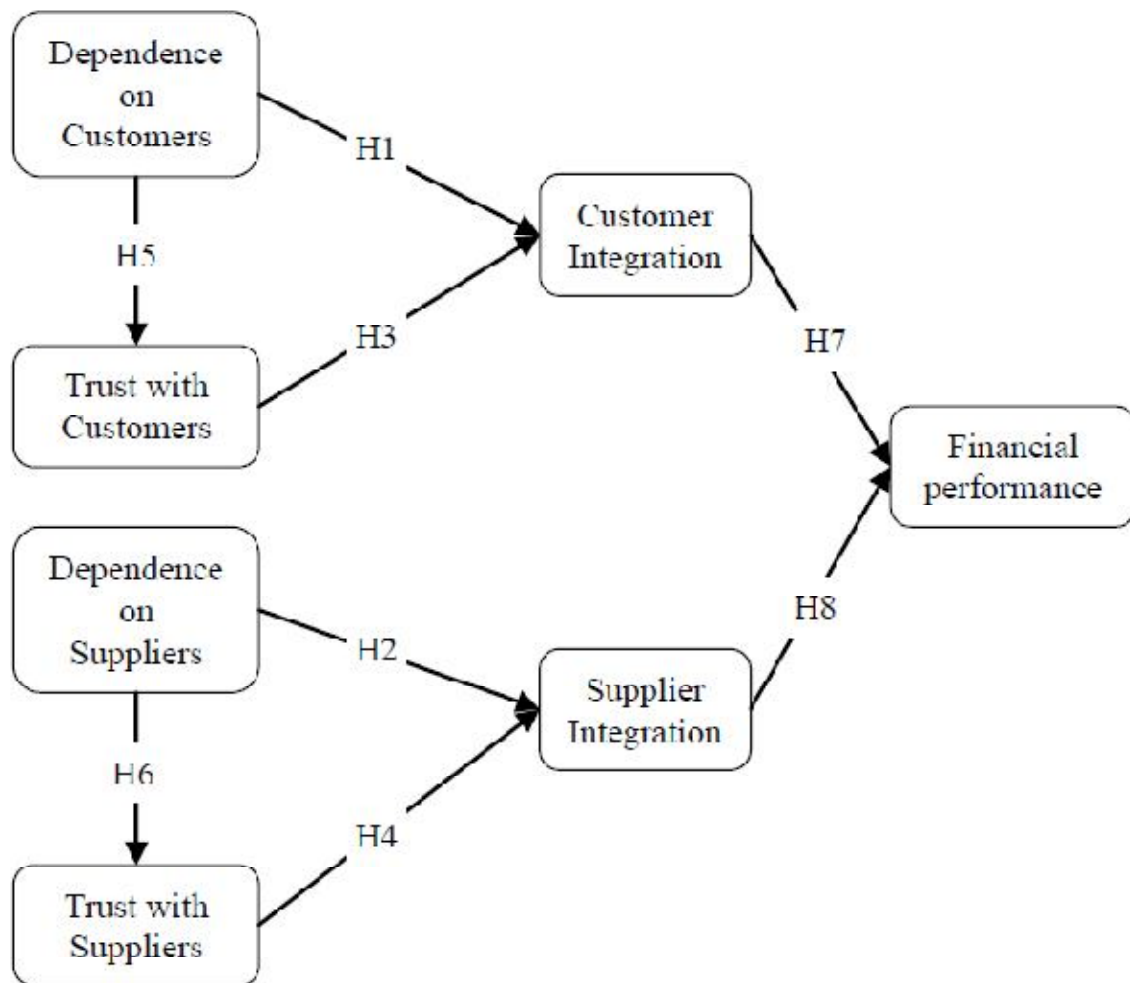
3- Huo (2012) Model: Examined the impact of supply chain integration (internal, customer, and supplier integration) on company performance (customer-oriented, supplier oriented, and financial performance) as shown in model (3) below:

Model (3): Huo (2012) Model
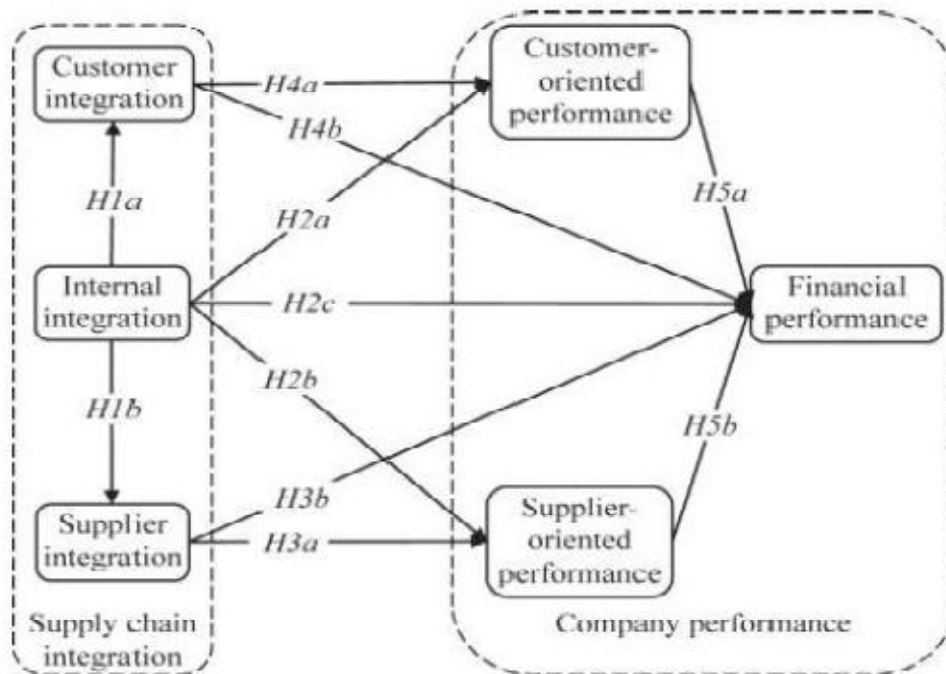
4-Zelbst, et. al. (2009) Model: Examined the impact of supply chain linkages (power, benefits, and risk reduction) on supply chain performance as shown in model (4) below:

Model (4): Zelbst, et. al. (2009) Model
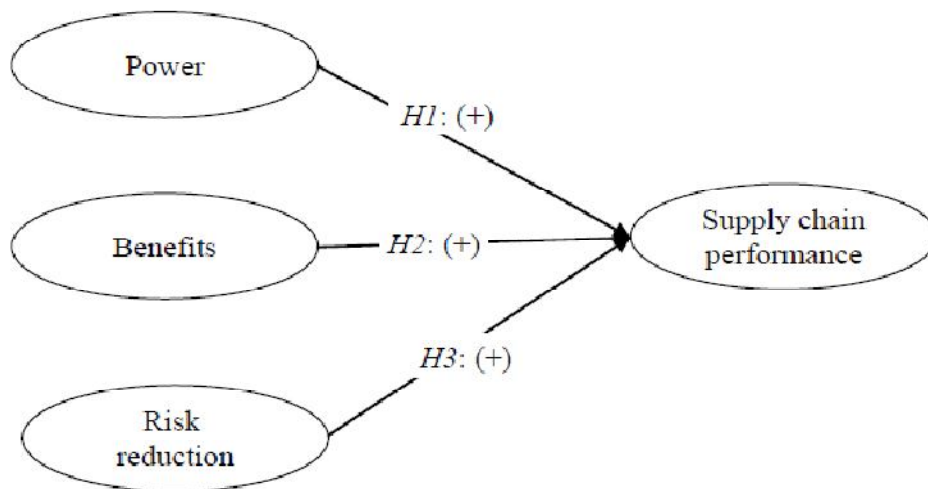
5- **Rosenzweig, et. al. (2002) Model**: Studied the impact of supply chain
integration intensity of both competitive priorities (product quality, process
flexibility, cost leadership, and delivery reliability) and business performance
(return on investment, revenue from new product, customer satisfaction, and
sales growth) as shown in model (5) below:

Model (5): Rosenzweig, et. al. (2002) Model
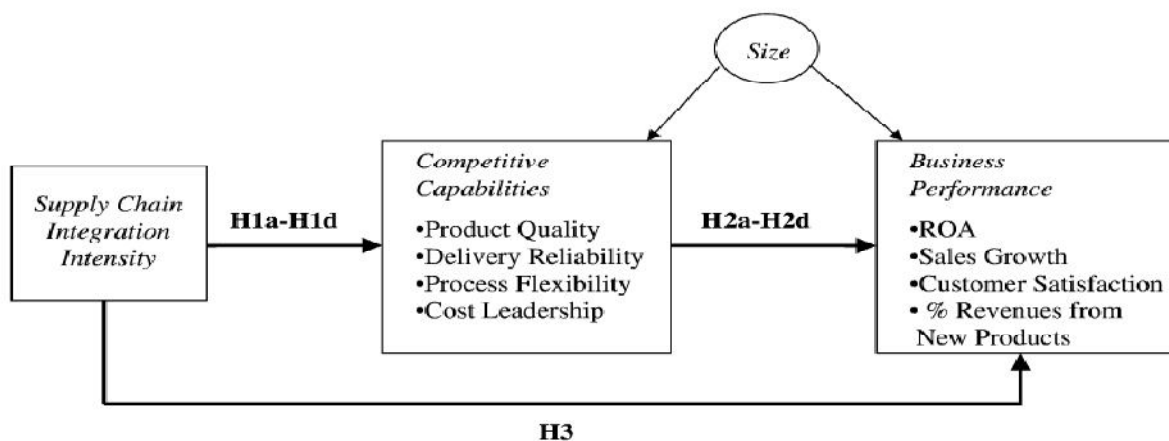
6-**Alam, et. al. (2014) Model:** Studied the impact of supplier involvement,
length of supplier relationship, information technology, and the mediating

effect of logistics integration on supply chain performance as shown in model (6) below:

Model (6): Alam, et. al. (2014) Model:
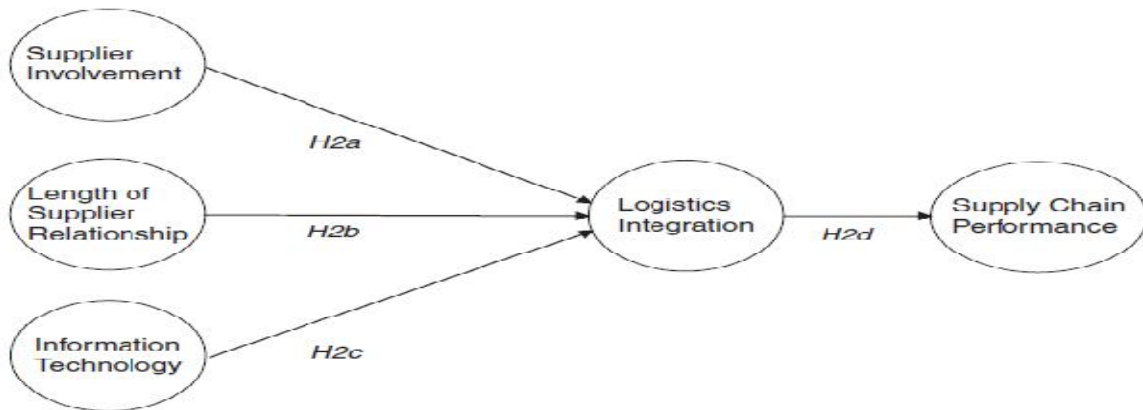
7-Devaraj, et. al. (2007) Model: Examined the impact of e-business capabilities (purchasing, customer, and collaboration) on operational performance (cost, flexibility, delivery and quality) through the mediating effect of production information integration (customer and supplier integration) as shown in model (7) below:

Model (7): Devaraj, et. al. (2007) Model
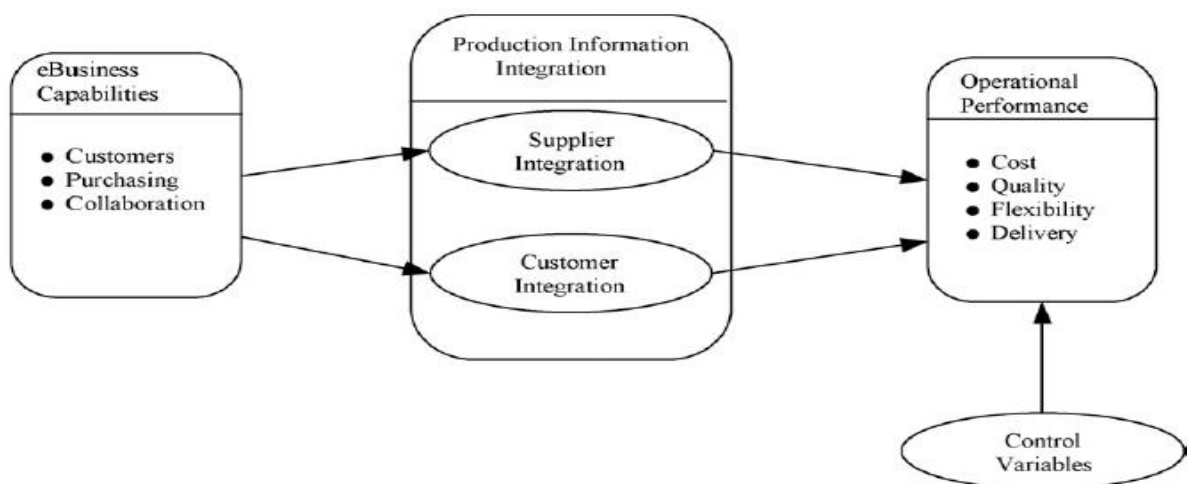
8- Frohlich and Westbrook (2001) Model: investigated the relationship between supplier and customer integration and its effect on operations performance as shown in model (8) below:

Model (8): Frohlich and Westbrook (2001) Model:
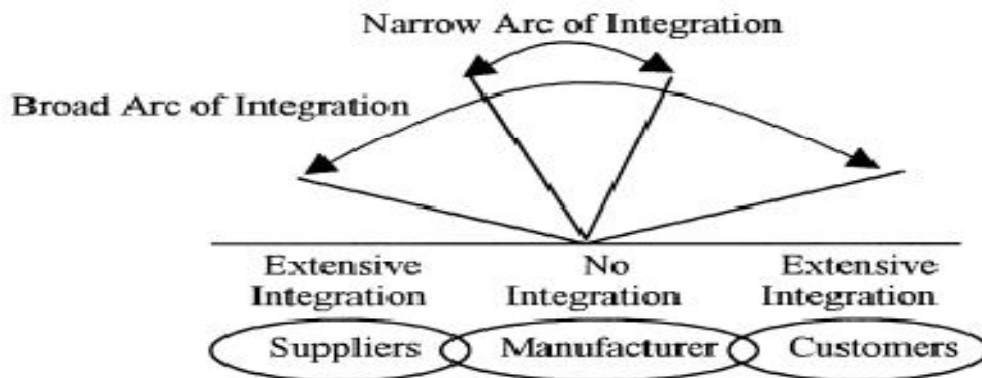
9-Van der Vaart and Van Donk (2008) Model: studied the impact of supply chain integration (Attitude, practices, and patterns) on business performance through business conditions as moderator as shown in model (9) below:

Model (9): Van der Vaart and Van Donk (2008) Model
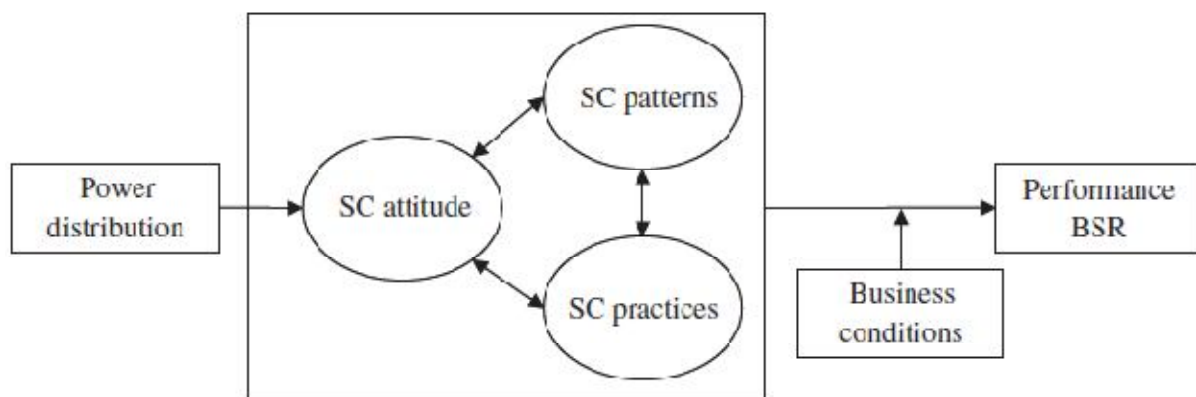
10-Zhao, et. al. (2011) Model: Examined the impact of internal integration and relationship commitment on external integration as shown in model (10) below:

Model (10): Zhao, et. al. (2011) Model:

Supply Chain Integration - Supplier Management - Customer Relationships - Manufacturing Participation in Strategy - Inventory Control
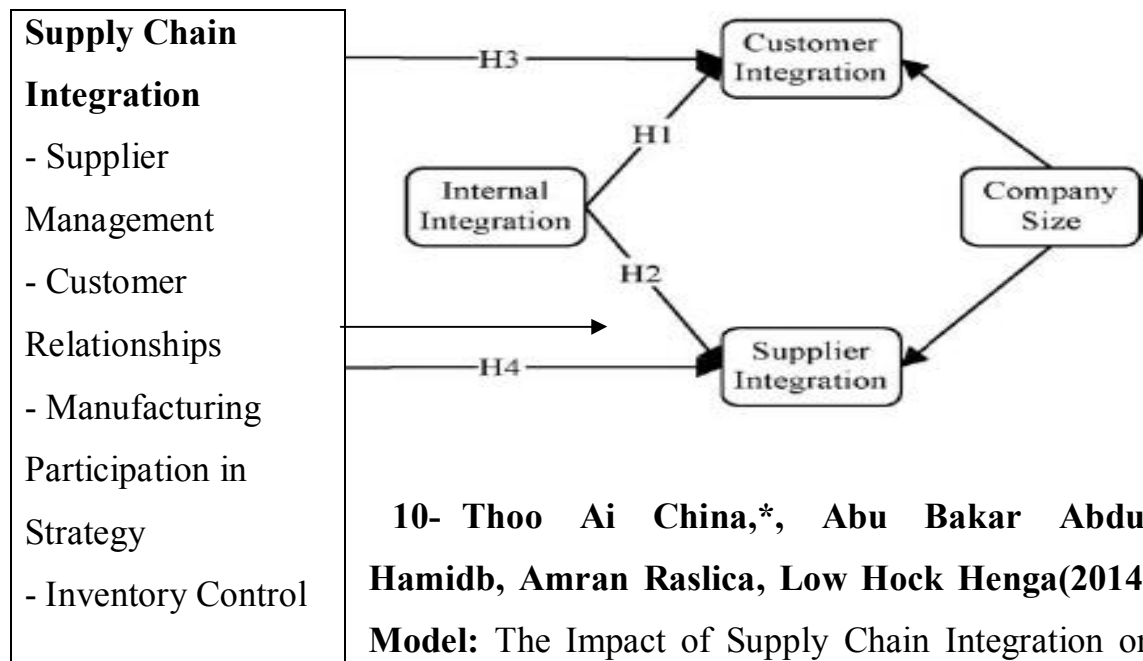
10- Thoo Ai China,*, Abu Bakar Abdul Hamidb, Amran Raslica, Low Hock Henga(2014) Model: The Impact of Supply Chain Integration on Operational Capability in Malaysian Manufacturers

Model (11): Henga(2014):

Operational Capability - Operational Cooperation - Operational Reconfiguration
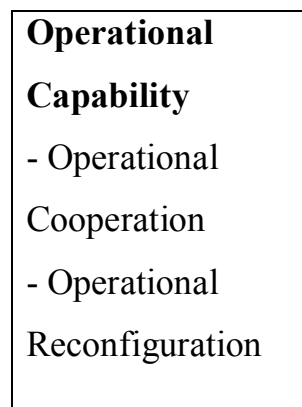
12- Meng Chen, Hefu Liu*, Shaobo Wei, Jibao Gu (2017)

Top managers' managerial ties, supply chain integration, and firm performance in China: A social capital perspective

Model (12): Chen, et. al. (2017) Model
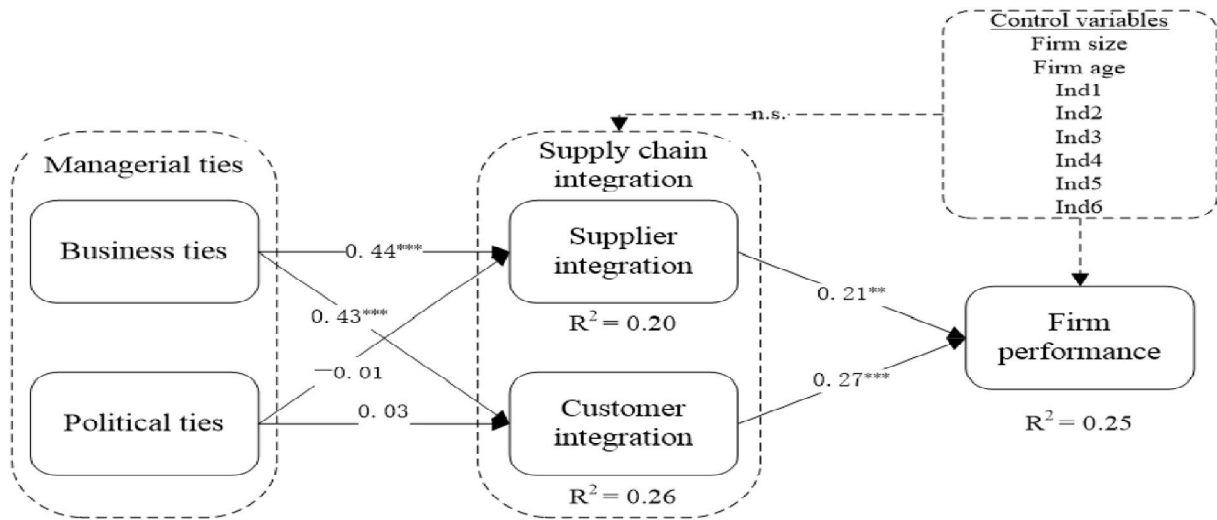
Note: ** p<0.01; *** p<0.001.

13- Dekeng S. Budiarto1, M. Agung Prabowo2, Tutut Herawan3 (2017)

An Integrated Supply chainto Support Supply Chain Management & Performance in SMEs

Model (13): Budiarto1, et. al. (2017) Model:
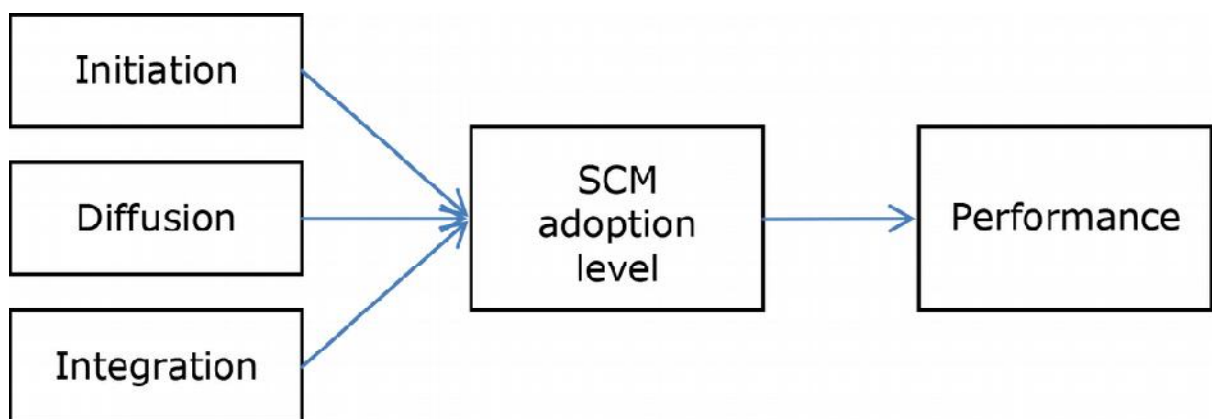
14- R. Glenn Richey Jr (2018)

The moderating role of

barriers on the relationship between drivers to supply chain integration and firm performance

Model (13): Richey, et. al. (2018) Model:

| Diverse of supply chain integration
Desire to improve
Environment | → | **Firm performance** |
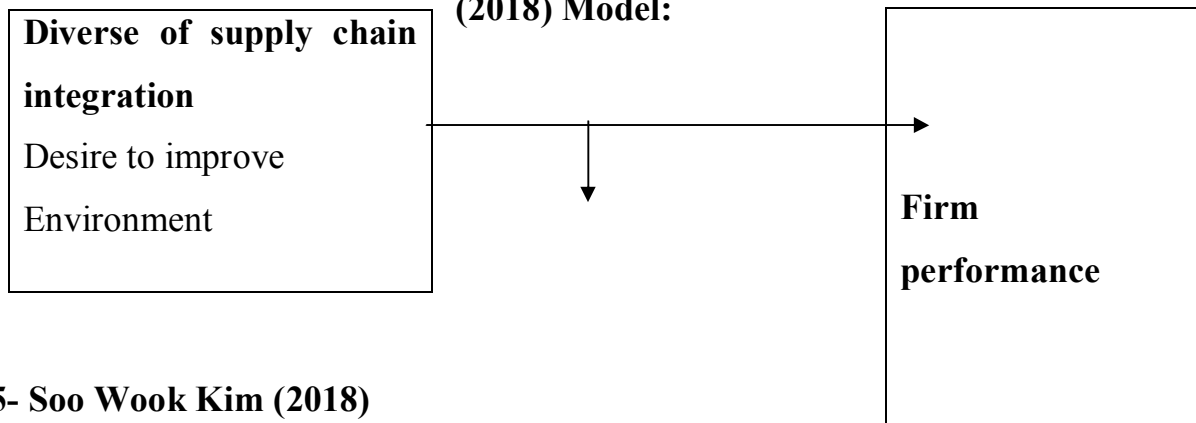
15- Soo Wook Kim (2018)

The effect of supply chain integration on the alignment between corporate competitive capability and supply chain operational capability

Model (15): Kim, et. al. (2018) Model:

| <u>**Corporate competition capability**</u>
Cost leadership
Innovation marketing differentiation
Customer service | **Barriers to supply chain**
Internal planning failure
External monitoring failure | <u>**Firm performance**</u>
Customer satisfaction
Market performance
Financial |

performance

CCC *
SCOC

**Supply   chain
operational capability**
Structural capability
Technological
capability
Logistical capability

**Developmental stage of
supply chain integration**
Independent operation
Internal integration
External integration

16-The Impact of Supply Chain Integration on Operational Performance

Source: Sultan El-Tamimi (2015)
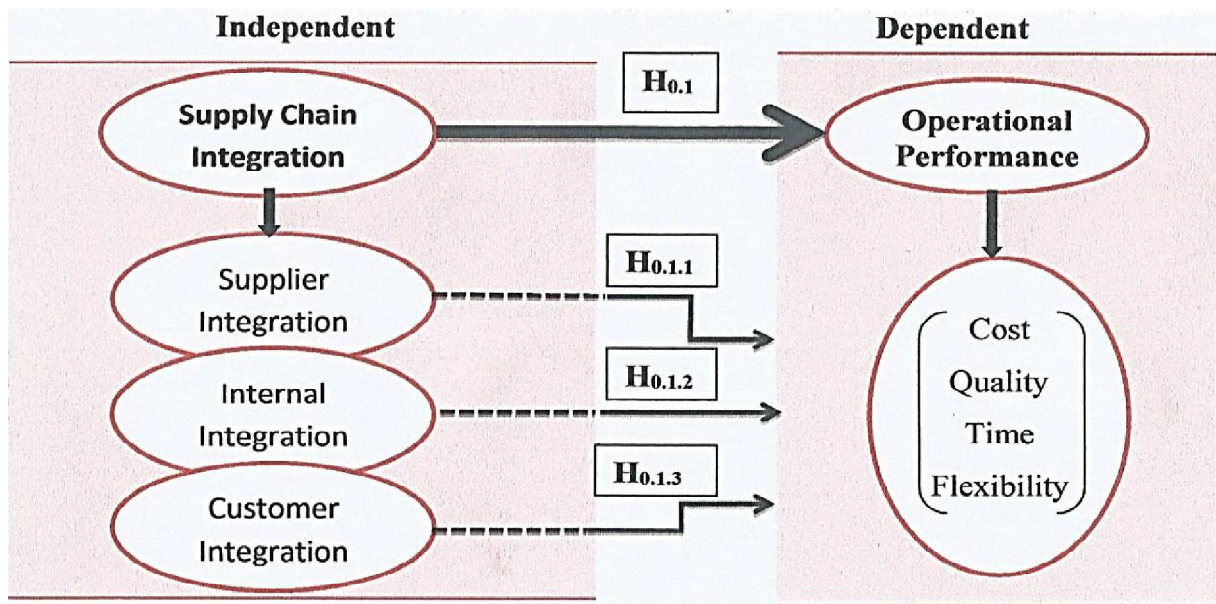
17- The Impact of Supply Chain Integration on Company Performance

Source: Huo (2012)
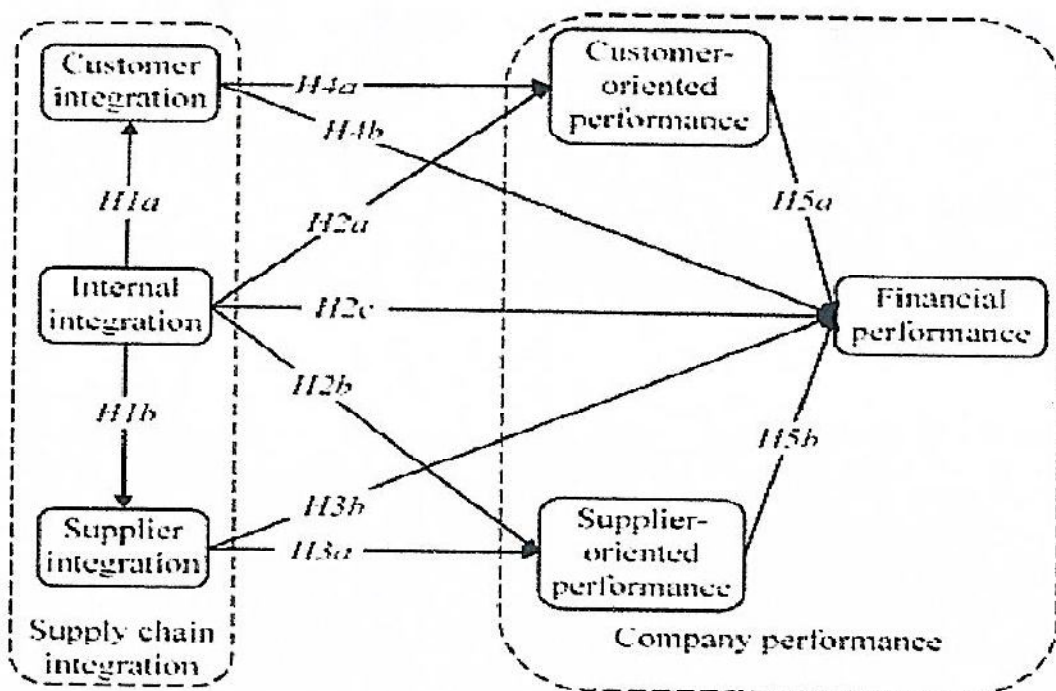
18- The Impact of Dependence and Trust on Supply Chain Integration

Source: Zhang and Huo (2012)
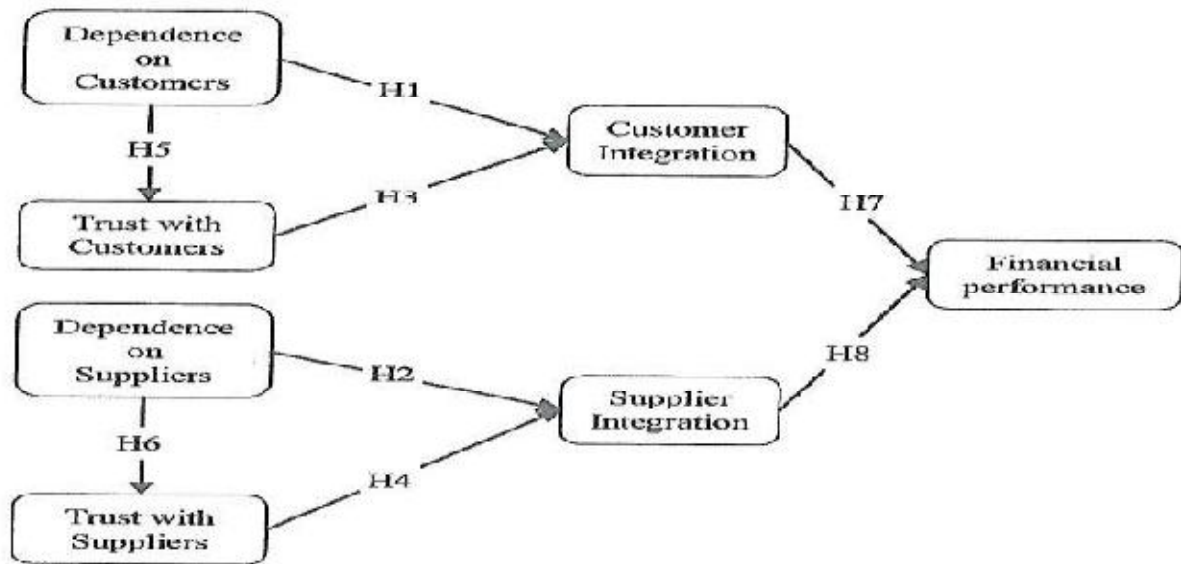
19- The Effect of Supply Chain Integration on Sustainable Development of Jordanian Phosphate Fertilizers Manufacturing Companies

Nazzal (2016)
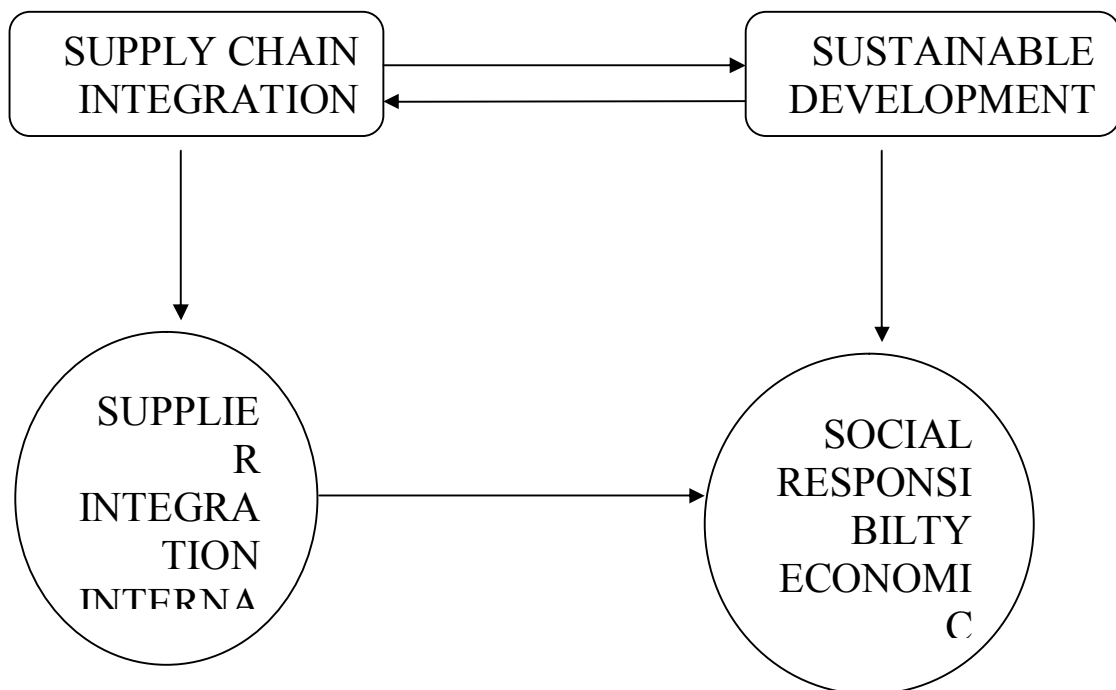
20- Premaratne Samaranayake (2017)

Configuration of supply chain Integration and delivery Performance Unitary structure model and fuzzy approach

```
┌─────────────────────────┐              ┌─────────────────────────┐
│  Fuzzy System Framework │ ───────────> │ Integrated Supply Chain │
│                         │              │          Model          │
└─────────────────────────┘              └─────────────────────────┘
            ↑                                        ↑
            │                                        │
            │          ┌──────────────────────────┐ │
            │          │ Fuzzy-based Decision      │ │
            └────────> │ Support System            │ <┘
                       │ (E.g. Chance of meeting   │
                       │ demand on-time increase)  │
                       └──────────────────────────┘
```
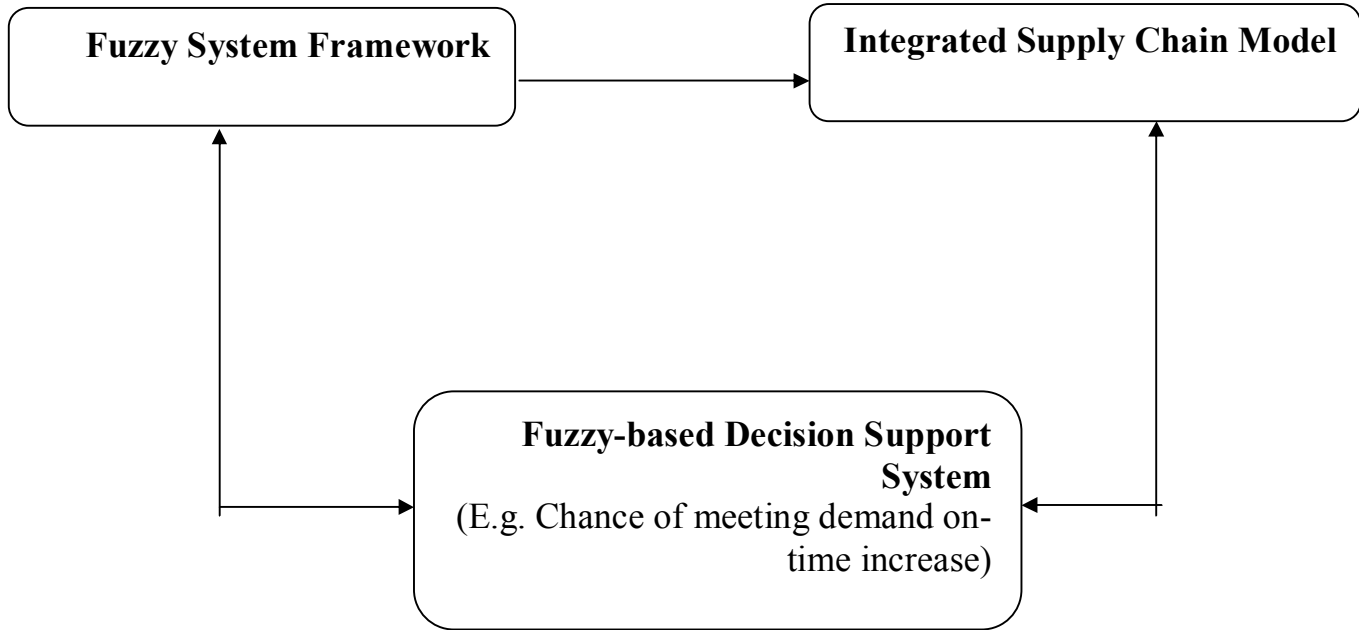
21- Hefu Liu (2018)

Effects of supply chain integration and market orientation on firm performance Evidence from China

```
                    ┌─────────────────────────────────┐
                    │        Market orientation       │
                    │  ─Customer orientation (H3)─     │
                    │   Competitor orientation (H4)    │
                    └─────────────────────────────────┘
                                    │
                                    ↓
┌──────────────────────────────┐       ┌──────────────────────────┐
│ Supply chain integration(SCI)│       │    Firm performance      │
│  ─Information sharing (H1a,H1b)│ ───> │  ─Operational performance─│
│ Operational coordination(H2a,H2b)│    │   Business performance   │
└──────────────────────────────┘       └──────────────────────────┘
                                                   ↑
                       ┌───────────────────────────┴──┐
                       │       Control Variables      │
                       │  ✓ Interfunctional coordination│
                       │  ✓ Ownership                 │
                       │  ✓ Industry                  │
                       │  ✓ Firm size                 │
                       │  ✓ IT department size        │
                       └──────────────────────────────┘
```
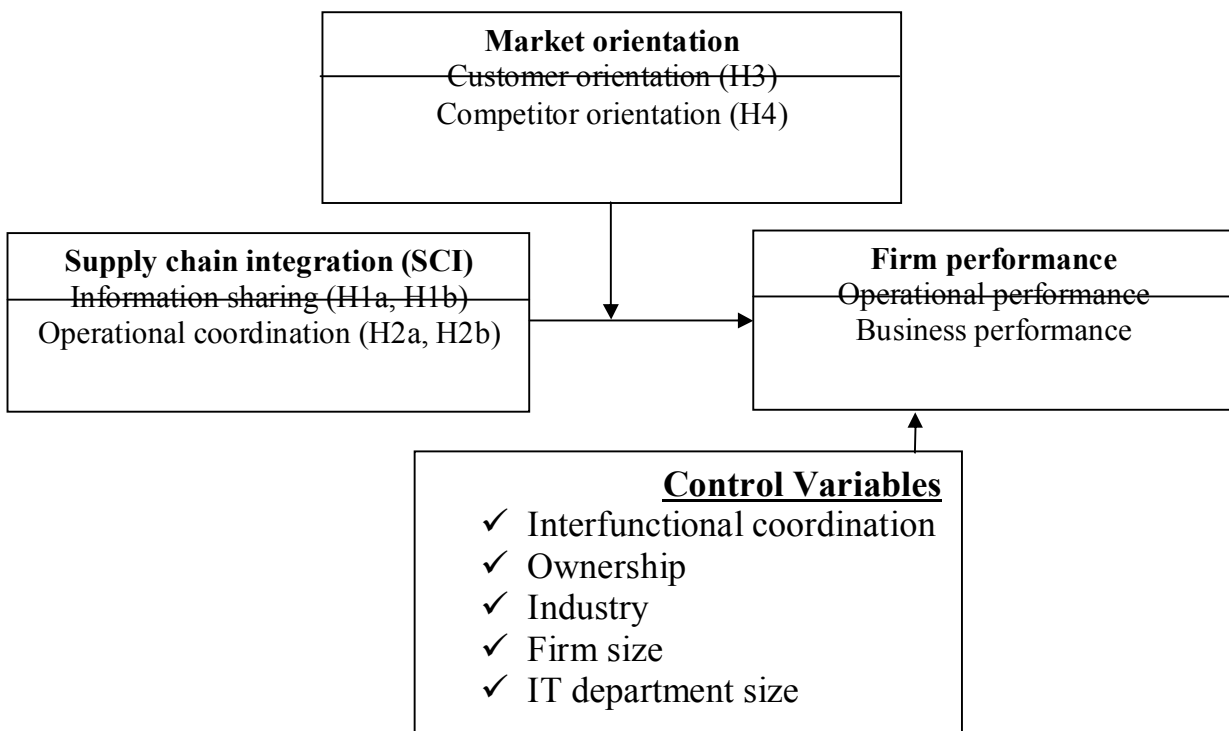
22- Ming-Chang Huang a, *, Hsin-Hua Huang (2018)

How transaction-specific investments influence firm performance in buyer supplier

Relationships: The mediating role of supply chain integration
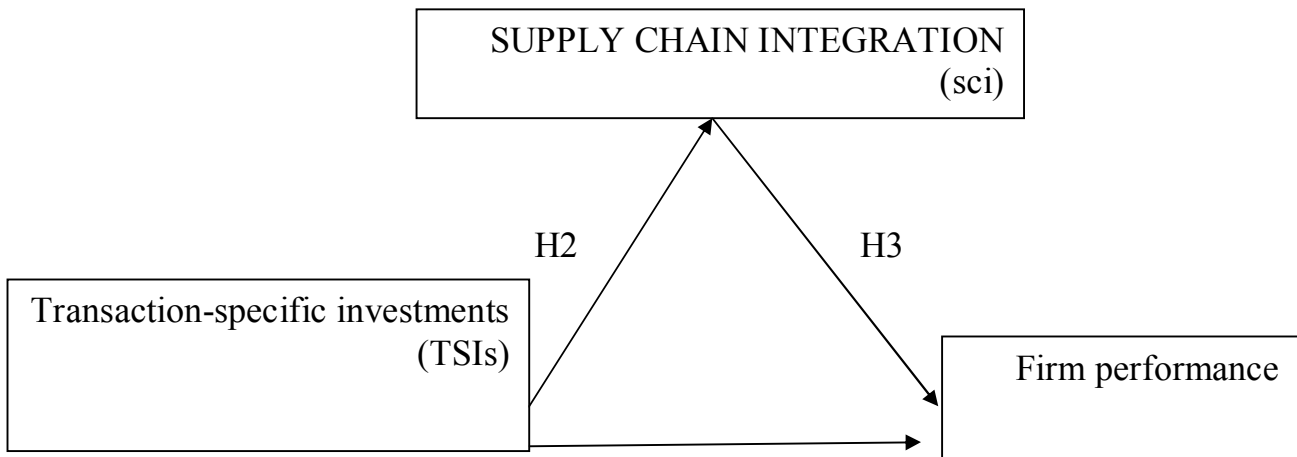
Supply chain information integration, flexibility, and operational performance

An archival search and content analysis
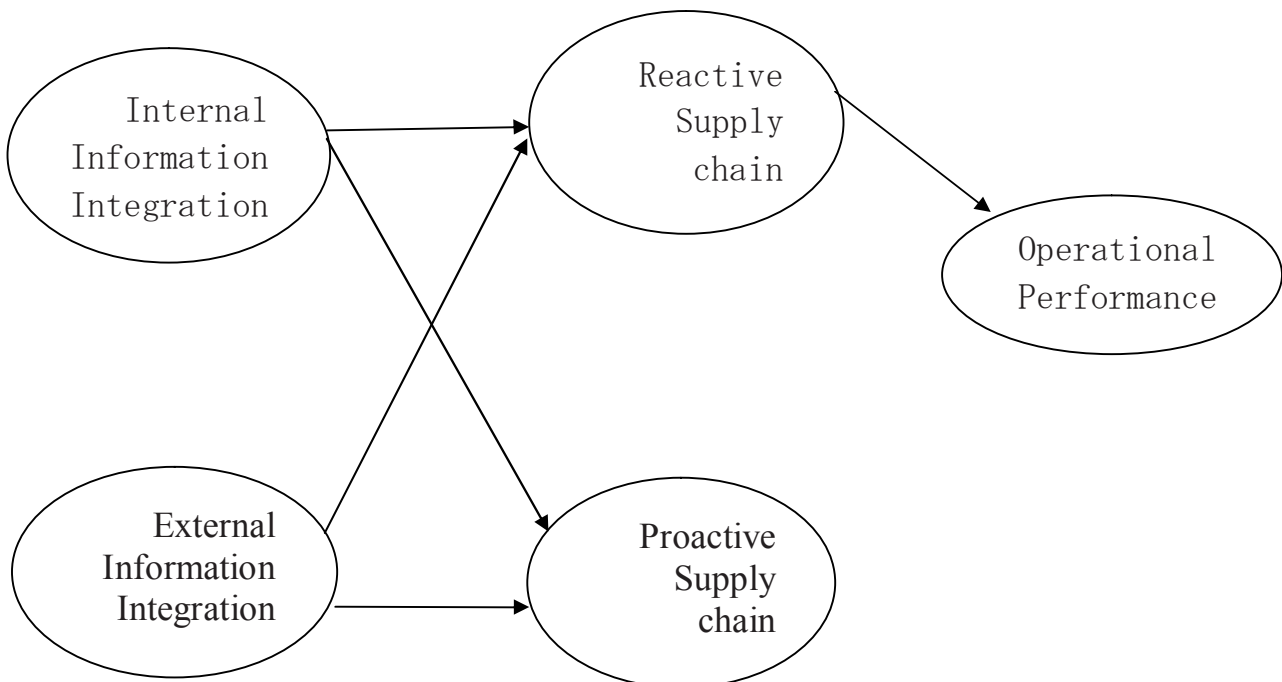
24- Daniel Prajogo (2018)

 Supply chain processes Linking supply logistics integration, supply performance, lean processes and competitive performance

```
                    ┌─────────────────────┐
                    │   Inbound Supply    │
                    │    Performance      │
                    └─────────────────────┘
          ↗                  ↑                  ↘
┌──────────────────┐                    ┌──────────────────┐
│ Supply Logistics │                    │   Performance    │
│   Integration    │                    │                  │
└──────────────────┘                    └──────────────────┘
```
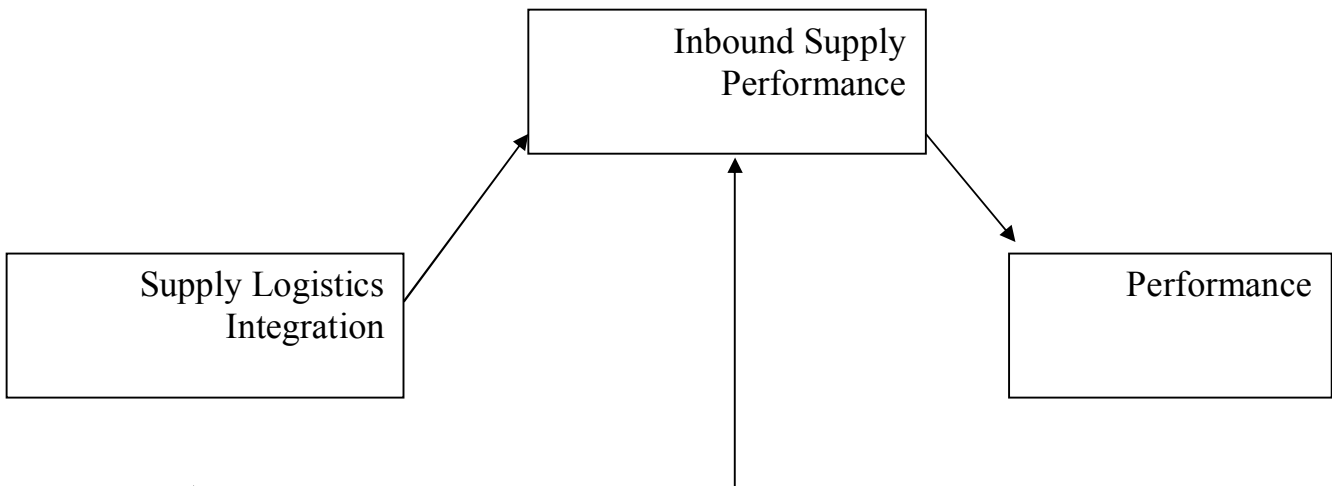
25- Vikas Kumar (2017)

The Impact of Supply Chain Integration on Performance: Evidence from the UK Food Sector

┌─────────────────────┐
│ Lean Production   │
│   Processes   │
└─────────────────────┘

Supply Chain Integration   **Supply Chain**

| Supplier Integration |
| Internal Integration |
| Customer Integration |
| Information Integration |

Operational Performance
Production Flexibility
Inventory Turns
Order Fulfillment Rate
Total Logistics Costs
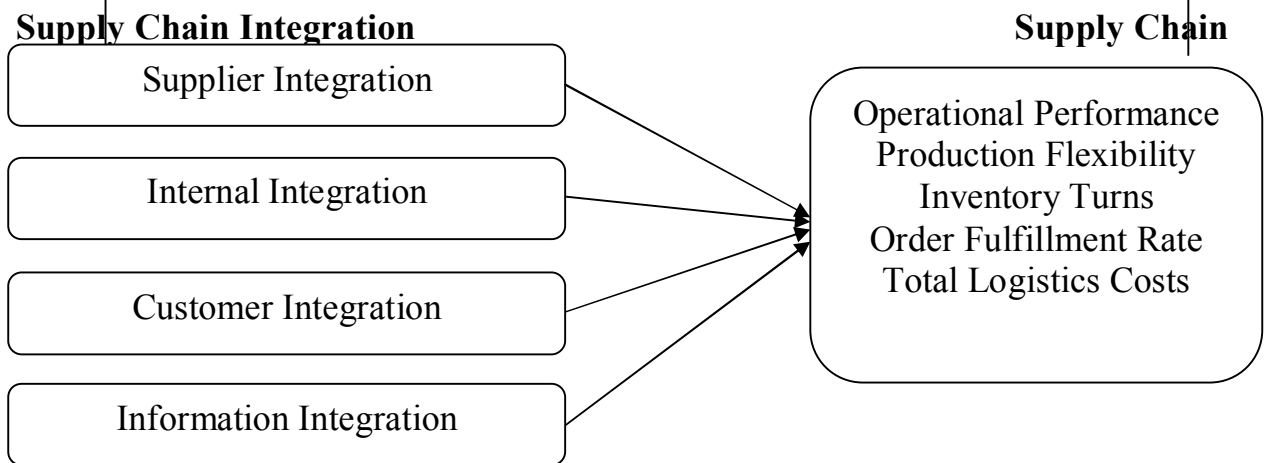
26- Erlinda Nusron Yunus (2012)

DRIVERS OF SUPPLY CHAIN INTEGRATION AND THE ROLE OF ORGANIZATIONAL CULTURE: EMPIRICAL EVIDENCE FROM INDONESIA

27- Meng Chen (2018)

 Top managers' managerial ties, supply chain integration, and firm Performance in China: A social capital perspective
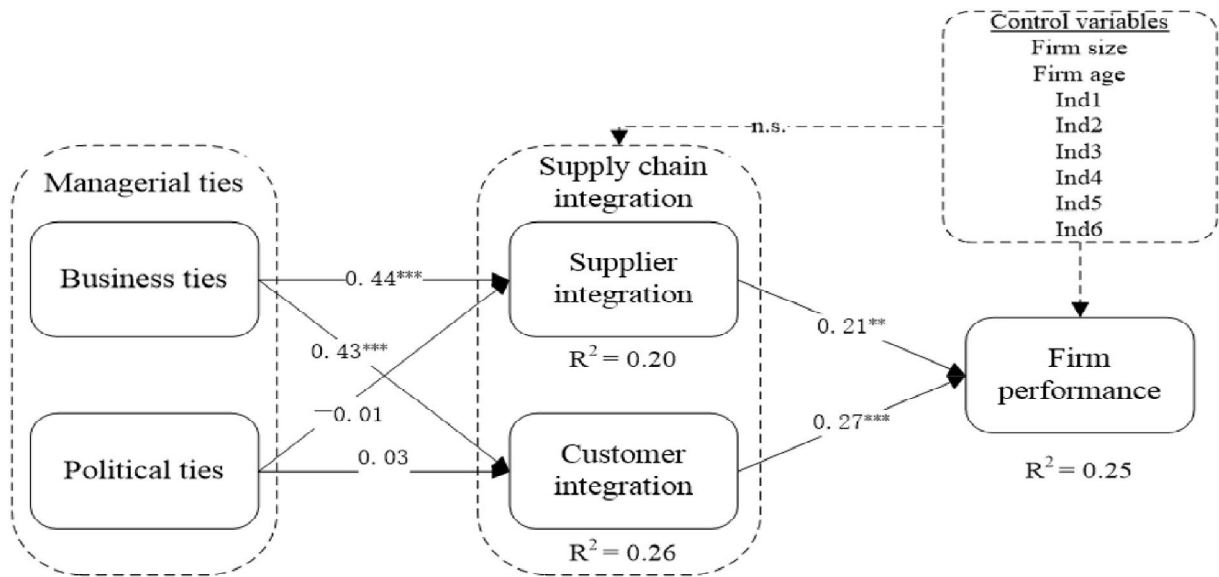
Note: ** p<0.01; *** p<0.001.

28- Woojung Chang (2016)

Supply chain integration and firm financial performance: A meta analysis of positional advantage mediation and moderating factors
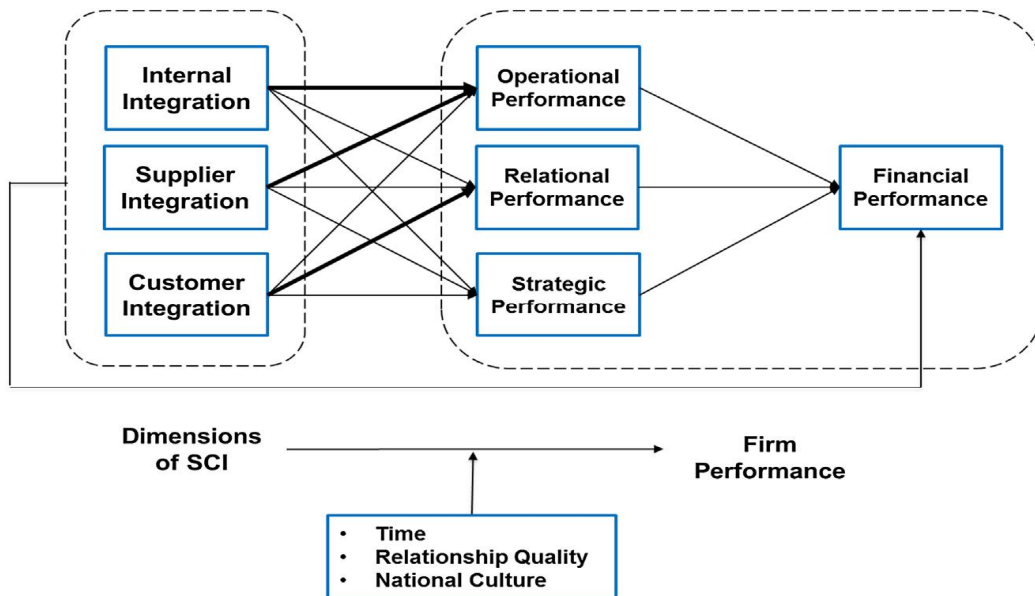
3.7.2 OPERATIONAL PERFORMANCE:

29- Habib ur Rehman Makhdoom (2016)

Supply Chain Integration and Operational Performance: Moderating role of Organizational Culture

Supply Chain Integration:
☐ Integration with Customer

☐ Integration with Suppliers

☐ Cross functional Integration within organization

Operational Performance
☐ Cost Leadership

☐ Customer Services

Organizational Culture:
☐ Group Culture

☐ Hierarchical Culture

☐ Developmental Culture

☐ Rational Culture
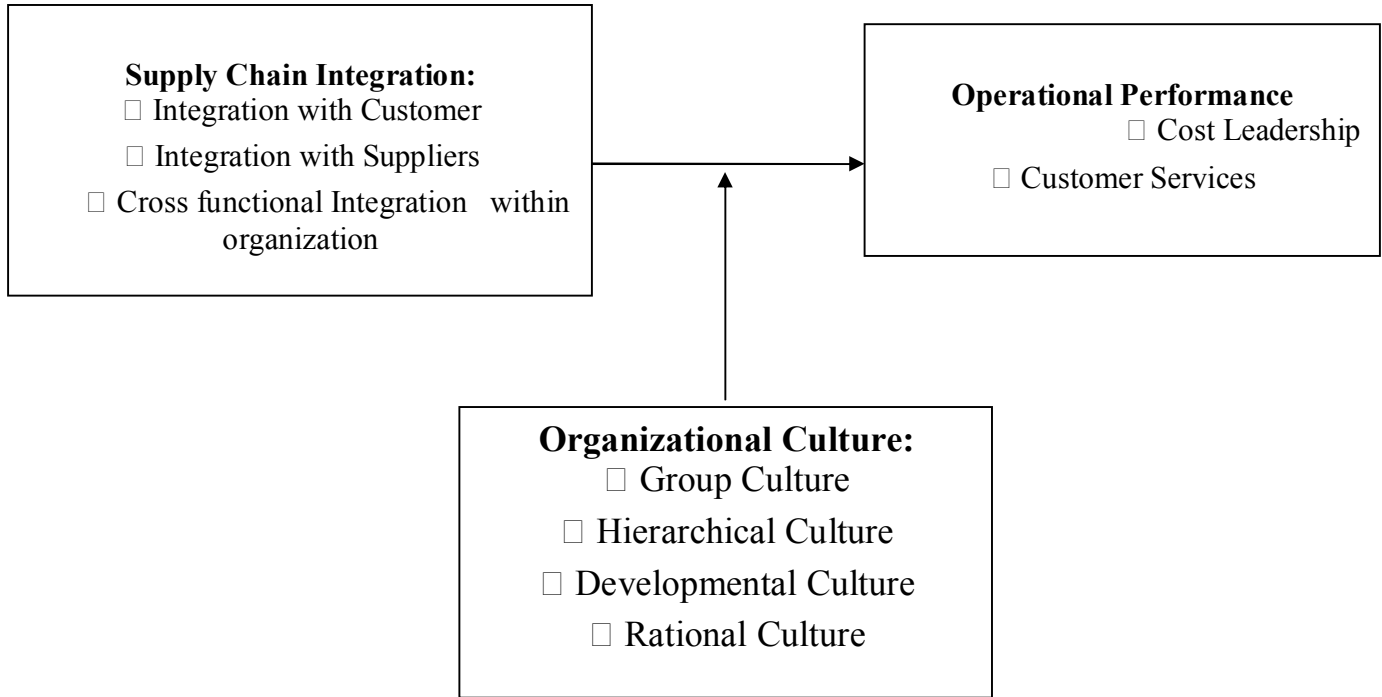
30- The effect of IT-enabled supply chain integration on performance
Wantao Yu* (2017)

Customer integration

Financial performance

IT implementation

Internal integration

Supplier integration

Operational performance
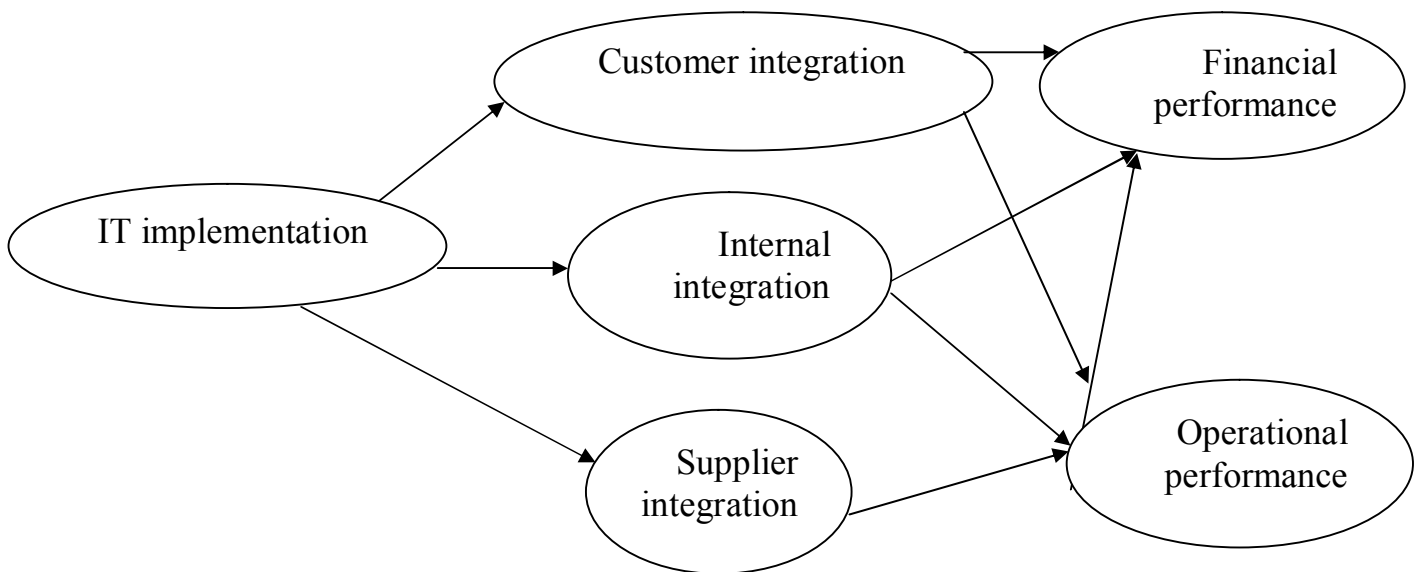
31- The influence of supply chain Integration on operational Performance A comparison between product and service supply chains

Kum Fai Yuen (2017)
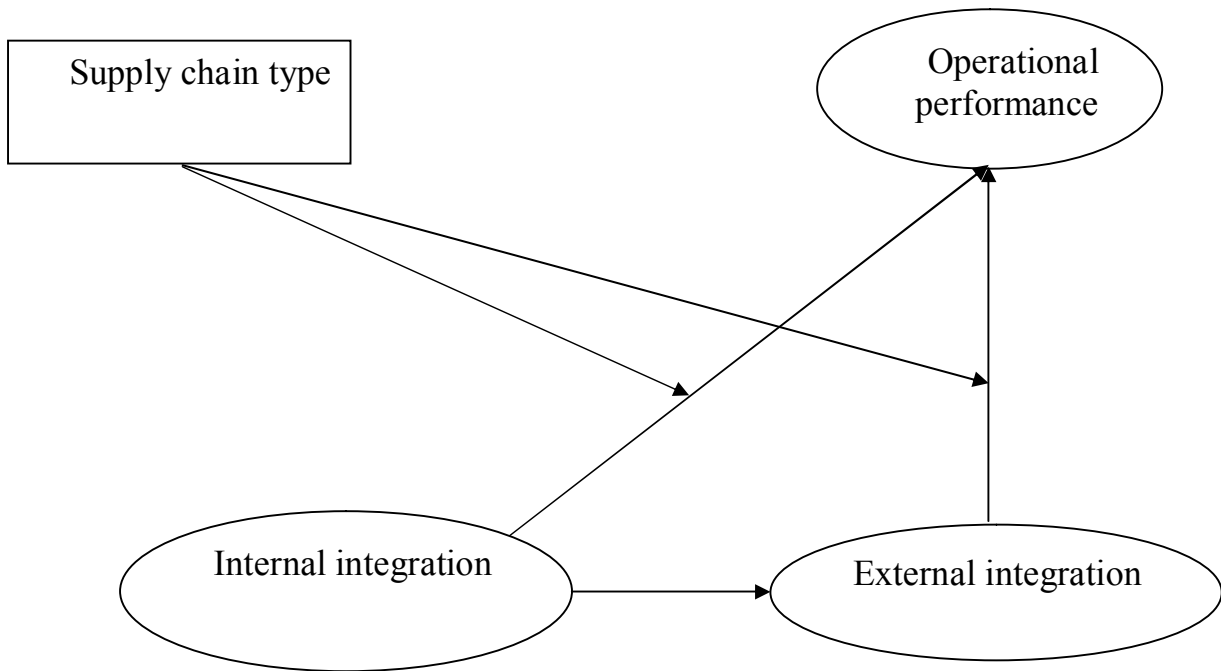
32- The impact of subsidiaries' internal and external integration on operational performance Krisztina Demeter (2016)
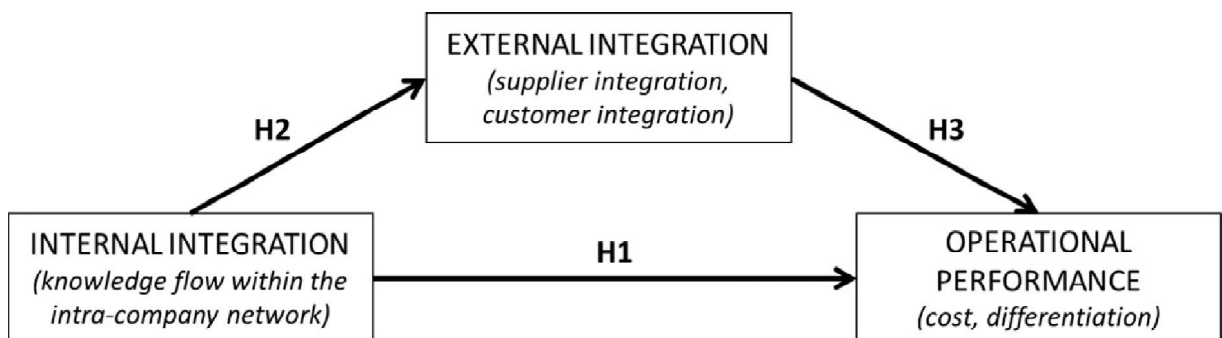
33- Sarv Devaraj (2007)

Impact of eBusiness technologies on operational performance:The role of production information integration in the supply chain
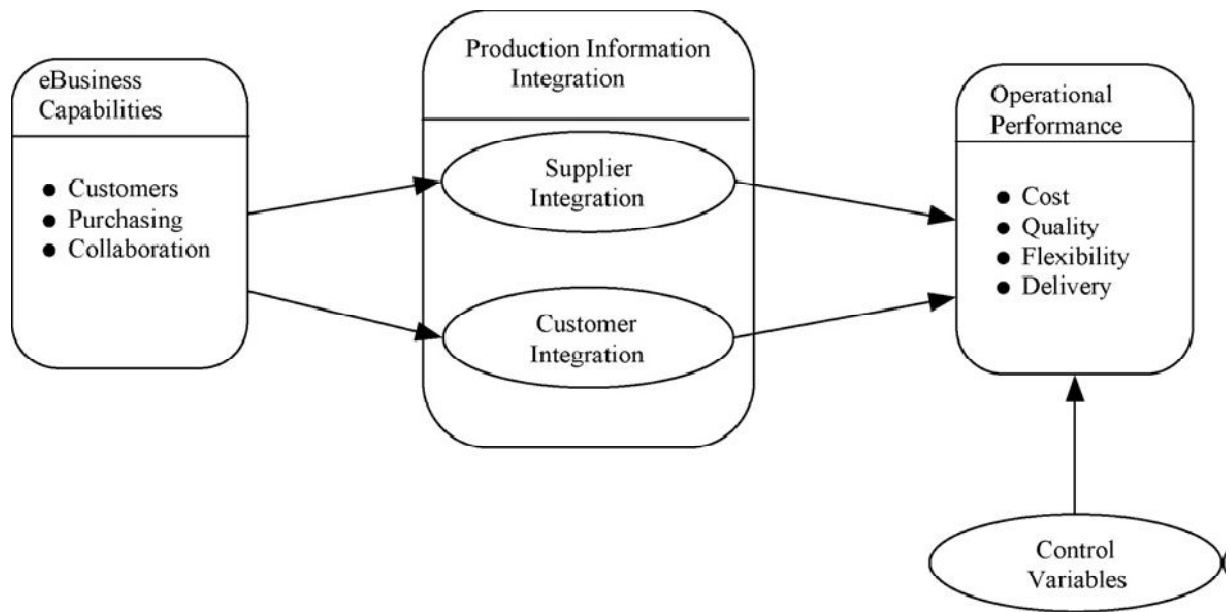
34- Cloud computing, Web 2.0, and operational performance The mediating role of supply chain integration

Sebastián Bruque Cámara (2018)
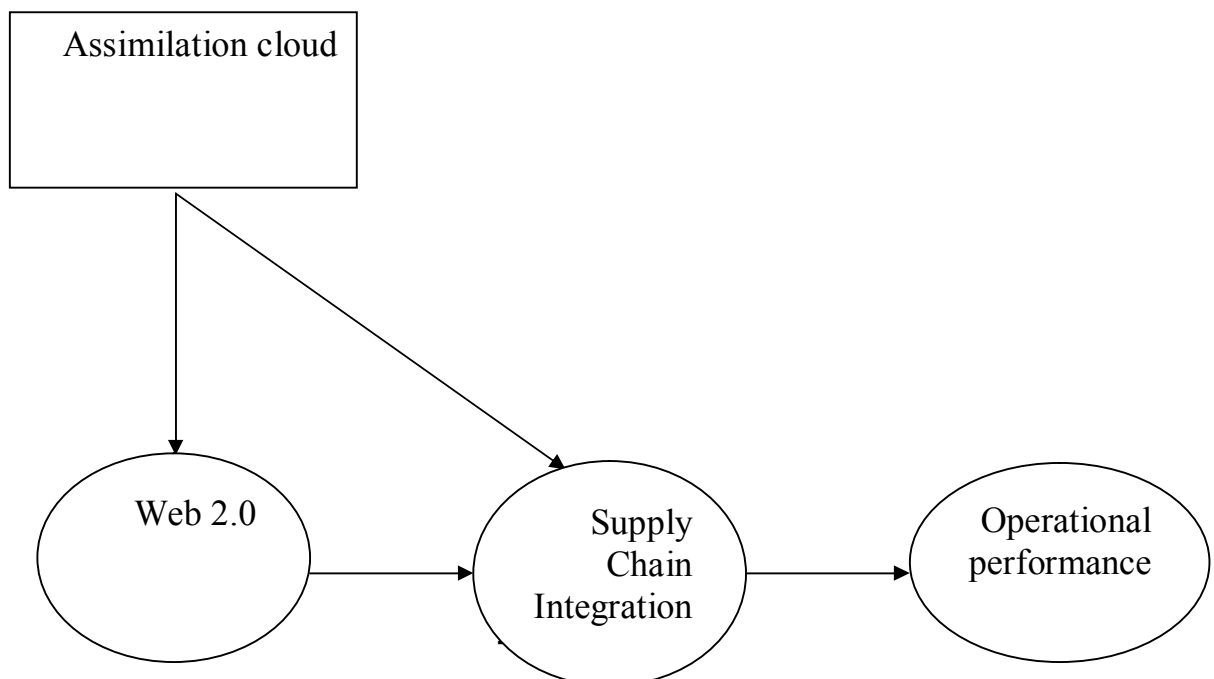
35- The relationships among supply chain partnerships, customer orientation, and operational performance: the effect of flexibility

Edward C. S. Ku (2015)
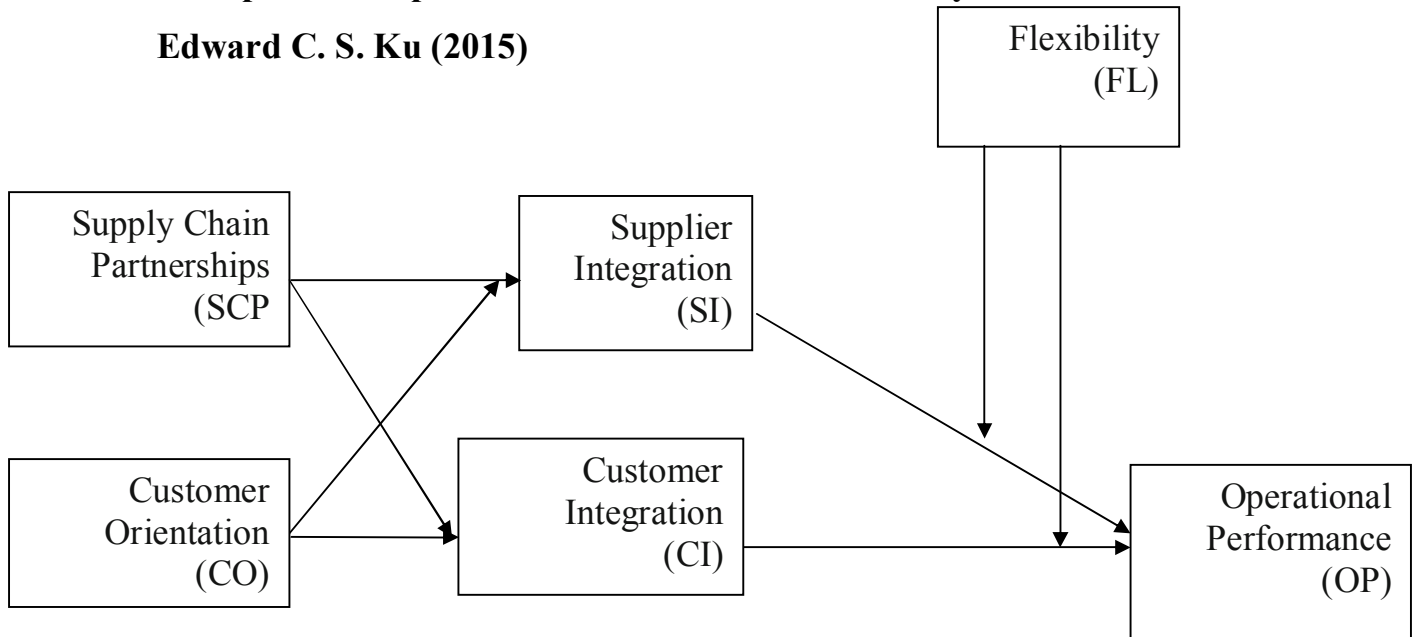
36- Hee Sung BAEa (2017)

Empirical Relationships of Perceived Environmental Uncertainty, Supply Chain Collaboration and Operational Performance: Analyses of Direct, Indirect and Total Effects*
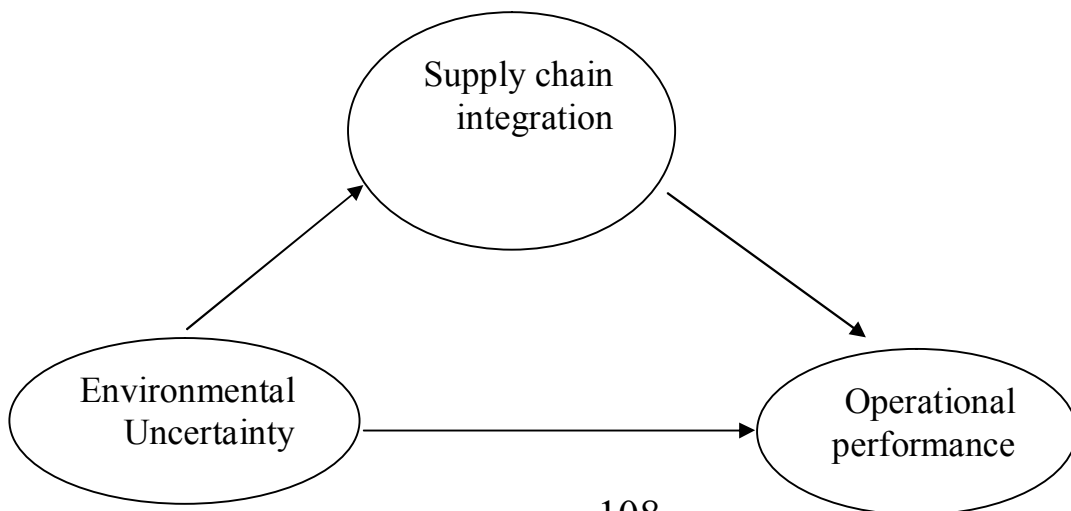
3.7.3 RESPONSIVENESS:

37- Responsive supply chain: competitive strategy in a networked economy_

Angappa Gunasekaran (2018)
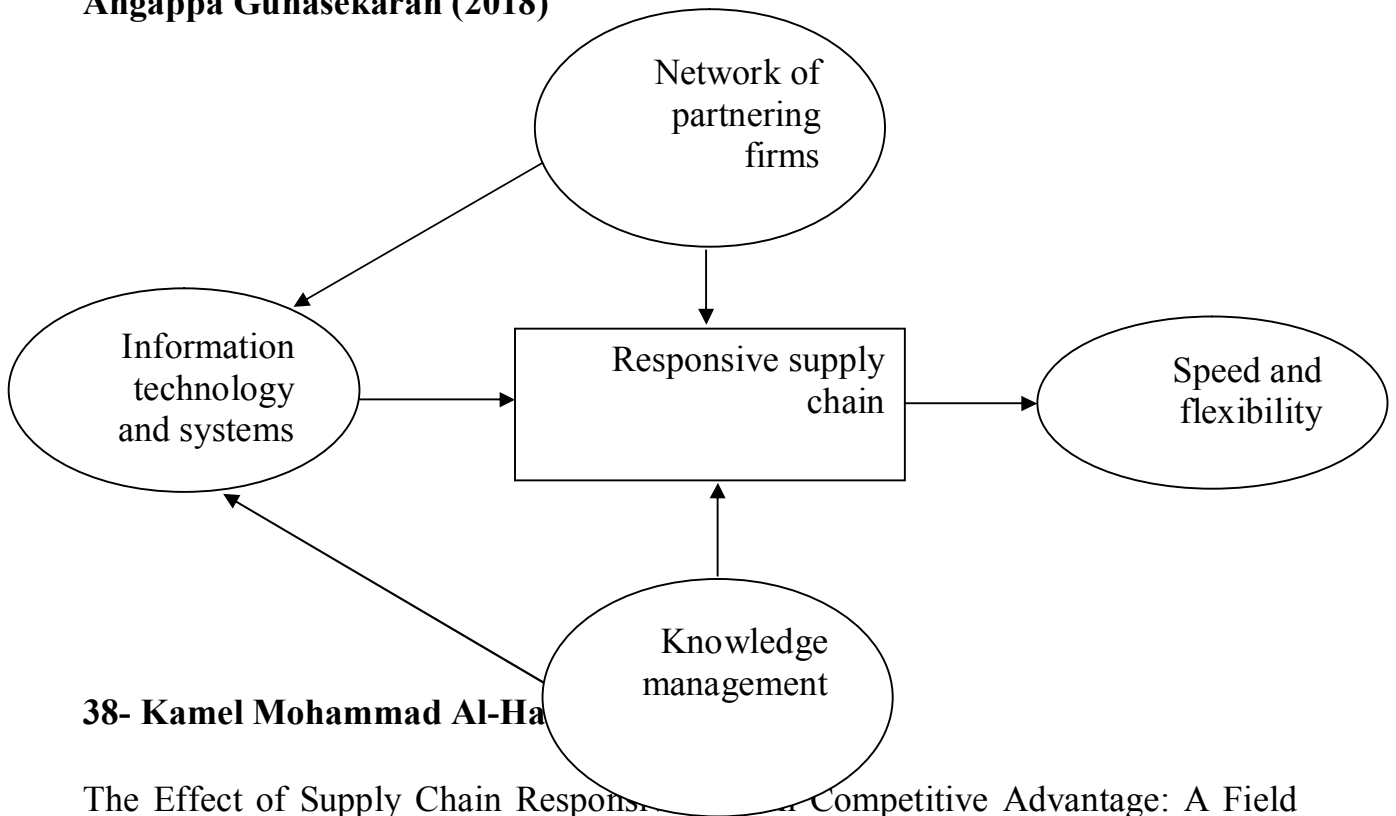
38- Kamel Mohammad Al-Ha

The Effect of Supply Chain Respons... Competitive Advantage: A Field Study of Manufacturing Companies in Jordan
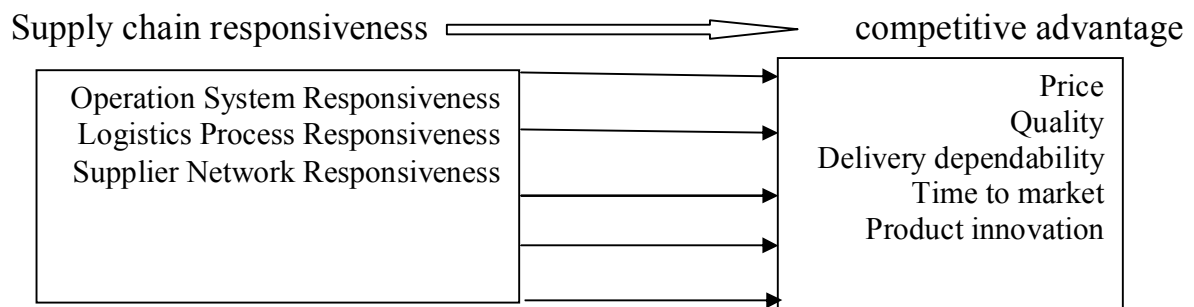
39- Ashish A. Thatte (2007)

 Competitive Advantage of a Firm through Supply Chain Responsiveness and SCM Practices
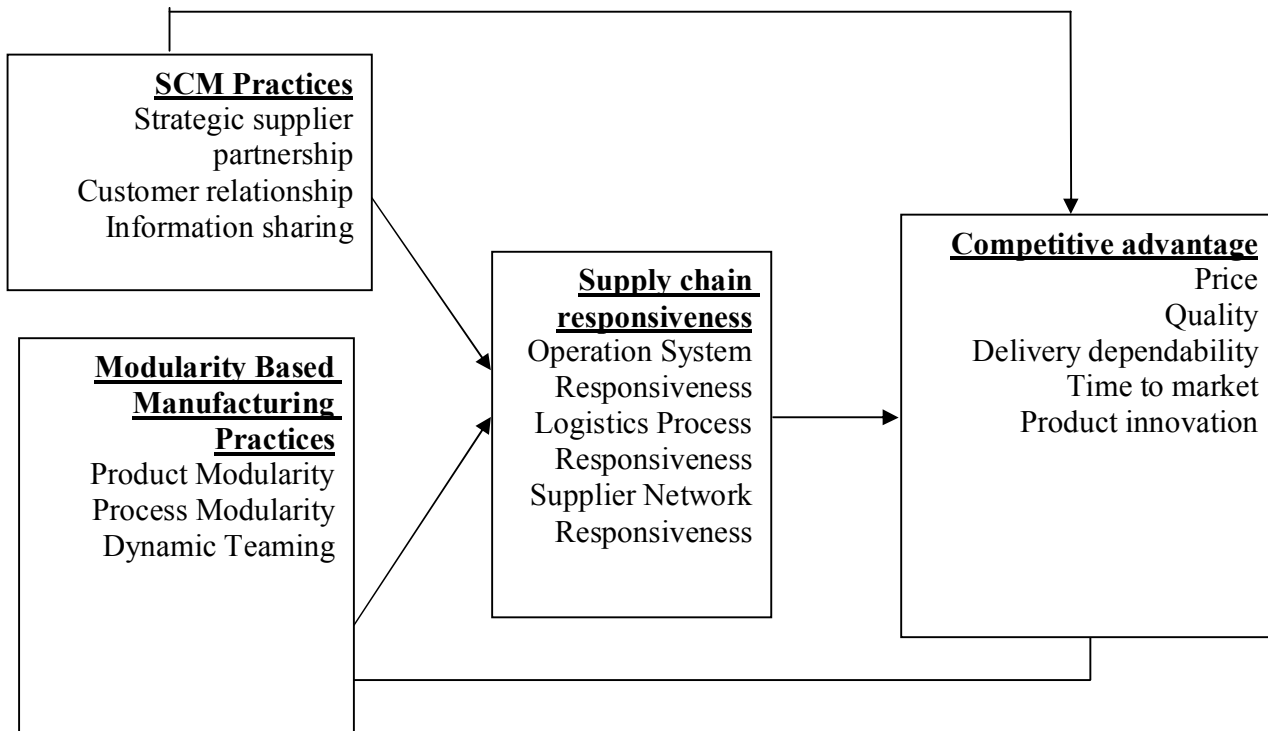
40- Competitive Advantage through Supply Chain Responsiveness and Supply Chain Integration **Inda Sukati, (2012) :**
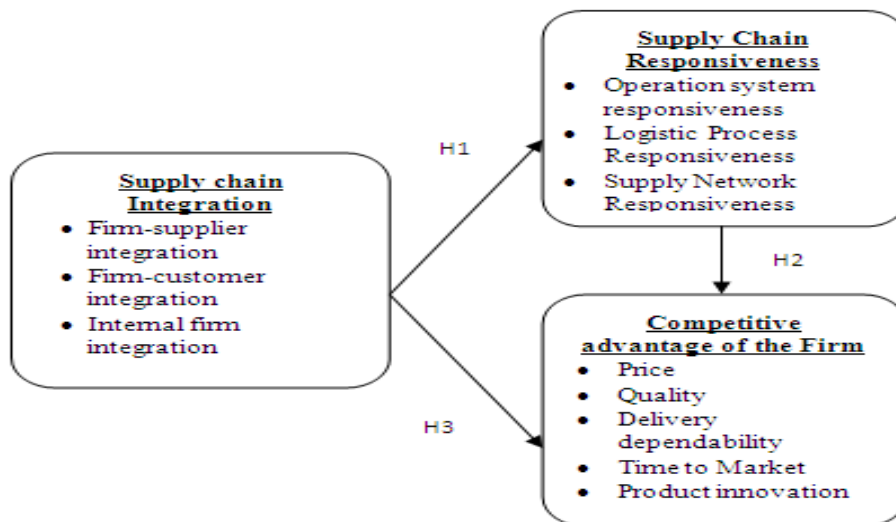
3.7.4 IT CAPABILITY:

41- Technology and Marketing Capabilities in a Developing Economic Context: Assessing the Resource-Based View within a Boundary Condition

Stern   Neill   (2014):
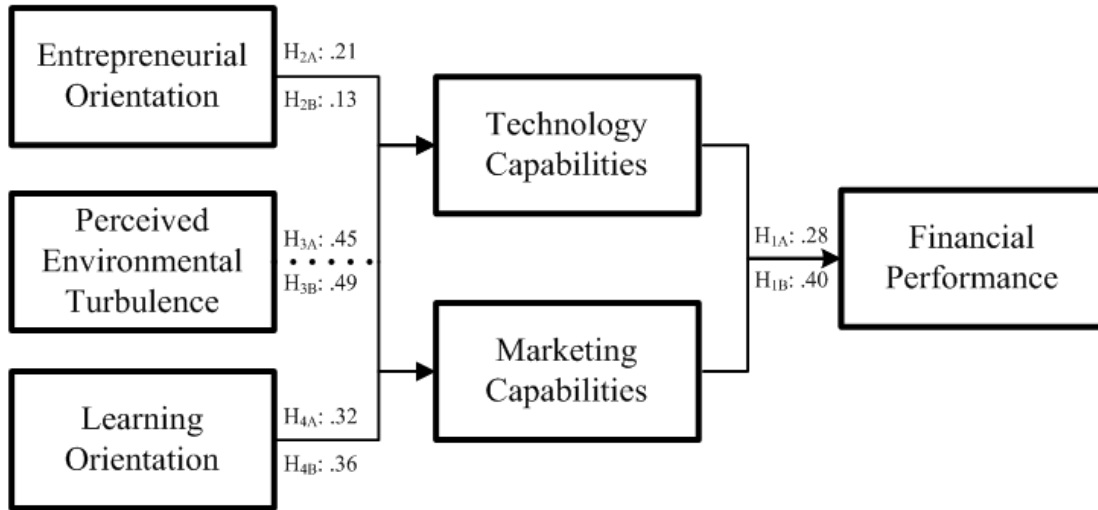
42- Salim (2015)

Foreign direct investment and technology spillover in Iran: The role of technological Capabilities of subsidiaries
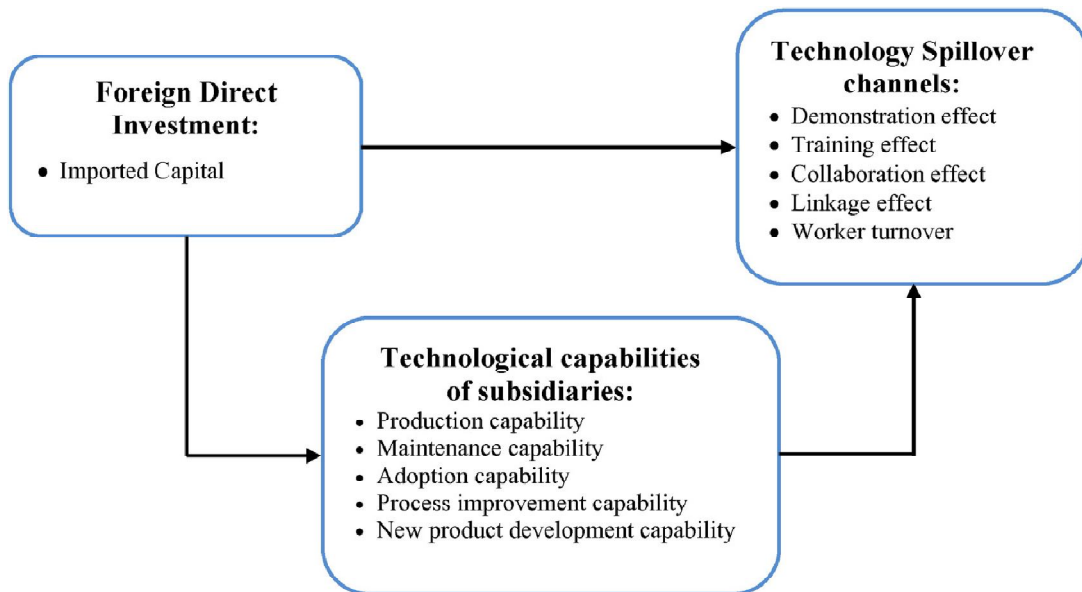
43- Deyvison de Lima Oliveira (2016)

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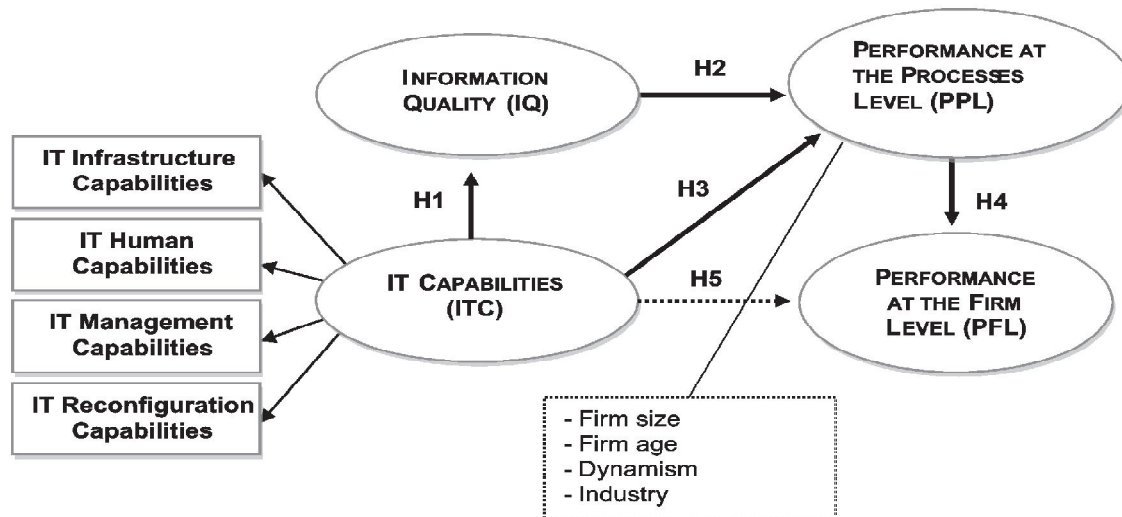
After reviewing the previous models that were studying a group of independent variables such as: intra-organizational resources, dependence on customers, trust with customers, dependence on suppliers, trust with suppliers, customer integration, internal integration, supplier integration, power, benefits,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

3.8 The research conceptual framework

Control variables

job nature – employees no – Organization age
Supplier no – competitors no
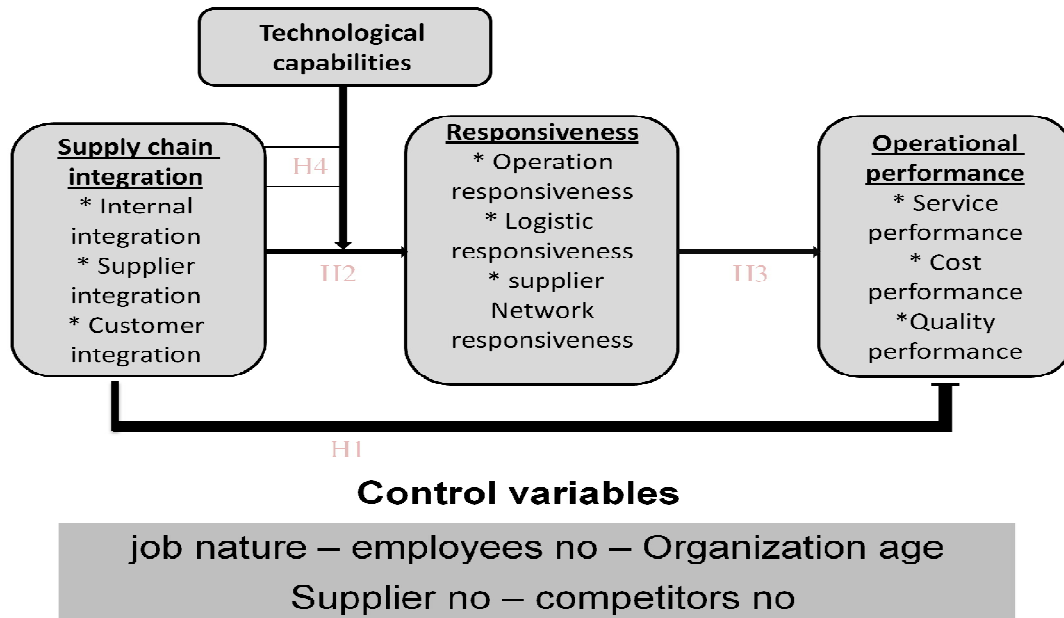
3.9Dimensions source:

variables	Year	Researcher
Supply chain integration	2018	Chen
responsiveness	2012	Sukati
Operational performance	2017 2015	Baea Tamimi
Technological capability	2016	Oliveira

3.10 Hypotheses Development:

3.10.1   The relationship between supply chain integration and operational performance.

In literature a number of scholars like (Chen,et.al 2018) (Kim,et.al 2018), (Liu, et al, 2018), (Prajogo, et al, 2018),(Wantao, 2017), beside others, are discussed supply chain integration concept is important in developing supply chain focus to enhance the organizational performance. (Yuen, 2017), (Richey, et. al 2018), (Huang, 2018) indicates a positive relationship between supply chain integration and firm performance. While, (Camora,2018), (Baea,2017), (Makhdoom,2016), (Demeter,2016), (Eltamimi,2015) indicates a positive relationship between supply chain integration and performance.

Based on the above discussions the following hypotheses are generated:

H1. There is a relationship between supply chain integration and operational performance.

H1.1There is a positive relationship between Supply chain integration and service performance

Developed sub hypotheses from first hypothesis as follows:

H1.1a There is positive relationship between internal integration and service performance

H1.1b There is positive relationship between supplier integration and service performance

H1.1c there is positive relationship between customer integration and service performance

H1.2There is a positive relationship between Supply chain integration and cost performance

H1.2a There is positive relationship between internal integration and cost performance

H1.2b There is positive relationship between supplier integration and Cost performance

H1.2c there is positive relationship between the customer integration and cost performance

H1.3There is a positive relationship between Supply chain integration and quality performance.

H1.3a There is positive relationship between internal integration and quality performance.

H1.3b There is positive relationship between supplier integration and quality performance.

H1.3c there is positive relationship between customer integration and quality performance.

3.10.2 The relationship between supply chain integration and responsiveness.

The supply chain integration is playing important role in building and affecting the responsiveness such as (operation responsiveness , logistic responsiveness and network supplier responsiveness) in the firms. In accordance with the findings in

literature supply chain integration was posited to have significant and positive relationship with responsiveness. (Sukati , 2012) indicates a positive relationship between supply chain integration and responsiveness. (Molahosseini, 2013; Flynn et al., 2010),(Fabbe-Costes and Jahre2007) states that supply chain integration isn't have prerequisite towards to achieving the highest responsiveness. While, (Danese et al.,2013) indicates a positive relationship between supply chain integration and responsiveness.

Based on the above discussions the following hypotheses are generated:

H2. There is a relationship between supply chain integration and responsiveness.

H2.2There is a positive relationship between Supply chain integration and operation process responsiveness

Developed sub hypotheses from firs hypothesis as follows:

H2.1a There is positive relationship between internal integration and operation process responsiveness

H2.1b There is positive relationship between supplier integration and operation process responsiveness

H2.1c there is positive relationship between customer integration and operation process responsiveness

H2.2There is a positive relationship between Supply chain integration and logistic responsiveness

H2.2a There is positive relationship between internal integration and logistic responsiveness

H2.2b There is positive relationship between supplier integration and logistic responsiveness

H1.2c there is positive relationship between customer integration and logistic responsiveness

H2.3There is a positive relationship between Supply chain integration and supplier network responsiveness

H2.3a There is positive relationship between internal integration and supplier network responsiveness

H2.3b There is positive relationship between supplier integration and supplier network responsiveness

H2.3c there is positive relationship between customer integration and supplier network responsiveness

3.10.3 The relationship between responsiveness and operational performance.

The literature suggests that the responsiveness to build effective responsiveness is a significant driver of performance. (Gunasekaran , 2018) Furthermore (Sukati , 2012) show that there is a significant relationship between responsiveness and performance. Most of the studies that examined the relationship between responsiveness and firm performance have found a highly significant and positive relationship between them such as (Thatte, 2007) investigated that there is a significant relationship between responsiveness and performance.

Based on the above discussions the following hypotheses are generated:

H3. There is a relationship between the responsiveness and operational performance.

H3.1There is a positive relationship between responsiveness and service performance

Developed sub hypotheses from firs hypothesis as follows:

H3.1a There is positive relationship between operation process responsiveness and service performance

H3.1b There is positive relationship between logistic responsiveness and service performance

H3.1c there is positive relationship between supplier network responsiveness and service performance

H3.2There is a positive relationship between responsiveness and cost performance

H4. 1a There is positive relationship between operation process responsiveness and cost performance

H3.1b There is positive relationship between logistic responsiveness and cost performance

H3. 1c there is positive relationship between supplier network responsiveness and cost performance

H5.**There is a positive relationship between responsiveness and quality performance**

H5.1 There is positive relationship between operation process responsiveness and quality performance

H5.2 There is positive relationship between logistic responsiveness and quality performance

H5.3 there is positive relationship between the supplier network responsiveness and quality performance

3.10.4 The responsiveness mediates the effect between supply chain integration and operational performance.

Conceptual and empirical researches in the field of supply chain management have begun to demonstrate how responsiveness may play a mediating role in the relationship between any tangible or/and intangible resources and firm performance, such as (Gunasekaran , 2018)investigate a positive mediate effect of responsiveness on relationship between Information technology system and speed , flexibility. (Sukati , 2012) show that a significant and positive mediating role of responsiveness on relationship between supply chain integration and competitive

advantage. While, (Thatte , 2007) investigate a significant and positive mediating role of responsiveness on relationship between supply chain Practice and competitive advantage. the above conceptual and empirical researches can justify the existing of such relationships. Therefore, based on the above discussions the following hypotheses are generated:

H4. The responsiveness mediates the relationship between supply chain integration and operational performance.

H6.1a operation process responsiveness Mediate the relationship between internal integration and service performance

H6.1b operation process responsiveness Mediate the relationship between internal integration and cost performance

H6.1c operation process responsiveness Mediate the relationship between internal integration and quality performance

H6.1a operation process responsiveness Mediate the relationship between supplier integration and service performance

H6.1b operation process responsiveness Mediate the relationship between supplier integration and cost performance

H6.1c operation process responsiveness Mediate the relationship between supplier integration and quality performance

H6.1a operation process responsiveness Mediate the relationship between customer integration and service performance

H6.1b operation process responsiveness Mediate the relationship between customer integration and cost performance

H6.1c operation process responsiveness Mediate the relationship between customer integration and quality performance

H6.1a logistic responsiveness Mediate the relationship between internal integration and service performance

H6.1b *logistic responsiveness Mediate the relationship between internal integration and cost performance*

H6.1c *logistic responsiveness Mediate the relationship between internal integration and quality performance*

H6.1a *logistic responsiveness Mediate the relationship between supplier integration and service performance*

H6.1b *logistic responsiveness Mediate the relationship between supplier integration and cost performance*

H6.1c *logistic responsiveness Mediate the relationship between supplier integration and quality performance*

H6.1a *logistic responsiveness Mediate the relationship between customer integration and service performance*

H6.1b *logistic responsiveness Mediate the relationship between customer integration and cost performance*

H6.1c *logistic responsiveness Mediate the relationship between customer integration and quality performance*

H6.1a *supplier network responsiveness Mediate the relationship between internal integration and service performance*

H6.1b *supplier network responsiveness Mediate the relationship between internal integration and cost performance*

H6.1c *supplier network responsiveness Mediate the relationship between internal integration and quality performance*

H6.1a *supplier network responsiveness Mediate the relationship between supplier integration and service performance*

H6.1b *supplier network responsiveness Mediate the relationship between supplier integration and cost performance*

H6.1c supplier network responsiveness Mediate the relationship between supplier integration and quality performance

H6.1a supplier network responsiveness Mediate the relationship between customer integration and service performance

H6.1b supplier network responsiveness Mediate the relationship between customer integration and cost performance

H6.1c supplier network responsiveness Mediate the relationship between customer integration and quality performance

3.10.5 Technological capabilities moderate the relationship between supply chain integration and responsiveness.

According to the theory of resource based view (Colin & Chwen, 2017) and finding of the literature suggests that the technological capabilities is playing significant and positive moderating, therefore few previous studies investigate technological capabilities as moderate variables such as (Jie Wu, 2014) investigated a significant and positive moderate effect of technological capabilities on relationship between cooperation with competitors and product innovation, while (Haeussler, et al, 2012) states that the technological capabilities influence effectively on relationship between Strategic alliances and product development, while (Ferna´ndez, 2012) investigated a significant and positive moderate effect of technological capabilities. And (Ortega, 2010) confirmed that a significant and positive moderate effect of technological capabilities on the relationship between Competitive strategies and firm performance.

Based on the above discussions the following hypotheses are generated:

H5. Technological capabilities moderate the relationship between supply chain integration and responsiveness.

H8.1 The effect of internal integration on operation process responsiveness is stronger when uses technological capabilities.

H8.2 *The effect of internal integration on logistic responsiveness is stronger when uses technological capabilities.*

H.8.3 *The effect of internal integration on supplier network responsiveness is stronger when uses technological capabilities.*

H8.1 *The effect of supplier integration on operation process responsiveness is stronger when uses technological capabilities.*

H8.2 *The effect of supplier integration on logistic responsiveness is stronger when uses technological capabilities.*

H.8.3 *The effect of supplier integration on supplier network responsiveness is stronger when uses technological capabilities*

H8.1 *The effect of customer integration on operation process responsiveness is stronger when uses technological capabilities.*

H8.2 *The effect of customer integration on logistic responsiveness is stronger when uses technological capabilities.*

H.8.3 *The effect of customer integration on supplier network responsiveness is stronger when uses technological capabilities*

3.11 Control Variables:

The study uses five control variables that have been identified to have a significant impact on the effects on performance. Previously, research indicates that the size of the firm has an impact on the relationship between variable similar such MO and PERF (Liu 1995). Also, smaller firms might have fewer resources for the implementation of supply chain integration (Cao and Zhang 2011). The size of the firm was measured by the number of employees (logarithmized). Second, (Ben Brik et al. 2011) the study controls for the age of the firm. Firm age can influence the implementation of supply chain integration and therefore, impact operational performance. Firm age is calculated as the number of years since firm foundation (logarithmized) (White et al. 1999), also firm ownership has been considered as

control variable because there are different types of ownership, and the kind of ownership related to the supply chain management and availability of resource, competitors has been consider also as control variables because there are effect on the cost , quality and services in medical service. Finally consider the suppliers because the number of supplier effect on the service that if they supply good raw material or bad raw material this affect on the final service.

3.12 Summary of the Chapter

This chapter was devoted to methodological issues of this thesis. Firstly, a general discussion on theory of the research, conceptual framework was presented with the result of the structured literature review, hypotheses development. The control variables were presented. Research Design and research philosophy, Research Methodology, population, samples, data collection, measurement, and questionnaire design will be the next chapter

CHAPTER IV:
RESEARCH METHODOLOGY

4.0 Introduction:

This chapter contains research methodology, Population and sample of the study, designing questionnaire, pretest and variables measurement and Data Analysis Techniques.

4.1. Research Design:

A research design is the specification of methods and procedures for acquiring information needed to structure or solve problems. It is the overall operational pattern or framework of the project that stipulates what information is to be collected, from which sources, and by what procedures. A research design might be described as a series of advance decisions that, taken together, from a specific master plan or model for the conduct of the investigation (Green, Tull and Albaum, 1988).

4.1.1 Research Philosophy:

Research inquiry is conducted mainly within three broad paradigms namely *Positivist*, *Naturalistic* and *Pragmatic* (Creswell, 2003)

4.1.2 The Research Methodology Options:

Here it is necessary to identify the most appropriate methodology for this study.

It is essential to recognize the philosophical methodology function before choosing this research methodology. According to (Tsai and Chou, 2008) there are three points to be considered: the first, the methodology can assist in making the research design clear.

The research design includes where and how to collect the evidence data for providing good interpreted to answer the research questions. Secondly, knowledge of the philosophy lets the researcher know how to avoid mistakes and points up the limitations for their research. The third one is that the knowledge of philosophy can create the dissimilar subject or knowledge structures from the research design from researchers past experiences. That is to say the research method is significant in linking theory and data in the research. (Creswell, 2003, p.5). Generally, there

are two main methodologies: quantitative and qualitative. Quantitative research focuses on statistical

techniques Tsai. (2008). Qualitative research explores social constructs, such as: Human beliefs, behaviors, perceptions and values.

4.1.3.Qualitative and quantitative research : -

4.1.3.1Qualitative research is a methodbased on small samples intend to provide insight and understanding of the problem setting which one is more focused on the analysis of data, such as words (Malhotra, 1996).

4.1.3.2 Quantitative research involves the collection of primary data from a large number of individuals, frequently with the intention of projecting the results to the larger population Martins *et al*. (1996). Therefore, Black (1999) referred to the two research methodologies' differences: Quantitative research is based on the collection of data from representative samples from large populations but qualitative research involves a more in-depth investigation of the topic.

Saunders *et al.* (2007) research approach is a useful tool in research for planning and explaining how the philosophical approach may be mapped out as a pathway for data collection and data analysis.

The **deductive approach** tests existing theory on real life observations and requires a positivist philosophy and quantitative research methods for theory testing (Dooley,2009). Empirical studies and mathematical models can build and test theory using an inductive or deductive research approach therefore this study descriptive.

4.2. Methodology:

When deciding upon the research approach for a study, the researcher can choose among several research approaches, all characterized by specific strengths and

weaknesses. The most important condition for choosing an appropriate approach is to identify the type of research questions that should be answered. Yin (2003) presents five different types of questions: "who", "what", "where", "how", and "why"- questions, to which different approaches are suitable. Due to the nature of this dissertation, they are Three main characteristics distinguish a survey approach from other approaches such as case studies or experimental studies. First, the collection of information in done by asking people in a structured manner. Collection methods in a survey approach could be mailed questionnaires, interviews face to face, or telephone calls. Second, a survey approach is a quantitative method that demands standardized information from and/or about the studied subject, e.g. individuals, groups or organizations. Third, information is generally gathered from a sample, which is a fraction of a specific population. The sample should be chosen in such a manner that the answers from the sample can be generalized to the whole population. (Malhotra and Grover, 1998; Pinsonneault and Kraemer, 1993).

Consistent with the purpose of this study to investigate the effects of supply chain integration (SCI) on operation performance (OP) in the service Sector (medical field) in Khartoum state the quantitative method was used (quantitative involves the collection of primary data from a large number of individuals, frequently with the intention of projecting the results to the larger population Black (1999) for this purpose the study have used the descriptive method (use of survey).

4.3 Data Collection:

4.3.1 Primary data collection tool:

The collection of the data will be done using structured questionnaire including closed answers.

4.3.2 Secondary data collection:

The secondary data will be collected using the following:

❖ Scientific books, references and international journals

❖ Previous related studies

❖ Internet web sources.

4.4 Research Design:

Is a framework or plan used as a guideline for collection and analysis of data, intended by the theory and methodology under which the research will be conducted.(Sekran,2006)
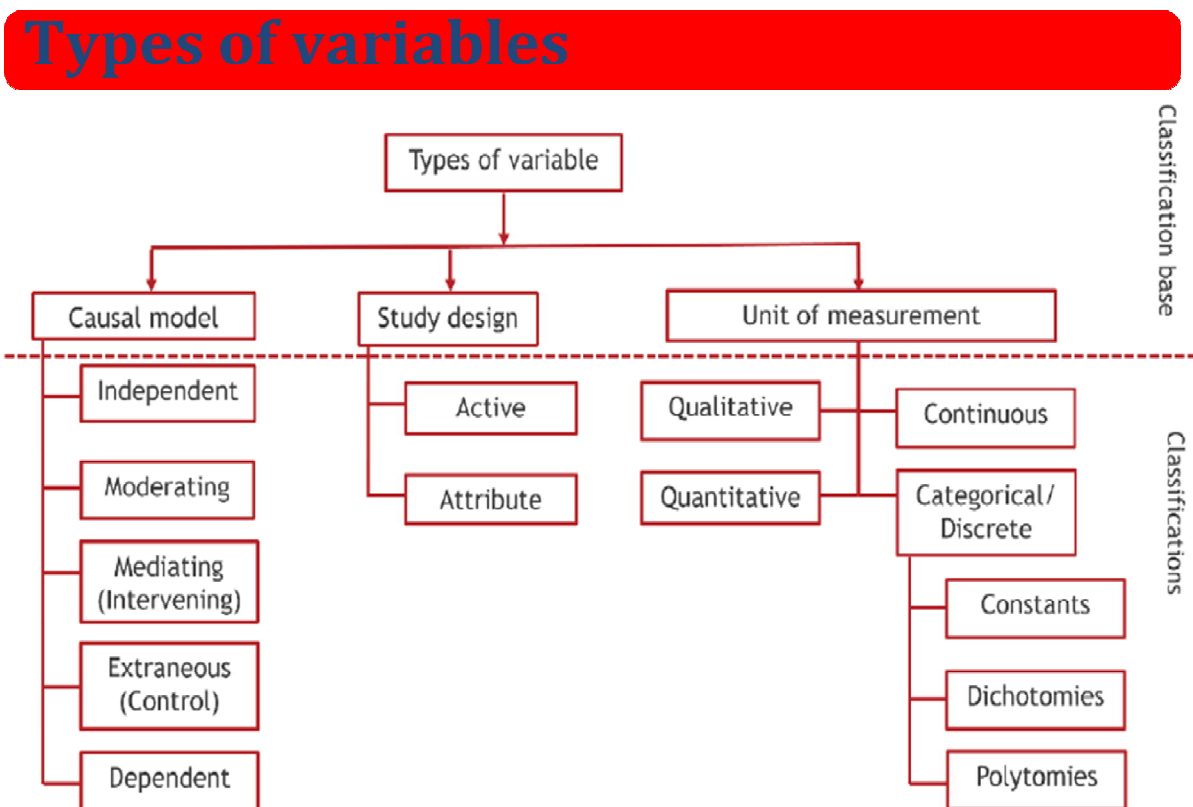
4.5 Research philosophy and approach:

Philosophy guides research, philosophy of science is really looking, what is the truth of science? And what depends on it as a science?

4.5.1 The philosophy of positivism:

What observed and confirmed from previous studies builds upon it through the development and testing of hypotheses through theoretical testing (Saunders et al., 2009).

The study is based on the descriptive analytical approach. It is characterized by its comprehensive view. It aims at studying the phenomenon as it exists in reality. It is concerned as a precise description and expresses it in qualitative and quantitative terms. It works to gather facts and information about them and analyze them.

(Saunders et al., 2009)

- Philosophy: Positivism

- Approach to theory development: Deduction

- Methodological choice : mono method quantitative

- Strategy : survey

- Time horizon: cross-sectional

- Techniques and procedures: Data collection and data analysis.
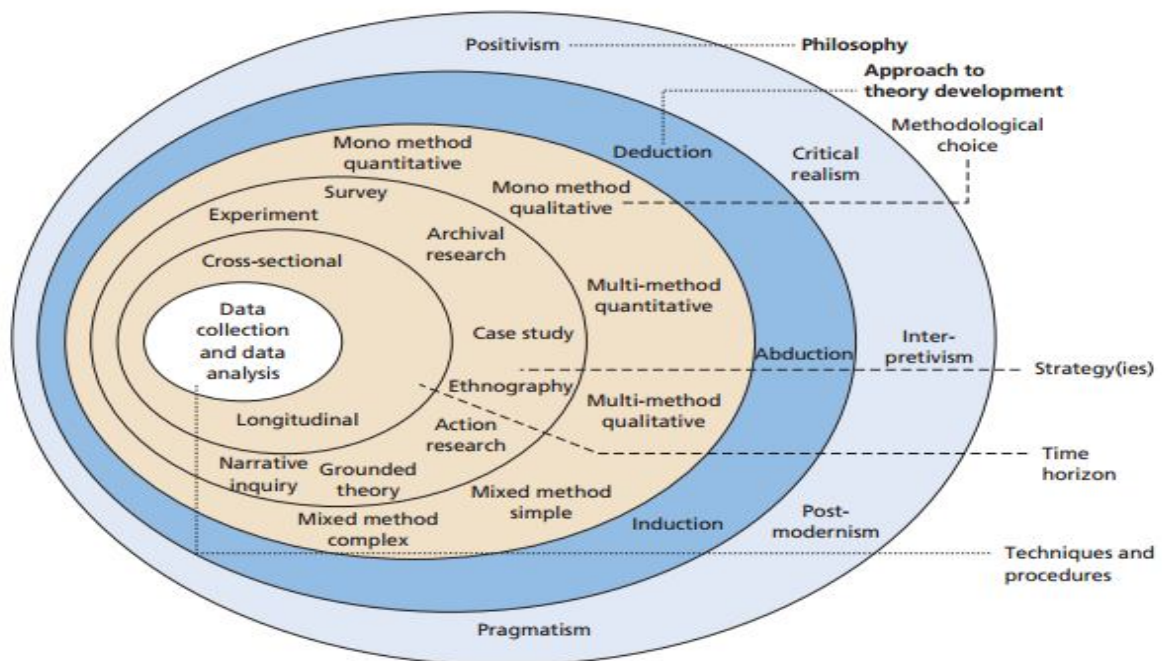
Source: Saunders et al., 2009

4.6 Population and sample of the study:

There are several reasons why service sector (medical field) was selected. It is an important and visible service of the Sudan and world economies. The medical sector is the largest service activity in the world is also one of the most complex and diverse service activities in the world. The target respondents for the survey will be the middle- level managers at the medical service level. Middle-level managers (supply chain managers, logistics managers. Procurement and Marketing, operations managers) are in the best position to answer the questions of this survey because of their experience, expertise, and access to operational and performance data would be the most appropriate to grasp the intent of the study, since the nature of the study requires knowledge about management policies, as well as detailed operational performances, the individuals in the middle-management are in the position. This study is focused on the medical field includes (private hospitals, private medical services, private service institutions). In

- 130 -

addition, the good performance of the medical sector could be a model for the other service sectors. (Ismail, et al., 1998) found that from the perspective of competitive advantage, firms are better management being big rather than small.

4.6.1 Study population:

The study population means the total population in the study area, the results later will be generalized to the whole community.

The study population include the top managers & supply chain managers in Sudanese service firms (medical field) operating in Khartoum State, and represented in the sectors (private hospitals, private medical centers and private medical services) totaling (162) medical sectors, where the method of complete enumeration was used. The study choose this sector (medical field) in service rather than other services because it's biggest and important and it's provide sensitive services to customers when it take care to be health people so the study concerned about the supply chain management as it is one of the best managerial practice in organizations.

Private hospitals	Private medical centers	Private medical services	Total
78	71	13	162

Source: special therapeutic institutions& chamber commerce

Thus, this research is carried out according to the above classification.

4.7 The Sample:

Sampling process involves selecting a sufficient number of the right elements that represent the population. (Bougie and Sekaran ,2010) Sampling techniques can be divided into two broad categories, that is, probability and non-probability sampling (Marsden and Wright,2010). Probability sampling is distinguished by the fact that each population element has a known chance of being included in the sample. In contrast to non-probability sampling, the basic principle that distinguishes

probability sampling from non probability sampling is the condition that each element in the population is given a nonzero probability of being selected into the sample (Marsden and Wright, 2010).

Lavrakas (2008 a), acknowledges that non probability sampling is useful in situations where it is difficult to define the population, or in circumstances where little or no interest exists in making inferences of sample to the population. The most familiar motivation for make use of non-probability sampling is its cost effectiveness and timeliness, that is, it is less expensive and can be implemented quicker than the probability sampling.

Non probability sampling is frequently split into three major categories:

(1) quota sampling,

(2) purposive sampling, and

(3) convenience sampling.

For the purpose of this research the researcher chose purposive sampling also known as judgment sampling or expert sampling. Purposive sampling is ideally used for small sample within a limited geographical area or when there are restrictions on population definition or at times when it is necessary to reach small but specialized group where making population inferences is not a priority.

Step1. Defining the population – the researcher has chosen the service sector (medical field) in Khartoum state the suppliers managers of the medical field as the population size because they are involved in the supply management and strategy and its implementation. The research participants of this research were senior managerial staff and Supply Chain, procurement, logistic, distribution Management practitioners, who were working in different institutions – by very nature they were suitable candidates for purposive sampling survey.

Step 2. Determining the sample frame – the sample was drawn from the published register of manufacturing companies..

Step 3. Determining the sample design – Probability and non-probability sampling. The researcher chose non probability sampling for this research because of inaccuracy of industrial companies data and major official sample surveys of businesses use convenience selection, because of severe problems in getting respondent cooperation.

Doherty, M. (1994) also it is cost effective and for its timeliness i.e. it can be implemented quicker than the probability sampling.

Step 4. Determining the appropriate sample size – factors, such as, the research objectives, the precision desired, the acceptable level of risk in determining the level of precision, the variability of the population, the costs and the time constraints and the possible size of the population were taken into consideration when determining the sample size. (Bougie and Sekaran (2010) indicated that for generalizability the sample size and the sample design must be representative of the sample. Even if the sample size is large, inappropriate sample design does not compensate to allow generalization of the population. This is also true, unless the sample size is large and satisfactory and meets the desired precision level it cannot be a useful tool for the research – i.e.

meeting the objective of the research. Therefore the study select (330) respondents based the numbers of medical field through the equation (1166/{(1943-1)(.o5).

4.8 Quantitative data collection method:

Quantitative data collection involves gathering numerical data using structured questionnaires or observation guide to collect primary data from individuals. The collected data may be a combination of beliefs, opinions, attitudes and lifestyle to general background information, such as, age, gender, education and income. Business researchers often refer to quantitative data collection as survey research. Hair et al. (2007) define the survey research methods as the research procedures used for gathering huge amount of unprocessed statistics by question and answer.

4.9 Measurements of the Variables:

There are four main types of variables are: the independent variable (supply chain integration), The dependent variable (operational performance),the mediating variable (responsiveness) and the moderating variable (technological capabilities. Measures for all dimensions of constructs were taken from the existing literature. To measure the dimensions of variables, the study used the five point Likert scale type scale ranging from strong agreement with the question to strong disagreement (Sekeran,2003).The Likert scale is designed to examine how strongly subjects agree or disagree with statements on a 5-point scale.

Moreover, the questionnaire items were adopted from different sources to suit the service firms (medical field). **Supply chain integration** was measured by using three dimensions: the items of (internal integration) are measured using four –point scales adopted from (Flynn et, al.2010). While, the supplier integration is measured using five- point scales were adopted from (Flynn et, al.2010). And customer integration is measured using five –point scales adopted from (Lii et, al.2015).

Operational performance were measured by using three dimensions: the service performance is measured using five- point scales were adopted from (Baea, 2017) ,cost performance is measured using four- point scales were adopted from (Baea, 2017) ,while quality performance is measured using five- point scales were adopted from (Nawanir et,al.2015).

Responsiveness were measured by using three dimensions,(operation responsiveness) is measured using five- point scales were adopted from (Thatee, 2007) ,(logistic responsiveness) is measured using four- point scales were adopted from (Thatee, 2007) ,(supplier network responsiveness) is measured using five-point scales were adopted from (Thatee, 2007). **Technological capabilities** are measured using five- point scales were adopted from (Agan, 2005).

4.9.1 Supply chain integration:

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

4.9.2 Internal integration measurement:

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

identified the nature of relationship, coordination and collaboration among organizational departments in this study will be four items evaluating on five-point Likert scale (where 1 = strongly disagree and 5 = strongly agree)

Table 4.3 **Internal integration** measurement items

No	Items	Source
1	Enterprise application integration among internal functions	Flynn et,al (2010)
2	Integrative inventory management	
3	Real-time searching of logistics-related operating data	
4	The utilization o f periodic interdepartmental meetings among internal functions	

4.9.3 Supplier integration measurement:

The process of cooperation between supplier and organization that facilitate sharing of information, knowledge, materials and experiences. It was measured by that reflects nature of relationship, partnership, and other relevant issues between supplier and medical institutions. This study will be five items evaluating on five-

point Likert scale (where 1 = strongly disagree and 5 = strongly agree) adapted from

Table4.4 **Supplier integration** measurement items

No	Items	Source
1	The relationship between the organization and suppliers is based on trust	Flynn et,al (2010)
2	The company engages suppliers in its various activities	
3	There are formal and informal channels of communication between suppliers and the company	
4	The company exchanges information with suppliers transparently and clearly	
5	Suppliers provide post-supply services to meet the company's requirements	

4.9.4 Customer integration measurement:

The process of building and maintaining a strong relationship and partnership with the customers. It includes sharing the knowledge, experiences, products, services, and suggestions with customers. It was measured by selected items that explores the relationship and partnership and related issues. The measurement of the this study will be five items evaluating on five-point Likert scale (where 1 = strongly disagree and 5 = strongly agree)

Table 4.5 **Customer integration** items

No	Items	Source
1	The level of communication with our major customer.	Flynn et,al
2	The frequency of period contacts with our major customer	(2010)
3	Our major customer shares Point of Sales (POS) information with us	
4	Our major customer shares demand forecast with us.	
5	Information is exchanged transparently between the organization and customers	

4.9.5 Operation process responsiveness measurement:

The ability of a firm's manufacturing system to address changes in customer demand. Operations system responsiveness includes both manufacturing and service operations.

Duclos et al. (2003) and Lummus et al. (2003) in a conceptual study, emphasize that operation responsiveness at each node of the chain is an integral component of supply chain responsiveness. As supply chain can be a channel of knowledge transfer, which influences operational performances including supply chain flexibility (Blome, et al., 2013).They further argue that in order to meet the end customer's needs, each entity in the supply chain must deliver the product or service in a timely and reliable manner. In this study will be five items evaluating on five -point Likert scale (where 1 = strongly disagree and 5 = strongly agree)

Table 4.6 **Operation process responsiveness** measurement items

No	Statement	Source
1	The enterprise operating system quickly responds to customer requirements.	Thatte (2007)
2	The enterprise operating system caters to customer requests in a timely manner.	
3	The enterprise's operating system quickly restructures mechanisms to handle changes in demand.	
4	The enterprise operating system has the ability to modify the largest number of operations.	
5	The enterprise operating system has the ability to re-equip mechanisms quickly to meet the changes requested by customers.	

4.9.6 Logistic process responsiveness measurement

The ability of a firm's outbound transportation, distribution, and warehousing system to address changes in customer demand. The responsiveness in the logistic processes is a vital component in the success of a responsive supply chain strategy (Fawcett, 1992). Logistics and distribution management includes the activities of transportation of goods from suppliers to manufacturer to distribution centers to final point of consumption (Ricker and Kalakota, 1999; Duclos et al., 2003; Lummus et al., 2003).The measurement in this study will be four items evaluating on five -point scale (where 1 = strongly disagree and 5= strongly agree)

Table 4.7 **Logistic process responsiveness** measurement items

No	Statement	Source
1	The enterprise's logistics system responds quickly to unexpected changes in customer demand	Thatte (2007)
2	In the organization, the logistics system can adjust the stock capacity quickly to meet unexpected changes in customer demand.	
3	Our logistics system has the ability to diversify transportation to meet changes in demand.	
4	Our logistics system has the ability to deliver services urgently.	

4.9.7 Supplier network responsiveness measurement:

The ability of a firm's major suppliers to address changes in the firm's demand. A key to responsiveness is the presence of responsive and flexible partners upstream and downstream of the focal firm (Christopher and Peck, 2004). Companies the world over have tried every conceivable approach to react quickly to customer demand is dependent on the reaction time of suppliers to make volume changes. The measurement of this study will be five items evaluating on five-point scale (strongly disagree 1 = and 5 = strongly agree) adapted from

Table 4.8 **Supplier network responsiveness** measurement items

No	Items	Source
1	They make our main suppliers change their mix of services in a relatively short time.	Thatte (2007)
2	Our main suppliers are constantly accommodating our requests.	
3	Major suppliers provide the logistics we need.	
4	Our main suppliers deliver on time.	
5	The main suppliers respond effectively to our emergency requests.	

4.9.8 Technological capabilities measurement:

Are knowledge-based and build on HTNFs' experiences and prior learning (Leiblein and Miller, 2003;Mayer and Nickerson, 2005).These capabilities denote a firm's "ability to produce a component according to the required specification and schedule" (Hoetker, 2005: 78). In high technology sectors, this ability is usually evident in a firm's scientific knowledge and competencies (Leiblein and Miller, 2003; Mayer and Nickerson, 2005).The measurement in this study will be five items evaluating on six -point scale (where 1 = strongly disagree and 5 = strongly agree).

Table 4.9 **Technological capabilities** measurement items

No	Items	Source
1	We have expertise in the modern technology.	Agan
2	We have the best IT infrastructure compared to our competitors.	(2005)
3	We have the ability to connect all enterprise facilities together.	
4	We have technology for software systems to connect infrastructure with our partners.	
5	The organization has information technology that provides access to our partners.	

4.9.9 Operational performance:

Group of standards and benchmarks that are adopted and used by the organizations to achieve competitive advantage, customer satisfaction, and maximum level of profitability. In this study supply chain operational performance was measured by the following dimensions:

4.9.10 Service performance measurement:

Most services are provided through facilities (Brackertz and Kenley, 2002) and it has been suggested that facility performance measurements should relate to the main business indicators for the primary task such as customer satisfaction or service delivery (Walters, 1999). As an integrated approach in managing the workplace, service is one of the key components for the facilities manager to consider in achieving the goals of the organisation. In service provision, facilities management is concerned from the major strategic decisions to very detailed decisions such as posting the signs to the ladies' toilet in restaurant (Looy, Gemmel and Dierdonck 2003). Therefore measuring service performance is crucial to the facilities manager. in this study will use five items evaluating on five-point Likert scale (where 1 = strongly disagree and 5 = strongly agree) .

Table 4.11 **Service performance** measurement items

No	Items	Source
1	Our organization has a high degree of flexibility in cooperating with partners.	Baea (2017)
2	We provide all special services to customers.	
3	In the organization, the customer receives the services in a timely manner.	
4	The ability of the organization to provide customers with services value added.	
5	We cooperate in the organization to overcome any problems with partners.	

4.9.11 Quality performance measurement

Juran and Godfery (1998) defined quality as "those features of products which meets customer needs and thereby provide customer satisfaction". In this study

quality defined as the degree to which supply chain integration meets customer needs and demands. It was measured by items embodied the concept of quality. In this study will use four items evaluating on five-point Likert scale (where 1 = strongly disagree and 5 = strongly agree).

Table 4.12 **Quality performance** measurement items

No	Items	Source
1	We have high quality of services compared to our competitors.	Tamimi
2	We are continually working to provide quality services.	(2015)
3	We employ our experience in service delivery.	
4	In the organization we employ our knowledge in providing the service.	

3.9.12 Cost performance measurement

The total costs and expenses that are incurred by completing all/ and or specific activities and operations within supply chain. It was measured by selected items no.49-56 (Appendix 5) that reflects the total incurred costs and expenses quickness (degree of responsiveness) in this study will use five items evaluating on five-point Likert scale (where 1 = strongly disagree and 5= strongly agree).

Table 4.13 **Cost performance** measurement items

No	Items	Source
1	Our service costs are lower compared to competitors.	Baea
2	We manage inventory in a way that helps to reduce costs.	(2017)
3	Our policy is to balance the costs of acquiring and maintaining inventory.	
4	We maintain the quality of our services at the lowest cost.	
5	Our service costs are lower compared to competitors.	

4.10 Designing and developing questionnaire: :
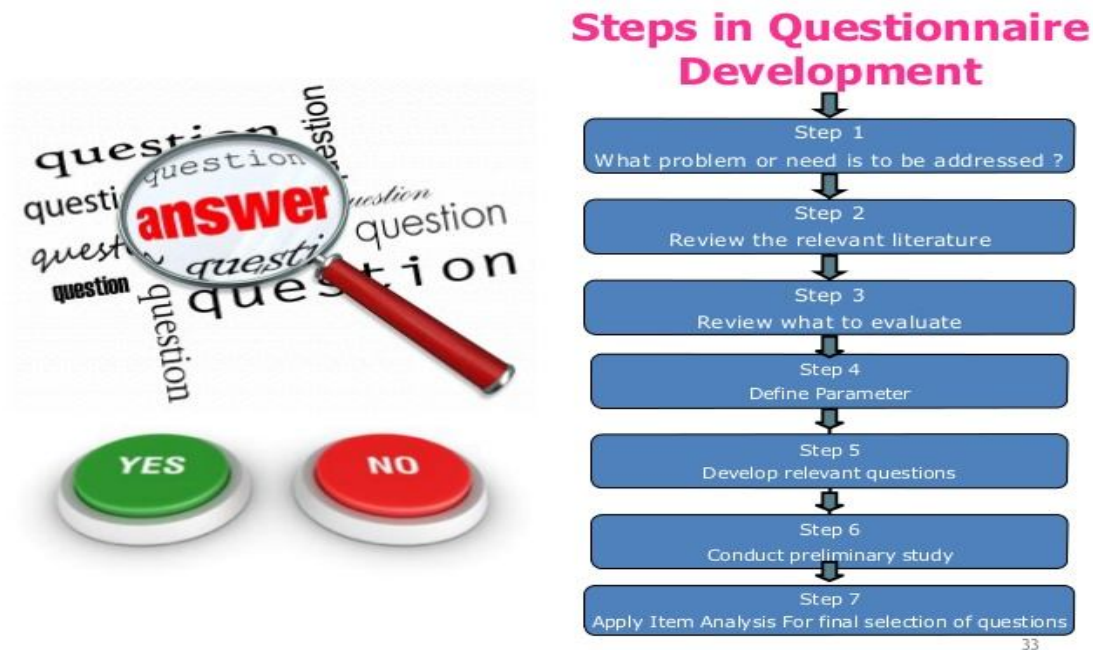
According to Tharenou et al., (2007 p164) a well-constructed and applied questionnaire should be able to gather data to enable the measurement of the relationship between variables. Three fundamental considerations need to be taken into account to have a properly designed and applied questionnaire.

First, it should be clear what the scale (questionnaire) should measure. **Secondly**, the designing of the measuring instrument should be informed by the application of a theoretical basis to develop the items. **Finally**, the designed questionnaire should measure the developed model's criteria as the mechanism for eliciting respondents' views, beliefs and attitudes Maylor and Blackmon, (2005) said that survey is useful technique to capture the truth, opinions, behavior**s** from the respondents. There are various types of survey methods as follow:

Step 1: there are two main streams of questionnaire: self administrated and interviewer administrated the main different between two methods is the

involvement of an interviewer. In the self administrated way the questionnaire is to be completed by the perspective respondent intervene from the interviewer.

Usually in the cases the interviewer-administrated is regarded as one of most common techniques usually is used in all types of business studies (mayor and Blackmon.2005).

This method enable researchers to get more freedom and flexibility to collect more data and information (Bryman and Bell, 2007). Although, this method consumes time and cost an effort but it ensure the accuracy truth .The measurement questions (items), which were essential for the study, were based on a five point Likert-Scale This study questionnaire will contain six divisions as follow:

1) Respondent data

2) Company profile

3) Supply chain integration

4) Responsiveness

5) Operational performance

6) Technological capabilities

Step 2: Formatting questionnaire

This step involve the conversion of the research objectives into information required to obtain the necessary output of the questionnaire, it involves formatting the clearly statements. All the research questions in this study had been converted into the relevant questions and clearly stated. Most of the respondents were familiar with Arabic language. Therefore, the instrument required translation to Arabic language and then to English language again.

The study questionnaires distributed to manufacturers. The English version was first developed and then translated into Arabic, and then back-translated into English. The back-translated English version was further checked against the

original English version. Some questions were reworded accordingly to improve the accuracy of the translation.

Some final refinement of the questionnaire was made based on their feedback.

Step 3: question warding

This step examines whether the questions are clearly understand to all respondents. Thus, it is necessary to use simple terminologies to avoid unclear or elusiveness in the meaning. It is important to avoid double –barreled or misleading and confusing question beside the phrasing and length of question, it is also designed to solicit idea and answers from target respondents. Sample statement was used so that the questionnaire could be easily understood. Answering the questionnaire was estimated to take approximately ten to fifteen minutes

Step 4: Sequence and layout Designs:

This step concerns the sequence and flow of the statements for achieving the respondent's cooperation. The instrument should start with easy question flow containing from general to specific question. The sensitive or difficult question must be avoided or not placed at the beginning. Moreover, an attractive layout of the questionnaire is considered for clarity of the items presented.

Step 5: Pre-testing and correcting problems:

An obvious prerequisite for properly carried out survey research is that the respondents must understand and interpret the questionnaire in the same way as the researcher. Even if the researcher has a perfect understanding of the content and knows exactly how it should be analysed, the answers can be useless if the respondents interpret the questions in a different manner. To avoid this, the questionnaire was tested on senior colleagues at the logistics division.

This step involves conducting a pilot test on the questionnaire to ensure that the questions meet the researcher's expectations with no ambiguities, appropriateness in the length of the questions, and clearing the double-barreled questions. The

objective of the pilot test is to eliminate confusing statements and checking the reliability of the variables. Therefore, to determine reliability, the Cronbach's (1951) coefficient alpha will be used to separately assess the reliability of the scales adopted in this study.

4.11 Validation Tools:

Means the ability of the questionnaire to measure the variables that were designed in the study framework.(20) Arbitrators with expertise and experience in business administration field, research methodology and supply chain management specialization verdict the questionnaire with a view to verifying their validity.

4.12 The pilot:

Above all these colleagues looked for important questions that were not in the questionnaire and for readability, i.e. how difficult/easy it was to understand the questions. Thereafter the questionnaire was further developed using their opinions. As a final step before sending the questionnaire, three managers at Sudanese manufacturing firms (which is the chosen population for the study) were contacted as a final test.

These people were asked for their opinions on the readability of the questions and how

possible it would be to answer them.

4.13 Pre-Testing of the Questionnaire:

The researcher used pre- testing for the questionnaire in order to ensure that the questions are understood by the respondents with no ambiguities, This study used Cronbach's alpha as diagnostic tool to assess the degree of internal consistency between multiple measurements of variables. (Hair et al, 2010) stated that the lower limit for Cronbach's alpha is 0.70.

A sample of 50 questionnaires was distributed to verify the validity and accuracy of the questionnaire and 47 questionnaires were obtained for managers and supply

chain managers then divided the supply of (medical field) to medical supply and managerial supply was selected randomly, and checking the reliability of the all variables, the research found that all variable is above than, 70 which means the reliability of the variables, 47 medical supplier, managerial supplier, in selected services institutions (medical sector) working in Khartoum state were agreed to answer the questionnaire as pre-test sample.

The answers to the questions given by the 47 respondents then were used to pre-test the questionnaire for reliability of the measures. Since the questionnaire of this study is contain many items and sophisticated, this number of respondents is sufficient for pretest of the questionnaire for reliability (Aaker et al., 2007). Consequently, Cronbach"s Alpha coefficient values were calculated for each of the variables of the study because is an adequate test of internal consistency reliability (Sekaran, 2003).

Variables	Dimensions	Number of items	Cronbach's alpha
Supply chain integration	Internal integration	4	**.711**
	Supplier integration	5	**.716**
	Customer integration	5	**.879**
Operational performance	Service performance	5	**.816**
	Quality performance	4	**.810**
	Cost performance	4	**.732**
Responsiveness	Operation process responsiveness	5	**.850**
	Logistic process responsiveness	4	**.842**
	Supply network responsiveness	5	**.835**
Technological capabilities	Technological capabilities	5	**.900**

Reliability Test for the pilot sample:

Variables Cronbach's alpha

4.14. Survey Administration:

Personal questionnaire is the best way to collect data. The major advantage is that, can collect all the completed responses within a short period of time. Administration questionnaire to large numbers of individuals simultaneously is less expensive and less time consuming interview. The cover letter will attach to the first part of the questionnaire which explains the objective of the study and ensured the confidentiality of the information a total of (290) personal questionnaires will distribute to respondents

4.15 Data Analysis Techniques:

In the statistical analysis process, the study will rely on the statistical packages (v25 SPSS) and AMOSv25 for data analysis. In order to test the quality of the measurements, the alpha-cronbach coefficient is used. It is one of the most common tests to measure the consistency between the components of the scale and use of exploratory analysis to detect factors that describe variables and differences between the expressions that measure each variable, as well as the empirical analysis to test hypotheses related to the existence or absence of a relationship between the variables and the underlying factors. The measurement of mean and standard deviations will be used to determine the homogeneity between the responses of the sample to all expressions of variables, and correlation analysis in order to identify the nature of the correlation between the variables. The hypothesis of the study will be based on the method of modeling structural equation. In a broader sense, structural equation models represent a series of supposed cause-and-effect relations between a set of variables, namely the use of path analysis, Lube has several advantages, commensurate with the nature of the study. To analyze the data and test the hypotheses, several statistical tools were used. Statistical Package

for Social Science (SPSS) AMOS Version 23 was used with the following techniques:

4.15.1. **Exploratory Factor analysis** EFA, "one seeks to describe and summarize data by grouping together variables that are correlated The purpose of performing an EFA on the SCI measurement items is to determine if SCI is indeed made up of eight factors or if there is a more parsimonious way of establishing SCI EFA will use traditional correlation-matrix derived statistics to find the underlying structure As described in the previous section, factors form around correlated data. To measure the degree of intercorrelation between the data, two statistical techniques—Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA)—were applied to the correlation matrix of the data.

4.15.2 Confirmatory factor analysis: is concerned with the extent to which the observed variables are generated by the underlying latent constructs, and thus the strengths of the regressionpaths from the latent variables to the observed variables are of primary interestCFA will use SEM-based methods to confirm the nature of the factors found. Additionally, CFA "is a much more sophisticated technique used in the advanced stages of the research process to test a theory about latent processes" and will allow for the testing of the hypotheses (Tabachnick and Fidell, 2007) The CFA will begin with an examination of the unidimensionality the components of the model. Once unidimensionality is established, the reliability of each factor will be tested using Cronbach's alpha as its criteria. Reliability will be further tested through construct reliability (CR).

4.15.3. **Cronbach alpha** (1951) alpha which is the most commonly used technique. For the technique using Cronbach's alpha, generally scales achieving an alpha score over 0.7 are considered reliable to measure the internal consistency.

4.15.4. **Descriptive statistics** was used to describe the respondent's characteristics.

4.15.5. Person correlation was used to see the degree of correlation between the variables.

4.15.6. **Multiple Liner Regression** was used to test the hypothesis.

4.15.7 Structural Equation Modeling SEM is a statistical methodology that takes a confirmatory approach to the analysis of a structural theory (Byrne 2001). Although SEM does not refer to a single statistical technique and has a variety of functions, this primarily enables a researcher to examine a complex model that comprises multiple causal relationships incorporating both unobserved and observed variables. Hair *et al.* (2010) demonstrate that the main characteristics of SEM are that it is able (1) to estimate the multiple and interrelated dependence relationships and (2) to represent unobserved concepts which are termed as constructs, latent variables and factors, in these relationships, and (3) to account for measurement error in the estimation process.

4.16 Summary of the Chapter:

The present chapter contained the research design, philosophy, methodology
 (cross sectional) of the study, The population of the study was the large Sudanese manufacturing companies. The measurement of the variables was adopted from previous studies used measurements. The data mainly gathered by questionnaire sent to supply chain, logistic procure, warehouse, marketing general manager, or director, or CEOS. The data were analyzed BY using a numbers of statistical techniques ,Factor analysis, descriptive ,Reliability, SEM, Path analysis.

The next chapter presents the research findings

CHAPTER V

DATA ANALYSIS AND FINDINGS

Chapter V
Data Analysis and Findings

5.0 Chapter Overview:

This chapter presents the findings of the data analysis; it is presented in three sections. The first section presents the process followed for measurement and validation of various constructs. Started by describe the descriptive statistics of the sample data then respondent's demographic information, section two The measurement and validation process of constructs, section three the results of the path analysis and hypotheses testing.

5.1 Descriptive Statistics:

As far as measurement and validation of research instrument is concerned, before evaluating the psychometric properties of various constructs, it become necessary to describe and understand the descriptive statistics of the sample data. Descriptive statistics examines the accuracy of the data entry process; measures the variability of responses and reveals the spread of data points across the sides of the distribution. The understanding of descriptive statistics helps in the interpretation and generalization of research result.

First making data cleaning that deals with detecting and removing errors and inconsistencies from data in order to improve the quality of data. And dealing with missing data that is common and always expected in the process of collecting and entering data due to lack of concentration and/or the misunderstanding among respondents, and missing information or other invalid data during the entry of data. Missing data can cause several problems. The most apparent problem is that there simply won't be enough data points to run the analysis and particularly in structural equation model (SEM). And dealing with Unengaged responses that means some responses giving same answer for all the questionnaire it seems to be random answers, in this case we use standard deviation to find out any unengaged response

this means that any standard deviation of responses less than 0.7 when Likert's five-point scale is used just deleted. Therefore, we removed (23) questionnaire not received form a response finally dealing Outliers it's very important to check outliers in the dataset. Outliers can influence the results of analysis. If there is a really high sample size, this will need to remove the outliers wanted. If the analysis running with a smaller dataset, you may want to be less liberal about deleting records. However, outliers will influence smaller datasets more than largest ones. However, in this dataset outliers were checked outliers but not making any change because it is seemed logic. There were no any outliers on dataset everything in dataset is logic. Skewness & Kurtosis We observed fairly normal distribution for our indicator of latent factor, and for all other variables (e.g..Gender etc.) in terms of Skewness , However ,we observed mild kurtosis for our variable these kurtosis values ranged   benign to 3. While this does violate strict rules of normality, it is within more relaxed rules suggested by Sposito (1983) who recommend 3.3 as the upper threshold for normality. The assessment of descriptive statistics (B1) reveals that all the variables fall within the predefined the important values.

5.2. Data Cleaning:

Data cleaning deals with detecting and removing errors and inconsistencies from data in order to improve the quality of data. The need for data cleaning is cantered on improving the quality of data to make them" fit for use" by users through reducing errors in the data and improving their documentation and presentation (Chapman, 2005). Data quality problems are present in single data collections due to misspellings during data entry, missing information or other invalid data. When multiple data sources need to be integrated, or analysis programs need to be used, the need for data cleaning increases significantly. Thus in this study data cleaning is used to manipulates missing data, unengaged responses, and outliers

5.3. Missing Data:

Missing data is common and always expected in the process of collecting and entering data due to lack of concentration and/or the misunderstanding among respondents, and missing information or other invalid data during the entry of data. Missing data can cause several problems. The most apparent problem is that there simply won't be enough data points to run the analysis and particularly in **Structural Equation Model** (SEM).

Both exploratory and confirmatory factor analysis and path models require a certain number of data points in order to compute estimates. Additionally, missing data might represent bias issues. Some people may not have answered particular questions in survey because of some common issue, If missing data is more than 10% of the responses on a particular variable, or from a particular respondent, that variable or respondent may cause some challenge related to the data. In this study the proportion of missing data is lower than 10% therefore there no need to remove any of responses.

5.4Unengagedresponse:

Unengaged responses means some responses giving same answer for all the questionnaire it seems to be random answers , in this case we use standard deviation to find out any unengaged response this means that any standard deviation of responses less than 0.5 when Likert's five point scale is used just deleted.

5.5 Outliers:

It's very important to check outliers in the dataset. Outliers can influence the results of analysis. If there is a high sample size, the need for removing the outliers is wanted, if the analysis running with a smaller dataset, you may want to be less liberal about deleting records. However, outliers will influence smaller datasets more than largest ones. However, in this dataset outliers were checked.
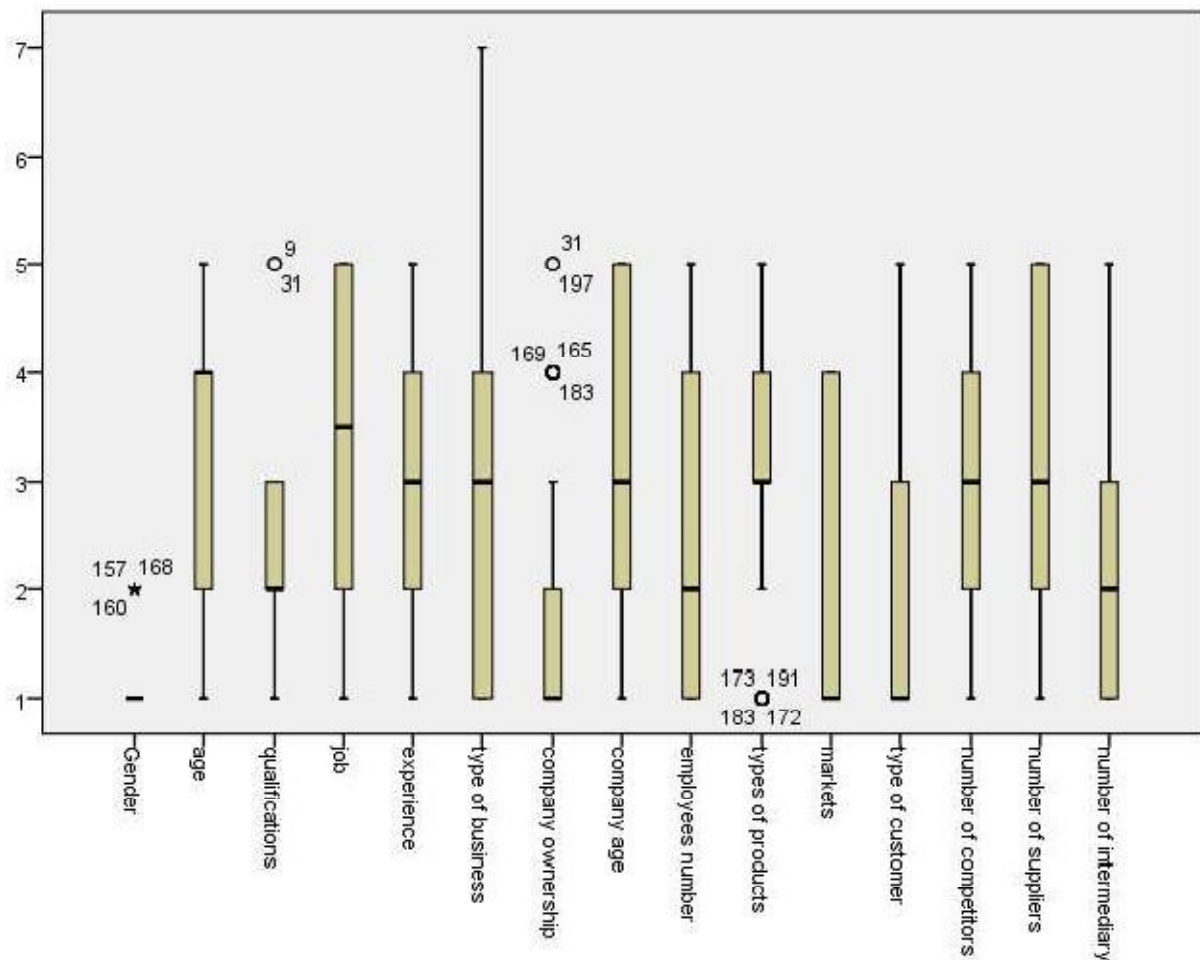
5.6 Variable Screening

5.6.1.Missing data in columns:

Some missing values were observed in the following variables but the biggest value in (value3) is missing (3). Therefor median value was used for respondent to impute the missing value.

5.6.2 Skewness & Kurtosis

Low levels of skewness and kurtosis indicated data normality. All items showed skewness and kurtosis close to |3| or less(Boomsma and Hoogland, 2001),. However ,the observed kurtosis of the study variables values ranged from 3. While

this violate strict rules of normality ,it is within more normal rules suggested by Sposito (1983) who recommend 3.3 as the upper threshold for normality.

5.7 Response rate:

It was well known that most of the **services institutions** located in three towns represent the capital of the country (Khartoum, Bahri, and Omdurman) therefore; the population of this study was the **medical services institutions** in these areas. The researcher employed convenient sample where self-administrated survey was used to distribute 330 questionnaires to the **medical services institutions** across the three towns, given to mangers were asked to fill the questionnaire, the overall response rate was 307 this was considered as high rate due to questionnaires given one by one to respondents and in researches used a self–administrated survey (Sekaran, 2003). Those who didn't responded to fill the questionnaire some were mentioned that they were not authorized to fill the questionnaires while others were not transparent in their justifications. Below is Table (5.2) to shows the summary of questionnaire response rate.

Table (5.2) Response rate of questionnaire:

Total distributed questionnaires	*330*
Total questionnaires received from respondents	*307*
Valid questionnaires received from respondents	*0*
Invalid questionnaires	*0*
Questionnaires not received	*23*
Overall response rate	*307*
Useable response rate	*307*

Source: prepared by researcher from data (2018)

5.8 profile of the responded firms and respondents:

Based on the descriptive statistics using the frequency analysis this part investigates the profiles of institutions that participated in the survey on the light of seven characteristics, these are the nature of work firm number of employees, age of the firm, the nature of the firm (commercial or service), the firm ownership, the firm number of competitors ,the firm experience and finally the suppliers number. The Spss output presented shows that (42.3%) of the responded institutions were private hospitals, where (36.2%) were private centers,and (21.5%) were medical services, the nature of organization classified to (62.5%) as services institutions, (30.9) were commercial institutions and (6.5%) were other institutions in terms of institutions number of employees almost (42.0%) of responded institutions are small institutions with less than 50 employee ,the medium one were (23.5%) with 50 less than 100 ,while the large one with more than 200 employees are (18.9%). The responded firm's number of employees ranged 50 less than 100 were (23.5%), where others ranged 101-150 is (11.1%).

Concerning the firm experience of the firms almost half of responded firms are well established institutions (24.4%) with 5 less than 10 years, where the newly established firms are (23.1%) with less than 5 years, from 10 less than 15 are (18.9%), from 15 less than 20 are (14.0%), while others ranged over 20 are (19.5%). The majority of responded firms are company owned by (54.4%), private owned by (38.1%), contribute owned by (4.2%). The other owned among the responded institutions were (3.3) to some extend high because (36.8) has more than 20 competitors, while (20.2%) of the respondents has 5 less than 10, also less than 5 (20.5%) competitors, while (14.3%) of the competitors has 10 less than 15, and beside (8.1%) of the institutions has 15 less than 20 competitors there was only institutions represents few competitors.according to the control variables there were high percentage to over 20 suppliers (40.4%) while less than 5 suppliers and

5 less than 10 were the same (17.6%), 10 less than 15 were (14.3%) and the lowest percentage to 15 less than 20 suppliers.

Frequency Table:

Demographic variables:

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Male**	189	61.6%	61.6%	61.6%
	Female	118	38.4%	38.4%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**25-35**	187	60.9%	60.9%	60.9%
	36-45	78	25.4%	25.4%	86.3%
	46-55	29	9.4%	9.4%	95.8%
	56 and over than	13	4.2%	4.2%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Qualification					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	**Under graduate**	22	7.2%	7.2%	7.2%
	Graduate	193	62.9%	62.9%	70.0%
	Post graduate	92	30.0%	30.0%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Job type					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	**Manager**	27	8.8%	8.8%	8.8%
	Sub manager	39	12.7%	12.7%	21.5%
	Managerial manager	111	36.2%	36.2%	57.7%
	Medical manager	130	42.3%	42.3%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Experience years					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	**5 years or less than**	108	35.2%	35.2%	35.2%
	5 & less than 10	112	36.5%	36.5%	71.7%
	10 & less than 15	43	14.0%	14.0%	85.7%
	15 & over than	44	14.3%	14.3%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Specialization					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	**Management**	125	40.7%	40.7%	40.7%
	Accounting	22	7.2%	7.2%	47.9%
	Economic	6	2.0%	2.0%	49.8%
	Medical science	131	42.7%	42.7%	92.5%
	Other	23	7.5%	7.5%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Based on demographic variables shows the respondent's profile, the table reveals that (61.6%) of the suppliers managers are males where (38.4%) are females. With regard respondents ages (60.9%) are in middle age 25- 35years, (25.4%) their age range is 36- 45 years, while the rest are between 46-55 years (9.4%), the respondents age (4.2%) their age range is 56 and over than years. Regarding the respondent academic qualification, the data shows that small number of the respondents (7.2%) is holding under graduate, where most of them are graduated

as highest level of education (62.9%). Regarding of job title respondents (8.8%) manager, (12.7%) sub manager, (36.2%) managerial manager and (42.3%) medical managers. In terms of respondents experience the date indicates that few (14.0%) of the manager have less than 10-15, compared to a great deal (36.5%) of the respondent have 5 and less than 10 years experience in the firm,(35.2%) of the managers have less than 5 experience,(14.3%) of respondent 15 and over of manager experience. This means that the well-experienced personnel in the institutions answered questionnaires.

Control Variables:

Organization type					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private hospitals	130	42.3%	42.3%	42.3%
	Private center	111	36.2%	36.2%	78.5%
	Medical services	66	21.5%	21.5%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Nature of organization					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Commercial	95	30.9%	30.9%	30.9%
	Services	192	62.5%	62.5%	93.5%
	Other	20	6.5%	6.5%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Employees No		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 50	129	42.0%	42.0%	42.0%
	50 & less than 100 employees	72	23.5%	23.5%	65.5%
	100 & less than 150 employees	34	11.1%	11.1%	76.5%
	150 & less than 200 employees	14	4.6%	4.6%	81.1%
	200 & over than	58	18.9%	18.9%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Competitors No		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5	63	20.5%	20.5%	20.5%
	5 & less than 10	62	20.2%	20.2%	40.7%
	10 & less than 15	44	14.3%	14.3%	55.0%
	15 & less than 20	25	8.1%	8.1%	63.2%
	20 & Over than	113	36.8%	36.8	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Institution Ownership				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private institution	117	38.1%	38.1%	38.1%
	Company institution	167	54.4%	54.4%	92.5%
	Contribute institution	13	4.2%	4.2%	96.7%
	Other	10	3.3%	3.3%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Experience Years				
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5	71	23.1%	23.1%	23.1%
	5 & Less than 10	75	24.4%	24.4%	47.6%
	10 & Less than 15	58	18.9%	18.9%	66.4%
	15 & Less than 20	43	14.0%	14.0%	80.5%
	20 & Over than	60	19.5%	19.5%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Supplier No					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	**Less than 5**	54	17.6%	17.6%	17.6%
	5 & Less than 10	54	17.6%	17.6%	35.2%
	10 & Less than 15	44	14.3%	14.3%	49.5%
	15 & Less than 20	31	10.1%	10.1%	59.6%
	20 & Over than	124	40.4%	40.4%	100.0
	Total	307	100.0	100.0	

Source: prepared By Researcher from data (2018)

Based on the descriptive statistics using the frequency analysis this part investigates the profiles of institutions that participated in the survey on the light of seven characteristics, these are the nature of work firm number of employees, age of the firm, the nature of the firm (commercial or service), the firm ownership, the firm number of competitors ,the firm experience and finally the suppliers number. The Spss output presented shows that (42.3%) of the responded institutions were private hospitals, where (36.2%) were private centers,and (21.5%) were medical services, the nature of organization classified to (62.5%) as services institutions, (30.9) were commercial institutions and (6.5%) were other institutions in terms of institutions   number of employees almost (42.0%) of responded institutions are small institutions with less than 50 employee ,the medium one were (23.5%) with 50 less than 100 ,while the large one with more than 200 employees are (18.9%).

The responded firm's number of employees ranged 50 less than 100 were (23.5%), where others ranged 101-150 is (11.1%).

Concerning the firm experience of the firms almost half of responded firms are well established institutions (24.4%) with 5 less than 10 years, where the newly established firms are (23.1%) with less than 5 years, from 10 less than 15 are (18.9%), from 15 less than 20 are (14.0%), while others ranged over 20 are (19.5%). The majority of responded firms are company owned by (54.4%), private owned by (38.1%), contribute owned by (4.2%). The other owned among the responded institutions were (3.3) to some extend high because (36.8) has more than 20 competitors, while (20.2%) of the respondents has 5 less than 10, also less than 5 (20.5%) competitors, while (14.3%) of the competitors has 10 less than 15, and beside (8.1%) of the institutions has 15 less than 20 competitors there was only institutions represents few competitors.according to the control variables there were high percentage to over 20 suppliers (40.4%) while less than 5 suppliers and 5 less than 10 were the same (17.6%), 10 less than 15 were (14.3%) and the lowest percentage to 15 less than 20 suppliers.

5 . 9Goodness of measures:

This section, reports the results of validity and reliability tests as a means to assess the goodness of measure in this study constructs (Sekaran, 2003). The study used **Exploratory Factor Analysis** (EFA). The following are the detailed information of each.

5.9.1 Exploratory factor analysis for all variables:

Exploratory Factor Analysis (EFA) is a statistical approach for determining the correlation among the variables in a dataset. This type of analysis provides a factor structure (a grouping of variables based on strong correlations). In general, an (EFA) prepares the variables to be used for cleaner **Structural Equation Modeling** (SEM). This means the (EFA) will be able to spot problematic variables

much more easily than the (CFA). Therefore, this study used **Exploratory Factor Analysis** for testing the validity and uni-dimensionality of measures to all variables under study, followed the assumptions recommended by (Lowry & Gaskin, 2014) as follow:

(*There must be a clean pattern matrix then Adequacy and Convergent validity and Discriminate validity and finally Reliability*).

Using maximum Likelihood as method, the summary of results was showed in Table (5.5) and the SPSS output attached in appendix B3. As shown in Table (5.5) below all the remaining items has more than recommended value of at least 0. 5 in measure of sample adequacy (MSA) with (KMO) (above the recommended minimum level of 0.60), and Bartlett's test of Sphericity is significant (p<.01). Thus, the items are appropriate for factor analysis.

5.9.2 Convergent validity:

Convergent Validity means that the variables within a single factor are highly correlated. This is evident by the factor loadings. **Sufficient/significant loadings** depend on the sample size of dataset.

Table (4.1) EFA for all variables:

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.								.889	
Bartlett's Test of Sphericity	Approx. Chi-Square							4959.881	
	Df							528	
	Sig.							.000	
Enterprise application integration among internal functions								.672	
Integrative inventory management								.547	
Real-time searching of logistics-related operating data								.694	

The utilization of periodic interdepartmental meetings among internal functions.							.705	
The level of communication with our major customer.								.808
The frequency of period contacts with our major customer								.711
The enterprise operating system quickly responds to customer requirements.	.751							
The enterprise operating system caters to customer requests in a timely manner.	.603							
The enterprise's operating system quickly restructures mechanisms to handle changes in demand.	.711							
The enterprise operating system has the ability to modify the largest number of operations.	.835							
The enterprise operating system has the ability to re-equip mechanisms quickly to meet the changes requested by customers.	.632							
The enterprise's logistics system responds quickly to unexpected changes in customer demand					.753			
In the organization, the logistics system can adjust the stock capacity quickly to meet unexpected changes in customer demand.					.758			
Our logistics system has the ability to diversify transportation to meet changes in demand.					.684			

Our logistics system has the ability to deliver services urgently.					.585			
They make our main suppliers change their mix of services in a relatively short time.			.526					
Our main suppliers are constantly accommodating our requests.			.817					
Major suppliers provide the logistics we need.			.801					
Our main suppliers deliver on time.			.770					
The main suppliers respond effectively to our emergency requests.			.772					
We have expertise in the modern technology.	.876							
We have the best IT infrastructure compared to our competitors.	.833							
We have the ability to connect all enterprise facilities together.	.880							
We have technology for software systems to connect infrastructure with our partners.	.832							
The organization has information technology that provides access to our partners.	.793							
We manage inventory in a way that helps to reduce costs.					.851			
Our policy is to balance the costs of acquiring and maintaining inventory.					.796			
We maintain the quality of our services at the lowest cost.					.769			

Statement								
Our organization has a high degree of flexibility in cooperating with partners.				.727				
We provide all special services to customers.				.704				
In the organization, the customer receives the services in a timely manner.				.732				
The ability of the organization to provide customers with services value added.				.633				
We cooperate in the organization to overcome any problems with partners.				.671				

Source: prepared By Researcher from data (2018)

Variables loaded significantly on factor with Coefficient of at least 0.5, * Items deleted due to high cross loading.

5.9.3 Discriminate validity:

Discriminate Validity refers to the extent to which factors are distinct and uncorrelated. The rule is that variables should relate more strongly to their own factor than to another factor. Two primary methods exist for determining discriminate validity during an (EFA). The first method is to examine the rotated component matrix instate of pattern matrix when principle component used. Variables should load significantly only on one factor. If cross loading do exist (variable loads on multiple factors) then the cross loading should differ by more than 0.2. The second method is to examine the factor correlation matrix. The correlation between factors should not exceed 0.7. The following Table (5.8) shows the discriminate validity.

Table () Discriminate validity of all variables in data set.

Component	1	2	3	4	5	6	7	8
1	1.000							
2	.350	1.000						
3	.356	.438	1.000					
4	.355	.382	.303	1.000				
5	.307	.440	.459	.395	1.000			
6	.347	.368	.310	.413	.279	1.000		
7	.306	.349	.237	.350	.285	.286	1.000	
8	.038	.203	.174	.193	.180	.115	.141	1.000
Extraction Method: Principal Component Analysis.								
Rotation Method: Promax with Kaiser Normalization.								

Source: prepared By Researcher from data (2018)

5.10 Reliability Analysis:

Reliability is a one of the basic psychometric requirement of scale validity. Reliability is concerned with the ability of an instrument to produce similar result, time and again under the assumption that group of respondents and prevailing conditions remain same. It reflects the degree to which an instrument is free from random error and consistently measures the underlying construct with reasonable accuracy (Churchill, 1979; Leedy and Ormrod, 2001; Yang et al., 2007; Hair at al. 2008). Internal consistency is an important aspect of reliability. It describes the extent to which the different scale items of a same construct correlate with one another. A higher degree of internal consistency, not only proves the convergence of scale items towards the common definition of underlying construct but it also affirms the claim that amount of variance captured by a scale is significantly higher

to the amount of error variances i.e. random error in a scale. Random error is assessed by squaring the inter-item correlation and subtracting the same from 1.00. As the estimate of reliability increases, the fraction of a test score that can be attributed to random error decreases.

5.11 Cronbach Alpha is one of the most popular methods for assessing internal consistency (Churchill, 1979; Peter, 1981). Closer the cronbach's alpha to 1, higher the internal consistency. In general, the reliabilities less than 0.70 indicates a poor estimate of observed variance i.e. amount of error variance in the test score is relatively higher to the observed variance. In context of the present study, reliability of the various constructs has been assessed through cronbach's alpha.

The value of cronbach's alpha for all the constructs (Table …..) are above the threshold limit of 0.60.

Table 4.8 Cronbach's Alpha for Study Variables

Construct	Variable	Number of items	Cronbach's alpha
Supply chain integration	Internal	4	.638
	Customer	2	.715
Responsiveness	Operating	5	.852
	Logistic	4	.821
	Network	5	.826
Operational performance	Cost	3	.761
	Services	5	.771
Technological capabilities	Technological	5	.924

Source: prepared By Researcher from data (2018)

- 171 -

5.12 Validity

The **validity** of the various constructs of interest has been examined by employing Campbell and Fiske criteria of validity. Campbell and Fiske (1959) proposed two aspects of construct validity: convergent and divergent validity. Convergent validity is the degree to which multiple attempts to measure the same concept are in agreement. Whereas, discriminate or divergent validity examines the extent to which the group of items representing a specific construct- differentiates that construct from another set of items - representing some other distinct construct (Bagozzi et al., 1991).

The convergent validity has often been assessed by looking at the **Standardized Factor Loadings** (SFL), **Average Variance Extracted** (AVE) and **Composite Reliability** (CR). SFL reflect the amount of explained variance by an indicator in accordance to the underlying construct (Hair et al., 2008; Markus, 2012; Byrne, 2013). Loading of .5 or more confirm the convergence of scale item i.e. the indicator is strongly related with its associated construct (Bagozzi et al., 1991; Hair et al., 2008; Byrne, 2013). AVE provides the summary of overall convergence of a scale and reflects the average communality (Fornell and Larker, 1981) i.e. the variance captured by an instrument through all its items. An AVE of less than .5 indicates that, on average, more error (i.e. systematic error) remains in measure than variance explained by the latent factor structure (Hair et al., 2008), whereas a score of more than .5 affirms the higher amount of explained variance. CR indicates the internal consistency of the instrument. Any value of .70 or higher affirms high degree of internal consistency between different scale items.

Divergent validity tests whether the concepts that are supposed to be unrelated are, in fact, unrelated. It is generally examined through the comparison of the AVE score with the squared correlations of respective constructs. A lower index of shared variance (squared correlation) between each pair of constructs against the

minimum of the AVEs of both of the concerned constructs affirms the divergent validity of the underlying constructs (Fornell and Larker, 1981). The logic here is based on the idea that if two or more concepts are unique, then valid measures of each should not correlate too highly (Bagozzi et al., 1991).

In context of present study, the convergent and divergent validity of different constructs have been examined during the validation of measurement models. **Confirmatory Factor Analysis** (CFA) has been utilized to estimate measurement adequacy (Hair et al., 1998). In the context of the scale development and validation, recent literature (e.g. Rentz et al., 2002) affirms the superiority of CFA over **Exploratory Factor Analysis**. To assess the fit between theory and reality, CFA rather concentrating on a single index, often rely upon numerous fit indices like: Normed Chi-square index, **Goodness-of-fit index** (GFI), **Adjusted goodness-of-fit index** (AGFI), Root mean square residual (RMR) and Root mean square error of approximation (RMSEA) – as indicators of absolute fit indices (Hu and Bentler, 1995; MacCallum et al., 1996; Steiger, 2007); **Comparative Fit Index** (CFI), **Tucker-Lewis index** (TLI), and **Normed fit index (NFI)** – as indicators of incremental fit indices (Bentler and Bonnet, 1980; Mulaik et al, 1989; Bentler, 1990; Hu and Bentler, 1995; Kline, 2005; Tabachnick and Fidell, 2007); **Parsimony goodness-of-fit index** (PGFI) and **Parsimony Normed fit index** (PNFI) – as indicators of parsimony fit indices. In contrast, these fit statistics are generally not available in standard methods of **Exploratory Factor Analysis**. A careful consideration is that assessing a measurement model through numerous fit indices is more parsimony approach than one with absolute or single criteria (Hair et al., 1998).

In the context of present study, following criteria (Table 4.4) has been adopted for the measurement and validation of various constructs:

Table 4.3 Criteria

S. No.	Parameter	Criteria
1	Normed Chi-square (ratio of Chi-square to degrees of freedom)	Less than 3
2	Goodness-of-Fit Index (GFI)	At least .90
3	Adjusted Goodness-of-Fit Index (AGFI)	At least .90
4	Normed Fit Index (NFI)	At least .90
5	Comparative Fit Index (CFI)	At least .90
6	Root Mean Square Residual (RMR)	Less than .10
7	Root Mean Square Error of Approximation (RMSEA)	Less than .08
8	Standardized Residuals	Less than 2.5
9	Standardized factor loadings (SFL)	At least .50
10	Average Variance Extracted (AVE)	At least .50
11	Composite Reliability (CR)	At least .70

5.13 Measurement and Validation of all variables in data set.

To assess the degree of correspondence between the manifest variables and latent construct of (TPB) a uni-dimensional CFA model (Figure 4.1) has been conceptualized and tested for its psychometric properties. The result of CFA show in Table ().
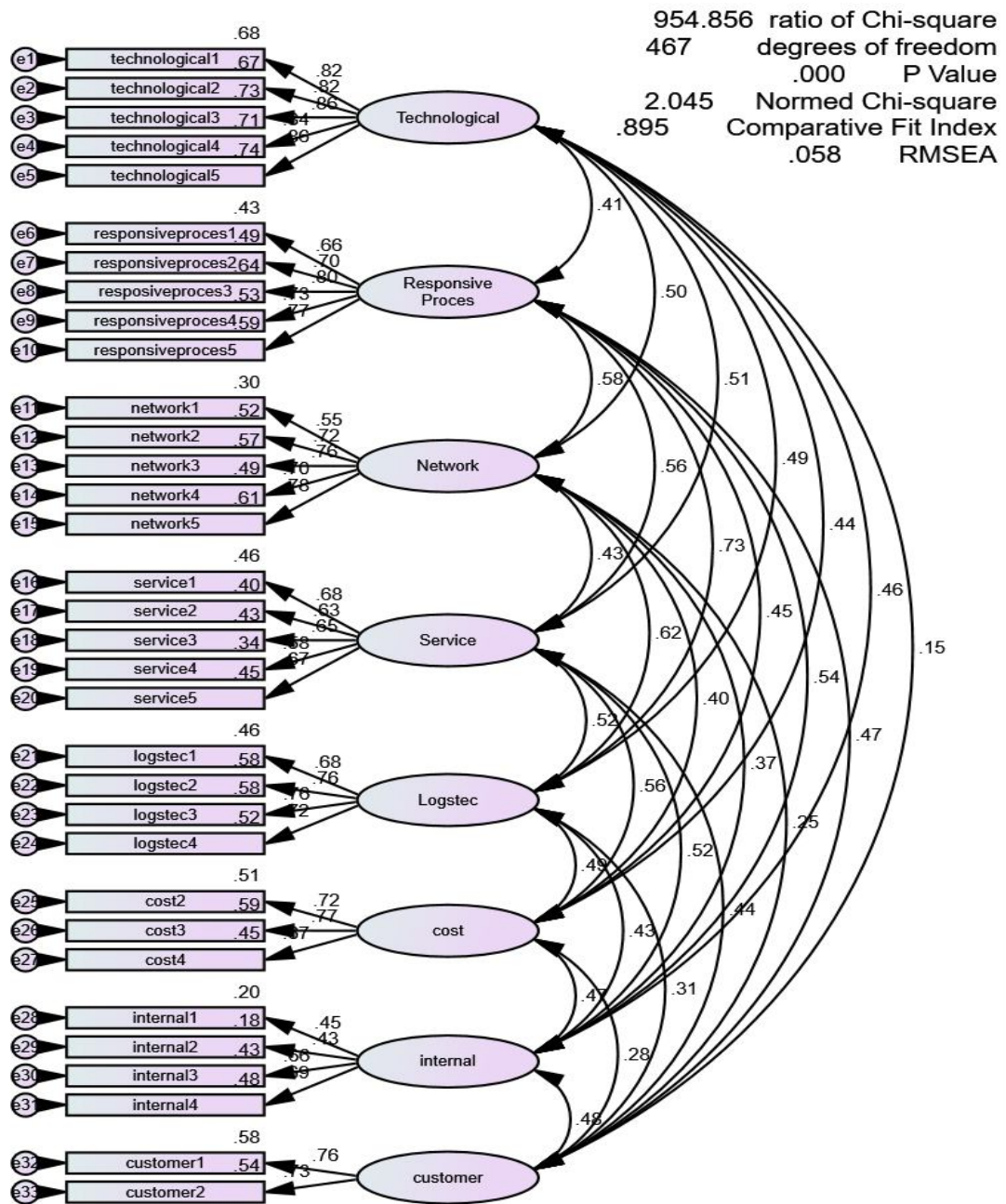
Figure () **all variable in data set.**

Figure () show **Confirmatory Factor Analysis** (CFA) is the next step after **Exploratory Factor Analysis** to determine the factor structure of your dataset. In the EFA we explore the factor structure (how the variables relate and group based

on inter-variable correlations); in the CFA we confirm the factor structure we extracted in the EFA, **the structural model of Confirmatory Factor Analysis (CFA) reveals the** same measures that can be calculated to determine goodness of fit show in Table **()**

Table ….. **Model Fit Indices of all variable in data set.**

Measure	Estimate	Threshold	Interpretation
CMIN	954.856	--	--
DF	467	--	--
CMIN/DF	2.045	Between 1 and 3	Excellent
CFI	0.895	>0.95	Need More DF
SRMR	0.053	<0.08	Excellent
RMSEA	0.058	<0.06	Excellent

Source: prepared By Researcher from data (2018)

Congratulations, your model fit is excellent!

5.14 Validity Concerns:

The convergent validity has often been assessed by looking at the **Standardized Factor Loadings** (SFL), **Average Variance Extracted** (AVE) and **Composite Reliability** (CR). SFL reflect the amount of explained variance by an indicator in accordance to the underlying construct (Hair et al., 2008; Markus, 2012; Byrne, 2013). Loading of .5 or more confirm the convergence of scale item i.e. the indicator is strongly related with its associated construct (Bagozzi et al., 1991; Hair

et al., 2008; Byrne, 2013). AVE provides the summary of overall convergence of a scale and reflects the average communality (Fornell and Larker, 1981) i.e. the variance captured by an instrument through all its items. An AVE of less than .5 indicates that, on average, more error (i.e. systematic error) remains in measure than variance explained by the latent factor structure (Hair et al., 2008), whereas a score of more than .5 affirms the higher amount of explained variance. CR indicates the internal consistency of the instrument. Any value of .70 or higher affirms high degree of internal consistency between different scale items.

Psychometric Properties of all variables in data set:

Dimensions	CR	AVE	MSV	Max R(H)
Internal	0.644	0.321	0.287	0.680
Customer	0.718	0.560	0.232	0.719
Operating process	0.852	0.537	0.538	0.859
Network	0.831	0.499	0.385	0.844
Logistic	0.822	0.536	0.538	0.824
Service	0.781	0.417	0.318	0.783
Cost	0.762	0.518	0.312	0.769
Technological	0.924	0.708	0.261	0.925

Source: prepared By Researcher from data (2018)

5.15 Discriminate validity:

Discriminate validity refers to the extent to which factors are distinct and uncorrelated. The rule is that variables should relate more strongly to their own factor than to another factor. The following Table (5.8) shows the **Discriminate Validity**.

Technological	Technological	Responsive process	Network	Service	Logistic	Cost	Internal	Customer
Operating process	0.841							
Network	0.410***	0.733						
Service	0.500***	0.576***	0.706					
Logistic	0.511***	0.564***	0.434***	0.646				
Cost	0.490***	0.734***	0.620***	0.524***	0.732			
Internal	0.437***	0.447***	0.402***	0.559***	0.486***	0.720		
Customer	0.457***	0.536***	0.373***	0.522***	0.427***	0.471***	0.567	
Technological	0.153*	0.469***	0.252**	0.439***	0.308***	0.283**	0.481***	0.748

Source: prepared By Researcher from data (2018)

5.16 Modified of Research Framework and hypotheses:

From the result of the factor analysis, the whale previous conceptual framework had been changed. Accordingly, the earlier hypotheses related to the some variables will be changed. And also, some previous partial hypotheses will be removed according to the factor analysis extraction. The bellow parts are exploring the change and removing in hypotheses according to factor analysis results.
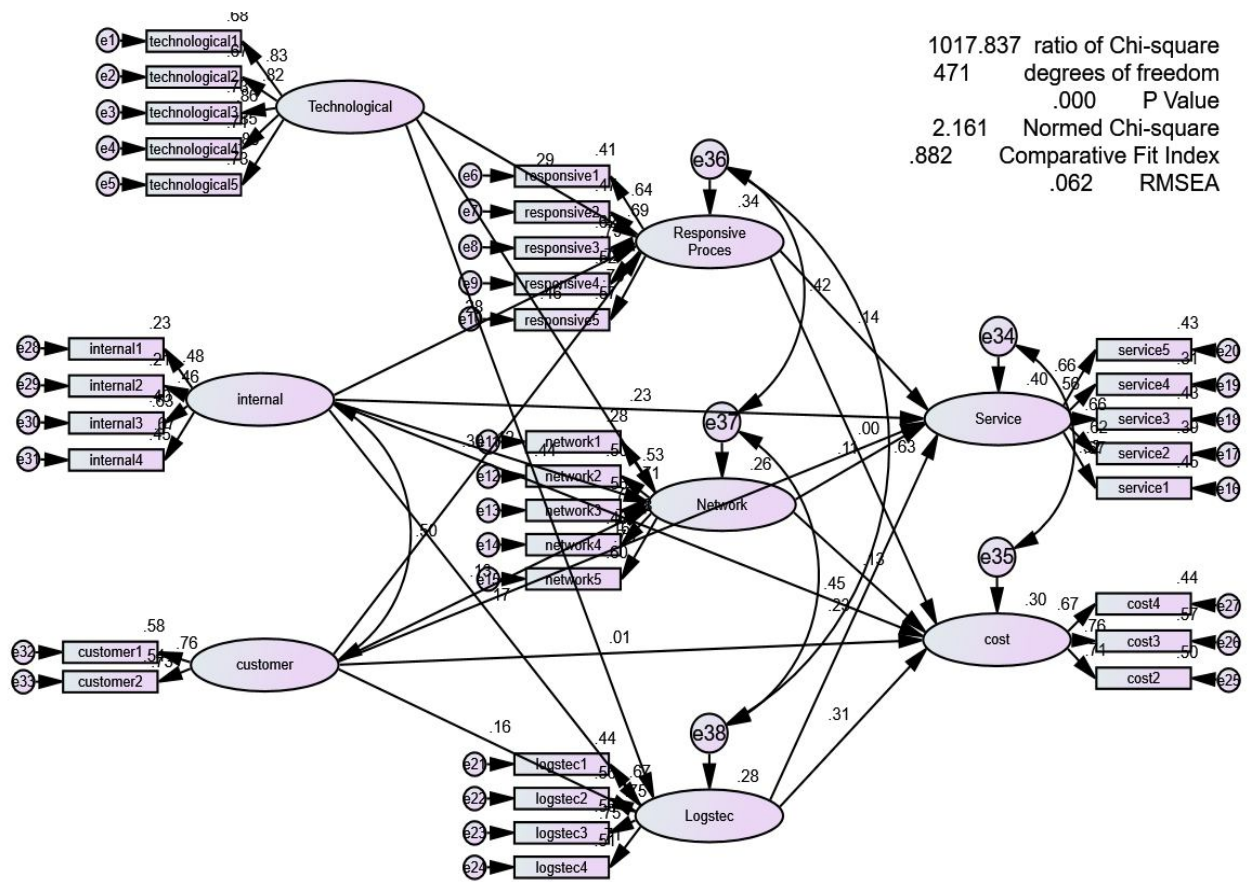
Figure () CFA for model

Figure () show the result of **the structural model of Confirmatory Factor Analysis** (CFA) **reveals the** same measures that can be calculated to determine goodness of fit show in Table **().**

Table ….. Model Fit Indices of model

Measure	Estimate	Threshold	Interpretation
CMIN	1017.837	--	--
DF	471	--	--
CMIN/DF	2.161	Between 1 and 3	Excellent
CFI	0.882	>0.95	Need More DF
SRMR	0.088	<0.08	Acceptable
RMSEA	0.062	<0.06	Acceptable
PClose	0.000	>0.05	Terrible

Source prepared by researcher from data (2018)

Based on the modified theoretical framework, the hypotheses related to all dimensions need to be restated. The restated hypotheses reflect the addition of new variables and the eliminated ones related to the constructs. The restated hypotheses are shown in table 4.14.

5.17 The New Framework:
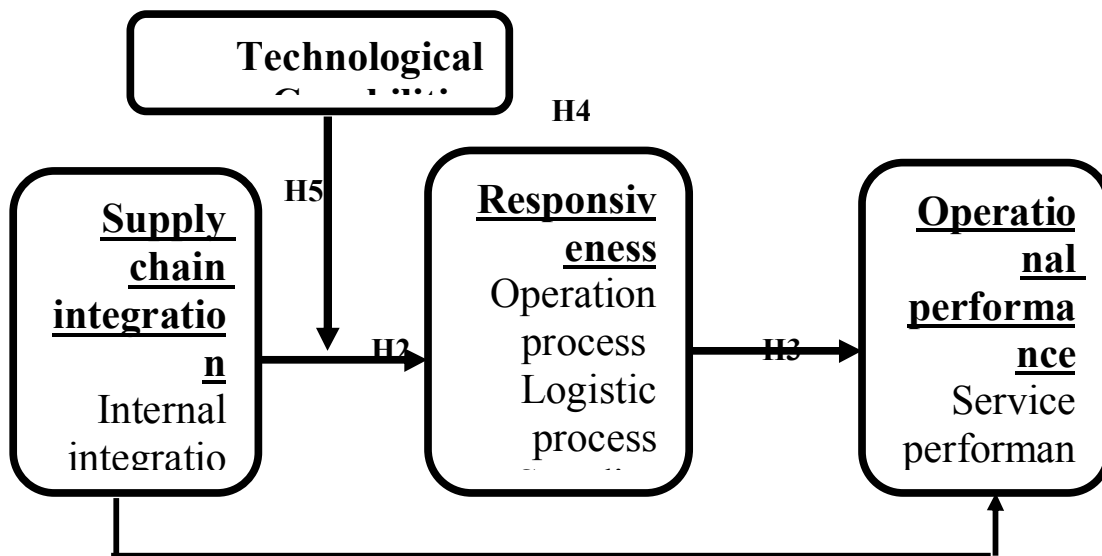
Source: prepared By Researcher from data analysis (2019).

Hypothesis related to the new framework:

H1. There is a relationship between supply chain integration and operational performance.

H1.1There is a positive relationship between Supply chain integration and service performance.

Developed sub hypotheses from first hypothesis as follows:

H1.1a There is positive relationship between internal integration and service performance

H1.1b there is positive relationship between customer integration and service performance

H1.2There is a positive relationship between Supply chain integration and cost performance.

H1.2a There is positive relationship between internal integration and cost performance

H1.2b there is positive relationship between the customer integration and cost performance.

H2. There is a relationship between supply chain integration and responsiveness.

H2.2There is a positive relationship between Supply chain integration and operation process responsiveness

H2.1a There is positive relationship between internal integration and operation process responsiveness

H2.1b there is positive relationship between customer integration and operation process responsiveness

- 181 -

H2.2There is a positive relationship between Supply chain integration and logistic responsiveness

H2.2a There is positive relationship between internal integration and logistic responsiveness

H1.2b there is positive relationship between customer integration and logistic responsiveness

H2.3There is a positive relationship between Supply chain integration and supplier network responsiveness

H2.3a There is positive relationship between internal integration and supplier network responsiveness

H2.3b there is positive relationship between customer integration and supplier network responsiveness

H3. There is a relationship between the responsiveness and operational performance.

H3.1There is a positive relationship between responsiveness and service performance

Developed sub hypotheses from firs hypothesis as follows:

H3.1a There is positive relationship between operation process responsiveness and service performance

H3.1b There is positive relationship between logistic responsiveness and service performance

H3.1c there is positive relationship between supplier network responsiveness and service performance

H3.2There is a positive relationship between responsiveness and cost performance

H4. 1a There is positive relationship between operation process responsiveness and cost performance

H3.1b There is positive relationship between logistic responsiveness and cost performance

H3. 1c there is positive relationship between supplier network responsiveness and cost performance

H4. The responsiveness mediates the relationship between supply chain integration and operational performance.

H6.1a operation process responsiveness Mediate the relationship between internal integration and service performance

H6.1b operation process responsiveness Mediate the relationship between internal integration and cost performance

H6.1a operation process responsiveness Mediate the relationship between customer integration and service performance

H6.1b operation process responsiveness Mediate the relationship between customer integration and cost performance

H6.1a logistic responsiveness Mediate the relationship between internal integration and service performance

H6.1b logistic responsiveness Mediate the relationship between internal integration and cost performance

H6.1a logistic responsiveness Mediate the relationship between customer integration and service performance

H6.1b logistic responsiveness Mediate the relationship between customer integration and cost performance

H6.1a supplier network responsiveness Mediate the relationship between internal integration and service performance

H6.1b supplier network responsiveness Mediate the relationship between internal integration and cost performance

H6.1a supplier network responsiveness Mediate the relationship between customer integration and service performance

H6.1b supplier network responsiveness Mediate the relationship between customer integration and cost performance

H5. Technological capabilities moderate the relationship between supply chain integration and responsiveness.

H8.1 The effect of internal integration on operation process responsiveness is stronger when uses technological capabilities.

H8.2 The effect of internal integration on logistic responsiveness is stronger when uses technological capabilities.

H.8.3 The effect of internal integration on supplier network responsiveness is stronger when uses technological capabilities.

H8.1 The effect of customer integration on operation process responsiveness is stronger when uses technological capabilities.

H8.2 The effect of customer integration on logistic responsiveness is stronger when uses technological capabilities.

H.8.3 The effect of customer integration on supplier network responsiveness is stronger when uses technological capabilities

5.18 Descriptive Statistics of Variables

In this section Descriptive Statistics such as mean and standard deviation was used to describe the characteristics of surveyed banks and all variables (Independent, dependent and moderators) under study.

Descriptive Statistics to internal integration				
	Range	Mean	Std. Deviation	Variance
Enterprise application integration among internal functions	4	4.12	.903	.816
Integrative inventory management	4	3.93	.981	.963
Real-time searching of logistics-related operating data	4	3.83	1.054	1.111
The utilization o f periodic interdepartmental meetings among internal functions.	4	3.84	1.136	1.291
Total	**4**	**3.93**	**1.018**	**1.045**

Note: All variables used a 5-point likert scale (1= strongly disagree, 5= strongly agre

Source: prepared By Researcher from data (2018)

Descriptive Statistics to customer integration				
	Range	Mean	Std. Deviation	Variance
The level of communication with our major customer.	4	4.40	.740	.547
The frequency of period contacts with our major customer	4	4.31	.816	.665
Our major customer shares Point of Sales (POS) information with us	4	4.03	.914	.836
Our major customer shares demand forecast with us.	4	3.98	1.001	1.003
Information is exchanged transparently between the organization and customers	4	4.03	1.032	1.064
Total	**4**	**4.15**	**0.900**	**0.82**

Source: prepared By Researcher from data (2018)

5.18.1 Descriptive Statistics for SCI:

Table (5.24) shows the means and standard deviations of the two components of SCI (internal, customer), the table reveals that the medical field operating in Sudan (Khartoum state) are emphasized more on response in internal (means=3.93, standard deviation=1.018), followed by customer (means=4.15,standard deviation=.900), given that the scale used 5-point scale (1= strongly disagree, 5=strongly agree), therefore the Sudanese medical field in Khartoum state are highly responding to response.

Descriptive Statistics to Operation process				
	Range	Mean	Std. Deviation	Variance
The enterprise operating system quickly responds to customer requirements.	4	4.09	.867	.752
The enterprise operating system caters to customer requests in a timely manner.	4	4.05	.877	.769
The enterprise's operating system quickly restructures mechanisms to handle changes in demand.	4	3.93	.963	.927
The enterprise operating system has the ability to modify the largest number of operations.	4	3.95	.967	.936
The enterprise operating system has the ability to re-equip mechanisms quickly to meet the changes requested by customers.	4	3.92	.994	.987
Total	**4**	**3.98**	**0.93**	**0.87**

Source: prepared By Researcher from data (2018)

Descriptive Statistics to logistics process				
	Range	Mean	Std. Deviation	Variance
The enterprise's logistics system responds quickly to unexpected changes in customer demand	4	3.79	.973	.947
In the organization, the logistics system can adjust the stock capacity quickly to meet unexpected changes in customer demand.	4	3.82	.960	.921
Our logistics system has the ability to diversify transportation to meet changes in demand.	4	3.71	1.021	1.043
Our logistics system has the ability to deliver services urgently.	4	3.80	.966	.933
Total	**4**	**3.78**	**0.98**	**0.96**

Note: All variables used a 5-point likert scale (1= strongly disagree, 5= strongly agree)

Source: prepared By Researcher from data (2018)

Descriptive Statistics to Supplier network				
	Range	Mean	Std. Deviation	Variance
They make our main suppliers change their mix of services in a relatively short time.	4	3.58	1.031	1.062
Our main suppliers are constantly accommodating our requests.	4	3.96	.968	.936
Major suppliers provide the logistics we need.	4	3.93	.961	.924
Our main suppliers deliver on time.	4	3.76	1.011	1.022
The main suppliers respond effectively to our emergency requests.	4	3.80	1.086	1.179
Total	**4**	**3.80**	**1.011**	**1.024**

Note: All variables used a 5-point likert scale (1= strongly disagree, 5= strongly agree)

Source: prepared By Researcher from data (2018)

5.18.2 Descriptive Statistics for responsiveness:

Table (5.24) shows the means and standard deviations of the three components of responsiveness (operation process, logistic process, supplier network) the table reveals that the medical field operating in Sudan (Khartoum state) are emphasized more on response in operation process (means=3.98, standard deviation=0.98), followed by logistic process (means=3.78,standard deviation=0.98), supplier network (means=3.80, standard deviation=1.01),given that the scale used 5-point scale (1= strongly disagree, 5=strongly agree), therefore the Sudanese medical field in Khartoum state are highly responding to response.

Descriptive Statistics to technological capabilities				
	Range	Mean	Std. Deviation	Variance
We have expertise in the modern technology.	4	3.67	1.134	1.287
We have the best IT infrastructure compared to our competitors.	4	3.52	1.139	1.296
We have the ability to connect all enterprise facilities together.	4	3.70	1.136	1.290
We have technology for software systems to connect infrastructure with our partners.	4	3.52	1.156	1.335
The organization has information technology that provides access to our partners.	4	3.55	1.191	1.419
Total	**4**	**3.59**	**1.15**	**1.33**

Note: All variables used a 5-point likert scale (1= strongly disagree, 5= strongly agree)

Source: prepared By Researcher from data (2018)

5.18.3 Descriptive Statistics for technological capabilities:

Table (5.24) shows the means and standard deviations of technological capabilities, the table reveals that the medical fields operating in Sudan (Khartoum state) are emphasized more on response (means=3.59, standard deviation=1.15), ,given that the scale used 5-point scale (1= strongly disagree, 5=strongly agree), therefore the Sudanese medical field in Khartoum state are highly responding to response.

Descriptive Statistics to cost performance				
	Range	Mean	Std. Deviation	Variance
Our service costs are lower compared to competitors.	4	3.75	1.031	1.063
We manage inventory in a way that helps to reduce costs.	4	3.95	.941	.886
Our policy is to balance the costs of acquiring and maintaining inventory.	4	3.99	.856	.732
We maintain the quality of our services at the lowest cost.	4	4.07	.894	.799
Total	**4**	**3.94**	**0.93**	**0.87**

Note: All variables used a 5-point likert scale (1= strongly disagree, 5= strongly agree)
Source: prepared By Researcher from data (2018)

Descriptive Statistics service performance				
	Range	Mean	Std. Deviation	Variance
Our organization has a high degree of flexibility in cooperating with partners.	4	4.27	.765	.585
We provide all special services to customers.	4	4.10	.864	.747
In the organization, the customer receives the services in a timely manner.	4	4.20	.817	.668
The ability of the organization to provide customers with services value added.	4	3.79	1.095	1.198
We cooperate in the organization to overcome any problems with partners.	4	4.23	.811	.657
Total	**4**	**4.11**	**0.87**	**0.77**

Note: All variables used a 5-point likert scale (1= strongly disagree, 5= strongly agree)

Source: prepared By Researcher from data (2018)

5.18.4. Descriptive Statistics for operational performance:

Table (5.24) shows the means and standard deviations of the two components of operational performance, the table reveals that the medical field operating in Sudan (Khartoum state) are emphasized more on response in service (means=4.11, standard deviation=0.87), followed by cost (means=3.94,standard deviation=0.93), given that the scale used 5-point scale (1= strongly disagree, 5=strongly agree), therefore the Sudanese medical field in Khartoum state are highly responding to response.

Descriptive Statistics for all Variables:

Variables	Dimension	Mean	Standard Deviation
Supply chain integration	Internal integration	3.93	1.01
	Customer integration	4.15	0.900
Responsiveness	Operation process	3.98	0.93
	Logistic process	3.78	0.98
	Supplier network	3.80	1.01
Technological capabilities	Technological capabilities	3.59	1.15
Operational performance	Cost performance	3.94	0.93
	Service performance	4.11	0.87

Note: All variables used a 5-point likert scale (1= strongly disagree, 5= strongly agree)

Source: prepared By Researcher from data (2018)

5.19 Model Fit and hypotheses testing:

The fit index statistic tests the consistency between the predicted and observed data matrix by the equation (Keith, T, 2006). One of the differences that exist between the SEM technique and regression method is that the former one does not have any single statistical test applicable for evaluation of model predictions "strength" (Hair, J.F., et al, 1988). In this regard, Kline (Kline, R.B, 1988) believed that there are "dozens of fit indexes described in SEM literature, more than any single model-fitting program reports". However, according to Hair, Black (Hair, J.F., et al,1988) and Garson (Garson, G.D, et al 2007), the chi-square fit index, also known as chi-square discrepancy test, is considered as the most fundamental and common overall fit measure. Thus, in a good model fit the value of chi-square

should not be very significant, i.e., p>0.05 (Hair, J.F., et al, 1988). However, one problem usually experienced through this test relates to the rejection probability of the model having direct interaction with the sample size. Moreover, the sensitivity level of chi-square fit index is very high, especially, towards the multivariate normality assumption violations (Garson, G.D, et al 2007).

Many indexes have been introduced and developed to avert or reduce the problems related to the chi-square fit index. Some of the indexes included in the absolute fit indexes are as follows:

a) ***"Normal Chi-Square Fit Index" (CMIN/DF):***

Normal chi-square fit index, χ^2/df, serves to adjust the testing of chi-square according to the sample size (**Byrne, B.M 2007**). A number of researchers take 5 as an adequate fit value, while more conservative researchers believe that chi-square values larger than 2 or 3 are not acceptable (**Garson, G.D, et al 2007**).

b) ***"Goodness-of-Fit Index"[30]:***

GFI is utilized for gauging the discrepancy level between the estimated or predicted covariance and resulted or observed ones **(Jöreskog, K.G,1993).**

$GFI = 1 − [max[(\chi 2 − df)/n , 0/ max[(\chi null 2 − df null)/n , 0]]$

The allowable range for GFI is between 0 and 1, where 1 indicates a perfect fit, which demonstrates that measures equal to or larger than 0.90 signify a 'good' fit **(**Garson, G.D, et al 2007**).**

a) ***"Adjusted Goodness-of-Fit Index"(AGFI)* (** Jöreskog, K.G.,1993**):**

AGFI is utilized for adjustment of the GFI relating the complexity of the model.

$AGFI = 1 − [(1 − GFI) dnull /]$

The measuring of AGFI is between 0 and 1, in which 1 or over 1 (AGFI>1.0) signifies a perfect fit, nevertheless, it cannot be bounded below 0, i.e., (AGFI<0). As in the case of GFI, AGFI values equal to or bigger than 0.90 signify a 'good' fit **(**Garson, G.D, et al 2007**).**

b) ***"Root Mean Square Residual" (RMR)*****:**

RMR shows the mean squared amount's square root, which distinguishes the sample variances and covariance from the corresponding predicted variances and covariance (**Hu, L. and P.M. Bentler, 1995**). The assessment relies on an assumption that considers the model to be correct. The smaller the RMR, the more optimal the fit is **(**Garson, G.D, et al 2007**).**

c) ***"Root Mean Square Error of Approximation"*** **(RMSEA) (**Steiger, J.H 1990**):**

RMSEA is employed to gauge the approximation error in the population.

RMSEA = [(χ 2 − df)/ (n − 1)df] 1/ 2

In cases where the RMSEA value is small, the approximation is believed to be optimal. An approximately 0.05 or smaller value of RMSEA means a more appropriate and closer model fit in connection with the degrees of freedom. Nevertheless, between 0.05 and 0.08 displays the most preferable status and the more optimal fit results (**Browne, M.W. and R. Cudeck 1970**).

In addition, the following indexes are also included in the incremental fit measures:

a) ***"Normed Fit Index or Bentler Bonett Index"*** **(NFI):**

Normed Fit Index or Bentler Bonett Index or NFI is applicable to contrast and compare the fit of a suggested model against a null model **(**Bentler, P.M. and D.G. Bonett, 1980**).**

NFI = [χ 2(NullModel) χ 2//df(ProposedModel) / [χ 2/df(NullModel) − 1]

This index defines all the observed variables as uncorrelated. The values of NFI range between 0 and 1, where 0.90 signifies an optimal fit **(**Garson, G.D, et al 2007**).**

a) ***"Tucker Lewis Index or Non-Normed Fit Index"*** **(TLI or NNFI):**

The TLI or NNFI index is used to gauge parsimony, which is applicable through the evaluation and assessment of the degrees of freedom of the suggested model to the degrees of freedom of the null model (Bentler, P.M. and D.G. Bonett,1980) .

$NFI = [\chi\, 2 (NullModel)\, \chi\, 2 // df (ProposedModel) / [\chi\, 2/df (NullModel) - 1]$

However, it is not certain whether TLI can vary from 0 to 1. A fit of model is required to possess a TLI that is larger than 0.90 (Bentler, P.M. and D.G. Bonett,1980, Tucker, L.R. and C. Lewis 1970).

   b) ***"Comparative Fit Index"* (CFI)** (Bentler, P.M.,1998):

CFI is not only less affected by the sample size, but also based on comparison of the hypothesized model to the null model (Kline, R.B, 1998).

$CFI = 1 - [\max [(\chi\, 2 - df), 0]\, \max [(\chi\, 2 - df), (\chi null\, 2 - df null), 0]]$

The values of CFI range between 0 and 1. However, its values need to be a minimum of 0.90 to be usable for a model fit (Garson, G.D, et al 2007).

5.20 Hypotheses Testing:

This section discusses the results of hypotheses of the study. The hypotheses were tested with the path analysis that discloses the effect of independent variables on dependent variables and the effect of mediator and moderator in relationships between variables through the structural equation modeling (SEM) that grows out of and serves purposes similar to multiple regressions, but in more powerful way which takes in account the modeling of interactions between variables, nonlinearities, correlated independents, measurement error, correlated error terms, multiple latent independents each measured by multiple indicators, and one or more latent dependents also each with multiple indicators (Gaskin, 2016), SEM may be used as a more powerful alternative to multiple regression, path analysis, factor analysis, time series analysis, and analysis of covariance. That is, these procedures may be seen as special cases of SEM, or, to put it another way, SEM is an extension of the general

linear model (GLM) of which multiple regression is a part. Given that the variables appeared in confirmatory factor analysis encompasses 35 hypotheses in this study. The main effects as well as the mediating effect were examined using path analysis, the statistical procedures of which had been explained in chapter 3 In order to perform path analysis, it is generally agreed that there are at least the assumptions of model fit should be met. It's given that the model fit was done in (CFA), however the need to do it again in structural model is important in order to demonstrate sufficient exploration of alternative models (Gaskin, 2016). Every time the model changes and a hypothesis are tested, model fit must be assessed. Thus the Absolute fit indices and Incremental fit indices assumptions are provided below:

5.20.1 Relationship between supply chain integration and operational performance:

To assess the impact of SCI such as (internal integration and customer integration) on OP such as (service performance and cost performance) structural equation modeling has been employed and a measurement model of these constructs has been assessed. Figure …. reveals that reflective indicators have been used for the measurement of latent constructs and non-causal relationship has been studied among different constructs, by drawing path

The structural model reveals the same value of model fit shown in Table .... , all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.22) justifies the underlying theoretical model.

Regression Weights: (Group number 1 - Default model)

Source: prepared By Researcher (2019)

Relationship between supply chain integration and operational performance:

The result of this hypothesis (H1) was partially supported

			Estimate	S.E.	C.R.	P	Result
Service	<---	Internal	.517	.134	3.856	***	Supported
Service	<---	Customer	.234	.088	2.656	.008	Supported
Cost	<---	Internal	.692	.178	3.877	***	Supported
Cost	<---	Customer	.081	.112	.724	.469	Not supported

*Source: prepared by researcher, (2019).***Note:** Level of significant: *$p<0.10$, **$p<0.05$, ***$p<0.000$

The table () show the probability of getting a critical ratio as large as 3.856 in absolute value is less than 0.001. In other words, the regression weight for internal in the prediction of Service is significantly different from zero at the 0.001 level. While, The probability of getting a critical ratio as large as 2.656 in absolute value is .008. In other words, the regression weight for customer in the prediction of Service is significantly different from zero at the 0.01 level. Also, the probability of getting a critical ratio as large as 3.877 in absolute value is less than 0.001. In other words, the regression weight for internal in the prediction of cost is significantly different from zero at the 0.001 level .Finally , The probability of getting a critical ratio as large as 0.724 in absolute value is .469. In other words, the regression weight for customer in the prediction of cost is not significantly different from zero at the 0.05 level.

5.20.2 Relationship between supply chain integration and responsiveness:

To assess the impact of SCI such as (internal integration and customer integration) on responsiveness such as (operation process, logistic process and supplier network) structural equation modeling has been employed and a measurement model of these constructs has been assessed. Figure …. reveals that reflective

indicators have been used for the measurement of latent constructs and non-causal relationship has been studied among different constructs, by drawing path

The structural model reveals the same value of model fit shown in Table …. , all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.22) justifies the underlying theoretical model.

Regression Weights: (Group number 1 - Default model)

Source: prepared By Researcher (2019)

Relationship between supply chain integration and responsiveness:

The result of this hypothesis (H2) was partially supported

			Estimate	S.E.	C.R.	P	Result
Operation process	<---	**Internal**	.550	.139	3.967	***	Supported
Network	<---	**Internal**	.459	.143	3.205	.001	Supported
Logistic	<---	**Internal**	.595	.168	3.543	***	Supported
Operation process	<---	**Customer**	.259	.088	2.959	.003	Supported
Network	<---	**Customer**	.078	.090	.863	.388	Not supported
Logistic	<---	**Customer**	.140	.106	1.319	.187	Not supported

*Source: prepared by researcher, (2019).***Note:** Level of significant: *p<0.10, **p<0.05, ***p<0.000

The table () show the probability of getting a critical ratio as large as 3.967 in absolute value is less than 0.001. In other words, the regression weight for internal in the prediction of operation process is significantly different from zero at the 0.001 level. However, the probability of getting a critical ratio as large as 3.205 in absolute value is .001. In other words, the regression weight for internal in the prediction of Network is significantly different from zero at the 0.001 level. And also, the probability of getting a critical ratio as large as 3.543 in absolute value is less than 0.001. In other words, the regression weight for internal in the prediction of logistic is significantly different from zero at the 0.001 level. While, The probability of getting a critical ratio as large as 2.959 in absolute value is .003. In other words, the regression weight for customer in the prediction of operation process is significantly different from zero at the 0.01 level. And also, the probability of getting a critical ratio as large as 0.863 in absolute value is .388. In other words, the regression weight for customer in the prediction of Network is not significantly different from zero at the 0.05 level. And lastly, the probability of getting a critical ratio as large as 1.319 in absolute value is .187. In other words, the regression weight for customer in the prediction of logistic is not significantly different from zero at the 0.05 level.

5.20.3 Relationship between responsiveness and operational performance:

To assess the impact of responsiveness such as (operation process, logistic process and supplier network on OP (service performance and cost performance) structural equation modeling has been employed and a measurement model of these constructs has been assessed. Figure …. reveals that reflective indicators have been used for the measurement of latent constructs and non-causal relationship has been studied among different constructs, by drawing path

The structural model reveals the same value of model fit shown in Table .... , all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.22) justifies the underlying theoretical model.

Regression Weights: (Group number 1 - Default model)

Source: prepared By Researcher (2019)

Relationship between responsiveness and operational performance:

The result of this hypothesis (H3) was partially supported

			Estimate	S.E.	C.R.	P	Result
Service	<---	Operation process	.328	.101	3.244	.001	Supported
Cost	<---	Operation process	.191	.135	1.413	.158	Not supported
Service	<---	Network	.101	.080	1.257	.209	Not supported
Cost	<---	Network	.162	.112	1.442	.149	Not supported
Service	<---	Logistic	.149	.090	1.648	.099	Not supported
Cost	<---	Logistic	.292	.127	2.296	.022	Supported

*Source: prepared by researcher, (2019).***Note:** Level of significant: *p<0.10, **p<0.05, ***p<0.000

The table () show the probability of getting a critical ratio as large as 3.244 in absolute value is .001. In other words, the regression weight for operation process in the prediction of Service is significantly different from zero at the 0.001 level. However, the probability of getting a critical ratio as large as 1.413 in absolute value is .158. In other words, the regression weight for operation process in the prediction of cost is not significantly different from zero at the 0.05 level. While, The probability of getting a critical ratio as large as 1.257 in absolute value is .209. In other words, the regression weight for Network in the prediction of Service is not significantly different from zero at the 0.05 level. However, the probability of getting a critical ratio as large as 1.442 in absolute value is .149. In other words, the regression weight for Network in the prediction of cost is not significantly different from zero at the 0.05 level. And also, the probability of getting a critical ratio as large as 1.648 in absolute value is .099. In other words, the regression weight for logistic in the prediction of Service is not significantly different from

zero at the 0.05 level. And finally, the probability of getting a critical ratio as large as 2.296 in absolute value is .022. In other words, the regression weight for logistic in the prediction of cost is significantly different from zero at the 0.05 level.

5.21 Modeling Mediating Effect/ Intervening Effect:

Mediation effect can be called as an intervening effect. A mediator is a predictor link in the relationships between two other variables. Normally, a mediator variable can become an exogenous and endogenous variable at same time. By testing for meditational effects, a researcher can explore to examine the influences between these variables. According to (Zainudin Awang, 2010) the mediation have three types mediator which is full mediation, partial mediation, and non-mediation.

5.21.1 For full mediation:

1. The regression coefficient of X1 on Y (or B1) is not significant.
2. The regression coefficient of X1 on X2 (or B3) is significant.
3. The regression coefficient of X2 on Y (or B2) is significant.

5.21.2 For partial mediation:

1. The regression coefficient of X1 on Y (or B1) is significant.
2. The regression coefficient of X1 on X2 (or B3) is significant.
3. The regression coefficient of X2 on Y (or B2) is significant.
4. The value B1 is lower than the product of (B3 multiply B2).

5.21.3 For non-mediation:

1. The regression coefficient of X1 on Y (or B1) is not significant.
2. The regression coefficient of X1 on X2 (or B3) is not significant.
3. Both regression coefficient (B1 and B2) are significant but B1 is higher than B3*B2

5.21.3 The Mediating role of Responsiveness on the Relationship between Supply chain integration and Operation performance:

To assess the impact of responsiveness such as mediating (operation process, logistic process and supplier network) on the relationship between SCI and responsiveness structural equation modeling has been employed and a measurement model of these constructs has been assessed. Figure …. reveals that reflective indicators have been used for the measurement of latent constructs and non-causal relationship has been studied among different constructs, by drawing path.

The structural model reveals the same value of model fit shown in Table …. , all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.35, 0.15 and 0.20) in mediating variables. While the R square (i.e. 0.43 and 0.33) justifies the underlying theoretical model independent variables. The next table describes the direct effect of all hypotheses.

Regression Weights: (Group number 1 - Default model)

Source: prepared By Researcher (2019)

Source: prepared By Researcher (2019)

5.21.4 The Mediating role of Responsiveness on the Relationship between Supply chain integration and Operation performance:

The result of this hypothesis (H4) was partially supported

			Estimate	S.E.	C.R.	P	Result
Operation process	<---	**Internal**	.556	.140	3.979	***	Supported
Network	<---	**Internal**	.455	.142	3.203	.001	Supported
Logistic	<---	**Internal**	.598	.167	3.574	***	Supported
Operation process	<---	**Customer**	.270	.089	3.038	.002	Supported
Network	<---	**Customer**	.080	.090	.886	.375	Not supported
Logistic	<---	**Customer**	.140	.107	1.315	.189	Not supported
Service	<---	**Internal**	.301	.125	2.413	.016	Supported
Service	<---	**Customer**	.152	.081	1.882	.060	Not supported
Cost	<---	**Internal**	.471	.176	2.676	.007	Supported
Cost	<---	**Customer**	.023	.110	.208	.835	Not supported
Service	<---	**Operation process**	.155	.109	1.415	.157	Not supported
Cost	<---	**Operation process**	.021	.150	.143	.887	Not supported
Service	<---	**Network**	.084	.079	1.064	.287	Not supported
Cost	<---	**Network**	.129	.110	1.175	.240	Not supported
Service	<---	**Logistic**	.147	.089	1.644	.100	Not supported
Cost	<---	**Logistic**	.275	.125	2.202	.028	Supported

*Source: prepared by researcher, (2019).***Note:** Level of significant: *p<0.10, **p<0.05, ***p<0.000

While the next table (5.34) presented the results of the Regression Path Coefficient for Indirect Effects to testing the mediating effect of responsiveness in relationship between SCI and OP when the path coefficient for indirect effect.

Indirect Effects (Group number 1 - Default model)

5.21.4.1 The mediation of operation process between SCI and OP was full mediated

Indirect Effects (operation process):

	Customer	Internal	Result
operation process	.000	.000	
Cost	.087	.179	Not mediated
Service	.088	.182	Not mediated

Significance (BC) (Group number 1 - Default model)

	Customer	Internal	Result
operation process	...	...	
Cost	.028	.014	Mediated
Service	.018	.003	Mediated

*Source: prepared by researcher, (2019).***Note:** Level of significant: *p<0.10, **p<0.05, ***p<0.000

The table shows the indirect (not mediated) effect of customer on cost is .087. That is, due to the indirect (not mediated) effect of customer on cost, when customer goes up by 1, cost goes up by 0.028. This is in addition to any direct (mediated) effect that customer may have on cost. While, the indirect (not mediated) effect of customer on service is .088. That is, due to the indirect (not mediated) effect of customer on service, when customer goes up by 1, Service goes up by 0.018. This is in addition to any direct (mediated) effect that customer may have on Service. However, the indirect (not mediated) effect of internal on cost is .179. That is, due to the indirect (not mediated) effect of internal on cost, when internal goes up by 1, cost goes up by 0.014. This is in addition to any direct (mediated) effect that internal may have on cost. Finally, the indirect (not mediated) effect of internal on services is .182. That is, due to the indirect (no mediated) effect of internal on

services, when internal goes up by 1, cost goes up by 0.003. This is in addition to any direct (mediated) effect that internal may have on services.

Indirect Effects - (Group number 1 - Default model)

5.21.4.2 The mediation of Logistic process between SCI and OP was Partial mediated:

Indirect Effects (Group number 1 - Default model)

	Customer	Result	Internal	Result
Logistic responsiveness	.000		.000	
Cost	.047	Mediated	.204	Not mediated
Service	.036	Mediated	.157	Not mediated

Significance (BC) - (Group number 1 - Default model)

	Customer	Result	internal	Result
Logistic responsiveness	...		...	
Cost	.264	Not mediated	.002	Mediated
Service	.254	Not mediated	.001	Mediated

*Source: prepared by researcher, (2019).***Note:** Level of significant: *p<0.10, **p<0.05, ***p<0.000

The table shows the indirect (mediated) effect of customer on cost is .047. That is, due to the indirect (mediated) effect of customer on cost, when customer goes up by 1, cost goes up by 0.264. This is in addition to any direct (not mediated) effect that customer may have on cost. While, the indirect (mediated) effect of customer on service is .036. That is, due to the indirect (mediated) effect of customer on service, when customer goes up by 1, Service goes up by 0.254. This is in addition to any direct (not mediated) effect that customer may have on Service. However, the indirect (mediated) effect of internal on cost is .204. That is, due to the indirect (not mediated) effect of internal on cost, when internal goes up by 1, cost goes up by 0.002. This is in addition to any direct (mediated) effect that internal may have

on cost. Finally, the indirect (not mediated) effect of internal on services is .157. That is, due to the indirect (not mediated) effect of internal on services, when internal goes up by 1, cost goes up by 0.001. This is in addition to any direct (mediated) effect that internal may have on services.

Indirect Effects (Group number 1 - Default model)

5.21.4.3 The mediation of supplier network between SCI and OP was partial mediated

	Customer	Result	Internal	Result
Supplier network	.000		.000	
Cost	.025	Mediated	.139	Not mediated
Service	.020	Mediated	.110	Not mediated

Significance (BC) - (Group number 1 - Default model)

	Customer	Result	Internal	Result
Supplier network	...		...	
Cost	.350	Not mediated	.008	Mediated
Service	.320	Not mediated	.011	Mediated

*Source: prepared by researcher, (2019).***Note:** Level of significant: *p<0.10, **p<0.05, ***p<0.000

The table shows the indirect (mediated) effect of customer on cost is .025. That is, due to the indirect (mediated) effect of customer on cost, when customer goes up by 1, cost goes up by 0.0350. This is in addition to any direct (not mediated) effect that customer may have on cost. While, the indirect (mediated) effect of customer on service is .020. That is, due to the indirect (mediated) effect of customer on service, when customer goes up by 1, Service goes up by 0.320. This is in addition to any direct (not mediated) effect that customer may have on Service. However, the indirect (mediated) effect of internal on cost is .139. That is, due to the indirect (not mediated) effect of internal on cost, when internal goes up by 1, cost goes up

by 0.008. This is in addition to any direct (mediated) effect that internal may have on cost. Finally, the indirect (not mediated) effect of internal on services is .110. That is, due to the indirect (no mediated) effect of internal on services, when internal goes up by 1, cost goes up by 0.011. This is in addition to any direct (mediated) effect that internal may have on services.

5.22 The Moderating effect Technological capabilities on the Relationship between Supply chain integration and Responsiveness:

To assess the impact of technological capabilities such as (moderator) on the relationship between SCI and responsiveness structural equation modeling has been employed and a measurement model of these constructs has been assessed. Figure …. reveals that reflective indicators have been used for the measurement of latent constructs and non-causal relationship has been studied among different constructs, by drawing path.

The structural model reveals the same value of model fit shown in Table …. , all the model fit indices for the structural model were not only significant but remain same as in the measurement model. The low index of R square (i.e. 0.35, 0.15 and 0.20) in mediating variables. While the R square (i.e. 0.43 and 0.33) justifies the underlying theoretical model independent variables. The next table describes the direct effect of all hypotheses.

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Result
Operation process	<---	**Internal**	.516	.174	2.963	.003	Supported
Network	<---	**Internal**	.239	.163	1.466	.143	Not supported
Logistic	<---	**Internal**	.370	.196	1.893	.058	Supported
Operation process	<---	**Customer**	.245	.097	2.513	.012	Supported
Network	<---	**Customer**	.073	.097	.755	.450	Not supported
Logistic	<---	**Customer**	.090	.115	.784	.433	Not supported
Operation process	<---	**Technological**	.146	.042	3.501	***	Supported
Network	<---	**Technological**	.266	.049	5.424	***	Supported
Logistic	<---	**Technological**	.286	.053	5.378	***	Supported

Source: prepared by researcher, (2019). **Note:** Level of significant: *p<0.10, **p<0.05, ***p<0.000
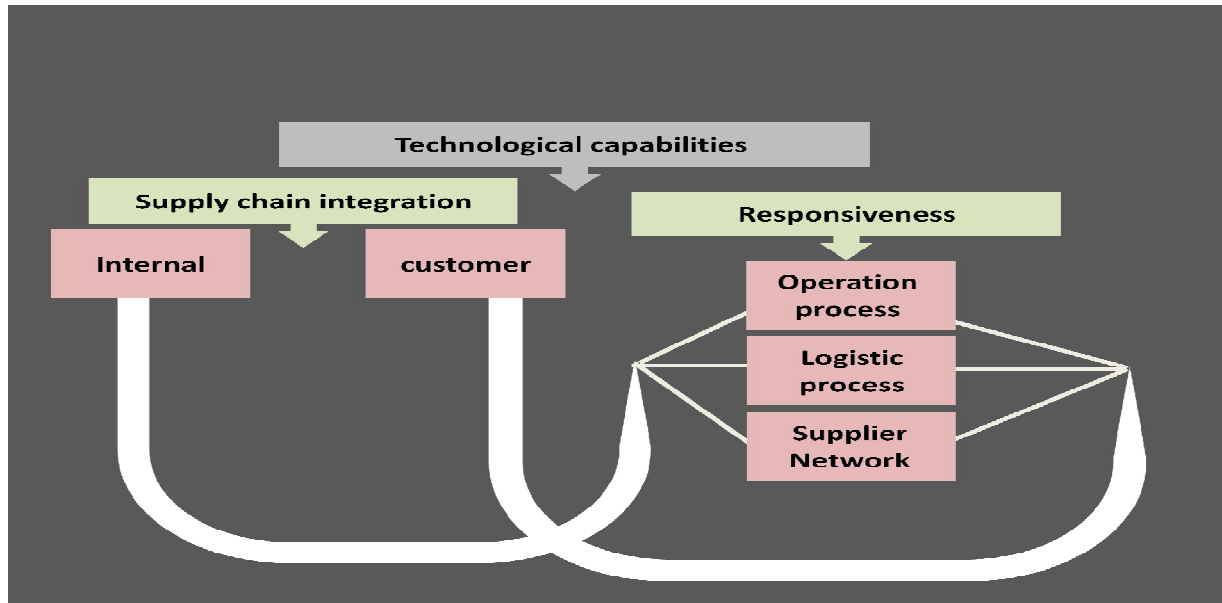
Moderating effect of Technological capabilities on the Relationship between Supply chain integration and Responsiveness

The result of this hypothesis (H5) was partially moderating

			Estimate	S.E.	C.R.	P	Result
Operation process	<---	Z Technological _Z internal	.083	.038	2.198	.028	Supported
Network	<---	Z Technological _Z internal	.078	.039	2.000	.045	Supported
Logistic	<---	Z Technological_ Z internal	.083	.046	1.806	.071	Not supported
Operation process	<---	Z Technological _Z customer	-.062	.039	-1.578	.115	Not supported
Network	<---	Z Technological_ Z customer	-.074	.041	-1.796	.072	Not supported
Logistic	<---	Z Technological _Z customer	-.125	.048	-2.580	.010	Supported

Table () show the probability of getting a critical ratio as large as 2.963 in absolute value is .003. In other words, the regression weight for internal in the prediction of operation process is significantly different from zero at the 0.01 level. While, the probability of getting a critical ratio as large as 1.466 in absolute value is .143. In other words, the regression weight for internal integration in the prediction of supplier network is not significantly different from zero at the 0.05 level. Though, the probability of getting a critical ratio as large as 1.893 in absolute value is .058. In other words, the regression weight for internal integration in the prediction of logistic process is not significantly different from zero at the 0.05 level. Thus, the probability of getting a critical ratio as large as 2.513 in absolute value is .012. In other words, the regression weight for customer integration in the prediction of operation process is significantly different from zero at the 0.05 level. Thus, the probability of getting a critical ratio as large as 0.755 in absolute value is .450. In other words, the regression weight for customer in the prediction of supplier network is not significantly different from zero at the 0.05 level. Consequently, The probability of getting a critical ratio as large as 0.784 in absolute value is .433. In other words, the regression weight for customer integration in the prediction of logistic process is not significantly different from zero at the 0.05 level. Therefore, the probability of getting a critical ratio as large as 3.501 in absolute value is less than 0.001. In other words, the regression weight for technological capabilities in the prediction of operation process is significantly different from zero at the 0.001 level. The probability of getting a critical ratio as large as 5.424 in absolute value is less than 0.001. In other words, the regression weight for technological capabilities in the prediction of supplier network is significantly different from zero at the 0.001 level. Hence, the probability of getting a critical ratio as large as 5.378 in absolute value is less than 0.001. In other words, the regression weight for technological capabilities in the prediction of logistic is significantly different from zero at the 0.001 level. And also, the probability of getting a critical ratio as large as 2.198 in absolute value is .028. In other words, the regression weight for Z technological capabilities _Z internal integration in the prediction of operation process is significantly different from zero at the 0.05 level. Moreover, the probability of getting a critical ratio as large as 2 in absolute value is .045. In other words, the regression weight for Z technological capabilities _Z internal in the prediction of supplier network is significantly different from zero at the 0.05 level. Furthermore, the probability of getting a critical ratio as large as 1.806 in absolute

value is .071. In other words, the regression weight for Z technological capabilities _ Z internal integration in the prediction of logistic process is not significantly different from zero at the 0.05 level. And also, the probability of getting a critical ratio as large as 1.578 in absolute value is .115. In other words, the regression weight for Z technological capabilities _Z customer integration in the prediction of operation process is not significantly different from zero at the 0.05 level. Therefore, The probability of getting a critical ratio as large as 1.796 in absolute value is .072. In other words, the regression weight for Z technological capabilities_ Z customer integration in the prediction ofsupplier network is not significantly different from zero at the 0.05 level. And finally, the probability of getting a critical ratio as large as 2.58 in absolute value is .010. In other words, the regression weight for Z technological capabilities _Z customer integration in the prediction of logistic process is significantly different from zero at the 0.01 level.

The results for all hypotheses:

Hypotheses	Relationship	Result
H1	The relationship between SCI and OP	**Partial support**
H2	The relationship between SCI and responsiveness	**Partial support**
H3	The relationship between responsiveness and OP	**Partial support**
H4	The mediation of responsiveness between SCI and OP	**Partial support**
H5	The moderation of TCs between SCI and responsiveness	**Partial support**

5.23 Summary of the chapter

This chapter concerns with data analysis that was generated from firms operated in Sudan to show the findings for testing the hypotheses of the study. For analyzing data different statistical systems and techniques were used. For example, IBM (SPSS and AMOS) statistics version 23 were conducted in this study in addition to other techniques like data cleaning which used for detecting and removing errors and inconsistencies to improve the quality of data followed by the validity and reliability to insure the goodness of measures for the study variables. Then, to identify the characteristics of all variables under study beside, responding firms

and respondents descriptive statistical techniques were used. Furthermore, Person's correlations were also implemented to identify the interrelationships among all the variables. Finally, path analysis in AMOS was used to test the direct and indirect effects for testing the hypotheses.

CHAPTER VI

DICUSSION AND CONCLUSION

CHAPTER VI
DICUSSION AND CONCLUSION

6.0. Introduction

In this final chapter, the findings are discussed in relation to previous studies, followed by implications of findings for theory and management is developed, followed by limitations and suggestion for future research, finally an overall conclusion of the study.

The primary objective of this study is to examine the relationships between Supply chain integration, as (internal integration, customer integration and supplier integration) and operational performance as (service performance, cost performance, quality performance) also the study tried to test the mediating role of responsiveness as (operation process, logistic process and supplier network) on the relationship between Supply chain integration and operational performance: in addition to test the moderator role of technological capabilities on the relationship between supply chain integration and responsiveness.

To achieve this objective, it was necessary first to hypothesis these causal relationships and second to empirically examine the relationships. The research model of this research was developed both from the literature review. Methodological issues were also addressed for the examination of the relationship in the conceptual model the data was collected from purposive sample by cross-sectional survey from (162) Sudanese service institutions (medical field). The research model and hypotheses were tested with Structural Equation Modeling (SEM).

To achieve the aims of the study the questions are as follows:

1. What is the relationship between the supply chain integration and operation performance?

2. What the relationship between (supply chain integration) SCI and responsiveness?

3. Is supply chain integration SCI effect on operational performance in Sudanese service institutions (medical field) at Khartoum State?

4. Dose responsiveness effect on operational performance?

5. Does the responsiveness mediate the relationship between supply chain Integration and operational performance?

6. Dose the technological capabilities moderate the relationship between supply chain integration and operation performance?

7. What is the level of supply chain integration of Sudanese service institutions (medical field) at Khartoum State?

8. What is the level of operation performance in Sudanese service institutions (medical field) at Khartoum State?

9. What the level of responsiveness?

Descriptive analysis was also conducted for the variables of the study: supply chain integration, operational performance, responsiveness and technological capabilities the results outlined that the Sudanese service institutions (medical field) have average level of supply chain integration SCI (the mean of two dimension were great than the median from score on 5-likert Scale) internal and customer was highest among supply chain integration.

Internal integration achieved highest score the supply chain integration SCI dimensions followed by customer integration, while supplier was less than the median score which indicates that the level of Sudanese services institutions suppliers weak. The results also indicate that the level of quality of Sudanese services institutions (medical field) is less average where the service and cost performance was the highest followed by strategic and operational performance. To that the level of responsiveness was above average.

The results of Person's correlation between all variables of the construct were revealed positive and significant where the results shows that the correlation between the supply chain integration SCI and the dimensions of operational performance (service and cost) is positive and significant, also the results indicated that the relationship between SCI dimension (internal and customer) and OP (cost and services) dimensions positive and significant, in addition to the relationship between supply chain integration SCI (internal and customer) dimensions and responsiveness (operation process, logistic process and supplier network) was positive significant and also the result showed that technological capabilities was positive and significant.

For that, the path analysis in (SEM) analysis was used to test the hypotheses of the study. The first hypothesis predicts that there is a positive relationship between supply chain integration and operational performance. The results outlined that two dimensions of SCI namely (internal and customer) have a positive effect on operation performance (service), while customer integration show no effect on cost performance. Also the results reveals that the two dimensions of SCI(internal and customer) have positive effect on operational performance (service) dimension in addition the results also show positive and significant relation between SCI (internal integration) and OP (cost performance) however there is negative relation and not significant between SCI (customer integration) and OP (cost performance).

The second hypotheses in this study predict that the one dimension of SCI (internal) have positive relationship with the three dimensions of responsiveness (operation process, logistic process and supplier network) while the results also show positive and significant relation between SCI (customer integration) and responsiveness (operation process) however there is negative relation and not

- 219 -

significant between SCI (customer integration) and responsiveness (logistic process and supplier network) .

The third hypothesis predicts that operational performance (service and cost) have positive effect on responsiveness (logistic process) where only OP(service) show positive significance effect on responsiveness (operation process) but OP (cost) show negative and not significant to responsiveness (operation process) however the OP (service and cost) has no significance effect on responsiveness (supplier network).

The fourth hypothesis predicts that three dimensions of responsiveness (operation process, logistic process and supplier network) mediate the relationship between the two dimensions of SCI (internal and customer) and operational performance (service and cost). The results proven that supply chain integration effect on operational performance through operation process responsiveness. Also the results confirmed that internal integration effect on operational performance through logistic process responsiveness, but customer integration has no effect on operational performance through logistic process. In addition internal integration has positive effect on operational performance through supplier network, but customer integration has no effect on operational performance through supplier network.

The fifth hypothesis predicts that technological capabilities moderate the relationship between the two dimensions of l SCI (internal and customer) and responsiveness (operation process, logistic process and supplier network) partially. The results indicates that technological capabilities have full moderating effect on the relationship between SCI and operation process. Also the results confirmed that technological capabilities have partially moderating effect on the relationship between SCI and logistic process. In addition the result showed that technological

capabilities have partially moderating effect on the relationship between SCI and supplier network.

6.1. Recapitulation:

This section is summary of the major findings of the study and relates to the findings of previous studies when it possible, and will discuss more each findings on the next section. This study aimed to investigating the relationship between supply chain integration and operational performance and study on service institutions (medical field) in Sudan (Khartoum State). Further, the study as well examined the relationship between supply chain integration and three types of responsiveness. The study was also explored the relationship between responsiveness and operational performance. Moreover, the study tried to determine the mediating effect of responsiveness in the relationship between supply chain integration and operational performance besides the moderating effect of technological capabilities on the relationship between supply chain integration and responsiveness. Instituted on the above discussion, the key outcomes of this research as follows:

1. Supply chain integration of service institutions (medical field) in Sudan (Khartoum State) is consisting of two components, through which is the internal integration and customer integration.

2. Internal integration is highly adopted in service institutions (medical field) in Sudan (Khartoum State) the hefty component of customer integration.

3. Responsiveness in service institutions (medical field) in Sudan (Khartoum State) is consisting of three components, operation system, supplier network and logistic.

4. Responsiveness has the greater positive relationship with operational performance. The emphases on the responsiveness from service institutions (medical field) in Sudan (Khartoum State) seems to be the most important for

supply chain integration components to   fulfilled operational performance in service institutions (medical field) in Sudan (Khartoum State).

5. Components of the operational performance in service institutions (medical field) in Sudan (Khartoum State) are service and cost.

6. Responsiveness has a positive relationship with operational performance, because the similar emphasis on operation responsiveness rather than, logistic responsiveness and supplier network responsiveness from Sudanese service institutions (medical field) in Khartoum State which appears to be the most important drivers for enhancing institutions' operational performance.

7. The Responsiveness has partial mediation on the relationship between supply chain integration and operational performance in Sudanese service institutions (medical field) in Khartoum State.

8. Technological capabilities of service institutions (medical field) in Sudan (Khartoum State) have not moderating effect on the relationship between supply chain integration and responsiveness.

6.2. Discussion:

The discussion covers the relationship between supply chain integration, operational performance and responsiveness, beside the relationship between responsiveness and operational performance. Furthermore, the discussion will extends to cover the mediating effect of responsiveness in the relationship between supply chain integration and operational performance as well as the moderating effect of technological capabilities between supply chain integration and responsiveness. After conducting the exploratory factor analysis, the supplier integration and quality performance dimensions were excluded because they did not met the requirements of the exploratory factor analyses, as the samples of the study examined did not absorbed the measurements of those dimensions.

Ideally service sectors in the medical field target the triad of good service, low cost and high quality, but in order for this to happen, there has to be good responsiveness which is achieved when the supply chain integration requirements are fulfilled. There was a gap to bridge between the suppliers and supplies which made it necessary to modify the theoretical framework. Initially the theoretical framework included (Internal integration-Supplier integration- Customer integration) in the supply chain integration and (Service performance-Cost performance-Quality performance) in the operational performance. Unfortunately, both supplier integration and quality performance had to be excluded in the final model which reflects the current situation of the health sector in Sudan. Suppliers in the service sector-medical field, Khartoum State could not be identified in the majority of cases because there is no identified, single supplier for these medical institutions. Because, there was notable dependence on multiple sources for both medical (e.g. medications, gloves, cannulas, syringes..etc) and managerial supplies(e.g. Electricity..etc).

The current economic situation of the country along with the defects & deficiencies in the service sector (medical field) are behind the absence of suppliers.

Absence of suppliers meant absence of quality performance, hence the new framework. However when the supplies reached their target destination, they were stored, distributed and integrated into the system, before they reached the customer and that's why it was possible to evaluate the service and cost performances in the grounds of reality former.

In this study show that supplier integration was negatively related to certain aspects of operational performance. This conforms with the findings of Stank et al.,(2001) and contradicts Devaraj et al., (2007) who found a positive relation."Quality is the most visible aspect of supply chain performance (Harrison

and van Hoek, 2008). Defects or errors are symptoms of quality problems in the supply chain process that are clearly visible to the end-customer. For instance, a supplier with quality problems represents a common, recurrent disruption. Without much effort, the customer can demand improvement or find a substitute (Chopra and Sodhi, 2004). If quality problems are identified to late, it will result in rework and rising costs (McIvor et al, 2006). This argues match the result of this study and what happens in Sudan because supplier not identified they always changes.This is attractive in terms of achieving lower costs due to one large contract with a single supplier (Costantino and Pellegrino, 2010). However, lower costs go with higher risks due to the dependency of only one supplier (Sodhi & Lee, 2007).

Delays in material flows occur mostly when a supplier cannot respond to demand changes.The cost and the quality largely influence one another but are not necessarily directly proportional (ie; high cost is not always indicative of good quality and vice versa) and are sometimes attributable to distribution of expenditure rather than quality of health service provided.

In this study the operation process responsiveness was optimal between cost, service, customer & internal integration because more attention paid from operating manager in medical field . The logistic process and supplier network was suboptimal between cost, services performance and internal , customer integration because there is absence in well recognized suppliers. Technological capabilities were partially significant between the supply chain integration and responsiveness in the medical field for a number of reasons; purchase and maintenance of medical technologies is very expensive in addition to that, the unavailability qualified well trained operating workforce that's needed to operate and maintain these devices, The absence of qualified trusted suppliers will affect the optimal delivery of medical service.

6.2.1. The relationship between SCI and OP:

The **first** objective in this study was to investigate the direct effects of the two components of supply chain integration (internal integration, customer integration) on operational performance (service performance, cost performance) of Sudanese service institutions (medical field) in Khartoum State.

6.2.1.1 Internal integration and operational performance:

Internal integration was found to have a direct positive impact on operational performance. Internal field). Therefore, confirming that the results of path analysis showed that internal integration has positive effect on operational service and operational cost, these results are argued with previous studies such as some studies have found that integration across the supply chain has a positive impact on firms' performance (Bagchi and Chun Ha, 2005; Flynn et al., 2010; Kim, 2006; Zailani and Rajagopal, 2005) while others have proved that integration has a positive impact on supply chain performance (Lee et al., 2007; Narasimhan and Kim, 2002) and operational performance (Flynn et al., 2010; Frohlich and Westbrook, 2001). When the results of our study are compared with those from previous research on SCI (Droge et al., 2004; Germain and Iyer 2006; Stank et al., 2001a and b), it is evident that internal integration was significantly related to operational and business performance. Thus, our research reinforces the importance of internal integration in improving a firm's performance. Because internal integration breaks down hierarchical barriers and improves integration refers to the institutions coordination to adopt the best practices and ideas by collaborate all the departments in the services institutions (medical cooperation to meet customer requirements, rather than operating within the functional silos associated with traditional departmentalization and specialization, it is expected to be related to performance.

Internal integration also increases the amount and variety of information available to institution (Montaka et al., 2015). In addition, frequent interactions and confrontations with different perspectives may reduce mistakes and waste, acquire opportunities for simplification and achieve concurrent engineering. In this sense, internal integration is the base for SCI and is positively related to operational and financial performance. Previous studies have found that components of internal integration such as cross-functional collaboration and integrative inventory management systems have positive impacts on a firm's performance (O'Leary-Kelly and Flores, 2002; Rosenzweig et al., 2003; Vickery et al., 2003) who find that internal integration has not impact on organizational performance in telecommunication companies in Jordan. The difference between it and the current study in the culture and environmental factors.(Zhang and Duan, 2010) who shows that internal integration is not significantly with performance in SMEs and large manufacturing exporters in China, However, given that conduct his study in manufacturing exporters, this study extends their findings in service institutions (medical field). Furthermore, while prior studies suggest that internal integration has stronger impact on performance (Wan, 2013) find that internal integration has a positive direct effect on superior firm performance in Malaysian SMEs. Amirkhani ja Reza (2015) has shown that there is a significant relationship between the internal integration with the bank performance and the business strategy in Tehran branch of Eghtesad Novin Bank.. This research gives empirical evidence to support the significance of supply chain integration, particularly in the service sector (medical field), which needs to pay attention to improve their service system to make sure that the services meet the customer's demand. If the owners or entrepreneurs of the institutions are able to capture the problem and take action at the flexibility stage, they will be able to retain their customers.

6.2.1.2. Customer integration and operational performance:

The outcomes in this research showed that customer integration has a positive and significant effect on operational service and operational cost, but it has not effect on operational ($p>0.05$). Thus, customer integration indicates partial support to operational performance. A close relationship between customers and a services offers opportunities for improving the accuracy of demand information which reduces the services design and services planning time and inventory obsolescence allowing it to be more responsive to customer needs. Because customer integration generates opportunities for leveraging the intelligence embedded in collaborative processes, it enables services to reduce costs, create greater value and detect demand changes more quickly. Customer integration involves sharing demand information; interacting with customers to set reliability, responsiveness and other standards to understand customer needs better and to forecast better customer demand; and the collaborative involvement of customers with respect to product design, provision of better quality products at lower costs and more flexibility in responding to customer demands (Homburg and Stock, 2004).

The findings on customer integration are significantly related to performance. This is consistent with the findings of several previous studies (Germain and Iyer, 2006; Koufteros et al., 2005). However, our findings contradict Devaraj et al.'s (2007) study which shows that customer integration had no direct significant effect on operational performance.

6.2.2 The Relationship between supply chain integration and responsiveness:

The **second** objective in this study was to examine the direct effects the two components of supply chain integration (internal integration, customer integration) on responsiveness with three component (operation responsiveness, logistic responsiveness and supplier network responsiveness) in Sudanese service institutions (medical field) that located in Khartoum State. . Furthermore, prior

studies suggest that SCI has a partially significant relationship with responsiveness (Sukati,2012) who find that SCI has a positive direct effect on responsiveness. (Thatte,2012) show that SCP has a positive impact responsiveness. The result of this research is different from the previous studied these refer to the different in the field, culture, environmental area so this research done in sensitive area for service in general.

6.2.2.1. Operation process responsiveness and supply chain integration:

The findings in this study shows statistical significant and partial relationship between supply chain integration and operation responsiveness. Thus supply chain integration indicates a positive link between operation responsiveness. This finding supports prior literature (Frohlich and Westbrook, 2001; Clinton and Closs, 1997; Gunasekaran and Yusuf, 2002; Van Hoek et al., 2001; Handfield and Nichols, 2002). In addition, effective relationships with customers and internal will positively influence a firm's ability to be operationally responsive to demand changes by customers. The strength relationship between supply chain integration and operation process responsiveness suggesting that SCI is effective drivers of responsiveness, the difference between it and the current study in the culture and environmental factors.

6.2.2.2. Logistic process responsiveness and supply chain integration:

The findings in this study show that a partial relationship between logistic process and SCI which there is positive and significant relationship between internal integration and logistic process while there is negative and no significant relationship between customer integration and logistic process (p>0.05). Thus the logistic process indicates partial support with the SCI. These results are argued with previous studies such as (Gunasekaran,et.al; 2017) that have find that weakest effect of logistic responsiveness on SC. Furthermore, while the some prior studies suggested that logistic process has stronger impact on responsiveness like (Sukati,

2012) who has report that responsiveness has a positive impact on competitive advantage. This research is different from previous studied because they have less attention from Sudanese service sector (medical field) that response through logistic process this related to the weakness information about logistic in Sudan as general.

6.2.2.3. Supplier network responsiveness and supply chain integration:

The results of this study show that a partial relationship between SCI and supplier network which the relation between internal integration and supplier network is positive and significant while the relation between customer integration and supplier network is not significant and negative relationship. This result different from the previous studied such as (Sukati,2012) show that there is positive relationship between SCI and supplier network , this diffrenation related to the study area , population, sector and the awareness of the respondent in this research while it examine in Sudan whereas Sudanese institutions were not aware enough about SC in general and SCI integration so the responsiveness through supplier is medium for all the above reasons in spite of these result explain that Sudanese manager (medical and managerial) they cannot make the main suppliers change their mix services in a relatively short time. Their main suppliers are sometimes constantly accommodating the requests. Major suppliers provide the logistics they need slowly. Their main suppliers deliver on time. The main suppliers they not respond effectively to our emergency requests. Thus the supplier network responsiveness indicates partial support to responsiveness.

Furthermore, there were some findings from the service sector literature as a contradiction to the results of this study while it examined their findings in service sector (medical field).

6.2.3The relationship between responsiveness and operational performance:

The **third** research objectives that to explain the relationship between the three components of responsiveness (operation responsiveness, logistic responsiveness and supplier network responsiveness) and operational performance dimensions (service and cost). relationship between responsiveness and cost/price can be studied in greater depth in future research. Yusuf et al.(2003; 2004) found high correlation between the responsiveness and time to market, dependability, product innovation, and quality Secondly, the results disclose that competitive advantage of a firm differs significantly both collectively and individually based on low price and high delivery dependability for high and low levels of supplier network responsiveness. That is, higher level of supplier network responsiveness creates higher level of competitive advantage for a firm, collectively on two dimensions – low price and high delivery dependability - as well as individually on each of the said dimensions. However, there was no support for the impact of supplier network responsiveness on the ability of a firm to compete based on quality, product innovation, and time to market. The current study results showed that the main hypothesis was rejected and the alternative was accepted which states that the SCR variables affect competitive advantage. Finally, the ability of a firm's major suppliers to effectively expedite the firm's emergency orders is the single most important measure of 'supplier network responsiveness' that directly leads to higher levels of overall competitive advantage of a company.

This indicates that Sudanese service institutions adopts the responsiveness to achieving operational performance partially because there is no relation between (operation process,supplier network) responsiveness with operational performance also the relationship between logistic process with operational performance was partially relation .

- 230 -

6.2.3.1. Operation process responsiveness and operational performance:

This subsection deals with the relationship between operation responsiveness and two components of operational performance, service and cost, as first sub-hypothesis of the main relationship between responsiveness and operational performance. The findings show that there is not significant relationship between operation process responsiveness and operational performance ($p > 0.05$). This result indicates that operation process responsiveness has not support to operational performance. The results also show that the inverse relationship between operation process responsiveness and operational performance ($p > 0.05$), this indicates that there is no Sudanese service institutions that adopts the operation process responsiveness to achieving operational performance. This finding is in contradiction with a number of researcher for example (Sukati, 2012) who has report a positive and significant relationship between responsiveness and CA, In contrast this result does not support the findings of a prior study by Thatte,2007) which showed insignificant relationship between responsiveness and CA.this result refer to indicates that there is no interest from the managers (medical, managerial) suppliers of Sudanese service institutions (medical field) in the Khartoum State in the operation process to achieving operational performance. Also it means That institutions operating system not responds to customer requirements, operating system caters to customer not requests in a timely manner , the operating system slowly restructures mechanisms to handle changes in demand. The institutions operating system has no ability to modify the largest number of operations. Finally institutions operating system has not the ability to re-equip mechanisms quickly to meet the changes requested by customers.

6.2.3.2. Logistic process responsiveness and operational performance:

This subsection deals with the relationship between logistic process and operational performance constructs, service and cost, the findings of this study

show that there is partial and significant relationship between logistic process with dimensions of operational performance service and cost, this result refers to positive and significant relation between logistic process and cost performance and not significant negative relation between logistic process and service performance This result is in line with (Thatte,2007) who has found that a positive relationship between responsiveness and CA, and (Sukati, 2012) who has report that a positive and significant relationship between responsiveness and CA. this indicates that Sudanese service institutions adopts the logistic process responsiveness medium to achieving operational performance. That means Sudanese service (medical field) at Khartoum State have no interest to achieve OP from SCI (customer) through logistic process but they interested to achieve OP from SCI (internal) through logistic process. The institutions logistics system has partial responds to unexpected changes in customer demand; sometime adjust the stock capacity quickly to meet unexpected changes in customer demand. Our logistics system has medium the ability to diversify transportation to meet changes in demand. And the ability to deliver services urgently continually.

6.2.3.3 Supplier network responsiveness and operational performance:

This subsection deals with the relationship between supplier network and operational performance constructs service and cost, the findings of this study show that a negative and not significant relationship between supplier network responsiveness with dimensions of operational performance service and cost, This result is in line with (Sukati, 2012) who has found that a positive relationship between supplier network and competitive advantage, and (Thatte, 2007) who has report that a positive and significant relationship between supplier network and competitive advantage, this indicates that Sudanese service institutions was not adopts the supplier network responsiveness to achieving operational performance. These result explain that Sudanese manager (medical and managerial) they cannot

make the main suppliers change their mix services in a relatively short time. Their main suppliers are not constantly accommodating the requests. Major suppliers provide the logistics they need slowly. Their main suppliers not deliver on time. The main suppliers they not respond effectively to our emergency requests. Thus the supplier network responsiveness indicates partial support to responsiveness. Despite the scarcity of empirical evidence on the link between supply chain integration and responsiveness however, This finding supports Thatte and Agrawal's (2017) findings about the positive relationship between SNR and CA. The study also found that CA of a firm differs significantly individually based on price and delivery dependability, for high and low levels of SNR. This effect is again reinforced through the finding that high and low levels of SNR significantly differ on price and delivery dependability. These findings imply that firms can achieve CA solely based on price or delivery dependability, if they have a network of responsive suppliers in terms of each of the four measures of SNR The study found that responsiveness of a firm's network of suppliers had no effect on the firm's ability to compete based on quality, product innovation, or time to market, implying that CA of a firm based on quality, product innovation, or time to market, is independent of and unaffected by the responsiveness of its supplier network.

6.2.4. The mediating role of responsiveness in the relationship between SCI and OP.

The **fourth** research objective of this study concerns with testing the three dimensions of responsiveness (operation responsiveness, logistic responsiveness and supplier network responsiveness) mediate the exchange between supply chain integration and operational performance. Generally, examining this relationship is important because the process through which supply chain integration enhance operational performance has often been overseen in previous studies. Responsiveness is an instrument that can be used by supply chain managers in

service institutions (medical field) for diverse business operations by collaboration all the departments; and supply chain managers must be deliberate and make informed choices about the sources or ideas of integrated (Thatte,2007). In this study, responsiveness or the extent to which a new service extension is hypothesized to act as a mediator in the relationship between supply chain integration and operational performance. This approach is premised on the belief that any attempt to improve a supply chain integration should lead to some kind of improvement in its existing way of doing business leading to better performance. The current research follows (Sukati,2012) who integrated operation process as a mediator between internal integration and service performance. In this research, responsiveness is tested on a larger scale in concert with two different constructs of supply chain integration. In this study responsiveness was found to have a partial mediating effect on the relationship between supply chain integration and operational performance because the mediation of logistic process and supplier network was partially while there is full mediation to operation process responsiveness between SCI and OP this lead to little information for the medical and managerial supplier in how to achieved OP by SCI through responsiveness in service sector (medical field). The following sections will discuss the mediation effect of responsiveness on the relationship between each component of supply chain integration and operational performance.

6.2.4.1. The mediating role of operation responsiveness in the relationship between SCI and OP.

This part deals with the mediating effect of operation responsiveness in the relationship between supply chain integration and operational performance. The result indicate that not support the mediating effect of operation process in this relationship. Regarding the mediating effect of operation process responsiveness in

the relationship between supply chain integration and operational performance the results of the indirect effect indicates that a no mediation effect of this relationship. Operation process responsiveness was found to significantly mediate the relationship between operation process and operational performance. The mediation effect of operation process responsiveness between supply chain integration and operational performance needs to be explained a bit further. The hypothesis posits that when a firm adopts supply chain integration it will achieve operation process responsiveness which will then lead to superior firm performance.Therefore,this research argues that operation process responsiveness mediates and enhances the relationship between supply chain integration and operational performance. The finding confirms a previous study by Thatte,(2007) who found operation process have a positive mediating effect on supply chain practice and competitive advantage. Sukati (2012) who has emphasis operation process mediates the relationship between SCI and competitive advantage. More research needs to be undertaken to gather evidence to further validate this relationship between supply chain integration, operation process responsiveness and operational performance. The result of this study also indicates that operation process responsiveness mediates the relationship between SCI (integration) and (OP) operational performance.

Regarding the operation process responsiveness mediate effect in the relationship between supply chain integration and operational performance. The results also explain that there is relationship between supply chain integration on operational performance through operation process responsiveness; this indicates that there is interest from the managers (medical, managerial) suppliers of Sudanese service institutions (medical field) in the Khartoum State in the operation process to achieving operational performance. Also it means that institutions operating system quickly responds to customer requirements, operating system caters to

customer requests in a timely manner; the operating system quickly restructures mechanisms to handle changes in demand. The institutions operating system has the ability to modify the largest number of operations. Finally institutions operating system has the ability to re-equip mechanisms quickly to meet the changes requested by customers.

Finally, the findings show that operation process mediates between supply chain integration and operational performance. This confirms that firms with high operation process responsiveness will be successful in responding to their internal and external environments leading to competitive advantage and superior performance. These results are consistent with some of the previous studies for example, (Thatte , 2007) who demonstrated operation process   to have a positive mediating effect on SCP and CA. While (Sukati,2012) shows that operation process as a mediator variable in the relationship between SCI and CA.

6.2.4.2. The mediating role of logistic responsiveness in the relationship between SCI and OP.

This sub-section concerns with the mediating effect of logistic process in the relationship between supply chain integration and operational performance. The results were found to have a partial mediating effect of logistic process in this relationship. Regarding the mediating effect of logistic process in the relationship between internal integration and operational performance (service and cost) the results obtained from indirect effect indicates partial mediation effect to logistic process in this relationship. The result also indicates that logistic process not mediates the relationship between customer integration and operational performance (service and cost). Other researchers have attempted to study the same path suggested in this study. (Sukati , 2012) found that logistic operation fully mediated the relationship between SCP and CA. (Gunasekaran, 2018) who asserted that logistic process becomes the best mediating variable between IT and

speed & flexibility, and (Thatte, 2007) who confirm that innovation   play a mediating role between SCI and CA. That means Sudanese service (medical field) at Khartoum State have no interest to achieve OP from SCI (customer) through logistic process but they interested to achieve OP from SCI (internal) through logistic process. The institutions logistics system has partial responds to unexpected changes in customer demand; sometime adjust the stock capacity quickly to meet unexpected changes in customer demand. Our logistics system has medium the ability to diversify transportation to meet changes in demand. And the ability to deliver services urgently continually.

6.2.4.3. The mediating role of supplier network in the relationship between SCI and OP.

This part deals with the mediating effect of supplier network responsiveness in the relationship between supply chain integration (internal) and operational performance. The results indicate that not support the mediating effect of supplier network in this relationship. while it effect the mediating of relationship between supply chain integration (customer) and operational performance.Regarding the mediating effect of supplier network responsiveness in the relationship between supply chain integration and operational performance the results of the indirect effect indicates that a partial mediation effect of this relationship.

Supplier network responsiveness was found to significantly mediate the relationship between supply chain integration (internal) and operational performance. The mediation effect of supplier network responsiveness between supply chain integration and operational performance needs to be explained a bit further. The hypothesis posits that when a firm adopts supply chain integration it will achieve supplier network responsiveness which will then lead to superior institutions performance. Therefore, this research argues that supplier network

responsiveness mediates and enhances the relationship between supply chain integration (internal) and operational performance.

Regarding the supplier network responsiveness mediate effect in the relationship between supply chain integration (internal) and operational performance. The results also explain that there is relationship between supply chain integration on operational performance through supplier network responsiveness; this indicates that there is interest from the managers of Sudanese service institutions (medical field) in the Khartoum State in the supplier network to achieving service performance through internal integration only but there is no relation between supply chain integration (customer) on operational performance through supplier network. The hypothesis posits that when a firm adopts supply chain integration (customer) it will not achieve supplier network responsiveness which will not lead to superior firm performance. Therefore, this research argues that supplier network responsiveness mediates partially the relationship between supply chain integration and operational performance in the service sector (medical field) at Khartoum State. Because they cannot make the main suppliers change their mix services in a relatively short time. Their main suppliers sometimes are constantly accommodating the requests. Major suppliers provide the logistics they need slowly. Their main suppliers sometimes not deliver on time. The main suppliers they not respond effectively to our emergency requests.

Finally, the findings show that operation process mediates partially between supply chain integration and operational performance. This confirms that firms with medium supplier network responsiveness will be successful in responding to their internal and external environments leading to competitive advantage and superior performance. These results are consistent with some of the previous studies for example, (Thatte , 2007) who demonstrated operation process to have a positive

mediating effect on competitive advantage. While (Sukati , 2012) shows that operation process as a mediator variable in the relationship between SCI and CA. Operation process responsiveness is considered a good variable for mediation since most types of supply chain integration (internal, customer) have been proven to have positive relationships with operation process for high operational performance, as indicated in the previous sections of this study. Internal integration relates to implementing something new or different as a response to institutions conditions and may be perceived as collaboration behavior. Such service institutions (medical field) are able to enhance the level of internal integration and enjoy greater levels of success in the institutions. Although both internal integration and customer integration have significant effects on performance, much of the variance in operational performance is attributed to the mediating role responsiveness in the internal integration -performance linkage.

6.2.5. The moderating effect of TCs on the relationship between SCI and Responsiveness.

The **fifth** main research objective of this study hypothesis that technological capabilities moderate the relationship between supply chain integration and responsiveness. However, there found that TCs is partial support the moderating effect. The moderating test of technological capabilities for the relationship between supply chain integration components, (internal, and customer) with responsiveness dimensions,(operation process responsiveness, logistic responsiveness and supplier network responsiveness) indicates that there is partial moderating effect of technological capabilities on this relationship. There is an inverse relationship between supply chain integration and responsiveness estimate (p>0.05), this shows that the service institutions (medical field) were partially interested in supply chain integration to achieve responsiveness. Because it is not significant to achieved through customer integration and network supplier

responsiveness, and also can not achieved through internal integration and logistic process responsiveness because it is not significant for this reason technological capabilities moderated partially this result showed refer to unimportant of the manager in medical field in Khartoum State and high cost of this capabilities to establish and controlled it this automatically related to well trained employees to operated this capabilities.

According to (Srivastava, Gnyawali and Hat, 2015) technological capability refers to internal competence or strength of the focal firm relative to other firms. Regarding the moderate effect of technological capabilities between supply chain integration and responsiveness relationship, the finding of this research demonstrates that technological capabilities have moderate effect on the relationship between supply chain integration and responsiveness partially. Most of the previous studies did consider this matter. Moreover, most of the previous studies addressed the moderating effect of technological capabilities on the relationship between the strategic orientation constructs and innovation, such as (José and Ortega, 2010) which indicated that the technological capabilities is moderating the relationship between quality orientation , cost orientation respectively, as a dimensions of competitive strategies and firm performance. Regarding the moderate effect of technological capabilities between supply chain integration and responsiveness relationship,the overall result shows that technological capabilities were moderate the relationship between the components of supply chain integration (internal , and customer) and responsiveness (operation process, logistic process , supplier network) partially because supply chain integration cannot achieve by internal integration on logistic process responsiveness and customer integration cannot achieved through supplier network responsiveness for this result there is partial moderating in this relation this result refers to expertise in the modern technology, no IT infrastructure compared to

other services have weak ability to connect all enterprise facilities together. Have not qualified technology for software systems to connect infrastructure. The institutions have few information technologies that provide access to partners.

These results argued, with (Srivastava, Gnyawali and Hat, 2015) which posited a negative moderation effect of technological capability. Moreover, (Haeussler, Patzelt and Zahra, 2012) who has report that technological capabilities moderate effect on the relationship between strategic alliances and product development in high technology new firms. And (Jantunen *et al.,* 2011) who has demonstrates that technological capabilities moderate effect on the relationship between supply chain integration and responsiveness as growth operational performance .

6.3. Implications of the study:

The sections above detailed the findings relating to the five broad categories of findings, namely, the direct effect of factors of supply chain integration (internal integration and customer integration) on operational performance, the direct effect of components of supply chain integration on responsiveness , the direct effect components of responsiveness (operation process responsiveness, logistic responsiveness and supplier network responsiveness) on operational performance, the mediating effect of responsiveness on the relationship between supply chain integration and operational performance, and moderating effect of technological capabilities on the relationship between supply chain integration and responsiveness. The discussion here in this section will bring together all the findings and attempt to create a holistic overview of the implications from the testing of the conceptual model. This section contains two sub-sections the theoretical implications and managerial implications of the study findings which are discussed below:

6.3.1. Theoretical implications

The current study has supported the present knowledge on supply chain integration in service sector (medical field). Although this study is conducted in Sudan (Khartoum State), some general implications can be derived for theoretical literature on this topic that are not localized to the context of the study. From a theoretical perspective, this research provides an understanding of how institutions can gain superior performance with the proposed components of supply chain integration mediated through responsiveness under the moderating influence of the technological capabilities.

The **first** theoretical contribution of this study is the development of a dimension of supply chain integration constructs through comprehensive combination perspective; based on a survey data of 162 service institutions (medical field), this study carries more weight especially for generalization purpose due to the limited quantitative approach in the extant literatures. As a whole, supply chain integration has important implications for operational performance.

The **second** theoretical contribution, it an attempt to viaduct that knowledge gap by addressing the value of supply chain integration as drive of such responsiveness like operation process responsiveness, logistic responsiveness and supplier network responsiveness, the result consists with the findings in literature that supply chain integration was posited to have partial significant and positive relationship with responsiveness in Sudanese service sector (medical field) at Khartoum State.

The **third** theoretical contribution, this study also contributes to the literature by extending the knowledge on the linkage between responsiveness and operational performance, our results, in conjunction with theoretical arguments; suggest that responsiveness plays a role on operational performance.

The **fourth** theoretical contribution is an attempt to extend supply chain integration in evidencing new relationships this study spotlighted the mediating effect of

responsiveness (operation process responsiveness, logistic responsiveness and supplier network responsiveness) in the exchange between supply chain integration and operational performance. The findings of the result confirmed the partial mediating effect of responsiveness between supply chain integration and operational performance. This study contributes to the literature by examining the responsiveness constructs (operation process responsiveness, logistic responsiveness and supplier network responsiveness) as a mediator between supply chain integration and operational performance , this relation is full mediated through operation process responsiveness rather than logistic process responsiveness and supplier network responsiveness this mean Sudanese service institution (medical field) well known about it and more careful to operation process responsiveness to achieve operational performance . In addition, this study contributes to the literature about the responsiveness concept based on resource based view theory.

The **fifth** theoretical contribution, this study was investigating the moderating effect of technological capabilities in the relationship between supply chain integration and responsiveness. The findings of the research found that the technological capabilities have moderating effect on the relationship between supply chain integration and responsiveness partially. In addition, There isn't of the previous research examined the moderating effect of technological capabilities on the relationship between supply chain integration and responsiveness therefore, this study contributes to the literature by examining the moderating effect of technological capabilities on the relationship between all two constructs of supply chain integration (internal integration and customer integration) and responsiveness (operation process, logistic process, supplier network) In addition, this study contributes to the literature about the technological capabilities concept based on technological capability theory.

6.3.2. Managerial implications:

This study offers a number of managerial implications:

First, this study will help decision makers in service institutions generally and (medical field) specially to know the importance of supply chain in general and supply chain integration specially and how supply chain integration influence the operational performance. Therefore, decision makers should focus on improve their supply chain integration.

Second, the study highlights the importance of managerial emphasis on the creation of a supply chain integration in service institutions as industrial institutions and encouragement of responsiveness activities. That supply chain integration helps managers to be more connected all the departments in the institutions such as dimension of supply chain integration appear to play an important role in allowing service institutions (medical field) to devise responsiveness solutions to business problems.

Third, from managerial point of view the findings obtained from testing the conceptual framework of this study improves the common understanding among decision makers, which makes the institutions more likely to be able to effectively respond to internal and external environment.

6.4. Limitations of the study

Several limitations inherited in the present study. A cross-sectional design was carried by the study to examine the relationship of framework and the data collected by a survey designed to be responded by single respondent representing the institutions based on institution unit of analysis this may represent the views of individuals within the organization single point of view sometimes effect on measurement errors and reliability (Phillips, 1981).future research should consider the issues of the unit of analysis in addition Longitudinal data can be gathered to test the whether the relationship and impact change over time.

Despite mentioned contributions, this study confronted by a number of limitations that should be took about in order to be path for future study.

Firstly, this study tests the role of supply chain integration in service context.

Secondly, this study use of only two respondent per institution one for medical supplier and other for managerial supplier, which might be a cause of possible response bias. Thus, caution should be taken in results interpreting.

Thirdly, like the majority of the studies in supply chain integration literature, this study is cross-sectional in nature. While, Rindfleisch et al, (2008) provide conclusive evidence that a cross-sectional design does not necessarily suffer from issues such as common method variance and causal inference.

Fourthly, the sample included a many institutions types, a broad range of institution sizes medical field and often they are different in the level of adopting SCI and different level of responsiveness thus future research can test these variables in such specific sector. Beside to the sample size is also small it's better for future research to expand the size.

Finally, Structural equation modeling on AMOS software was used as the statistical tool for this study. Although AMOS is well known for its efficiency, the size of the data set (n=330) in (162) medical field in Khartoum State may have reduced the power of the statistical test. This study concerned on service sector (medical field) only in Khartoum State.

6.5. Suggestions for future research:

This section pointed out there are quite a few limitations in this study and some directions for future research could be derived from within these limitations before progressing into some more general avenues for future research.

First, this study tested supply chain integration in service context (medical field), future research should test in other settings (e.g. pharmacy) could expand the scope

of supply chain integration. ***Second,*** this study use of only two respondents per institution, future research should endeavor to collect data from multiple members. ***Third,*** instate of cross-sectional data future research should consider alternative approaches such as panel data or a longitudinal design whenever possible.

Fourth, this study taken up technological capabilities as one dimension moderate effect between supply chain integration and responsiveness, future research has to take into consideration the moderating effect of technological capabilities with multiple dimensions in this relationship or must test the technological capabilities between responsiveness and operational performance. ***Finally***, this study focuses on service institutions (medical field) in Sudan (Khartoum State). Future research may include firms from other industries / services or regions to generalize the findings. It would provide valuable information for managers regarding the mapping of supply chain integration with operational performance.

6.6. Conclusions:

This study is an attempt to developing a conceptual framework to examine the link between supply chain integration and operational performance exploring the mediating role of responsiveness in this relationship between supply chain integration and operational performance in service sector (medical field) in Sudan (Khartoum State). Moreover, the study has investigated the moderating effect of technological capabilities between supply chain integration and responsiveness. The present study was run among 162 institutions from different service institutions in Sudan (Khartoum State). The findings demonstrate that supply chain integration in Sudan consist of two components (internal and customer) and institutions in Sudan (Khartoum State) are to some extent implemented supply chain integration.

This study makes important contributions to theory, methodology and business performance. Moreover, this study supports supply chain management by linking

internally, customer integration and responsiveness to different aspects of performance. It also gives managers guidance on combining supply chain integration to achieve enhanced profitability. In the interests of advancing this field, a number of suggestions for future research are provided throughout this chapter.

Scholars should continue to strive towards a better conceptual understanding of how combinations of supply chain integration drive superior operational performance.

Abbreviations:

No	Abbreviation	Term
1.	**SCM**	Supply chain management
2.	**SSC**	Strategies supply chain
3.	**SCI**	Supply chain integration
4.	**SCR**	Supply chain responsiveness
5.	**II**	Internal integration
6.	**EI**	External integration
7.	**SI**	Supplier integration
8.	**CI**	Customer integration
9.	**OPR**	Operation process responsiveness
10.	**LPR**	Logistic process responsiveness
11.	**SNR**	Supplier network responsiveness
12.	**GDP**	Gross Domestic Product
13.	**GSCM**	Green supply chain management
14.	**SSCM**	Sustainable supply chain management
15.	**CSCMP**	Council of Supply Chain Management Professionals
16.	**CLM**	Council of Logistics Management
17.	**GSCFS**	Global Supply Chain Forum
18.	**SC**	Supply chain
19.	**CA**	Competitive advantage
20.	**FM**	facilities management
21.	**TCs**	Technological capabilities
22.	**RBV**	Resource based view
23.	**DCs**	Dynamic capabilities
24.	**GFI**	Goodness-of-Fit Index
25.	**AGFI**	Adjusted Goodness-of-Fit Index
26.	**NFI**	Normed Fit Index

27.	**CFI**	Comparative Fit Index
28.	**RMR**	Root Mean Square Residual
29.	**RMSEA**	Root Mean Square Error of Approximation
30.	**SFL**	Standardized factor loadings
31.	**AVE**	Average Variance Extracted
32.	**CR**	Composite Reliability
33.	**EFA**	Exploratory Factor Analysis
34.	**PGFI**	Parsimony goodness-of-fit index
35.	**PNFI**	Parsimony Normed fit index
36.	**NFI**	Normed fit index
37.	**TLI**	Tucker-Lewis index
38.	**CFI**	Comparative Fit Index
39.	**CFA**	Confirmatory Factor Analysis
40.	**CR**	Composite Reliability
41.	**AVE**	Average Variance Extracted
42.	**SFL**	Standardized Factor Loadings
43.	**SEM**	Structural Equation Modeling

Western Cape At 22:40 29 October 2016	**<u>Operational Performance</u>** Quality Cost Delivery Reduced defects/scrap Innovation Minimum Work in Progress Capacity utilization
University of Victoria(2014)	Operational Reliability Efficiency
Western Cape (2018)	Flexibility Delivery
Shawn Rocco Jones 2008	Inbound Internal Outbound Market Net Profit Margin Supply Chain Contribution
Adam Yagoub Abker Hamad 2014	Quality Cost Flexibility Delivery
ADILSON ADERITO SILVA 2017	Reliability Quality Costs

	Speed
China,et.al(2014)	Supplier Management - Customer Relationships - Manufacturing Participation in Strategy - Inventory Control
Western Cape May 2018	**supply chain integration** _ independent operation _ internal integration _ external integration
Xu, et. al. (2014)	Inter- organizational capabilities _ Supplier Integration _Customer Integration
Zhang and Huo (2012) Model	impact of dependence and trust on supply chain integration _ Supplier Integration _Customer Integration
Rosenzweig, et. al. (2002)	Supply chain integration intensity
Sebastian J, et. al. (2001:14)	Supply chain integration intensity
Huo (2012, Tolossa, et. al. (2013)	Supply chain integration intensity
Rostamzadeh, et. al. (2015:186)	Supply chain integration intensity

Mose, (2015:17)	Supply chain integration intensity
Sultan El-Tamimi (2015)	Supply chain integration intensity
Frohlich and westbrook (2001:186)	- Supplier Integration - Internal Processes Integration - Customer Integration
Western Cape May 2018	Information sharing Operational coordination
Toledo June 2005	Supply Chain Integration • Integration with Customers • Integration with Suppliers
Vikas Kumar et al. (2017)	- Supplier Integration - Internal Integration - Customer Integration - information integration
Alexis 2018	- Supplier Integration - Internal Integration - Customer Integration
Erlinda Yunus (2013)	- Supplier Integration - Internal Integration - Customer Integration
Western Cape At (2018)	Drivers of supply chain integration _ desire to improve _ environment
Western Cape (2018)	Barriers to supply chain integration _ internal planning failure

	_ external monitoring failure
Adeel anjum December 2016	- Integration with Customer - Integration with Suppliers -Cross functional Integration within organization
Wantao Yu (2015)	- Supplier Integration - Internal Integration - Customer Integration
C.Y. Wong et al. (2011)	- Supplier Integration - Internal Integration - Customer Integration
Dennis Minnich Frank H. Maier	**Supply chain responsiveness** _ willingness to shift to efficiency _ willingness to accept higher saftey stocks
Ashish Thatte, may2018	-Operations System Responsiveness -Logistics Process Responsiveness -Supplier Network Responsiveness
Ashish thatte 2007	-Operations System Responsiveness -Logistics Process Responsiveness -Supplier Network Responsiveness
Ruud lenders 2009-2010	-Speed -flexibility
BACHELOR THESIS L.C.A.	-Volume

VINKE 2010	-Process -product
Inda Sukati, 2012	• Operations System Responsiveness • Logistics Process Responsiveness • Supplier Network Responsiveness
Abu Bakar Abdul Hamid 2012	• Operations System Responsiveness • Logistics Process Responsiveness • Supplier Network Responsiveness
Rohaizat Baharun, 2012	• Operations System Responsiveness • Logistics Process Responsiveness • Supplier Network Responsiveness
Mohd Norfian Alifiah,2012	• Operations System Responsiveness • Logistics Process Responsiveness • Supplier Network Responsiveness
Matthias Holweg	Volume Process Product
Kamel Mohammad Al-Hawajreh 2014	• Operations System Responsiveness • Logistics Process Responsiveness • Supplier Network Responsiveness

Questionnaire Judgers:

No	Judger	University
1	Prof. Margani Hamor	University Of Khartoum
2	Prof. Abdalazez Abdalrahem	Alnileen University
3	Prof.Hassan Abbas	Ahfad University
4	Prof.Zaki Maki	Alnileen University
5	Prof. Omer Almagle	Banking Instituation
6	Prof.Bakrey Altayeb	University Of Science & Technology
7	Dr .Siddeg Balal	Sudan University
8	Dr. Altaher Ahmed	Sudan University
9	Dr. Ibrahim Hissen	Qater American University
10	Dr. Alshek Mohammed	Karray University
11	Dr.Ahmed Musa	Open Sudan University
12	Dr. Ahmed Abdallah	Alnileen University
13	Dr. Rodwan Alamin	Alzaem Alazhary

14	Dr. Abdallah Alkafeel	University of Khartoum
15	Dr. Musa Ahmed	Omdurman Islamic University
16	Dr. Abdalal Abdalwadood	Alzaem Alazhary
17	Dr. Kbashe Mohammed	Alnileen University
18	Dr. Omer Alazrag	Elnasr Technical Colleage
19	Dr. Adel Abdallah	Karray University
20	Dr. Abdalslam Adam	Sudan University

جامعة السودان للعلوم والتكنولوجيا
كليه الدراسات العليا
كلية الدراسات التجارية

الدور الوسيط للإستجابة في العلاقة بين تكامل سلاسل التوريد

و الأداء التشغيلي في ظل القدرات التكنولوجية كمتغير معدل

(القطاع الصحي بولاية الخرطوم)

The Mediating Role of Responsiveness on the Relationship between

Supply Chain Integration and Operational Performance: the

moderating effect of technological capabilities

Medical Field in Khartoum State)(

بحث مقدم لنيل درجة الدكتوراه في إدارة الأعمال

إعداد الطالبه:

نسيبه عزام ابراهيم يوسف

إشراف:

أ.د أحمد إبراهيم أبوسن

2018م

- 257 -

جامعة السودان للعلوم والتكنولوجيا
كليه الدراسات العليا
كلية الدراسات التجارية

السيد/ ....

المحترم

تحية طيبة و بعد

الموضوع: إستبانة بحث دكتوراة

إشارة للموضوع أعلاه فإن هذه الإستمارة التي بين يديك متعلقة بدراسة موضوع " **الدور الوسيط للإستجابة في العلاقة بين تكامل سلاسل التوريد و الأداء التشغيلي في ظل القدرات التكنولوجية كمتغير معدل"** عينة الدراسة قطاع المؤسسات الخدمية بولاية الخرطوم.دراسة مقدمة لنيل درجة الدكتوراة في إدارة الأعمال.

بين أيديكم إستبانة تحتوي علي فقرات الدراسة. أرجو التكرم بتفضلكم بالإطلاع علي محاورها و قراءة العبارات التي تتضمنها الإستبانة و وضع علامة صح في المكان المناسب الذي يعبر عن رأيك و أن الموضوعية و صدق الإستجابة تساعد الدراسة للوصول إلي نتائج أكثر دقة و التي سوف تعتمد عليها الدراسة. علما بأن جميع الإجابات سوف تكون موضع الإهتمام و سوف تستخدم لغرض البحث العلمي فقط.

و تفضلوا بقبول خالص التقدير و الإحترام ،،،،،،،،،،،،،،،،،

الباحثة : نسيبه عزام إبراهيم يوسف
ت: 00249913129091
nuseibaazzam@yahoo.com

المشرف :أ.د أحمد أبوسن

إستبانةَ ولَ الدور الوسيط للإستجابة في العلاقة بين تكامل سلاسل التوريد والأداء التشغيلي في ظل القدرات التكنولوجية كمتغير معدل

القسم الأول: البيانات الشخصية

1- الجنس:

ذكر ☐   أنثى ☐

2- العمر :

25 – 35 ☐   36 – 45 ☐   46 – 55 ☐   56 فما فوق ☐

3- المؤهل العلمي :

قبل الجامعي ☐   جامعي ☐   فوق الجامعي ☐

(أ) تخصص أكاديمي :

إدارة أعمال ☐   محاسبة ☐   إقتصاد ☐   علوم طبية ☐   أخري☐

(ب) الدرجة الوظيفية:

مدير عام ☐   نائب مدير ☐   مدير طبي ☐   مدير إداري ☐   مدير مالي ☐

(ج) الخبرة :

أقل من 5 سنوات ☐   5 - 10 سنوات ☐   10– 15 سنوات ☐   15 سنه فأكثر ☐

القسم الثاني : معلومات عن المؤسسة:

1- إسم المؤسسة:

مستشفيات خاصة ☐   مراكز علاجية ☐   خدمات صحية☐

2- طبيعة العمل بالمؤسسة:

تجاري ☐   خدمي ☐   أخري ☐

3- عدد العاملين بالمؤسسة:

أقل من 50 عامل ☐   50 و أقل من 100 عامل ☐   100 و أقل من 150 ☐

150و أقل من 200 ☐   200 عامل فأكثر ☐

4- عدد المنافسين للمؤسسة:

أأقل من 5 ☐   5 و أقل من 10 ☐   10 و أقل من 15 ☐   15 و أقل من 20 ☐   20 فأكثر ☐

5- ملكية المؤسسة:

مؤسسة خاصة ☐   مؤسسة شراكة ☐   مؤسسة مساهمة ☐   أخري ☐

6- سنوات الخبرة للمؤسسة:

أقل من 5 ☐   5 و أقل من 10 ☐   10 و أقل من 15 ☐   15 و أقل من 20 ☐

20 فأكثر ☐

7- عدد الموردين للمؤسسة:

أقل من 5 ☐   5 و أقل من 10 ☐   10 و أقل من 15 ☐   15 و أقل من 20 ☐

20 فأكثر ☐

القسم الثالث: المحاور

أولا المتغير المستغل : تكامل سلاسل التوريد

تكامل سلاسل التوريد هو قدرة المنظمة علي تحقيق التكامل بين أنشطتها و عملياتها الداخلية و التعاون مع مورديها و عملائها.

1- تكامل داخلي:

يشير التكامل الداخلي إلي نظام التعاون بين الوظائف المختلفة في المنظمة حتي تتمكن المنظمة من تلبية إحتياجات العملاء في الوقت المناسب و بالتكلفة المناسبة.

الرقم	العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
1	تشترك جميع الوظائف الداخلية في المؤسسة لمعالجة الطلبات.					
2	يتم مشاركة البيانات المتعلقة بمستوى المخزون.					
3	لدينا نظام موحد للبيانات التشغيلية اللوجستية تستخدم في جميع اقسام المؤسسة.					
4	تقوم المؤسسة بعقد إجتماعات دورية مع مختلف الاقسام لتنسيق الأعمال المرتبطة بالتوريد.					

تكامل الزبائن:

يشير تكامل الزبائن إلي قدرة المنظمة علي بناء و تطوير و المحافظة علي علاقات تعاونية و تبادل للمعلومات مع العملاء.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	العبارات	الرقم
					للمؤسسة علاقات تعاون وثيقة مع الزبائن	1
					هناك ثقة قوية بين المؤسسة والزبائن	2
					يتم التنسيق بشكل ملائم للأنشطة المشتركة بين المؤسسة والزبائن	3
					يتم التعاون بين المؤسسة والزبائن في حل المشكلات	4
					يتم تبادل المعلومات بشفافية بين المؤسسة والزبائن	5

2- تكامل المورد:

يشير تكامل المورد إلي قدرة المنظمة علي بناء و تطوير و المحافظة علي علاقات تعاونية و تبادل معلومات مع الموردين.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	العبارات	الرقم
					العلاقة بين الشركة والموردين مبنية على الثقة	1
					تعمل الشركة على اشراك الموردين في أنشطتها المختلفة	2
					توجد قنوات اتصال رسمية وغير رسمية بين الموردين والشركة	3
					تتبادل الشركة المعلومات مع الموردين بشفافية ووضوح	4
					يقدم الموردون خدمات ما بعد التوريد تتلائم مع متطلبات الشركة	5

ثانيا المتغير الوسيط : الإستجابة

إستجابة سلاسل التوريد تشير إلي قدرتها علي التكيف مع التغيرات التي تحدث في البيئة و السوق بسرعة و فعالية

1- إستجابة نظام العمليات:

تشير إستجابة نظام العمليات إلي قدرة نظام العمليات بالمنظمة علي التعامل مع التغيرات في طلب العملاء، للإستجابة للتغيرات في طلب العملاء.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	العبارات	الرقم
					نظام التشغيل في المؤسسة يستجيب بسرعة لمتطلبات العملاء.	1
					نظام التشغيل في المؤسسة يلبي طلبات العملاء في الوقت المناسب.	2
					يقوم نظام التشغيل في المؤسسة بسرعة بإعادة هيكلة آليات لمعالجة التغيرات في الطلب.	3
					نظام التشغيل في المؤسسة لديه القدرة على التعديل والإستجابة لأكبر عدد من العمليات.	4
					نظام التشغيل في المؤسسة لديه القدرة على إعادة تجهيز الآليات بسرعة لمواجهة التغيرات التي يطلبها العملاء.	5

2- إستجابة العمليات اللوجستية:

تشير إستجابة العمليات اللوجستية إلي قدرة أنشطة النقل و التخزين و التوزيع بالمنظمة علي التعامل مع التغيرات في طلب العملاء، و سرعة الإستجابة للتغيرات في طلب العملاء.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	العبارات	الرقم
					يستجيب النظام اللوجستي في المؤسسة بسرعة للتغيرات غير المتوقعة في طلب العملاء	1
					في المؤسسة يستطيع النظام اللوجستي على تعديل الطاقة الإستيعابية للمخزون بسرعة لمواجهة التغيرات غير المتوقعة في طلب العملاء.	2
					نظامنا اللوجستي لديه القدرة على تنويع وسائل النقل لمواجهة التغيرات في الطلب.	3
					نظامنا اللوجستي لدية القدرة على الإيفاء بالخدمات بشكل عاجل.	4

3- إستجابة شبكة الموردين:

تشير إستجابة شبكة الموردين إلي قدرة الموردين الرئيسين للمنظمة علي التعامل مع التغيرات في طلب المنظمة. حيث تتوقف قدرة المنظمة علي الإستجابة بسرعة للتغيرات في طلب العملاء علي سرعة رد فعل الموردين للتعامل مع طلب المنظمة.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	العبارات	الرقم
					يقوموا موردينا الرئيسيون بتغير مزيج الخدمات التي يقدمونها في وقت قصير نسبياً .	1
					يعملوا موردينا الرئيسيون على استيعاب طلباتنا باستمرار.	2
					موريدينا الرئيسيون يوفروا الخدمات اللوجستية التي نحتاج اليها.	3
					يقوموا موردينا الرئيسيون بالتسليم في الوقت المحدد.	4
					موريدينا الرئيسيون يستجيبوا بشكل فعال لطلباتنا الطارئه .	5

ثالثا المتغير المعدل : القدرات التكنولوجية

تشير القدرات التكنولوجية للمعلومات لإمتلاك الشركة أنظمة و برمجيات و مهارات تساعد علي العمل بشكل مشترك بين الشركة و شركائها.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	العبارات	الرقم
					لدى المؤسسة خبرة في مجال أحدث التقنيات الحالية.	1
					لدينا أفضل بنية تحتية لتكنولوجيا المعلومات مقارنة بمنافسينا.	2
					لدينا القدرة على ربط جميع مرافق المؤسسة مع بعضها.	3
					لدى المؤسسة تكنولوجيا لأنظمة البرامج لربط البنية التحتية مع شركائنا.	4
					لدى المؤسسة تكنولوجيا معلومات تتيح إمكانية الوصول لشركائنا.	5

رابعا المتغير التابع : الأداء التشغيلي

يشير الأداء التشغيلى الى النتائج المرغوبة التي تسعى المؤسسة إلى تحقيقها وهوقدرة المؤسسة على تحديد أهدافها من خلال الاستخدام الكفء والفعال لمواردها المتاحة.

1- تكلفة الأداء:

تشير تكلفة الأداء لتقديم خدمة بأقل تكلفة و إيصالها للزبائن بأقل سعر.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	العبارات	الرقم
					تعتبر تكاليف خدماتنا أقل مقارنة مع المنافسين.	1
					ندير المخزون بطريقة تساعد علي تخفيض التكاليف.	2
					توازن سياستنا بين تكاليف الحصول علي المخزون والاحتفاظ به.	3
					نحافظ علي جودة خدماتنا بأقل تكلفة.	4

2- أداء الخدمة:

يشير أداء الخدمة لتحقيق النوعية والجودة العالية، وبتوقيت مناسب لمتطلبات العملاء.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	العبارات	الرقم
					في مؤسستنا درجة عالية من المرونة في التعاون مع الشركاء.	1
					نوفر في المؤسسة كافة الخدمات الخاصة لمتطلبات العملاء.	2
					في المؤسسة يحصل الزبون علي الخدمات في الوقت المناسب.	3
					مقدرة المؤسسة على تزويد العملاء بخدمة ذات قيمة مضافة.	4
					نتعاون في المؤسسة على التغلب لأي مشاكل مع الشركاء.	5

3- جودة الآداء:

تشير جودة الأداء إلي تحسين الأنشطه و العمليات لتحقيق رضاء العملاء و تقديم الخدمات بجودة عالية مقارنة بالمنافسين.

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	العبارات	الرقم
					لدينا جودة عالية من الخدمات مقارنة مع منافسينا.	1
					نعمل بإستمرار لتقديم خدمات ذات جودة عالية.	2
					نعمل علي توظيف خبراتنا في تقديم الخدمة.	3
					في المؤسسة نعمل علي توظيف معارفنا في تقديم الخدمة.	4