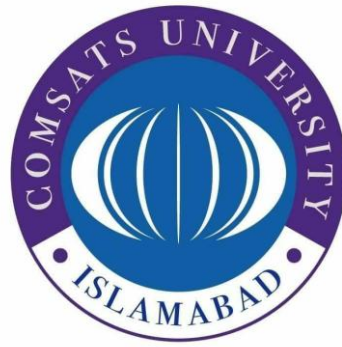


The Relationships between Supply Chain Agility
and Supply Chain Performance under the
Moderating Role of Environment Uncertainty



By

Ahmed Ghazali

CIIT/FA20-RBA-007/LHR

Master's Thesis

In

Master's in Business Administration

COMSATS University Islamabad,

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A thesis Presented to

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of the requirement for the degree of

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A Post Graduate Thesis submitted to the department of Management Sciences
as partial fulfillment of the requirement for the award of Degree of Master of
Business Administration.

Name	Registration Number
Ahmed Ghazali	CIIT/FA20-RBA-007/LHR

Supervisor

Dr. Ghulam Hussain
Associate Professor
Department of Management Sciences
COMSATS University Islamabad
Lahore Campus
January 2023

Final Approval

The Relationships between Supply Chain Agility and Supply Chain Performance under the Moderating Role of Environment Uncertainty

By

Ahmed Ghazali

CIIT/FA20/RBA-001/LHR

Has been approved

For the COMSATS University Islamabad, Lahore Campus

External Examiner: _____

Dr

Supervisor: _____

Dr. Ghulam Hussain

Management Sciences / Lahore

HoD: _____

Name

HoD (Management Sciences / Lahore)

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I Ahmed Ghazali FA20/RBA-001 hereby declare that I have produced the work presented in this thesis, during the scheduled period of study. I also declare that I have not taken any material from any source except referred to wherever due that amount of plagiarism is within acceptable range. If a violation of HEC rules on research has occurred in this thesis, I shall be liable to punishable action under the plagiarism rules of the HEC.

Date: _____

Ahmed Ghazali
CIIT/FA20/RBA-001/LHR

Certificate

It is certified that Ahmed Ghazali FA20/RBA-001 has carried out all the work related to this thesis under my supervision at the Department of Management Science COMSATS University Islamabad, Lahore Campus and the work fulfills the requirement for award of Master's Degree.

Date: _____

Supervisor:

Dr. Ghulam Hussain
Associate Professor
Department of Management Sciences

Head of Department:

Dr. Rana Nadir Idrees
Department of Management Science

DEDICATION

This thesis work is dedicated to my Teachers, who have been a constant source of support and encouragement during the challenges of graduate school and life. I am truly thankful for having you in my life. This work is also dedicated to my parents, who have always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve.

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Ahmed Ghazali
CIIT/FA20/RBA-001/LHR

ABSTRACT

The Relationships between Supply Chain Agility and Supply Chain Performance under the Moderating Role of Environment Uncertainty

The main purpose of this study is to examine the impact of supply chain agility on supply chain performance under the moderating effect of environment uncertainty. Considering the research's objectives; this study tested the direct effect of supply chain agility on supply chain performance, and the moderating effect of environmental uncertainty on supply chain agility and supply chain performance. Data was collected through online surveys from supply chain managers of the manufacturing firms. Analysis was performed on 317 responses. The findings showed that there is a positive and significant relationship between supply chain agility and supply chain performance. Environment uncertainty also has a significant and positive moderating effect on supply chain agility and supply chain performance. Based on the study's findings, implications for theory and practice are presented at the end.

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List of Abbreviation's

A	Alpha
B	Beta
SCA	Supply Chain Agility.
SCP	Supply Chain Performance.
ENV	Environment Uncertainty.
DC	Dynamic Capabilities

Chapter 1

Introduction

1.1 Background of the Study

Today's business environment can be defined by constant change, turbulent and volatile markets, limited life cycle of a product, and increased demand uncertainty (Christopher M. 2., 2000) (Agarwal, 2007) (Almahamid, 2010). As these conditions became the standard, business organizations and the scholars parallel have turned to the concept of supply chain agility (SCA) in their pursuit for a sustainable source of having competitive advantage. Agility has been well-known as the mean for handling change, increasing customer responsiveness, and mastering market turbulence (Hoek, 2001) (Ismail, 2006). SCA has come up as a prevailing competitive advantage for the organizations in this unpredictable and changing business environment, and has been signaled as the business pattern of this era. (Tseng, 2011). Agility resulted from the idea of some business professionals who wanted to bring an insightful change in the model of manufacturing business to address the changes in the global competitive environment. These groups of business professionals have termed agility as a process that can swiftly shift between the prototypes and products to encounter the fluctuations in the marketplace (Yusuf, 1999). The concept of agility in the business environment instigated the principles of agility to be functional in different aspects of the industries (Katayama, 1999). The impression of agility is stretched to responsive opponents (Goldman S. N., 1995) revolutions in agility (Wilson K. a., 2011) agility incorporate affairs, (Preiss, 1996), organizational agility, (Goldman S. N., 1993) (Lu Y. a., 2012). The most important element for improving firm competitiveness is agility and agility has been mirrored for firms to prosper and thrive in vibrant environment (Gunasekaran A. a., 2002). The growth of agility is of immense importance because the typical contemporary business has turned towards the concept that specific industries cannot contest as exclusive independent organizations, but relatively like SC, (Cooper, 2000) (Christopher M. , 2005) (Defee, 2005) (Stank, 2005). For the organizations to accomplish the upper hand in the quickly changing business climate, firms need to line up with the customers and the suppliers to

facilitate tasks and accomplish a degree of SCA past your entrants (Lin, 2006). All the associates in the supply chain must align communal competences rapidly to react to the fluctuations in the supply and demand (Gligor D. a., 2012). In the SC management, agility is highlighted as an extremely significant affair (Lee H. , 2004). Explicitly, a few articles examine the idea of an agile supply chain, whereas there are few articles that talk about the idea of steady SCA, whereas additional utilize both relationships reciprocally (Christopher M. 2., 2000) (Lee H. , 2004) (Swafford, 2006) (Li X. G., 2009). Agile supply chain discusses the use of responsiveness, competency, flexibility and rapidness to achieve the wellness of supply chain operations on a regular basis. Agility is a very wide notion connecting several aspects (Gligor D. a., 2012). The constructive impression of agility has received great appreciation; scholar's provides concepts that are related to multiple theories. An inclusive definition of SCA is advanced in successive segments, so it is necessary to showcase a primary employed definition of agility. In spirit, SCA of a firm can be referred as the capacity to regulate the strategies and operations with inside its SC in order to address or acclimatize to the variations, like the potential possibilities and issues in the surroundings. There are plenty of theoretical implications associated with addressing the gaps highlighted in this research. This thesis underwrites in constructing model and highlighting confusion neighboring its measurements moreover defining an agile supply chain and furthermore addressing how firm SCA affects performance of SC. Study enlarges on, (Li X. G., 2009) (Braunscheidel, 2009) work by conceptualizing 12 concepts multidimensionality. The research highlights the flexibility, swiftness, alertness, accessibility and decisiveness as firm SCA dimensions. The thesis underwrites to the growth of theory with a briefing a thorough description on the influence of agility on performance of SC. This thesis will help the managers to understand the advantages that are linked with the SCA and the impact of SCA on the Supply chain performance. SCA involves the supply chain of the organization to respond to the consumers demand, market changes and unpredictability and the shortening lifespan of a product range. A company that has a base product in stock that is a "work in progress" that can be swiftly adjusted to satisfy a specific customer requirement. A production process that isn't constrained by the need to mass-produce items but can differentiate products and respond swiftly to market changes and consumer needs. Companies can decrease costs and optimize

inventories by forecasting demand as accurately as feasible through SCA. Organizations that have attributes of SCA respond quickly are able to efficiently deliver price competitive solution for the consumer requirement. This complete scenario is grounded on the liveness in the supply, design, distribution & production. For the commodities like in the food sector and clothing sector, it is most suitable that needs to make obtainable as soon as demanded by the customers. An agile supply chain enables a company to develop a predictable supply chain with an agile supply chain. In a continuously changing economic environment, an agile supply chain can adapt to meet unforeseen demand. Agile supply networks can produce a wide range of items in a short amount of time. However, there are conflicting views and overall lack of research regarding how to effectively implement the agility in the supply chain of the organization. Agile supply chains are not suitable for all organizations and, sometimes human or technical errors can restrict agility, deeply embedded technologies can also limit its success.

1.2 Statement of the Problem

Demand of supply chain around the world has grown immensely because of recent pandemic. The supply chain specialists have also received recognition because of the hard work they have put in maintaining the complete process of the supply chain in a smooth and efficient manner in that tough environment. This pandemic highlighted the importance of an agile supply chain and allowed the organizations to recognize the importance of agility. The organizations that remain efficient have enjoyed success, and those who did not both have prepared themselves in a better manner to adapt to situations like these soon. Agile supply chain ensures the products are handed over to the customers with their complete requirement and on time. Agility will ensure the inventory management properly with an accurate level of inventory. This research aims to identify and evaluating SCA for highly dynamic industries in which subject knowledge is continuously growing. The purpose of the research is to let the organizations know about having an agile supply chain and what role does agility plays in performance of the firm's supply chain.

This chapter will provide an introduction to the study by first discussing the background and context, followed by the research problem, the research aims, objectives and questions, the significance and, finally, the limitations. An Agile SC is

been known as the firm's ability in quickly regulate the strategies specifically looking into stock maintenance, procurement and the ability to deliver products to encounter the uncertainty that are required for the SC. Firms that have great command and excellence in SCA can adopt to the changes easily like changes in the market conditions and can effectively in no time take advantage of the new business opportunities. To build an agile supply chain, the organizations must have the resources to improve and optimize operations of the logistics efficiently, easily implement the latest automation and technology, and gain visibility into the operations and access to real-time data. In the current time where after the global pandemic the market has seen an immense shift to the e-commerce, platforms like Amazon, Ebay, Shopify, Alibaba, Ali express and even Daraz has seen a huge boom in their business because of their high degree of SCA. These big market monsters have taken the advantage of the business opportunities that came across their way because of the global pandemic. Amazon has recorded the highest sale of lifetime during that time. This shows the importance agility plays in the business growth of an organization. A refine process with technology advancement is a value addition for a company to reach heights and ecommerce business secured that during the pandemic. An agile SC plays a significance role across multiple businesses, but also is considered as an empowered tool in the light of online businesses, consumer interaction, addressing customers' requirements and also optimizing operational costs. One of the superior benefit of SCA is that it enables companies to consistently meet the demand of the customers swiftly, affordable shipping despite the fluctuations in the numbers of the orders. To meet the always changing market trends, demands take careful planning and execution of the supply chain.

1.3 Research Objective

“Previous researches show us that few distinguishing pointers, besides their modification, can encourage the agility of SC system. The communication instrument amongst the attributes of agility of SC system is praise worthy to consider for the sake of improving the agility of SC system with the mode of regulating the measure or else the arrangement of the SC system. Supply chain has gained immense popularity in recent times. In the recent pandemic, it has played an important role in meeting customer expectations. The organizations that have not yet seen the importance of

SCA after the pandemic and are not adapting an agile chain they cannot compete in this extremely tough business environment. The organization should have this ability that they could react to future uncertainties and should evaluate their strategies by forecasting future events. So that they could easily adapt to the situation with better plans. The companies will achieve success as the when they will acclimatize the advancement in the technology and could adjust themselves to meeting the needs of the market. Organizations can speed up their response time with an agile supply chain. Primary aspects of increasing agility are when the organizations are shifting towards complete automation and also forecasting a better future. It is extremely important for an organization who is willing for a shift that they should adapt these aspects in order to enhance agility. Organization that doesn't change its operations, will stuck behind in the race. Opting to handling operations manually will take a lot of time and is also difficult to manage with more chances of mistakes as well. According to a survey, the most important cause of not forecasting the environment uncertainties is their pace to react and their failure to evaluate the problems (Citation). All this is because of the manual handling of operations, which takes more time and is very slow. Manual operations are extremely difficult to manage because there are multiple tasks that are been performed in same time resulting in errors. The companies that embrace agility, can overcome critical obstacles like the problems in maintenance of data, performing multiple tasks and also to integrate. Upgrading to the technological advancement will help companies to perform tasks more efficiently and rapidly than to do it manually with no conflicts. A mechanism that is smooth in process and is better able to manage your work operations help organizations to be more agile and prepares them to encounter the conflicts they or they may face in the chain of supply. Organizations should focus more towards an agile system because it helps them to motivate and pursue the management towards the expected goals, they want to achieve. With an agile supply chain, a firm can be efficient and competitive with everyone across the business, be it your supplier or anyone. This will help the management provide necessary and accurate that they need in order to drive towards the change in the market environment. To achieve all these, organizations also need a proper and relevant stage to do this. Irrelevant market or stage will not allow organizations to taste better result they will get from this.

Agile supply chain is critically important for the performance of the companies and the employee's satisfaction as well. Many studies have investigated the strategies that how an organization can switch to the agile network to escalate supply chain and how it is beneficial for the organization. However, these studies have traditionally focused on relatively slow paced industries where the operations and the structure do not change often. This body of the theory presents a problem for the organizations that are facing these problems and cannot embed an agile supply chain network. These include the organizations that are keen on development and cannot adopt to new operations, structures, and other practices. As a result, the existing research is inadequate for the organizations in which essential skills and knowledge are not constantly and rapidly developing, organization in such multifaceted environment and unable to cope up with the different unpredicted changes and face problems. Provided the lack of research regarding the organizations to implement an agile supply chain in the fast-moving competition, this study will aim to identify and evaluate the problems the organizations face in implementing agility, its importance and the part agility plays in contributing to the general presentation of a SC. Addressing the study breaches highlighted overhead subsequent research objectives are designed:

1.4 Research Questions

1. What is the impact of SCA on supply chain performance?
2. What is the effect of environmental uncertainty on supply chain performance?
3. What is the moderating effect of environmental uncertainty on SCA and supply chain performance?

1.5 Significance of the Study

This study will contribute to the body of knowledge on agility for organizations so that they can adapt rapidly to constant changes. This helps address the ongoing current deficiency of research in this field and offers value to organizations functioning in these vibrant atmospheres. In this chapter, the framework related to the research is highlighted. There was immense need for this investigation and to achieve aims. Furthermore, limitations in this

Research have also discoursed. Now the next section contains prevailing work and will be appraised towards recognizing agility importance, the role it plays in

increasing the overall performance of supply chain within the context of fast moving organizations, especially that has an agile supply chain. Dynamic capabilities have also enhanced the concept of agility and the concept of supply chain in this study. Dynamic capability is referred to as the ability of an organization to merge and construct the resources to discourse and form the quickly changing business environment. Dynamics capabilities of SC are keener on prompting the capability of SC to adjust to variations of market and less on developing the atmosphere according to theory of dynamic capabilities. Until now not much scholars have used dynamic capabilities in SCM. Dynamic capabilities are used in new theories of SCM. These dynamic capabilities encourage actual use of capabilities in case of gaining of knowledge in an organization and cases of creation of new capabilities. This leads to the discovery of competitive advantage. Dynamic capabilities make organization with its resources to reconfigure its operational capabilities and find new capabilities which let organization to gain competitive advantage among other market participants. The combination of dynamic capabilities and SCM makes organization more flexible and dynamic, organization can easily and fast to adapt to new market trends and easily go through market turbulences. That creates to a company competitive advantage among other market participants.

1.6 Scope of the Study

The advancement of IT with enhancement in the globalization made SC systems further complex and dynamic. The SC arrangement is a kind of a multifaceted system that comprises allied objects like which comprises the sellers, producers, vendors, and consumers. With ongoing fluctuations in the market atmosphere and fruition of corporate organizations cause that the SC system should be further agile so that the unexpected marketplace demands are satisfied professionally and successfully. The erratic variations in the center and peripheral atmosphere cause that the SC arrangement holds the consistent receptive capability. The complex assembly of the association should be closely related to the agility. The agility of the organization as a manufacturer is referred as the capability of rapidly switching among different production lines and models that emphasizes on the liveness of the manufacturing developments and methods in command to answer to customers 'need in actual timeframe. Alternative concept is that the organization rapidly reorganizes or rebuilt

the entire process that is already been implemented and also discovering new methods to compete with the demand tendency for the sake of improvement in the capability to curtail in the extremely vibrant reasonable market situation. SCA is not about adjusting the day to day operations and the flow of work to meet internal performance, but also improving the manufacturing SCA will swiftly change internal processes. Most of time it means adopting new technology, data management and service agreements with the vendors. The aim is to maintain a responsive and smooth supply chain that can direct any changes that may come their way, be it positive or negative. Successful and effective supply chain relies on firstly understanding the factors externally that shapes your supply chain logistics regardless of how slow things are the current moment, discovering the value chain components that are most affected by industry disturbances. Explaining the agility of the entire SC system refers to the capability that associates and complete SC quickly arranges a system coalition to transmit the processes to address vibrant and impulsive mandate of the consumers. Over the past decade, agility has been one of the key concepts discussed by many authors. In this article, we do not intend to provide an exhaustive review of the literature, but simply a quick analysis elaborated in sufficient detail to allow clarifying the concept of agility. Supply chain sensitivity and build a consistent evaluation model. The emphasis on SCA from a SC perspective was developed in 2001 and was first initiated by (Van Hoek, 2001). According to (Lee H. , 2004) key goals of an agile supply chain are to respond quickly to short-term changes in demand (or supply) and smoothly manage external disturbances. Sometimes agility can be confused with similar but different concepts, like adaptability and resilience. While agility is the ability to manage and exploit uncertainty and variability. Adaptability is more used for deeper changes in the medium term. Adaptive supply chains adjust their design in response to structural changes in the market, and change and adjust supply networks to align with strategies, products, and technologies (Lee H. , 2004). (Christopher M. a., 2004) Defined resilience as the ability to ability of a system to return to its original state or change to a new and more desirable state after an interruption. The recent pandemic emphasized significance that how an agile supply chain and how it is extremely important in current times. This has also glorified the old impression within professional processes approach, which was 3A's SC. Triple-A supply chain means having a cost effective and fast supply chain cannot provide an organization a

competitive advantage. This strategy has been failed as organizations with these strategies have been seen deteriorated in the past. Supply chain that provides an organization a competitive advantage displays agility, adaptability, and alignment. Agility refers to the businesses capability to react towards sudden fluctuations of the demand. The organizations should learn its importance as the SC executives around entire businesses remain experiencing presently by working in order to fulfill the unpredicted demands while also facing through the scarcities of stock shaped through the global pandemic. For example, a grocery industry, in the stores the empty shelves suggest the supply of the food is at risk and customers are worried, but in the grocery store industries there is utmost steady plus robust SC than some other business. As they have recognized that the industry faced an unforeseen rise in the demand during the pandemic, customers were worried that things will be sold out they won't be able to purchase items, then there was a sudden shift everyone was eating at home instead of eating out. That you can go to the grocery store where you can most of your grocery is a testament to the agility of grocery supply chains. This shows the ability to effortlessly source the products from different locations, performing all the necessary and rapid shipments between the grocery stores, ration products by different region and locations and transfer of these shipments are a sign of rapid supply chain. Adaptability reflects of an organization to adjust to a changing marketplace. Considering the grocery industry again over the past decade, all the big guns in this industry have fought to see who will curtail in this immensely difficult and fast-paced market like on the biggest marketplace ground breaker in the field of e-commerce. All the strategies implemented in this industry has been seen failing in this market like from near distribution center to decided last stop transport, at households then others. They tried and consume wide range of methods that include stores pickup, van pickups delivery, and even other system. Revenue in the grocery industry has been enticing and very few of the grocers have figured out the customer friendly model that can help them to lead to a decent profit margin. Global pandemic has not allowed the grocers to test different delivery models because of the extremely swerve situation, but the epidemic has vividly enhanced the purchaser acceptance to purchase at home through e-commerce. The grocers were left with no alternative instead of acclimatize their professional representations besides distribution, approaches now actual quick period in resolving operational distribution issue and the purchasers were speedily

shifting towards accessible shopping. Arrangement follows as soon as interest of vendors, dealers, producers within SC gets connected in a way that discrete judgment help enhance performance of the SC. A vendor whose main purpose is to enhance the excellence of the work between them and the providers toward mending overall procedures plus excellence production instead of using the valuing compression techniques that might root the contractors in opting price wounding techniques that also reduces quality.

With COVID-19, we have seen unparalleled associations among different businesses towards an amount for the sake of terrible requirement in like these crucial difficult periods. Associations within the SC remain somewhat that doesn't come up very often and easily, nor do the companies turn it on. It requires a lot of time and efforts for the companies to develop faith with also addition to employed associations with the contractors. Calamity pushed the shareholders within the SC in order to serve collaboratively in this time and support each other, like medicinal expedient SC.

1.7 Definition of the terms

The terms used often in this study are SCA, supply chain management, environment uncertainty, and Dynamic Capabilities. SCA is termed as the capability of the firms to rapidly change its tactics specifically in managing the inventory procurement and swiftness in the delivery to meet the increasingly changing needs of SC. Environment uncertainty is defined as uncertainty of the environment, the inability to predict the impact of environmental change, and the inability to predict the consequences of response choices. Supply chain Management Supply chain management is the management of the flow of goods and services and includes all processes that transform raw materials into final products. Dynamic capability is referred to as the ability of an organization to merge and construct the resources to discourse and form the quickly changing business environment.

1.8 Summary of the Chapter and structure of the Proposal

This Study is organized into five chapters. Chapter1 presents a synopsis of the happenings of industry and also highlighting the research breaches in this research, determine the research questions and research objectives, the scope of this study,

Definitions of the frequently used terms and offers this research possible academic and administrative contributions.

Chapter 2 provides a theory and hypotheses overview.

Chapter 3 explains the methodology used in this dissertation like the collection of the data and its scrutiny course of action.

Chapter 4 offers study's findings. Chapter 5 discusses the results and implications for theory and practice.

Chapter 2

Literature Review

The Versatility of agility has led the way to so much if uncertainty and vagueness. Factors and connection between the elements of the agility and under developed. The comprehensive amalgamation of the business mechanisms has been termed as agility (Kidd, 1994) and as the capacity to switch quickly from one products assembly to another's assembly (Quinn, 1997). Researchers have tinted the multiple dimensions of agility which are cogitated in different perceptions on agility inside and outside the areas of business (Booth, 1995) explain it as a manufacturing idea that developed naturally from the initial notion of lean manufacturing with a focus on reduction in the cost. (Kumar, 1995)Termed agility as ability of the company to speed up the critical route. Initially, the definition of agility focuses on reduction in the cost, whereas the second major focus is on the swiftness of agility. Besides the confusion, some definitions of agility explain the qualities or features of agility. Together, they show that few similarities across agility conceptualization occur, but have not yet reached to any harmony. Consecutive investigations on these definitions specify agility have changed with the period and the scholars have extended the scopes of the theory. The issue, however, is the lack of accuracy associated with this method. Agility now has factors that have nothing to do with its original purpose. The (Merriam-Webster, 2012)defines agility as "nimble" moreover developed to represent a myriad of required traits with commercial consequences; therefore, scholars have stayed away from the original meaning of the word agility. This broad approach to define agility has resulted in the demise of SCA hypothetical foundation plus unwillingness scheduled towards part of experts in order to completely adopt their training. It is necessary to define what agility is and is not in order to attain its maximum perspective as a corporate idea. The theoretical foundations of SCA are based on the extensive notion of agility within the field of industry. However, the SCA notion has kept the paradoxes associated with agility as a business concept. Agility is defined with extensive definitions with none consensus within its parameters. For example, defines an agile chain an ability to implement or reacting to the fluctuations in the marketplace's environment in quick manner. Very few efforts are needed for

incorporating SCA beginning the perception of SC. Midst those, (Swafford, 2006) take a one-dimensional method to term and recognize complexity of agility. There are two similar articles that recognize the complex approach of agility. (Li X. G., 2009) Has analyzed the concept of agility which is related to the quick response ability and the alertness to change ability. Both models recommend that the firm SCA is displayed within the ability of the firm to be alert and react to distinct changes at the strategic, operational and episodic level. There are six factors that has portrays agility of a supply chain are those are mentioned in this research. This research aims to recognize the major concept of agility that is the response ability and the alertness to change ability of a firm supply chain. This research depicts one very important aspect of agility dimension that is the pre arrangement of the response capability. A supply chain that is rapid in responding to changes in the environment and also to be alert to identify those changes is termed as an agile supply chain. But to this context there is no relevant information provided by or collected like how the capability of responding to changes is introduced or what actually is the need for this capability. This research highlights the gap in understanding that what impact an agile supply chain has on the performance of the firm's supply chain. Though there are many advantages of SCA that are well known and widely accepted (Christopher M. 2., 2000) (Van Oyen, 2001) (Wilson K. a., 2011) (Zhang, 2011). There has been very limited research conducted that identifies or highlights the impact SCA has on performance of the SC of a firm. Effectiveness and efficiency highlight the firm's performance that how effectively is the firm able to respond to different complex situations in the marker (Mentzer, 1991) (Fugate, 2009). Many Scholars asserted that effectiveness of a supply chain and agility is closely linked with each other if a firm is not as effective as it should be in responding or adopting to predicted market changes it cannot achieve agility (Ketchen, 2007) (Lee H. , 2004) (Li X. C., 2008). The agility of a supply chain is associated with the customer effectiveness and is also recognized as the opposite of lean (Goldsby, 2006). The concept of an agile manufacturing system has also gained immense importance in today's time and has grabbed attention of multiple businesses from the period of its introduction (Bottani, 2010) (Jain, 2008) (Almahamid, 2010). Few prominent perceptions built on the number of references are explained. Most quoted agility definitions were provided by (Goldman S. N., 1995). Agility has been defined by the authors with multiple aspects both with inside and outside the business

as a strategy that enriches customers, which allows businesses to work together to improve effectiveness, organizations to acclimatize and flourish in the face of market fluctuations and vagueness, and capitalize on the information and impact it has on people. Research by Goldman et al. has served as the basis for many authors who have proposed unique characteristics and properties of agility. For example, (Gunasekaran A. , 1998) views agile manufacturing as the ability to survive and thrive in a constantly changing and unpredictable competitive environment by reacting quickly and efficiently to changing markets through customer-designed products and services. This definition contains the same elements as that of (Goldman S. N., 1995) where it emphasizes the ability to thrive when unexpected changes occur and that a rapid response is needed. (Narasimhan, 2006) Also used factors of demand uncertainty and changed in their definition of agility. They consider production to be fast if it can effectively change operational states in response to a change in the environment. Other researchers offer similar explanations for agility, such as (Sarkis, 2001), who defined agility as the ability to thrive in constantly and frequently changing environments and unforeseeable. (DeVor, 1997) Define SCA the organizations capability to operate profitably in case of fluctuating conditions and volatile competitive environment, however (Ismail, 2006) referred SCA a capability of an organization dealing through unexpected variations, surviving through extraordinary intimidations in the working world, and turn deviations into prospects. (Dove, 1994) (R, 1999) defines agility as the ability to successfully explore inexpensive centers (quickness, liveness, proactive invention, excellence, and productivity) by utilizing knowledge-rich environments, rearranging deep pockets, and implementing best practices to produce customer-focused goods and services in a market that is changing quickly. Explanation of SCA focuses on the value of incorporating facilities in achieving the agility that is expected. Agility, according to more recent agility definitions, agility improves a company's capacity to respond quickly to changing consumer needs in order to survive increasing risks in the economic world, and seize opportunities as they arise. Historical review discloses that primary emphasis of the study was on cost adaptation in order to save costs. Reduced breakeven point and fixed expenses (Katayama, 1999). The desire to create customer value in an environment where customers' expectations are increasingly individualized appears to be driving the drive to become agile over time. Agile

manufacturing is viewed to respond fast to demand changes and to meet a variety of consumer's desire. It has proven as a successful strategy for dealing with rising worldwide competitiveness. (Kasarda, 1998). Mass market fragmentation, and the necessity for partnerships. The need to better understand the determinants of favorable results for everyone in the organization has grown as the competition shift from the company to the supply chain vs. the supply chain. Pellets, one by one.SCM benefits organizations integrate businesses through engaging with other partners in the worth SC to address unmet needs predicted by the end user. To deal with demand uncertainty, the think tanks contend that an incorporated SC is required. Agility is termed the capability of an SC in addressing the changing emerging difficulties (Sharp, 1999); (Christopher M. 2., 2000) (Jain, 2008). Most studies concentrate on being really agile; organizations must find a way (Christopher M. 2., 2000). Some studies provide SCA frameworks that are quite similar to the tested manufacturing agility frameworks. Although no one approved definition of SCA exists, existing definitions include the same terms and concepts, implying that there is some level of agreement. SCA is popularly known as the capability of SC and its associates to swiftly adapt the complete managerial operations to aggressive requirements of their consumer SCA, while (Ismail, 2006) explicates organizational ability in adapting quickly to the system besides procedures for dynamic and chaotic needs of their customers. Both definitions highlight the ability to respond swiftly to changing consumer needs, as do those of organizational and production agility. Agility, according to (Li X. C., 2008), result of combining attentiveness in-house and external fluctuations which along sides bring together chances and difficulties with the ability to adapt (proactively/react) to these changes quickly and efficient manner. Whereas this explanation of agility is similar to earlier definitions that it also enables firms to attain the agility and conditions necessary for forming a supply chain nimble and agile. The conflicts around the concept of agility can also be seen in SCA definitions. While various definitions of SCA address various areas of construction, still lack a comprehensive description. According to the literature assessment, most research regarding an agile supply chain is conducted, concentrating on the role of production

What does an agile supply chain look like?

Organizations have different supply chains. A concept is a guiding vision for how your business can run, rather than a universal strategy for all businesses to follow. However, there are a few crucial features in this concept. Late adopters and people who don't take these features seriously are pitted against companies that use them.

Proactive decision-making

Experts can quickly respond to any current or future deterioration or disruption in the sector. Decisions are based on real-time objective data, cutting-edge forms, and speedy yet perceptive channels, all of which are transmitted clearly and contextually to everyone in the company, not just the operator.

Inherent flexibility

Supply chains are more responsive to a wide range of market, supplier, and consumer needs, and they are also more adaptable, understanding how these changes influence their internal business needs or new strategic priorities. Organizations use templates and tools to swiftly organize processed weeks and then track the impact of those changes on the downstream chain in real time as data is collected at each step, and next phase reports are prepared to meet tomorrow's adaptive demands.

Cost-effective operations

Although cost savings are not the primary goal of an agile supply chain, they are a good side benefit. Organizations that are more flexible can swiftly decrease their losses amid inventory or sales delays. Organizations with these capabilities are also better able to predict any supply chain shortages or interruptions, and they have a better understanding of their present process and product waste, including excessive safety stock.

Profitable workflow

A leaner and quicker production environment is formed by combining faster decision making, waste reduction, and continuous data evaluation with greater cross-departmental communication. This is a unique method of improving revenues. While

it may be easier said than done, establishing a more resilient supply chain now is critical for organizations that wish to thrive in the future.

Relationship amongst SCA strategy and SC practices

"Supply Chain Strategy" defines SC's goals in addition institutes SC's general direction in footings of price and sensitivity. SC strategy inspires nature of major SC procedures like sourcing, managing stock, delivery, and consumer service. A SC strategy is referred to as a plan of action for adapting the SC and varying consumer requirements swiftly and efficiently. The agile SC strategy embodies SCA (Fisher, 1997) (Christopher M. 2., 2000). Studies have also looked at whether a supply chain approach is appropriate, such as when certain product features are present or not (Fisher, 1997) (Lee H. , 2002). This document, organizes answer how or why an agile supply chain approach might improve supply chain performance. A set of activities and methods for fulfilling specified tasks in a supply chain is known as supply chain practices. We claim that a SC plan of action when carried out between certain SC applications can increase SC performance, based on the premise the plans implemented by a specific way procedures and accomplishments. This idea is backed up by the complementarily notion researchers, which states that a firm's strategy, processes, and structure must all work together to produce desired organizational results like performance and profitability. To reap the performance benefits, unique supply chain practices must exist alongside a specialized supply chain strategy. This research highlights three supply chain practices that complement the strategy and must establish a favorable connection with the approaches also supply chain enactment. The primary attribute of an agile company, according to (Christopher M. a., 2002) is flexibility. SCA is the ability to reach outward because of supply chain process adaptability (Swafford, 2006). They claim SCA stands aided by "sourcing/sourcing flexibility," "manufacturing flexibility," and "logistics/distribution flexibility." Four skills (machinery, labor, handling, and routing flexibility) and two capacities (volume and mixed flexibility) make up manufacturing flexibility. The concept of agile production has a lot of literature (Yusuf, 1999) (Ismail, 2006).

As a result, in order to achieve SCA, flexibility is a must. As a result, it is regarded as the home of agility's basis. While this is an important aspect of the, it is not the only requirement for SCA. Improved responsiveness is another important feature of agile

supply chains. Visibility and velocity are two other crucial aspects of agility (Christopher M. a., 2004). Different Scholars have also highlighted another capacity for SCA, which is a combination of efficiency and reactivity in an agile environment.

Dimensions of Agility

The study's thesis is that a complete classification of agility and can only be produced if the concept is properly investigated. To aid in the thorough comprehension of the notion, different research are studied, besides the literature related to agility in operations vigilance, accessibility, assertiveness, speed and flexibility;

Vigilance was defined in this study as the ability to rapidly detect changes, opportunities, and threats. The subject of vigilance has appeared in many fields. In industrial investigation, (Sharifi H. a., 1999) found that businesses that are agile require a core capability to detect, perceive, and expect fluctuations. (Sharifi H. a., 2000) Identified four types of agility: Responsiveness the ability to recognize, react to, and recover swiftly from changes, being able to react proactively or competence (ability to effectively and efficiently accomplish business goals), Flexibility/adaptability ability to use several processes and methods to attain the same goal, as well as speed. The formulation of (Sharifi H. a., 2000) concept proved challenging, although it introduces some features of agility. The limitation of separation amongst capacity to notice change with the capability to react to change is one of this concept's limitations. Other scholars have also acknowledged part of vigilance in order to draft agility in all the production facilities (Goldman S. N., 1995) (Almahamid, 2010) (Zhang, 2011) (Inman, 2011) (Vinodh, 2011) (Zhang, 2011). The part vigilance plays in order to gain maximum output they can be agile, while also explaining the immense importance of agility in the sector of technology and how it completely affects the overall system. Other scholars emphasize the need to discover market Possibilities and risks, whereas (Sarker, 2009) suggests that agility rests in scanning the surroundings and sensory patterns to forecast and recognize possible or approaching problems (Tseng, 2011) (Lu Y. a., 2012) (Tallon, 2011). When it comes to managing a supply chain, (Christopher M. 2., 2000) recognizes that a SC should read and address to genuine needs cutting-edge order to be really agile and called it as vulnerability of market. His understanding has a flaw in that, while he understands the need of reading client requirements, he does not think of it as a distinct option;

instead, it is lumped in with its ability to meet actual demands. Another flaw in the study of his work is that it emphasizes on necessary interpretation of information about demand but ignores supply. Other experts have acknowledged that an agile system necessitates in time notice in variation and acceptance of Christopher's economic-sensitive component (Lin, 2006) (Agarwal, 2007) (Jain, 2008) (Li X. C., 2008) was the first to recognize alertness unique SCA measurement. Rendering toward writers, SCA obligation remain conscious to variations together between SC countering contiguous surroundings. The capacity to detect developing trends in the market, hearing on customers' requirements and addressing them, exemplifies this adaptability (Li X. C., 2008). Organizations that are alert can predict the changes in the industries easily, future disruptions, threats from the competitors and the opportunities of growth as in comparison with those who lack alertness. The more alert and effective an organization is to these certainties, the faster you can respond to the change in the market pricing, feedbacks, supplier trends, and the demand of the product.

Accessibility

There is no way that organizations can change the system if there are lacking the tools and information. Organizations which are alert find a pattern or a trend as they have access to the data of the specific industry, which helps them to share and analyze easily all the relevant data together. Accessibility has been developed as another type. Accessibility is explained as the aptitude to access pertinent figures. Different scholars have suggested that when a change is detected through alertness of an organization as they are capable to get important data to determine the way of providing swift return (Gunasekaran A. , 1998) (Sharp, 1999) (Jain, 2008) (Vinodh, 2011). Broader entrance on the evidence of SC are considered the key prerequisite of SCA. (Vinodh, 2011) (Gligor D. a., 2012) (Christopher M. 2., 2000). (Christopher M. 2., 2000) Claims agility carries multiple differentiating features. Supply chain participants need to proportion actual ultimatum, portfolio, with manufacturing record. Advent in digital SC permits entire SC participants to get entry toward applicable facts by creating knowledgeable choices approximately a way to reply to adjustments detected with inside the surroundings. (Lin, 2006). Talk to the capability to get entry to records as records integration, and describe it because the capacity to

apply records era to proportion facts among customers and supplies. In the eye of Industrial investigation, forming an economic scenario where complete necessary records are available is also a necessity for creating agility. Information structures and records structures improvement studies additionally offer vast empirical proof for thinking about records integration as a key enabler of agility. An excessive stage of integration makes workable well timed and correct records collecting and sharing (Lu Y. a., 2012).

Decisiveness

The ability to decide with no hesitation using the information that is available and decisiveness is been highlighted as another measure of SCA. Judgment building is also recognized as the important aspect in contributing to the performance of agility. A variety of contexts have been explored to see how decision-making abilities affect agility (Chelladurai, 1976). Other agility frameworks recognize the importance of decision-making abilities in agility performance. According to research, decision-making skills become increasingly critical as task complexity increases (Sheppard, 2006). According to previous studies, (Christopher M. 2., 2000) extricates concerning promptness (meeting purchaser mandate over and done with shorter delivery lead times) and agility in the supply chain (responding quickly to changes in demand in terms of both volume and variety).Some argue speeding up the decision step will cause a nimble reaction (Dekker, 2006). According to the research analysis, developing the ability to recognize changes rapidly and gain pertinent knowledge in what way it can cope with variations is not enough to build SCA (accessibility). Firms must also encourage employees to make firm judgments about how to adapt to changes (decisiveness). The cognitive area of firm SCA is formed when the alertness, accessibility, and decisiveness elements of agility are combined. These dimensions have to do with information processing and help the company decide how to react to the environmental uncertainty that surrounds a company.

Swiftness

According to study when a choice is made in what way to react on variations, organizations responsibility is to put these decisions into action swiftly (Sharp, 1999) (Gunasekaran A. a., 2002) (Lin, 2006) (Alberts) (Mackley) (Jain, 2008). Speediness is

characterized by capability in making pronouncements rapidly. SCA another measurement or calling it the 4th measurement was identified. Quickness refers to document the basic attribute of SCA. Swiftiness, according to (Christopher M. 2., 2000) is needed characteristics of agility. Swiftiness is defined in terms of its capability in executing an activity as rapidly as possible. Across SCM research, capacity remains frequently acknowledged as a critical enabler in SCA (Sharp, 1999) (Lin, 2006) (Jain, 2008) (Li X. C., 2008) response capability dimension of firm SCA also includes swiftiness. The ability to speed up activities on a crucial path is referred to as the swiftiness (Kumar, 1995). Manufacturing study backs up the idea of include swiftiness as measurement for an agile supply chain. According to (Sharifi H. a., 1999) an important ability of an agile company is speed. Agility is known as capability to complete undertakings, procedures taking the least amount of time possible. (Kidd, 1994) Points out SCA things change hurriedly, Zhang agrees. They explain SCA capability to complete activities and procedures in least aggregate period possible. (Kidd, 1994) Notes organizations that are sluggish travel speedily, while (Zhang, 2011) deliberates SCA featuring with sprightly enterprises. Trendy reality, agility heart of business impression. (Gunasekaran A. , 1998) Highlights characteristics of swiftiness (e.g., rapid partnership formation) as crucial agility enablers in one of the most often referred works in agile manufacturing.

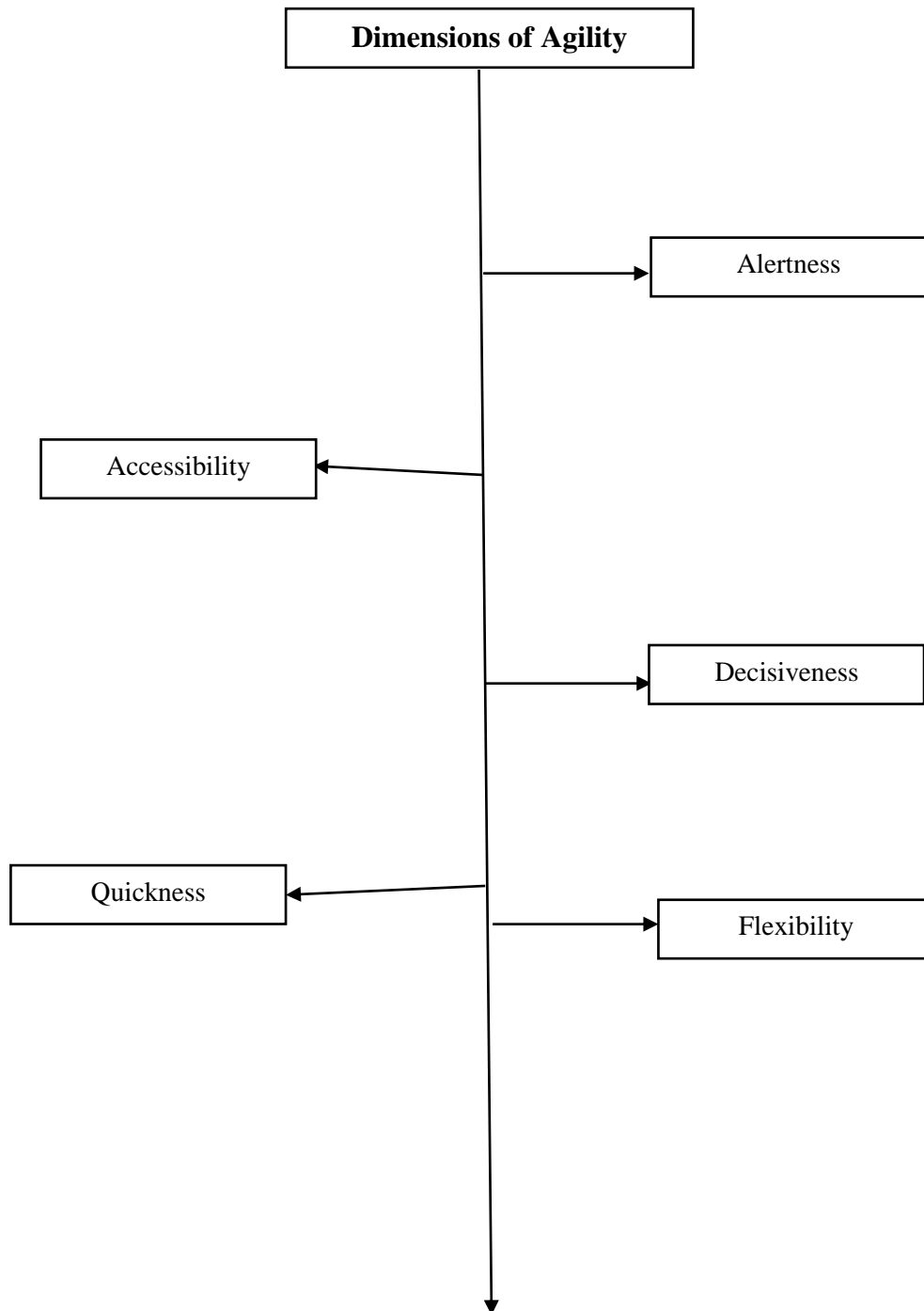
Flexibility

Another measurement of firm of an agile chain is how flexible it is. Its capability in changing the strategies or activities as needed is defined as flexibility. The supply chain of a company

Runs inside convinced assortment, then assortment bounds SCA (i.e., the ability to change tactics and operations). The firm's supply chain, for example, is unable to quickly generate more things apart from the capability that the production system allows. To deliver an agile response flexibility is been highlighted as of immense importance in previous literatures. Flexibility and agility are intricately bound (Swafford, 2006). Rendering some investigation, elasticity shows a straight then beneficial influence to SCA. Flexibility is recognized by other researchers. (Li X. G., 2009) Regard Elasticity basic feature of SCA in their definition. Likewise, variety of SCA background sustenance perspective (Christopher M. 2., 2000). Many empirical

study publications in the manufacturing field corroborate this viewpoint (Yusuf, 1999).

Figure 1: Dimensions of Agility



Relationship of Agility with different Concepts

There are many relations that describe agility, including responsiveness, adaptability and flexibility. This chapter will provide a clear difference between agility and other concepts. To address the business phenomenon deeply, the difference between agility and other concepts are to be understood clearly.

Agility and Flexibility

Relationship among flexibility and SCA remains explored previously as well, but additional information is also needed to understand this phenomenon. The term agile is described as nimble by (Merriam-Webster, 2012) that means to move rapidly and easily. Ability to adapt to change is emphasized in most definitions of organizational flexibility (Sherehiy, 2007). Though, for flexibility; there is no mention of speed, whereas agility is all about speed. Organizational flexibility, for example, a company's ability to change inner arrangement, procedure's reaction to environment change. Organizational agility also refers to a company's ability to quickly change its structures and procedures in reaction to uncertainty. As a result, while a company that is flexible, it is not necessarily agile. This study's shows that flexibility and agility are independent ideas, based on definitions and the material studied in the previous section flexibility is also termed as a feature of agility.

Responsiveness and Agility

Supply chain management scholars coined the term responsiveness to describe certain customer service methods. Error rectification, after-sales support, and successful processing of information requests are all considered components of responsiveness. Responsiveness is processing of individual customer requests that go beyond typical service measurements, whereas some researchers define reaction by flexibility. A hallmark on agility, according to this dissertation, is reactivity. However, there are a few flaws in this interpretation of responsiveness. The word's origin shows that responsiveness refers to a response to a provocation. As a result, be it "proactive" explained is debatable. Resilience, not responsiveness, can be understood as capability towards rebound after changes (Pettit, 2010). Responsiveness, within an unusual sense, is best defined as a rapid reaction to change. Agility and responsiveness are both different concepts. It's just that to responsiveness is enabled

with agility. An organization which is responsive and can adapt to environment uncertainty is unnecessarily agile. The attribute an organization needs so that they can shift towards different scenarios is agility.

Adaptability and Agility

According to (Merriam-Webster, 2012), the phrase adaptability best expresses the ability to become adaptable. Adaptability meaning in the corporate world further highlights it as a distinct concept of agility. According to (Lee H. , 2004), an agile supply chain can react fast to unanticipated variations in the market environment, whereas flexible SC can regulate project to suit market mechanical adjustments. Agility and adaptability are different notions in this dissertation, with agility serving as a promoter for adaptability. Agility gives adaptation a speed boost.

Resilience and Agility

Traditional techniques of risk management lacks to scrutinize difficulties of SCA. To address limitations of SC, scholars have twisted the concept of resilience. Resilience is also a multifaceted and a broad concept as like as agility. In SC resilience is been explained as the ability of the SC to get ready for uncertain environments, responding to disturbances and controlling the operations and structure. The capability of the firm to recover from the disruptive events is known as supply chain resilience (Blackhurst, 2011). This study defines resilience as a capability of a system to move to a favorable state or return to its originality after being disrupted. Agility enables resilience and also adds up speeds to resilience. To respond rapidly to environment uncertainty is a competitive advantage. Agility can help firms gain competitive advantage by cutting down the time the system takes to recover itself after being disruptive.

Research Hypotheses and Theoretical Model

The background that are of the extreme importance to this thesis research is laid forth in the aforementioned literature review. The analysis of prior research also lends assistance to the exploring suggested research questions in chapter 1. This part of the dissertation develops research hypotheses and provides introduction to the theoretical models.

SCA and SCP

In today's world businesses are operating in a time where everything is complex, ragging and impulsive than it used to be in past with increase in the uncertainties in the environment. Instead of suggesting environmental uncertainty as a mediator/moderator of the relationship between agility and performance as other have done, this research offers a substitute view in which SCA is seen as mediating the relationship between environmental uncertainty and supply chain performance. This research proposes that SCA is a response to the effects of environmental uncertainty and environmental uncertainty should be seen as a driver of SCA. Few studies test the direct relationship between uncertainty and supply chain performance, and none simultaneously test for agility's mediation and moderation effect between environmental uncertainty and agility. Therefore it is projected that

H1: SCA has a direct and positive relationship with SCP.

Environmental Uncertainty and SCP

This model offers theoretical justification for treating environmental unpredictability as a covert predecessor in performance of a company's 'SC during strategic development. According to this theory, an organization's strategy developed while considering external environmental elements determines how its organizational structure and operational procedures will grow (Galbraith, 1978)(Miles, 1978 :1984). The most successful businesses create strategies that closely align with demands that are of the surrounding situation. The thesis of this dissertation is that a firm's market and supply chain performance is directly and favorably affected by environmental uncertainty. In their groundbreaking paper,(Kohli, 1990) suggested companies that are working with various markets that are not categorized as highly intense rather squat roughness and low potency of competition focus more on being the companies that are more product driven because with this they serve a limited group of individuals that have easily predictable tastes, it also lacks strong conflict and leave clients with limited choices, however, customer assumptions are least constant, businesses should recognize how client's choices have evolved and modify product that reflect these changes. Similar to how increased options for customers result from intense competition, businesses must keep track of and adapt to shifting consumer demands in

order to convince customers to choose their products that are of rivals. It requires necessary mention that (Kohli, 1990) do not argue being a company which only supervise product over quality is not proven desirable in circumstances with little uncertainty; rather, they argue it is of least important. Therefore, projected:

H2: There is direct and positive association between environmental uncertainty and SCP.

Moderating effect of environmental uncertainty on SCA and SCP

According to the dynamic competence concept, characteristics must gradually change and be regenerated to give businesses a competitive edge across period. The utilization of dynamic competences "integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece, 1997). It is established that an agile supply chain is of advanced level competence devoted to the change of operational procedures. It permits resource reconfiguration, the detection of potential environmental dangers and opportunities, and their exploitation. Resulting it as a deliberated dynamical capacity and has the potential to sustainably improve the presentation of the SC of the Firm. The relationship between organizational performance and company SCA is also supported by this model. It implies that a company's SCA, which was developed taking into account the firm's strategy results in organizational presentation that is top notch rather of rivals who deficit similar level of worthiness (Miles, 1978 :1984). Companies' achievements are best podcasted as the capability of firms in accomplishing its market and commercial aims and objectives. Revamping SCP is always proven tremendous success in terms of rehabilitating organizational accomplishments. (Gunasekaran A. a., 2002)Contend about the advance prospects of SC that with SC organization can promise advancement in market and commercial achievements. Lao et al. (2010) also recommend the more advance SC compliance is, the more supreme SC is in getting parish organizations to address fluctuations in the surroundings. Along these lines, we hypothesize in H3 that capacity of SC to counter adequately to consumers' requirements is positively link to SCP. Consequently, it is proposed that:

H3: Environment Uncertainty moderates the relationship between SCA and SCP.

Controls

This study controlled for the effects of firm's age and size. Heterogeneity in firm's size and age could affect the supply chain performance.

Chapter 3

Methodology

Research Design

The research design mainly comprises the arrangement through which data are being collected. This study examines the moderating effect of environmental uncertainty on SCA and supply chain performance. To accomplish the research objective, the hypotheses are formulated in the light of exiting theories. Therefore, this research mainly uses the quantitative research design and deductive research approach.

Target Population and Sample

As already discussed, this study examines the moderating effects of environmental uncertainty on SCA and supply chain performance. This study will mainly target the manufacturing sector. The supply chain system of manufacturing firms is more visible from such as from raw material acquisition to product delivery. Therefore, manufacturing sector is more suitable to study the phenomena under investigation. This sector contributes 12.79% to overall GDP of the country and employs 16.1% of the total labor force (Pakistan Economic Survey, 2021). Within manufacturing sector, this study will target the small and medium-sized enterprises (SMEs). Owing to the resources' constraints, SMEs registered with The Lahore Chamber of Commerce & Industry, The Gujranwala Chamber of Commerce & Industry and The Sialkot Chamber of Commerce & Industry will be the target population of the study. A list of manufacturing SMEs will be obtained from these chambers of commerce & industry. Further, this study will use the simple random sampling technique to select the representative sample.

Sampling

Within the selected SMEs, the managers who are overseeing the operations of supply chain system will be approached with consent of management to collect data. Participation in the study will be discretionary and the respondents at any stage may withdraw with no explanation. Anonymity of the responses will be ensured by the researcher and data will be used only for academic purpose.

Data Collection Method

Because of the study's nature, quantitative data will be required to test the hypothesized relationships. Therefore, a structured survey will be used to collect the data. Further, researcher will mainly use the self-administered surveys to maximize the response rate.

- Measures of the Study
- Supply chain agility
- Environmental uncertainty
- Supply chain performance.

Data Analysis Techniques

The data collected through questionnaires will be coded and entered SPSS. Different descriptive statistics techniques such as frequency tables, histograms, mean and standard deviations will be obtained to describe the characteristics of the data. Normality assumption will be tested through skewness and kurtosis. The goodness of the measures such as validity and reliability will be tested through confirmatory factor analysis in AMOS. To test the relationships between study's variables, Pearson correlation coefficients will be obtained. To test the hypothesized relationships, moderated multiple regression will be used.

Measurements

SCA is embodied by its different dimensions as already been discussed above in literature review. These dimensions were firstly used or adapted by different scholars for the research purposes. In accordance to these dimensions SCA of a firm can be assessed. Following are the dimension;

- Alertness,
- Accessibility,
- Decisiveness,
- Swiftness
- Flexibility

Charles Darwin was the one who developed the concept of agility around 129 years ago. Darwin focused on the immense importance of agility in the era of advancement. Many years later now the business leaders from around the globe start realizing the immense need of Supply chain agility in today's world and what role it plays in the overall growth and productivity of the companies. According to a PwC survey different CEO's around 76% have said that agility or the ability to adapt to change will be future and vital tool for competitive advantage. Moreover McKinsey and Korn Ferry have also agreed to the concept of Darwin a supported theory of agility. Similarly Environment Uncertainty has also been the talk of the town while discussing agility. As unforeseen situations and future disruptions are situations that are to be addressed. As this a situation all companies around the world are taking a serious note on. Research Scholars Burns and Stalker (1961) suggested the idea to the organizations to adapt by categorizing the environment as constant and unpredictable. Previous researchers have identified measures of environment that are; the change, volatility and the factors that the organizations and their relationship. In the light of unforeseen events, the change or dynamism plays a vital role to make decision on uncertainty. A researcher (Duncan, 1972) explains environment as competitors, suppliers and also customers as well. These all are part of the environment as mentioned by Duncan. Every organization is concerned with the competition. In current time the economy has seen a drastic change from been individual company performance to SCP. To get victorious in this time it is necessary to every organization to improve its SC. To improve the overall SC some specific measures are needed to put into consideration.

Measurements

Supply chain agility

SCA is embodied by its different dimensions has already been discussed above in literature review. These include alertness, accessibility, decisiveness, swiftness and flexibility. To measure SCA, thirty items are assembled from previous studies (Gligor D. H., 2013)(Li X. G., 2009).

Environmental Uncertainty

Environmental uncertainty will be measured with five items of (Miller, 1986).

Supply chain performance

Supply chain performance of the firm will be assessed on thirteen indicators compared to its major competitors. These items are developed by (Bowersox, 2000).

CHAPTER 4

Results

This chapter explains the findings of research question prolonging to the analysis of the findings. To start with this chapter contains the management of data following by representing the demographic characteristics of the respondents through descriptive statistic techniques moreover Offers the normality of data alongside the measurement of reliability and validity of the instrument used in the research by conducting the confirmatory factor analysis. This chapter includes the hypotheses test to examine the variable effect on each other following the discussion and conclusion with limitations and future results.

4.1 Data Management

Conducting a research and requires the management of the data to be perfect. The most important process starts after the data is collected as data is been evaluated and analyzed. For this Research the survey was conducted using an online questionnaire survey using Google forms. The questionnaire was sent to the respondents via email and WhatsApp. This data collection method or survey was used as it is most effective and easiest way of collected as all the responses that are attempted by the respondents are routinely submitted in Google form through which we can later access them all from the Google spreadsheet and can use for data Analysis. All the data or responses are gathered through spreadsheet and data management is started liking addressing to the unclear responses or unanswered responses. After This process, the responses are imported in SPSS and the responses are transformed into numeric form so that the analysis could be started.

4.2 Demographic

The table 4.2 shows the numerical distribution of all the respondents in the survey. A total of 317 responses were collected. In the survey around 62.3% of male respondents and 37.7% of female respondents participated in the survey 44.3% of data is collected from the Supply chain Manager, 31.6% of the responses were collected from the production managers of the organization and the remaining responses from

the managers and Assistant Managers of manufacturing industry in Sialkot and Lahore. All the responses are collected from the industries with more than 5 years of manufacturing experience up to 20 years.

Table 4.2 Demographics of the Respondents

CHARACTERSTICS	FREQUENCY	PERCENTAGE
Gender		
Male	197	62.3
Female	119	37.7
Age		
Under 25	53	16.8
25-29	76	24.1
30-40	164	51.9
40 and above	23	7.3
Designation		
Assistant Manager	30	9.5
Business	24	7.6
Manager	98	31.0
Production Manager	24	7.5
Supply Chain Manager	140	44.3

4.3 Descriptive Statistics

Descriptive Statistics As the transformation and management of the data is completed the next and the most important step is performing the Descriptive analysis on the data ((Selvamuthu & Das, 2018).Descriptive analysis is performed to describe the characteristics of the data and getting to a conclusion from the given data. Researchers have accomplished that to examine the association amongst the variables descriptive analysis is performed as it helps to shape the data in a perfect manner to fetch the conclusion (Marshall Jonker, 2010). Moreover, researchers are found addressing descriptive analysis as a vital tool that can help to cater to solving multifaceted tasks and also seeking guidance from the experts, as you will collect the data in a perfect manner. This tool is also most commonly used to measure diffusions and frequencies (Kaur, 2018). Descriptive analysis is basically performed in order to identify the mean and standard deviation of the data that is been imported in SPSS for analysis (Bhattacharjee, 2012).

Table 4.3

Variables	Mean	Std.Deviation
Agility	3.8680	.58105
Environment	4.4715	.31557
SCP	3.6013	.62030

Table 4.3 shows the descriptive analysis performed on the variables from the research. Mean values of Supply Chain Agility, Environment Uncertainty and Supply chain performance are 3.8680, 4.4715 and 3.6013. Likewise the Standard Deviation of all these variables are Supply chain agility recording the highest values with standard deviation of .62030 which represent that the responses were spread out were far away from their mean value and the variable environment uncertainty records the lowest value of standard deviation .31557 meaning the responses were clustered towards it mean value contrary to the other variables in the research. Moreover when the data is clustered means that distribution curve is very steep and standard deviation is small and when the data or responses are spread out means the curve is relatively flat and there is large deviation.

4.4 Data Normality

Data normality test is performed to recognize the distribution magnitude of each variable. There are two ways to check the normality one is Skewness and the other one is Kurtosis. This test is performed to check whether or not the distribution amongst the variables is normal. Normality of the data can be checked using the tool of descriptive analysis. Many authors suggest the range of Skewness must be between -3 to +3 and for the kurtosis the range should be under -10 to +10 (Brown, 2006). If the values of both kurtosis and skewness are below or above the given range, then there is a suspect that data is not normal, there is a certain problem in the data.

Table 4.4 Skewness and Kurtosis

Constructs	Skewness		Kurtosis	
	Statistics	Std. Error	Statistics	Std. Error
Agility	-1.002	.137	1.662	.237
Envir	-.890	.137	1.554	.237
SCP	.027	.137	-.374	.273

Table 4.4 shows the normality of the data using Skewness and Kurtosis Analysis.

4.5 Confirmatory Factor Analysis

CFA is mainly a confirmatory technique adopted to analyze the theoretical link between variables. It is used to verify the reliability and validity of the data and for that it has four main components. The components are: (1) internal consistency, (2) indicator reliability, (3) Convergent reliability and finally (4) discriminatory reliability, so CFA was carried out for this research in order to find out the reliability and validity of the data. Confirmatory factor analysis is a very important tool for theory testing. Another important factor of CFA is that it accounts for measurement errors so we can take control of all kinds of measurement effects and also to test

complex multivariate models (Karahanna, 2000)(Lomax, 2004). CFA allows us to approximate a little better the complexities of real life when we try to measure constructs. Confirmatory factor analysis is performed to see whether or not the measurement model fits. The threshold value should not increase 0.50 if it does not turnout that there is a problem in the model. After that, the items are eliminated those are complex and have a value greater than 0.50 to make model best fit. Further for the verification of model, whether it is best fit or not two further analyses are performed firstly Convergent Validity and Second Discriminant Validity.

Table 4.5 Fit indices of Measurement Model

	CMIN/DF	RMR	RMSEA	IFI	TLI	CFI
Five Factors	4.425	0.048	0.059	.919	.949	.912

Measurement

Model

The Table 4.5 results demonstrates that this model has high order construct range which is acceptable and fits the data really well. The table shows that incremental fit index is .919, Tucker-Lewis index value is of .949 and comparative fit index value is .912. These all values are greater than or above than the value range of 0.90 which is acceptable and showcase that the model is data fit. Furthermore the value of (RMSEA) root-mean-square error approximation value is .059 and root-mean-square value is 0.048 which is lesser than the cutoff value which is 0.80 explaining the data fits the model (Hu, 1999)(Browne, 1993).

4.5.1 Convergent Validity

For the assessment of the validity if the study methods that are recommended are firstly convergent validity which measures the degree in which the variables are correlated with another test in the perfect accordance(Taherdoost, 2016)(Larker, 1981).Convergent validity can be investigated or measured by matching the data results with other in the same study. If the data suggest a positive correlation among the findings, then it is said to have a convergent validity. An example best explains the convergent validity, like the analysis of examination grades of one does not correlate with the analysis of other examination analysis, meaning low convergent validity. Author has

proposed that the factor loading value of the construct should be above the value or should be 0.50 for the study to have convergent validity (Larker, 1981).

Table no 4.5.1 Measurement Model

Latent Constructs	Indicators	Factor Loading	AVE	CR	Cronbach's a
SCA	AGL1	0.813			
	AGL2	0.86			
	AGL3	0.69			
	AGL4	0.65			
	AGL5	.271			
	AGL6	0.681			
	AGL7	0.843	0.590	0.935	0.749
	AGL8	0.751			
	AGL9	.828			
	AGL10	.723			
	AGL11	.810			
ENVIR	EU01	.229			
	EU2	0.670			
	EU3	0.529			
	EU4	0.89	0.506	0.747	.071
SCP	SCP1	0.71			
	SCP2	0.384			
	SCP3	0.356			

SCP4	0.862			
SCP5	0.662			
SCP6	0.754	0.563	0.836	.738

Shaded values were below the 0.5 and were excluded

The Results in Table no 4.5.1 showcases that most of the factors in CFA contains high factor loading score that are greater than 0.50 and many scholars has suggested that score above 0.50 are good factor loading score explaining that the survey been conducted is overall in a good capacity ((Truong & McColl, 2011).In the results out of 21 items, 4 items are below the recommended factor loading score and can increase validity of the constructs.

4.5.2 Discriminant Validity

The other method for the assessment of the validity of the construct is discriminate validity. Discriminate validity can be examined by measuring the extent to which a construct is analytically separate from other constructs in the study. There are different techniques to do this (Larker, 1981) has suggested that each theory’s average variance extract must be compared with the squared inter construct correlation and the square of AVE should be higher than inter construct correlation in order to establish discriminate validity. Meaning that your square variance within a single construct must be greater than the shared variance amongst the construct (Gefen, 2000).

Table 4.5.2 Discriminant and Convergent Validity

	CR	AVE	MSV	AGL	EU	SCP
AGL	0.935	0.590	0.032	(0.768)		
EU	0.747	0.506	0.01	-.010	(0.711)	
SCP	0.836	0.563	0.032	.180**	.141*	(0.750)

Bold values in the diagonals are squared roots of average variance extracted scores

AGL =Agility

SCP= Supply Chain Performance

EU= Environmental uncertainty

Various tests are performed to check discriminant validity of the constructs in this dissertation. The Table 4.6 explains initially square root of average variance extract diagonally in order to check whether there is a presence of discriminant validity construct in this research or not. In order to check the validity, it must be apparent that the Maximum Shared Value of the construct should be less than the Average variance extracted also the average of AVE of both the variables must be greater than their correlation value. These test are performed in order to check the discriminant validity and the findings states that all the requirements and criterion mention is accomplished. The criterion mentions that the AVE value should be more than the Maximum Shared value and it can be depicted from the table above that this is accomplished and ensure discriminant validity.

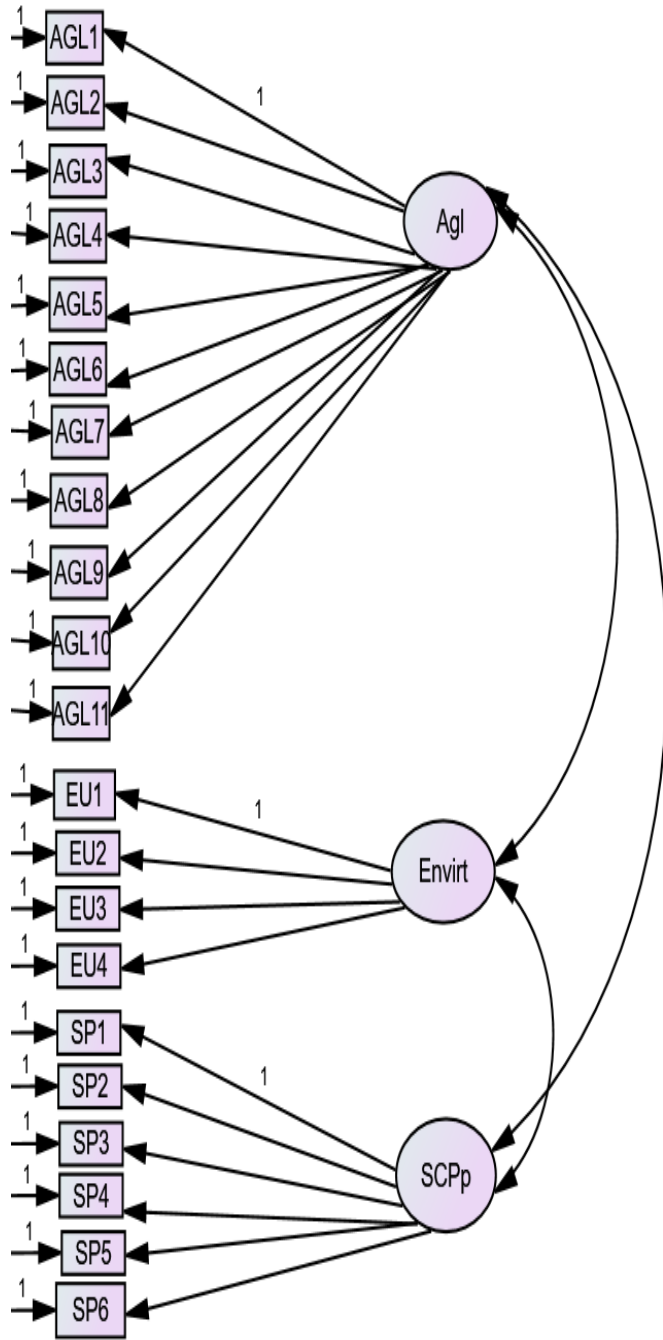


Figure 4.5 CFA

4.6 Reliability and Validity

Reliability and validity is performed to assess the genuineness of the research data. Reliability assesses the quality of the research and specifies how well a method or techniques test measures something and also showcasing the consistency of the measure. Reliability is also known as to see whether the findings can be replicated under the same circumstances or not. Reliability is referred to as a grade where the findings of the data are constant and dependable. Reliability highlights the constant results over the period of time. Cronbach's Alpha test widely used by scholars is performed to gauge the data items' uniformity. Reliability is a technique of how constant variables are in estimating what they should investigate. It was noted that reliability investigation is crucial for identifying the firmness and uniformity of the items reviewed. For quality reliability, the variables must have a higher correlation. Internal dependability is achieved when Cronbach's Alpha is 0.7 or above, whereas validity is known as measuring the level of accuracy in the study. Validity is performed to see whether the results of the study do really depict what was supposed to be measured in the study, focusing on the outcomes of the findings. Most importantly, different researchers have explained the importance of reliability in validity as there cannot be validity without the reliability in the study.

Table 4.6

Variables	Number of Items	Cronbach's a
Agility	11	.749
Environment	04	.710
SCP	06	.738

4.7 Common Method Bias

Various means are required to respond plausibly to the survey questions that are proven to be very beneficial for the common method bias (Podsakoff P. M., 1986). In this dissertation the possibility of common method bias has been decreased because of the data collection was performed by senior managers, managers and executive supply chain managers as they were better able to understand all the questions because of their experience and knowledge in the relevant field meaning supply chain. Harman's single factor test was performed in order to check the possible Common method bias available in the data.(Podsakoff M. &, 2012).while performing Harman's test we depicted that there is no problem of common method bias in the data as the shared variance is below 50% which signifies that in the research the correlation variables has not been changed and the results also showcase that possible or latent effects of common method bias is not comparable.

4.8 Correlation Analysis

Correlation analysis suggests what sort of association is in between the variables and also helps in considering the knowledge of all the variables in term of their importance with the variables. The coefficient in between -1 and +1 is considered to be acceptable. Negative correlation describes a negative correlation and positive describes a positive correlation. The coefficient zero depicts no correlation. The correlation is in low range when it is 0.19 or below and when the coefficient is within 0.40 to 0.69, it is said to have a modest correlation. Moreover, the range of 0.70 to 0.89 is high correlation.

Table 4.8 Correlation

Correlations	Agility	Environment	SCP
Agility Pearson Correlation	1		
Envir Pearson Correlation	-.010	1	
SCP Pearson Correlation	.180 ^{**}	.141 [*]	1

Correlation is significant at the 0.01 level (2-Tailed)

Correlation is significant at the 0.05 level (2-Tailed)

The results of Correlation Analysis showcases that there is negative and non-significant relationship between supply chain agility and Environment uncertainty as it $p = 0.01$ which is lesser than $.05$ but also the stats depicts $r = -.010$ which shows weak correlation between these variables. Whereas the results showcases positive and moderate relationship between supply Chain agility and Supply Chain performance as $r = .180$ which showcase very high correlation among these variables. Furthermore the variables Supply chain performance and Environment Uncertainty signifies significant and positive relationship between each other as the p value is lesser than the prescribed and $r = .141$ states very high correlation between supply chain performance and Environment Uncertainty .

4.9 Hypotheses testing

Further analysis after the correlation analysis is hypotheses testing and also one of the most important tests of analyzing the results. Examining the relationship amongst the variables in the research is known to be as a regression analysis. Regression analysis is of two types one linear regression analysis and other is multiple regression the

major difference amongst the linear and multiple regression is that in linear regression only one independent and one dependent variable is examined and in multiple regression two or more than two dependent or independent variables are examined. This research has proposes 3 hypotheses to find out or investigate the relationship amongst the dependent and independent variables and the importance of this research and the relation of the variables can be done through scrutinizing the p-value.

Table No 4.9 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error Estimates	Change Statistics				
					R Square Change	F Change	Df1	Df2	Sig F Change
1	.208	.043	.037	.60860	.043	7.065	2	313	.001
2	.265	.070	.061	.60106	.027	9.004	1	312	.003
3	.306	.094	.082	.59435	.024	8.084	1	311	.004
4	.346	.120	.106	.58663	.026	9.236	1	310	.003

Table no 4.9.1 Coefficients

Model	Understanding Coefficients		Standardize Coefficient	T	Sig	95.0% interval for B		Co linearity statistics	
	B	Std Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
Constant	3.359	.073		4.5851	.000	3.215	3.503		
Firm age	0.20	.005	.245	3.628	.000	.009	.031	.668	1.497
Firm Size	-.000	.000	.087	-1.287	.199	.000	.000	.668	1.497
Constant	3.374	.073		4.6529	.000	3.232	3.517		
Firm age	.019	.005	.230	3.441	.001	.008	.029	.664	1.505
Firm Size	-.000	.000	-.085	-1.278	.202	.000	.000	.669	1.497
Zscore(AGL)	.102	.034	.164	3.001	.003	.035	.169	.993	1.007
Constant	3.364	.072		4.6860	.000	3.223	3.506		
Firm age	.019	.005	.241	3.640	.000	.009	.030	.662	1.510
Firm Size	-.000	.000	-.094	-1.421	.156	.000	.000	.667	1.500
Zscore(AGL)	.103	.034	.165	3.052	.002	.036	.169	.993	1.007
Zscore (Env)	.095	.034	.154	2.843	.005	.029	.161	.996	1.004
Constant	3.375	.071		4.7568	.000	3.235	3.515		
Firm age	.019	.005	.231	3.523	.000	.008	.029	.660	1.514
Firm Size	-.000	.000	-.086	-1.324	.186	.000	.000	.666	1.502
Zscore(AGL)	.088	.034	.142	2.632	.009	.022	.154	.973	1.028
Zscore (Env)	.080	.034	.128	2.375	.018	.014	.146	.972	1.028
AGL×Env	.100	.033	.166	3.039	.003	.035	.165	.955	1.048

4.10 Hypotheses testing Results

The results in the table above demonstrate that supply chain agility has significant and positive effect on supply chain performance ($\beta=0.088$, $p<0.05$). Environmental uncertainty has a significant and positive effect on supply chain performance ($\beta=0.080$, $p<0.05$). The interaction term of supply chain agility and environmental uncertainty has also produced significant and positive effect on supply chain performance ($\beta=0.100$, $p<0.05$). The significant and positive coefficient of interaction term shows that environmental uncertainty has positively moderated on supply chain agility and supply chain performance.

Discussion

The perspective of dynamic capabilities within the theoretical background is explained in this discussion section. Dynamic capability has been accepted and used globally to describe the performance differences in the organizations (Barreto, 2010). The dynamic capabilities let companies to transform their operational abilities to cater or pledge a new change in the external dynamics of the organization (Teece D. J., 2007). (Helfat, 2011) Has termed dynamic capability as the ability of the company to nurture, develop and spread its resources. This thesis explains the dynamic capability effect on supply chain as advanced process that nurtures the supply chain performance of the company hence helps the organization in gaining competitive advantage by transforming their complete operations working dynamics. This research extends its provision to Dynamic capability that an agile supply chain brings about a positive and significant change in the performance of the supply chain of the organization. The findings of the research show supply chain agility provide immense benefits overall to supply chain performance in the existence of environment uncertainties. Moreover, with an effective, agile supply chain the performance in the times of uncertainties is likely to be effected because of positive impact of supply chain agility on supply chain performance. Without an agile supply chain companies are less likely to taste the success and gain competitive advantage in time of external uncertainties but agility in the other place can be proven highly beneficial in difficult time.

Managerial Implications

This thesis will help the experts to discriminate and address to situation like environment uncertainties for the higher benefits that are related to supply chain. Organizations are always surrounded by extreme situations be it by means of pressure from their competitors or like by external forces. When organizations are undergoing tough situations like facing environment uncertainties and are employing agility it will help them prosper and are anticipated to get greater rewards through the supply chain performance than the competitors who are not aware of the importance of agility. This thesis also discourses the moderating effect of environment uncertainty on the supply chain performance. Moreover will help the supply chain experts to see through the importance of agility and to advance their system with implementing

agility by considering how an agile supply chain effect the performance and to build their supply chain in relative to its importance.

Limitation

The broad view of this study will spread or will be viewed only for (SME's) small medium enterprises in future other studies should spread their scope within multiple industries and different scale companies. Furthermore another limitation is that the surveys were mostly addressed by the experts who are within the same dynamics who have knowledge and expertise regarding supply chain so the responses should be collected through manufacturers in general. The expertise of the respondents relative to the surveys with collection and analysis of the data effects against the common method variance (Swink, 2007). In addition, for future research regarding this the scholars should also see possibility on collection of data from both the manufacturers and the suppliers. This data collection from both the manufacturer and supplier will be useful for further analysis and validity of the data will also be greater.

Conclusion

Some Authors have suggested that agility is proven a successful factor in improving performance of supply chain for highly dynamic industries and some has not acknowledged agility as a beneficial factor (Cooper, 2000)(Lambert, 2000). This research has been conducted in order to extend or completely back the importance of agility in the presence of environment uncertainties showing the positive effect of agility in supply chain performance. Predictable that supply chain agility if is successfully employed or implemented by highly dynamic industries or SME Small Medium Enterprises will improve the performance. This thesis conveys an amount of theoretical contributions to the research. Mainly starting with the queries this thesis responds to like, the impact of Agility on Supply chain performance and also how these results enhance the dynamic capabilities. Moreover this research also aims on showing the moderating effect of Environment uncertainty on the performance of the supply chain. The literature however address to the concept of supply chain agility in relation to the performance of supply chain. Explaining the role of supply chain agility as a dynamic capability with the scope of further improvement of the supply chain performance. This research has been conducted because till now no research has

been conducted on showing the impact of agility on supply chain performance under the moderating effect of environment uncertainties. For this sake, this research shows why agility is of extreme importance or has become in recent times resulting the organizations can be immensely successful to improve the supply chain performance and to gain competitive advantage. In addition the research helps SME's small medium enterprises acknowledging the importance of agility in recent times and is significant and positively related to the improvement of the organization. Furthermore the supply chain executives could be able to identify the SCA as an dynamic capability with its five dimensions. Supply chain agility is not an old concept comparatively within the supply chain but it can be further investigated into its dimension and what role the dimensions of agility plays with a better knowledge of industrial setup.

CHAPTER 5

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