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Supply Chain Collaboration

Case of Manufacturing Industry in Iceland

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ABSTRACT

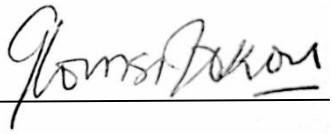
Companies are now progressively looking beyond themselves to come up with ways to improve revenue and profit margins. This has resulted in a heightened focus on the efficiency of the supply chains. Inefficient supply chains are being perceived as cavities that can deprive the firm from its cash flows when inventory is not required and sales revenue when product is not available at the point of sales. This has stimulated development of business models that intend to leverage and enhance the supply chain management. This resulted in supply chain collaboration. Supply chain collaboration made sense as the conventional supply chain models have their inherited issues like unfamiliar customer expectations and costs and efficiency concerns and suppliers together can provide a much superior customer service to the customers. Collaboration of supply chain can be understood as the sharing of mutual objectives; a sense of commitment; trust and respect; skills and knowledge; and intellectual alertness. Presently there are not many studies dedicated to understanding the need for or analyzing the present scenario of collaborative supply chain management in the manufacturing industry of Iceland. Therefore this study is an attempt at bridging this research gap. It was found that the collaborative supply chain in the manufacturing industry in Iceland was under-mined. Though most firms have adopted the practice but there are many explicit and implicit barriers confronting the progression. Suitable recommendations are made on the basis of the empirical study conducted.

Key Words: Collaborative Supply Chain, Iceland, Nordic countries, manufacturing industry

Declaration of Research Work Integrity

This work has not been previously accepted in substance for any degree and is not being concurrently submitted in candidature of any degree. This thesis as the result of my own investigations, except where otherwise stated. Other sources are well acknowledged by giving explicit references. A bibliography is appended.

By signing the present document, I confirm and agree that I have read RU´s ethic code of conduct and fully understand the consequences of violating these rules in regards to my thesis.

Reykjavik 15/05/2015	0107823339	
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This thesis forms the final part of my Master program at Reykjavik University. In this document I prove my knowledge in International Business and my competence to understand the Supply Chain environment in a specific field called Supply Chain Collaboration. I would like to thank the people who have helped me in several ways with this project. First of all I want to thank Sverrir Ragnars Arnsgrimsson for his professional guidance during this project. Secondly I want to thank my friends and colleagues during the writing process of my thesis.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter: 1 INTRODUCTION

1.1 Background of the study

The dynamic contemporary business environment poses severe economic pressures on firms, compelling them to alter the way they conduct business. Competition is getting intensified and companies are witnessing global competition. Customer demands are increasing while loyalty is on a decline. This makes profit-earning a challenging task. Companies are now progressively looking beyond themselves to come up with ways to improve revenue and profit margins. This has resulted in a heightened focus on the efficiency of the supply chains. Inefficient supply chains are being perceived as cavities that can deprive the firm from its cash flows when inventory is not required and sales revenue when product is not available at the point of sales. This has stimulated development of business models that intend to leverage and enhance the supply chain management (Ireland, 2005). This resulted in supply chain collaboration. Collaboration can be understood as the key driving force behind effective supply chain management and develop into a core competency. However, many are skeptical and believe that only a few firms are able to actually harness its potential. Min et al. (2005), through an empirical study deduced that positive collaboration related outcomes can be many like augmentation linked with overall organizational efficiency and effectiveness and market shares.

The concept of collaboration of supply chains started taking shape in the mid-1990s. It stressed upon the significance of building collaborative relations between suppliers to develop a proficient supply chain. The concept has gained equal interest from academia and practice. Supply chain collaboration made sense as the conventional supply chain models have their inherited issues like unfamiliar customer expectations and costs and efficiency concerns and suppliers collectively can provide a far superior customer service to the customers. The supply chain collaboration allows the firms to be more prompt to customer expectations, better product offerings innovations and foresee customer requirements. Collaboration of supply chain can be understood as the sharing of mutual objectives; a sense

of commitment; trust and respect; skills and knowledge; and intellectual alertness (Tsai, 2006). Thus, supply chain collaboration can be viewed as a competitive weapon that can enhance organizational performance. It enables the development of strategic partnerships with the channel partners and other trading partners in order to accomplish the common advantageous goals and shared business processes and information. Supply Chain collaboration allows firms to drive market share, sales that culminates into maximization of return on assets (ROA) and return on investment (ROI) (SAP, 2007). The advantages of supply chain collaboration over supply chain management are: lower inventory requirements and higher inventory turns; reduced transportation and warehousing expenditure; decreased out-of –stock levels; reduced lead times; augmented customer service; proactive market intelligence; competence of shaping demand; prominence in customer demand and supplier performance; prompt decision making; better utilization of resources and capacity (SAP, 2007). Cao & Zhang (2012) highlighted the elements that need to be coordinated under supply chain collaboration. These elements are from diverse disciplines like customer relationship management (marketing), inventory, production and distribution management (operations management), and strategic alliances etc. Ahmed & Ullah (2012) assert that there are three types of collaborative relationships established under supply chain collaboration: collaborative transaction management; collaborative event management and collaborative process management. Collaborative transaction management is described by high-volume data exchange and task alignment based on operational concerns. Collaborative event management is done for combined planning for a particular event like product launch or especial promotional events. The third type of collaboration is for process management wherein a comprehensive strategic collaboration based on knowledge sharing and mutual decision making. It takes place for more integrated supply chain processes that result in united problem solving and long-term combined business planning.

Thus, it is evident that supply chain collaboration can be highly beneficial for the participating firms and enable sharing of various mutual benefits. Since the study intends to study the manufacturing industry of Iceland and how supply chain collaboration is being shaped up there, it is wise to explore the present scenario. This is done in the next section.

The manufacturing sector of Iceland has some unique characteristics. Firstly, the manufacturing sector is majorly concentrated into two prominent sub-sectors: food processing and aluminum production. These sectors collectively account for more than 80 percent of the total manufacturing production. The manufacturing of machinery and other capital goods is reasonably small. Even in the food processing sector, only little is for the domestic market while more than 67 percent of the seafood product is for the international market. The other key sub-sectors are the manufacturing of machine and equipment (10%) and pharmaceuticals' chemical products (4%) and manufacturing of building materials (4%). Iceland's dominating manufacturing sector is the aluminum production which is a highly power-intensive industry. Its contribution has escalated considerably over the past few years, resulting in the export of nearly 42 percent of the total production in 2011, almost double from that in 2000. The aluminum manufacturing sector is chiefly based on competitive energy costs, strategic location and skilled work force. Production also registered a steep increase from 210000 metric tons per year in 2000 to 820000 metric tons per year. The sector is witnessing a boom with numerous export-oriented firms entering the industry over the last decade. These companies strategies their competitive advantage on the basis of product innovation, research and development, information and communication technologies (ICT) and strategic marketing. Some companies from the medical equipment, pharmaceuticals and food processing and fishery equipment sectors have emerged from small and medium- sized enterprises to prominent international players capturing a considerable market share globally (The Central Bank of Iceland, 2012).

The need for supply chain collaboration is immense in the country. Hameri & Palsson (2003) asserted that since nearly 70 percent of the Iceland's total export is food related, its geographical distance from its prominent markets like Europe, US and Japan, efficient supply chain management is of paramount importance. With fluctuating raw material supply and stringent quality demands, collaborative supply chains can be instrumental in meeting the customer expectations, stabilize material flow and meet the objectives set for efficient supply chain management. Even natural calamities can hamper supply chains and thus, collaborative supply chains can be a source of rescue. Jakšić & Editors (2012) highlighted the case of eruption of the Eyjafjallajökull volcano in 2010 that made the air traffic in Europe come to a

standstill for nearly 8 days. All major airports in Europe were forced to shut down and the European airline industry suffered damages over USD 2 billion. This shows that the higher the number of partners in the supply chain, the higher is the complexity of coordination and management. This issue can be catered through collaborative supply chain to a certain extent though no control can be executed on natural calamities. Collaborative supply chain management would have enabled organizations to escape or reduce the hampering impact of such continent-wide disruption of air traffic. Further, World Economic Forum (2012) expressed that global supply chains and transport network have emerged as the mainstay of the globalized economy, stimulating trade, business and economic prosperity. This along with the development of lean processes warrants more collaborative supply chain networks. Supply chain and transport disruptions are no longer the responsibility of operational risk managers. Supply chain strategy is more of a balancing act between the costs and service provided. With firms struggling for reducing costs and to match up with the rising customer expectations for prompt delivery and better service, supply chain collaboration works as a remedy. Further, technologically advanced tools have improved the firms' ability to analyze product and market segments, profitability and cost incurred (Deloitte, 2014).

The study aims to understand the role of supply chain collaboration in the manufacturing sector of Iceland through an empirical study.

1.2 Problem Statement

With the intention to capitalize on the complete potential of collaborative supply chain, firms across the industries in Iceland are employing strategy, organizational framework, policies and procedures to accomplish competitive advantage. The evolution of supply chain is not remarkable as there are no proactive efforts from Government (Chamber of Commerce) and the industry players in Iceland are individually seeking a platform to drive collaborative supply chain management. It can benefit the larger section of the business fraternity if the manufacturing industry is able to stabilize SCM through strategy, policies that cater to adopting best practices of SCM. The key to efficient supply chain management system today

is to reduce costs and increase efficiency by harnessing IT systems that will help engage internal and external stakeholders on real time basis. Presently there are not many studies dedicated to understanding the need for or analyzing the present scenario of collaborative supply chain management in the manufacturing industry of Iceland. Therefore this study is an attempt at bridging this research gap.

1.3 Aim & Objectives

A research study is undertaken to find answers to some questions related to the unknown. Thus, it is obvious that there are certain aims and objectives that the scholar wishes to accomplish and determine them prior to conducting the study. The aim and objectives act as the guidance for the study and enable a well-structured study to develop some unique knowledge in the field of the key concept studied.

The primary aim of this research is to analyze the prevalence and criticality of supply chain collaboration in the manufacturing industry in Iceland.

The objectives of this study are:

- To evaluate the current supply chain elements and its contribution towards manufacturing.
- To understand the collaborative supply chain practices and existence in Iceland's manufacturing industry.
- To recommend time bound strategies for a comprehensive collaboration in supply chain domain in Iceland manufacturing industry.

1.4 Research Questions

The relevance of supply chain collaboration as a competitive edge is gaining acknowledgement both by academia and practitioners (Wang & Yu, 2006; Zhang, 2007). The intention of this study is to seek to answer to the following questions:

- What is the role of supply chain management in a manufacturing firm?
- How supply chain collaboration benefit a manufacturing firm?
- What is the current state of supply chain collaboration in manufacturing sector of Iceland?
- What supply chain collaboration can be improved in Iceland?

1.5 Hypothesis

- $H1_0$: The internal organization functions do not influence the importance of supply chain collaboration in an organization.
- $H1_1$: The internal organization functions do influence the importance of supply chain collaboration in an organization.
- $H2_0$: The supply chain relationship with supplier does not influence the importance of supply chain collaboration in an organization.
- $H2_1$: The supply chain relationship with supplier does influence the importance of supply chain collaboration in an organization
- $H3_0$: The supply chain relationship with clients does not influence the importance of supply chain collaboration in an organization.
- $H3_1$: The supply chain relationship with clients does influence the importance of supply chain collaboration in an organization

1.6 Purpose/ Significance of the Study

With dynamically evolving business environments, technological up gradation and globalization of the markets, organizations across the world are awakening to the impending need of optimizing the performance of the supply chains in entirety and not just individual firms. To survive and flourish in this cut-throat competition which is getting internationalized, firms are developing strategies of supply chain collaboration to capitalize on resources and knowledge of suppliers, customers and other channel partners to develop some core competencies (Cao & Zhang, 2012b). The study aims to explore the adoption of supply chain collaboration adopted by the manufacturing firms of Iceland. The findings of the study can be instrumental for firms who have not adopted supply chain collaboration in Iceland. The study can be extended to the other sectors as well. Further, the study holds relevance for the administration that intends to provide the required infrastructure for collaborative supply chain framework in Iceland aiming at economic development. The implications of the study can be applied to manufacturing sectors of other countries of similar economic built up. Also, the study can be a vital source of motivation and reference for studies on similar lines.

1.7 Research scope

The study is delineated to study a few manufacturing firms and understanding their take on supply chain collaboration and the opinion of managers and employees on the role of IT in enabling collaborative supply chain to augment their operational process. For this, the supply chain managers and the employees of the case manufacturing firms were considered for the data collection and analysis aspect. Managers were interviewed to get the experts' perspective with an open-ended questionnaire while a survey was conducted amongst the employees to get the quantitative data through a close-ended questionnaire. The study shall gauge the impact of the supply chain collaboration on the organizational efficiency and performance.

1.8 Definition of terms

This section involves definition of the key terms associated with the study at hand:

- **Supply Chain Management:** *"Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies*."(Deloitte, 2014, p. 6)

- **Collaboration**: In terms of business, collaboration can be understood as relationships, *"when two or more firms voluntary agree to integrate human, financial, or technical resources in an effort to create a new, more efficient, effective or relevant business model"* (Fendt, 2010, p. 219)

- **Supply Chain Collaboration:** *"two or more chain members working together to create a competitive advantage through sharing information, making joint decisions, and sharing benefits which result from greater profitability of satisfying end customer needs than acting alone"* (Betts & Tadisina, 2009, p. 2).

1.9 Limitations of the Study

The study attempts to adopt an extensive approach to accomplish the research objectives but there are certain caveats that were completely unavoidable. Following is the elucidation of the limitations:

- The study cannot be very extensive in its approach as the underlying intention of the study is essentially academic in nature and had to be successfully completed within a stipulated time frame.

- The scholar had access to restricted resources and time at disposal.
- The sample size adopted for the study is quite small, only 100 employees and 5 supply chain managers who were a part of the case manufacturing firms were considered for the study. Further, the study was conducted only in the country of Iceland.
- The study is done in context of only one sector only, but the need and characteristics of the supply chain collaborations vary from sector to sector. This hinders the study from being comprehensive.

1.10 Chaptalization Plan

With the intent of making the study at hand more understandable and presentable, the documentation of the research report shall be compiled into the following chapters:

i. ***Chapter 1: Introduction:*** This is the initial chapter that shall chalk the outline of the research and elucidates the background of the study containing introduction to supply chain collaboration and supply chain management in Iceland. It shall also highlight problem statement, aims and objectives of the study, research questions to be answered, significance of the study, and limitations of the study and the chapter organization plan of the study report.

ii. ***Chapter 2: Review of Literature****:* This chapter shall be an account of the exhaustive analysis of the analyzed documented literature on the prominent underpinning concepts of the study and assesses multiple prominent works by eminent scholars and practitioners. This chapter develops theoretical backing for the primary research. The concepts shall mainly consist of supply chain management, its features, importance of effective supply chain management in the manufacturing industry, new technologies in supply chain management, supply chain collaboration, features, advantages and limitations of supply chain collaboration, supply chain management

in Iceland's manufacturing exactitude industry and the need for supply chain collaboration in Iceland.

iii. ***Chapter 3: Research Methodology:*** This chapter shall elucidate the research plan applied for the conduct of the study like the research design and research framework appropriate to make the study ethical and meticulous. Further, in this chapter the methodology used for the data collection and analysis is explicated and justification of the appropriateness of the tools and techniques of research methodology applied to realize the research objectives is explained in details.

iv. ***Chapter 4: Data analysis:*** This segment is indeed the most integral aspect of the study. Data analysis contains gathering, assemblage and analysis of the primary data with the help and application of appropriate statistical tools and software like SPSS 19.0 and MS Excel. The data analysis along with descriptive analysis, involves several figures, tables and graphs etc.

v. ***Chapter 5: Conclusion:*** This will be the final chapter that will summarize the entire study and verify the extent of realization of the aims and objectives of the study. It will explicate the key findings and recommends tactics to solve the problem explored in the study. Also, it shall throw light on how future research work can be done in this direction.

Chapter: 2 LITERATURE REVIEW

2.1 Introduction

The current study intents to explore the role of collaborative supply chain in the manufacturing sector of Iceland. The preceding chapter introduced the research and laid the foundation of this study. This chapter critically analyses the established concepts and theories about this concept that have been put forward in the past by eminent scholars and researchers. The chapter commences with an introduction to the concept of supply chain management (SCM), followed by a discussion of the available literature on the concept of supply chain management. This includes like features and characteristics of SCM and importance of effective SCM in the manufacturing industry. Further, the focus shifts to the new technologies and methodologies adopted in SCM. The next section explores the key concept of the study: Supply chain collaboration (SCC). Further, the features and description of SCC are discussed with elucidating the advantages and limitations of SCC. The next section explores the geographical area of the study, Iceland and the role of SCM in its manufacturing sector and throws light upon the need of SCC in the country.

2.2 About supply chain management

In modern business, firms have established networks for procuring raw materials, producing goods or delivering services, warehousing and distributing the goods and finally enabling the goods and services to reach to the end-users or consumers. These efforts are collectively referred to as supply chain management (Poirier, 1999). Over the time, supply chain management has emerged as one of the most critical business tools for performance enhancement. Suppliers, manufacturers, distributors, retailers and service organizations have realized that in order to sustain the competition, they need to transform their operations with better, innovative and regulated supply networks (Poirier, 1999). Further, Shah (2009) expressed that supply chain includes the whole gamut of activities involved in the transition and transformation of the goods from the raw material state to the finished goods and gradually to the sales stage. Supply chain management encompasses planning, designing and

controlling the transition of material, information and finance through the channel partners to ensure dispending supreme customer value in an effective and efficient manner (Shah, 2009). Though here, supply chain management may seem similar to logistics, but there is significant difference between the two concepts. Ayers (2006) asserts that though supply chain has its roots in the logistics field that encompasses warehousing and transportation management, there is a significant difference between the two. Supply chain management is a much broader term and often results in creation and transfer of intellectual capital or knowledge. On the other hand logistics is an essential aspect of the supply chain process that plans, executes and controls the effectual and effective flow and storage of goods, services and associated information from the point of origin to the point of consumption so as to cater the customer expectations profitably. Jespersen & Skjott-Larsen (2005) further highlighted another difference between logistics and supply chain that logistics is more focused on individual firm and the efficiency of its transportation system while supply chain management focuses on the augmentation of the processes of all the participating firms. However, from a holistic purview, supply chain management can be comprehended as the management of all the processes instigated aiming towards consumer satisfaction. It encompasses all the primary business activities like marketing, manufacturing, purchasing, logistics, finance and human resources (Quayle, 2005). Though ambiguity persists around the exact definition of supply chain management, The Council of Logistics Management (CLM) in 2000 proposed a comprehensive definition of supply chain as *"the systematic, strategic coordination of the traditional business functions and tactics across these business functions within a particular organization and across business within a supply chain for the purpose of improving the long term performance of the individual organizations and the supply chain as a whole"* (Venkata & Reddy, 2012, p. 429).

Coming to the evolution of supply chain, Lu (2011) elucidated that over the last three decades, there has been a radical change in the field of business management and many conventional practices of doing business have become obsolete and replaced by the contemporary approaches like business process re-engineering, strategic management, lean thinking, blue ocean strategy etc. Supply chain management stemmed out from such churning of ideas and research and evolved as an independent concept which has been widely accepted

across the globe by both academia and practice. Interestingly, the term "supply chain management" was first coined by Oliver and Webber in 1982 (Lu, 2011). However, initially, the supply chain management was chiefly focused on purchases and cost-optimization but with time, the scope for supply chain integration and supplier-buyer relationship surfaced due to stimulators like intensifying competition, globalization and need for competitive advantages. This compelled managers to accept that a firm is a part of the supply chain they are participants of and it's the supply chain that excels or fails. The present day is the competition of supply chains rather than firms. Similar views have been expressed earlier as well by authors Naslund & Williamson (2010) emphasize that in the modern global business landscape, it is essential for organizations who are into international alliances, to figure out how SCM can be successfully applied during the turbulent times for mitigating risks and disturbances in the supply chain. Thus, companies have to shift the focus from their own performance to the inter-relationship between the other participants in the supply chain.

The above section shows that supply chain management is still an ambiguous concept lacking a universally accepted standard definition. In its formative years, the term was considered a synonym to logistics. However, with time and research, the scholars established that supply chain management is much broader term than logistics. The term supply chain management is an integrated concept encompassing all the process and material flows taking place during the transfer of goods from raw material procurement by the producer to delivering final products to the consumers. However, the lack of uniform definition of SCM restricts the growth in this field.

2.3 Features and characteristics of supply chain management

Different scholars have explored supply chain in context of different sectors and firms and have highlighted the features and characteristics of supply chain management accordingly. This section explores the key features and characteristics from the perspective of the different scholars. The supply chains comprise of numerous processes like product development, procurement, manufacturing, distribution, transportation, warehousing etc. In order to

understand the features and characteristics of supply chain management, it is essential to understand the various functions of a manufacturing supply chain. Following is the diagrammatic representation of the supply chain.

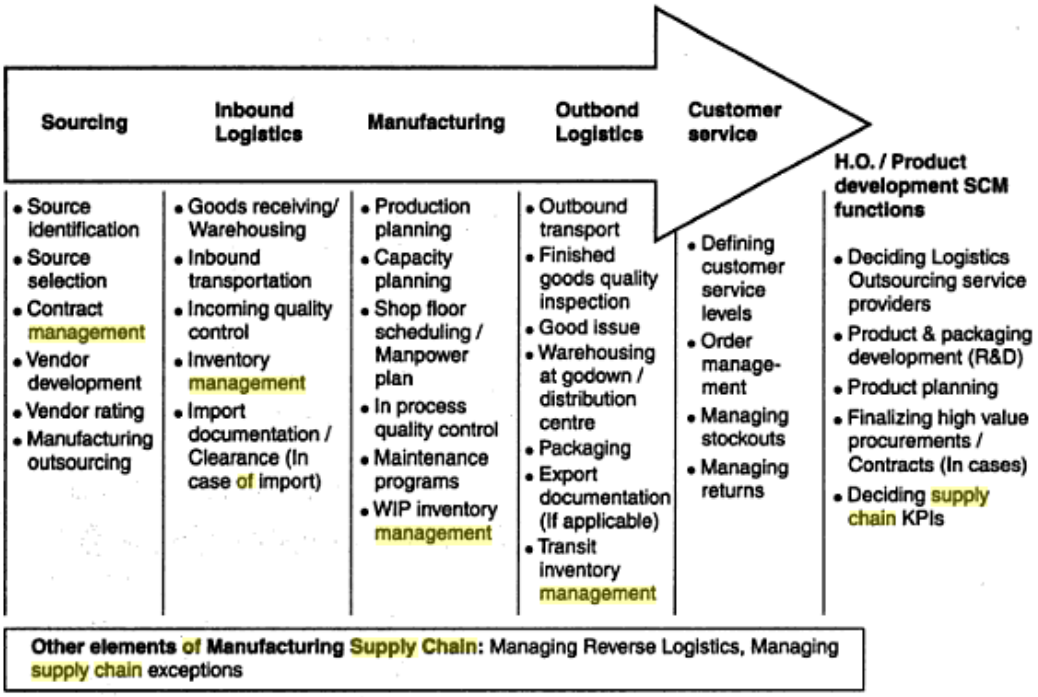


Figure 2.1 Manufacturing Supply Chain

Source: (Ray, 2010)

The diagram is self-explanatory as it lists the various sub-processes involved in a simple manufacturing supply chain. Further in this section, the researcher will explore that how various scholars have illustrated the features and characteristics of the supply chain management. Chen & Paulraj (2004) carried out an extensive literature analysis and stated that one of the fundamental features of a supply chain is that firms are inter-linked and it is a challenge of establishing and maintaining a network of codependent relationships resulting through the strategic collaboration of the firms.

This interdependency was viewed by Power (2005) as the need for adopting a holistic view of the supply chain in its entirety. It is a significant characteristic of any supply chain that it is seen in entirety for a more extensive implementation. This suits the strategic nature of supply chains and also foster strategic planning and execution by the firms involved. Supply chains have intricate inter-relationship of technologies, logistics and partnerships, thus, a holistic approach and strategic harmonization of the efforts are imperative to allow all the trading partners to capitalize on benefits.

Another key feature of supply chains is that a firm needs to integrate its supply chain strategy with its overall competitive strategy. It is only through harmonization between supply chain strategy and firm's strategies that organizational objective of improved organizational performance can be accomplished (Kim, 2006).

While the studies discussed so far throw light upon the positive features of supply chains, Craighead, Blackhurst, Rungtusanatham, & Handfield (2007) asserted that supply chain disruptions and the subsequent operational and financial risks are a common a feature associated with supply chains. These disruptions often result in an impending and unwanted cost burden on the firm and hamper the progress and organizational productivity of other trading partners as well. This makes the supply chain more vulnerable, risky, flexible and consistent.

Ayers & Odegaard (2007) further added that knowledge is an integration feature of any supply chain. It is through knowledge that innovation and modification of products and services can be done, knowledge is central for innovation. Supply chain involves a lot of technological assistance and thus, knowledge transfer is facilitated. Supply chain also supports the satisfaction of end-user requirements. It is these requirements that determine the aims and objectives of the supply chain developed exclusively for different market segments. Another essential characteristic of a supply chain is that it has a two-way flow. Rejecting the common premonition that the supply chains only have a forward flow from suppliers to the end-users, supply chains also have a reverse flows not only in form of returns but also for payments and rebates, replenishment orders, repair etc.

While all the issues discussed so far are all constructive features. However, there are some undesirable features and characteristics of supply chain that the unavoidable and firms have to manage them as well. Coyle, Langley, Gibson, Novack, & Bardi (2008) highlighted such unconstructive issues. The foremost of these issues is complexity. With the rise in globalization and merging of supply chains, there is a rise in the complexity for the firms related to large number of SKUs, locations of the trading partners and customers, logistic requirements, trade regulations, legal implications etc. Another characteristic highlighted by the authors is that inventory is many a time replicated along the chain resulting in the "bullwhip" effect.

Moreover, if supply chain management is efficient, these unconstructive features can be kept at bay with suitable strategic implementations like inventory deployment as it will help in cost optimization through enhanced efficiency. An interesting characteristic of supply chain management is its role in collaborating organizational relationships. Supply chain management focuses on a horizontal process orientation and promotes collaboration with external vendors, customers, transportation companies, third party logistics and other partners of the chain. Internally, SCM enables alignment of marketing, sales, operations and finance (Coyle et al., 2008).

The strategic dimension of the characteristics of SCM was explored by Nakornsri & Lee, (2008). Communication is one of the chief factors responsible for the fostering of trust in supply chain partnership. With the advancement in communication technologies, information sharing is an indispensable aspect of supply chain management. Information sharing allows better decision making not only within the organization but across and beyond the supply chain. Likewise, flexibility of supply chain is an imperative feature. In today's uncertain market scenario, firms are expected to have sufficient flexibility in its functions in order to accommodate the changing customer needs and supply chain is no exception. Flexible supply chains are able to meet customer expectancies promptly, thereby capitalizing on the emerging revenue opportunities through better organizational performance.

This section explored the fundamental features and characteristics of the supply chain. It was found that scholars have highlighted the features from multiple dimensions with the

underpinning postulation that supply chain is the integral function that results in revenue creation and better organizational performance. The next subsequent step is to reflect on the importance of effective supply chain management especially in the manufacturing industry as it is the basis of the study.

2.4 The importance of effective supply chain management in the manufacturing industry

The importance of effectively managing the supply chain has been emphasized upon time and again. Supply chain management is being globally acknowledged as the effective way to integrate key business processes. This is being asserted again and again that supply chain is emerging as the source of competitive advantage. Hammer (2001) cited in Croxton, Lambert, M., & Rogers (2001) affirmed that, *"Streamlining cross-company processes is the next great frontier for reducing costs, enhancing quality, and speeding operations. It is where this decade's productivity wars will be fought. The victors will be those companies that are able to take a new approach to business, working closely with partners to design and manage processes that extend across traditional corporate boundaries. They will be the ones that make the leap from efficiency to super efficiency"* (Croxton et al., 2001, p. 13). Thus, supply chain management initiatives are concentrated on value creation by way of either innovation in processes or products and services being delivered to the end customer.

From the perspective of the manufacturing industry, Stevens (2007) affirmed that irrespective of the scale of operation, nature of product or manufacturing process, all manufacturing firms need to control the flow of material from suppliers, by way of production, warehousing and distribution to the ultimate consumer. Conventionally, the transition of the material was regarded as a mere operation, aimed at increasing the efficiency and lowering the cost. Many a times, the operation of the movement of goods was abandoned due to the ever changing expectations of the competitive landscape. Contemporarily, the thumb rule of survival is to be responsive to the market changes else perish. This is where the role of supply chain becomes paramount. Integration of the supply chain needs to be viewed as a strategic concern

and regard it as an independent business function or entity and the most suitable tools and techniques must be employed to be abreast with the evolving market conditions. It is only through the integration of the supply chain into the strategic agenda of the company that actual dual benefits of increased market share at a reduced asset base can be accomplished (Stevens, 2007).

Researchers have illustrated the importance by seeking relevance to various industries. It is evident that in the dynamic global market scenario, there is an ardent need for a more alert and responsive supply chain.

This was further illustrated by Wahyuni (2010) that a competitive advantage can be obtained either through cost reduction or product/process differentiation. When the inter-relationships and key processes are efficiently managed within the value chain, it undeniably lays the foundation for establishing sustainable competitive advantage through supply chain through optimization and coordination of the trading partners and processes. If the supply chains are well managed, it is bound to fetch financial upsurge by way of cost savings. This surge is extended to the shareholders and customers. By way of analyzing the case of Woolworths, Australia, it was asserted that through supply chain efficiency the retail giant was able to increase the shareholders' value with higher Earnings per Share and dividend. Likewise, customers gained through getting superior quality goods and services at lower prices (Wahyuni, 2010).

With the emergence and wide-scale adoption of production outsourcing, firms want to capitalize on the low-cost production. Zhelyazkov (2011) explored the fast fashion industry through the case of Zara and is of the opinion that the competition in fast fashion industry is not only on the basis of price but also about time. This is because the product and technology life cycles are continuously reducing and the forecasting the market expectations is becoming more and more challenging. Supply chain management is the source of success in the fast fashion industry as it involves catering the process right from raw material procurement to the final consumption by the customers. Supply chain holds a lot of relevance for this industry as it delivers not only a final product but a function of time, place, product and associated services.

Today most industries are adopting a knowledge-centric approach and are striving to create, store and disseminate knowledge effectively so that problems can be righteously addresses and new opportunities can be identified and capitalized upon. Done (2011) laid emphasis upon the role of integrated supply chains in streamlining knowledge transfers from the trading partners of the supply chain. External knowledge transit is essential for all participants of a supply chain because it fosters better coordination and sharing amongst the external partners of the supply chain and also creates "generic" knowledge applicable by all. It also, promotes viewing the supply chain in its entirety rather than individual firms. Supply chain allows both upstream and downstream transfer of information as the flow of knowledge from both ends is crucial for manufacturer's performance especially the knowledge coming upwards from the customers. Moreover, it allows development of integrated knowledge based on both sets of knowledge which has the deepest impact on the overall performance.

The importance of SCM was further implored by Kam, Suwandy, Le, Chang, & Shian (2012) who advocates that the effectiveness of SCM enhances better revenue recognition as non-availability or out-of stock of the product may negatively influence the consumer perception about the brand or product. It is the supply chain management that augments the inventory control and visibility of supply. Ironically, most firms regard supply chain as a sustenance or secondary function. But on the contrary, it is the supply chain that determines the success and failure of a company. The authors also cited that it is the tendency of Indian firms to adopt a tactical approach towards supply chains instead of a strategic approach. The tactical approach towards supply chain is myopic and doesn't adopt an enduring vision and thereby succumb without accomplishing organizational objectives. Citing the example of Nestle, authors asserted that for a manufacturing unit, continuous augmentation of supply chain can enable in shortening the inventory pipeline of the finished goods resulting in freshness of stock, lesser requirement of working capital, controlled distribution cost and elevated productivity (Kam et al., 2012).

The above discussion highlights that the supply chain management is an essential aspect of any business especially manufacturing units. However, every industry has its own distinct characteristics which need to be considered while developing appropriate supply chain strategies. In recent times, organizational performance measurement and metrics are gaining

attention and supply chain is a central contributor to the performance. However, there is the dearth of literature that focuses on the implications of supply chain management of the manufacturing industry of Iceland. This study is an attempt to bridge this gap by making significant contribution to the existing literature.

The next section explores the new technologies of supply chain which enhances the importance of supply chain management in the manufacturing sector.

2.5 About supply chain collaboration

Rapid globalization and intense competition have compelled firms in every industry to operate in a networked business environment. The firms are operating presently in a geographically dispersed business environment which further complicates the business operations. As supply chains turn global, there is a growing need to establish collaboration throughout the supply chain. Contemporary supply chains include multiple touch points in every activity whether it is handling of raw materials or delivering the finished goods to the final consumers. As such, it becomes indispensable to achieve supply chain collaboration for smoother business operations (SAP, 2007).

Barratt (2004) asserts that supply chain collaboration (SCC) refers to sharing common objectives, skills and knowledge, mutual trust and respect, as well as intellectual flexibility. McClellan (2002) put it simply that supply chain (SC) collaboration is a win/win arrangement that is expected to offer enhanced business success for all the parties involved in such collaboration. Simatupang & Sridharan (2005) on the other hand, define the concept of supply chain collaboration as being the collaboration of two or more supply chain members wherein they aim to achieve competitive advantage through sharing information, joint decision making, and distributing higher profits resulting from better customer satisfaction they achieve by such joining hands rather than working alone (Simatupang and Sridharan, 2002 cited in Karuranga, Frayret, & D'Amours, 2008).

Supply chain collaboration as conceived by Chen and Paulraj (2004); Daugherty et al. (2006); Simatupang & Sridharan (2004) cited in Kohli & Jensen (2010) goes much beyond the casual collaboration and includes information sharing, participation in collaborative activities, managing the exceptions, anticipating demand allocations, and supervising the accomplishment of performance goals

Whipple & Russell, (2007) prescribe three kinds of collaboration based upon ten factors including people, process and technology characteristics; extent of involvement in decision making; time horizon; degree of focus on collaboration; the level of the organization and knowledge; information domain; and finally the classification of return on relationship. On the basis of these ten factors, Whipple and Russell identify three kinds of collaboration: Type I is the collaborative transaction management; Type II, the collaborative event management; and Type III (collaborative process management).

Fawcett et al. (2012) have referred to supply chain collaboration as an important and dynamic capability to deliver differential performance. Fawacett further elaborate upon the concept of supply chain collaboration to include types of collaboration initiatives: one that takes place between suppliers and customers, known as the vertical collaboration; and another that involves competitors and other organizations operating in the same frame.

Haider (2014) in his research on collaboration in supply chain management explained that collaboration is a generic term and can be used in various academic disciplines like sociology, psychology, management and marketing in addition to its usage in supply chain. Haider also proposed that in academia, in context of supply chain, the terms cooperation, coordination and collaboration are often used interchangeably but this is wrong and coordination and cooperation are activities to secure collaboration in the supply chain and hence cannot be used as synonyms. Regarding definition of SCC, Haider confirms the viewpoint of Mentzer et al (2000) who refer to the term as a mechanism to achieve either efficiency or effectiveness in the supply chain. However, Haider also establishes that supply chain collaboration is a widely discussed concept and every scholar has its own perspective about the same but still the significance of SCC in today's highly competitive market environments cannot be denied.

The review of literature on supply chain collaboration concept provides that the field has no doubt gained considerable visibility from the academia as there is no paucity of studies on this subject. But at the same time, the research in this area is still in its infancy as none of the researchers could reach to a consensus on the concept of supply chain collaboration. Generally speaking, supply chain collaboration is all about developing mutual trust and confidence among partners for information and resource sharing to achieve better customer satisfaction, reduce costs and a sustainable competitive advantage in the long-run. There is undoubtedly a dire need of removing this vagueness around the concept to enhance its utility. The current research aims to achieve the same.

2.6 Features/ description of supply chain collaboration

In a study conducted by Holweg, Disney, Holmström, & Småros (n.d.) it was found that supply chain collaboration is not a novel concept as academicians and scholars in the mid-1990s had also recommended this. But the term supply chain collaboration was probably not coined because it was referred to under the concepts like Vendor Managed Inventory (VMI), Collaborative Forecasting Planning and Replenishment (CPFR), and Continuous Replenishment (CR). Even till date, the research in supply chain collaboration is in its infancy despite the term gaining worldwide attention.

Jespersen & Skjott-Larsen (2005) explore the basic prerequisites for SCC when they provided that trust and confidence among partners is essential to initiate collaboration (Skjoett-Larsen et al., 2003 cited in Kohli and Jensen, 2010). Supply chain collaboration in every industry operates at three different levels: strategic level, tactical level, and the execution level. At the strategic level, supply chain collaboration agree to joint decision making on various strategic issues including product and pricing related decisions; at the tactical level, information sharing takes place on matters like product and price descriptions, inventory, contract terms and service levels; finally at the execution level, the members into collaboration exchange key transactional data including information like purchase and sales orders, invoices, credit and debit notes, and production/work orders (SAP, 2007).

Betts & Tadisina (2009) establish in their study that supply chain collaboration is higher when the environment is uncertain and the supply chain is agile. This is because when environmental uncertainties are higher, firms look for greater collaboration to cope with such environmental dynamics and such better collaboration usually results in better supply chain performance however a contrasting feature is that after a certain point, a higher collaboration does not benefit the supply chain performance. It is argued that after a certain point, the collaboration starts consuming the resources which can better be used elsewhere.

An important characteristic of supply chain collaboration is that the collaboration elements differ in different industries. In a study conducted by Cassivi (2006) in context of telecommunications industry, it was found that information visibility is the most significant element for collaboration while social factors like interdependence, trust and intensity are also important. In contrast to the findings in telecommunications sector, Vlachos and Bourlakis (2006) who conducted the research in food industry concluded that trust is instrumental to creating any kind of collaboration between supply chain members and that other factors like information sharing, commitment and physical distribution are also important but not as important as trust.

SAP (2007) throws light on the three kinds of collaboration that can possibly take place in an organization: upstream collaboration, downstream collaboration and internal collaboration. Upstream collaboration occurs between the company and its suppliers and outsourcing partners. With globalization, business operations are often frequently scattered and much are outsourced to outside parties. This increases the need for upstream collaboration to ensure everybody is working towards a common goal. Upstream collaboration generally involves information sharing on shipments, supplies on hand, manufacturing capacity, quality and anything that affects productivity. Downstream collaboration takes place between the company and its customers. It is however to be noted that customers here not only refer to the end-user but also include wholesalers and retailers. Finally, the internal collaboration happens within the organization and comprises the interdepartmental sales and operations planning (S&OP) process to ensure accomplishment of tactical goals by all business functions and geographic divisions of the firm.

The literature establishes that supply chain collaboration although not a new concept has remained mostly overlooked. Different kinds of collaborations take place within SCC and the collaboration elements differ industry-wise. Yet in every industry, the SCC takes place at strategic, tactical and execution level. Environmental agility has been found to be an important determinant of the extent of collaboration. But the literature failed to establish anything concrete and no studies were found in context of manufacturing industry. These gaps are to be filled in this research.

2.7 Advantages and limitations of supply chain collaboration

Supply chain collaboration (SCC) provides several benefits to the chain members. The benefits of SSC extend to manufacturers, suppliers as well as the customers. Supply chain collaboration aids in massive cost reduction, reduced lead times and improved service for customers, enhanced end-user satisfaction, better information visibility and increased competitiveness apart from a clear distribution of responsibilities among different supply chain members (Akintoye et al., 2000; Matopoulos et al., 2007; Sandberg, 2007 cited in Kohli and Jensen, 2010). Scholars like Fisher (1997), Lee et al. (1997); Simatupang & Sridharan (2005) also focused upon the cost reduction and revenue enhancement advantages of supply chain collaboration but also added the dimension of added operational flexibility which aids the firms in coping with demand uncertainties. Barratt and Oliveira (2001) and Whipple & Russell (2007) found the benefits of collaborated supply chain in better and more accurate forecasts leading to the benefits of reduced inventory and costs. They also concluded that SCC enhances the firms' sales and helps in delivering better customer service. Kotabe et al. (2003) on the other hand elaborated about SCC benefits in the form of division of labor and knowledge sharing among chain members.

Yakova (2005 cited in Kohli and Jensen, 2010) related the benefits of supply chain collaboration to supply chain performance and asserted that SCC allows firms to win competitive advantage over rivals thereby securing strong market position. However, industry-wise researches conducted by other scholars do not confirm the same. In a research

by Tucci et al (2005) conducted on software industry, it was concluded that collaboration alone cannot improve supply chain performance.

While many assert that these benefits outnumber the challenges involved in supply chain collaboration, Simatupang and Sridharan (2002); Whipple (2007) argue that the efforts towards attaining collaboration in the supply chain may go wrong and not necessarily turn in a success. Different challenges often confront the supply chain members towards achieving a better supply chain collaboration including the exposure to greater competition and the subsequent risk of failure, increased operational complications, and insufficient technological compatibilities (Barratt, 2004; Matopoulos et al., 2007, Sandberg, 2007; Van Weele, 2009 cited in Kohli and Jensen, 2010).

Holweg et al (n.d.) stress that the irony in collaboration implementation that the significance is well accepted by industry and the concept is rather simple yet there is little implementation in within mainstream industries. One of the major reasons identified in this regard include lack of understanding of the collaboration concepts. They argue that despite the concept being simple; it is conceptualized in differing ways thereby resulting into confusion and hesitation of acceptance.

Barratt (2004) confirms the findings of Holweg et al. when he state that supply chain collaboration has proved to be difficult in implementation. The reasons identified by Barratt include an over-reliance on the technology for such implementation, a lack of understanding of the concept of SCC, indecisiveness about with whom to collaborate and when to collaborate, and finally lack of trust between supply chain members. Barrat (2004) recommends that a supply chain segmentation approach needs to be adopted by firms wherein the basis of segmentation would be the customer buying behavior and their service needs. Besides, a better understanding of supply chain elements is also advisable including the strategic, cultural and implementation related elements.

SAP (2007) brings into focus the different barriers to effective collaboration of supply chain. The heterogeneity of IT and technical infrastructures among different members spread globally often act as a major hurdle in collaboration. The difference of perspectives between suppliers and customers also prohibit the collaboration to take place smoothly. Suppliers and

customers mostly have different perspectives on supply chain issues. Besides, safety and security issues around the supply chain also need to be catered as a problem in any part of the supply chain would affect all the members of that chain. SAP also drew attention to the lack of effective metrics to measure performance of all members in the supply chain as a considerable hurdle in the way of collaboration. In a collaborated supply chain, the members need to ensure mutual gains and not just concentrating upon the performance of firm's supply chain but this needs extension of supervision to those activities as well which are not under direct control of the firm. In such circumstances, without end-to-end visibility, ensuring performance improvements throughout collaborated supply chain becomes extremely challenging.

Karuranga et al. (2008) assert that this field has received little attention by academia in context of collaboration measurement. Collaboration initiatives often involve high costs, are resource intensive and their outcomes are mostly unpredictable (Delbufalo, 2012).

The review of literature reveals the several advantages of supply chain collaboration in terms of operational flexibility, reduced inventory lead times, reduced overall operational costs, higher end-customer satisfaction and better profitability. But at the same time, it highlighted the challenges involved in collaboration, primary being the high costs of collaboration and the indecisiveness relating to with whom to collaborate and how to collaborate. There has been an argument among researchers if benefits of collaboration outweigh its challenges or it is vice versa. Moreover, it was also observed that none of the researches have tried to suggest solutions for supply chain collaboration challenges identified by them. The current research attempts to do the same.

2.8 New technologies/ methodologies in supply chain management

Over the years, scholars and practitioners have been focusing on developing and improving the processes involved in the individual manufacturing supply chains. However with time the focus has shifted to performance, design and analysis of the supply chain as a whole. This has been mainly stimulated by the increasing costs of manufacturing, the reducing resources of the manufacturing facilities, trimming of the product life cycles and globalization of the

markets and economies (Beamon, 1998). Other than the internal alterations, the businesses today are susceptible to external environmental risks and it has become a necessity to evaluate the flaws of the supply chains and develop strategies to sustain continuity and operations to mollify the aftermaths and ensure persistence of the key processes (Pai, Kallepalli, & Caudill, 2003).

For addressing these issues, supply chain management and inter-firm collaboration is being widely used. While SCM aims in developing innovative models and technology to support collaborative practices, the inter-firm collaborations intent to capitalize on the advantages of supply chain management. Conventionally there were transaction-oriented relationships between the participants of the supply chain and were competing amongst themselves to seek advantage from the other from individual gains. However, the contemporary supply chain practices foster collaborative relationships based on a three-level scale from short-term transactional exchanges to long-term relationship based on collaborative practices like mutual investments and research and development (Karuranga et al., 2008). Further, these relationships can be classified as supply relationships; outsourcing relationships and co-production relationships. Frayret (2002) cited in (Karuranga et al., 2008) highlighted six generally applied methods of collaboration explicated through the following table:

Type	Principle	Examples of practice
Outsourced local decision-making	Increase the level of responsibility of suppliers	Vendor-managed inventory, supplier quality program, early supplier involvement (component design)
Improved local decision-making	Enhance and align local decision-making	Information sharing, shared POS data, joint capacity management, joint inventory management
Decision objective alignment	Joint objective planning and objective alignment	Collaborative forecasting, collaborative promotion planning, early supplier involvement, category management
Pooled resource and capacity sharing	Resource pooling and sharing, and joint investment	Shared pallets, joint trailer, 3PL (mediated resource sharing), joint facility and R&D investment, shared prototyping facility
Process and IS integration	Business process and information system integration	JIT supplier (ex.: Toyota), CPFR standards adoption, B2B marketplace, E-business standards compliant
Supply chain process reengineering	Internal business process redesign and alignment	Joint cycle time reduction, supply chain event management, suppliers training and evaluation, process postponement, performance metrics

Figure 2.2 Patterns of Collaboration

Source: (Karuranga et al., 2008)

Based on the above patterns, the latest methods of supply chain management are explored.

- **Third-Party (3PL) and Forth-Party (4PL) Logistics:** This pattern is of resource pooling and capacity sharing. More and more firms are resorting to 3PL and 4PL service providers to handle the customer centric segment of their supply chain. The firms who have been partnering with customers and suppliers are easily switching to this mode and obtaining considerable cost savings (Sreenivas & Srinivas, 2008). The role of Logistics service providers is to enhance the performance of the supply chain and integrate the functions of the participants to make it more collaborative (Vivaldini, Pires, & Souza, 2008). These logistics service providers make up for the connectivity and communication requirements of the complex supply chains and have progressed from facilitating logistics competence to emerge as "orchestrators" of supply chains to foster long-term competitive advantage (Zacharia, Sanders, & Nix, 2011).

- **Direct Delivery and Merge-in- transit:** Customers usually regard higher value to a broad product assortment. But this involves a lot of cost for the supplier as a large stock of product variants have to be maintained in the inventory. However, it is feasible to diminish the need for warehousing through direct deliveries from the manufacturing units, but the customer value in such cases is considerably decreased as at many occasions, orders are received through quite a few shipments depending on the variety and suppliers of products ordered. Direct deliveries usually result in multiple invoices with each shipment and the processing of each levy a considerable cost on the consumers. This problem can be solved through merge-in-transit. It is a distribution system wherein goods shipped from multiple supply locations are consolidated into one final package while in transit and customers receive only one package. This method is being widely adopted by e-commerce enterprises (Karkkainen, Ala-Risku, & Holmstrom, 2003).

- **Cross- Docking:** Cross- docking is a distribution tactic adopted extensively in collaborative supply chains as it warrants concentrated coordination and consistent flow of superior quality information amongst the partners of the supply chain. Broadly, cross-docking can be understood as the transfer of goods and materials from an inbound carrier to an outbound carrier, without the goods being actually stored in the warehouse. This way cross-docking allows significant inventory savings (Kulwiec, 2004). Cross-docking requires substantial coordination and collaboration amongst the channel partners in order to replace the conventional warehousing and secure an uninterrupted flow of goods. This way it can be instrumental in lowering the inventory costs and enhancing receptiveness to the consumer expectations (Gümüş & Bookbinder, 2004; Lee, Jung, & Lee, 2006).

Apart from the methods illustrated above, there are scholars who have recommended other unconventional methods of optimizing the collaborative supply chains. Manthou, Vlachopoulou, & Folinas (2004) professed the virtual e-chain (VeC) model for collaborative supply chains. In a virtual arrangement, the participating companies are working together through mutual values and objectives for exploring a specific business opportunity. Based on the characteristics of each company like the partner's business model, organizational and technical alignment and agreements between the firms, a collaborative supply chain can be effectively developed. VeC model enables creating a virtual collaborative framework of the roles of partners based on their core competencies and assessment of partners' readiness to collaborate. This model is backed by the ICT tools and is suitable for the globalized networking and supply chains that extend beyond geographical borders (Manthou et al., 2004).

Another tool for optimizing collaborative supply chains, benchmarking was suggested by Simatupang & Sridharan (2004). The powerful and extreme competitive market compels companies to collaborate their supply chain with the upstream and downstream associates. However, it is imperative to ensure that all the participants are proceeding in the right desired direction to ensure top-class practice. This is possible through benchmarking. Benchmarking enables collective learning for performance enhancement for all. Intra-company

benchmarking of supply chain is a common phenomenon but inter-company benchmarking is a new approach for linking collaborative performance metrics and collaborative enablers and recognize the performance pitfalls and synchronize improvement endeavors accordingly.

Supply chains have ICT as their foundation, thus, the role of IT in collaborative supply chain is indispensable. Helo & Szekely (2005) through an extensive literature review study found that there is considerable overlap pertaining to the functionalities of software applications and since supply chains are becoming more and more collaborative, there is an ardent need for real time information laying stress upon flexible IT-systems that can manage massive amount of data and are simplified to be interconnected. This is will gradually culminate into more focused approach in the field of product configuration, RFID-technology, standards in relation to interoperability of software applications (EAI technologies). Thus, role of IT is critical in collaboration and optimization of supply chains.

Simatupang & Sridharan (2005) proposed a collaborative supply chain framework comprising of five interconnected features like collaborative performance system, information sharing, decision synchronization, incentive alignment, and integrated supply chain processes. This framework is aimed at enhancing supply chain collaboration as it allows the participants of the supply chain to analyze the key features of supply chain collaboration prior and during the collaborative attempt. While most studies focus on one dimension of the supply chain, this study attempted to address all the connecting features of collaboration. A similar study was conducted by Whipple & Russell (2007) to assess the characteristics, necessities, advantages and difficulties of collaborative supply chains and recommend a typology of collaborative approaches. For this an empirical study was carried out amongst 21 managers from 10 manufactures and retailers and found that a typology of three types of collaborative approaches, collaborative transaction management, collaborative event management and collaborative process management. This approach can be instrumental in evaluating the present collaborative supply chain and identify the areas where improvement is required. The typology can be employed by the managers to derive collaborative strategies for the entire supply chain based on the core advantages that each participating firm brings to the supply chain.

This section has explored some of the models and approaches adopted over the period of time that have propelled the gradual progression of conventional individualistic supply chains to more comprehensive and collaborative supply chains. However, most studies discussed assess collaborative supply chains in general neutral to the nature of the industry. Most studies made general conclusions. This study shall attempt to bridge this gap by exploring the supply chain management and collaboration in the manufacturing sector of Iceland which is hardly explored.

2.9 Supply chain management in Nordic Countries

On exploring the available literature on supply chain management in Nordic countries i.e. Denmark, Finland, Iceland, Norway and Sweden, it was found that not much of research work has been done in this regards. Heckmann, Shorten, & Engel (2003) explored the status of the concept of supply chain management in its "adulthood", 21 years post the introduction of the term by Booz Allen's Keith Oliver in 1982. However, the survey study conducted by the author deduced that the concept have repeatedly disappointed at many fronts as it is unable to deliver the desired performance. The survey was conducted 196 heads from manufacturing, purchasing, or logistics departments or members of general management. Focusing on SCM practices in Nordic countries, it was observed that at present, most firms have delegated the supply chain management function down the leadership hierarchy and is majorly managed through its fragmented components like procurement, transportation, distribution and inventory. SCM is not regarded as a considerable aspect of the company's overall business strategy and is not included in the planning process. Nordic companies follow demand-driven programs that focus on savings in purchases. This is because in many areas and sectors, the competition is majorly centered on price, demand- driven SCM tend to influence the savings. This savings is irrespective of the fact that whether marketing is involved in the planning process or not. However, the biggest let down is the fact that though the countries are IT advanced but technological advancements are not being efficiently and effectively used in decision making across the supply chains.

While this study was from the practice perspective, there are studies conducted with the academic perspective. Stentoft Arlbjørn, Jonsson, & Johansen (2008) explored the concept of logistics and supply chain management from the academic research perspective and found that there is no well-defined research paradigm adopted and the focus is mainly on supply chains, networks, dyads of different organizations. This can be comprehended better by understanding the nature of the business scenario of the Nordic region and how it is a breeding ground for supply chains especially of collaborative nature. Arlbjørn, Haas, Mikkelsen, & Zachariassen (2010) asserted that the Nordic region is predominantly a logistical market and the market is characterized by high purchasing and spending power. The region is developed in terms of IT. For many global brands, Nordic region serves as a perfect choice for pilot testing. This is because there is a unique business- to-consumer cross border network in the region and also a business-to-business network amongst the countries that have the same legal structure and common IT platform. These act as chief catalysts for supply chain collaboration in the region. Thus, entering the region means entering five countries with a single entry. More recently, Karlsson & Alers (2013) attempted to gauge organizational sustainability in context of national sustainability and found that Nordic countries strive to ensure a high standard of living for their residents. This results in corporate sustainability to be comparatively diverse from other countries. It is important that corporate sustainability strategies need to be aligned with the state policies and must strive to focus on areas which the government tends to ignore. This underpinning motivation makes the supply chain of Nordic companies to be superior to those of their global counterparts. The Nordic supply chains when extended across borders, they follow the same suit and identify the need to provide sustenance to the local society and employees with a higher intensity. However, it was also observed the Nordic companies are not very good at talent attraction and retention.

Thus, it shows that Nordic countries have scope for collaborative supply chains and international companies are attracted towards the Nordic region for the same. However, the dearth of literature does not indicate the competence of the supply chains adopted in the Nordic companies. The study attempts to make significant contribution to the literature on SCM in the Nordic region especially focusing on Iceland and also motive further research on similar lines.

The further section explores the studies conducted on supply chain management in the manufacturing sector and attempts to identify the gaps that can be made up through the primary study at hand.

Hameri & Palsson (2003) studied the supply chain management in the fishing industry of Iceland which is the prominent export sector of the country. It was found that the export of seafood to key markets in Europe, US and Japan requires a robust supply chain management which has to deal with the issues related to extremely fluctuating raw material supply and stricter quality expectations. For this, the supply chain needs to be collaborative to be able to manage the upstream flow of material.

While this study focused on supply chain of one sector in a particular country, Holweg, Disney, Holmström, & Småros (2005) explored the concept of collaboration in supply chain across industries and countries and found that the adoption of collaborative supply chain is retarded mainly because of the absence of understanding of the process and the implications involved in collaboration of external factors with the internal production and inventory control. The authors proposed that the supply chain collaboration can be effective by focusing on two factors: intensity of the integration of internal and external factors and the degree of alignment of the supply chain initiatives with the geographical distribution network, demand patterns and the nature of product. Likewise, Vereecke & Muylle (2006) analyzed the relationship between supply chain collaboration and performance improvement and concluded that there is a negligibly positive relationship between supplier or customer collaboration and performance enhancement. Performance augmentation can be accelerated by way of cost, flexibility, quality and procurement. Thus, the higher levels of collaboration amongst the trading partners of the supply chain, the better is the performance of the overall supply chain. In this year, Jiao, You, & Kumar (2006) recommended a multi-agent system for fostering supply chain collaboration in a global manufacturing supply chain network. The study asserts that multi-agent system is appropriate for handling wide scale coordination and negotiation issues especially in global manufacturing supply chain.

While the studies discussed above discuss supply chain collaboration extensively but ignored the key issue of sustainability. This was covered by Vachon & Klassen (2008). The authors

studied the supply chain and its impact on the environment based on a survey conducted amongst the North American manufacturers. Environmental collaboration can be understood as the alignment of supply chain objectives with the environmental goal setting and ensuring that the supply chain attempts to lower pollution or other environmental hazards. These supply chain practices can be both upstream and downstream.

Another aspect of collaborative supply chains, managing supply chain interfaces, was covered by Stefansson & Russell (2008). Supply chain interfaces are where there is a transition of goods or information from one trading partner to another and are one of the chief aspects of collaborative logistics management. It is necessary for the firms to recognize the important interfaces that need attention and analyzing the related attribute and their values will have a constructive impact on the collaborative logistics management arrangements.

All the studies reviewed in this section have shown the relevance and importance of supply chain collaboration. However, there have not been many studies done in this regard in the country of Iceland. This study at hand is an attempt to bridge the gap of literature in supply chain management and collaborative supply chain in the manufacturing sector of Iceland.

2.10 Summary of the chapter

This chapter was developed on the summarization of extensive critical analysis of the available studies carried out by eminent scholars in the past. This review of literature has developed a theoretical framework that will work as the guidance for the primary aspect of the study. The literature analysis reveals that supply chain management is of strategic relevance for any organization. With the present scenario of globalized competition, the emergence of collaborative supply chain is the need of the hour. However, the concept is extremely undermined by both academia and practice.

Chapter: 3 RESEARCH METHODOLOGY

3.1 Introduction

A research can be understood as an expansive study undertaken by the scholar for established new knowledge related to social and objective events (Kumar, 2008). Research is about unleashing the unknown in a more systematic manner (Khan, 2008). Any research work is characterized as a work with systematic approach, objective, reproducible, relevant and controlled (Pathak, 2008).

This chapter presents the research methodology applied in the course of the study at hand. The research methodology provides a guiding framework for the conduct of the study and helps the scholar to avoid any deviation (Rajasekar, Philominathan, & Chinnathambi, 2013). The research methodology has been explained with its suitability and its alignment with the aim and objectives of the study has been maintained throughout.

3.2 Research design strategy

Research design can be understood as, *"the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance"* (Beri, 2007, p. 579). Hence, research design provides with an exhaustive framework for the study to ensure the smooth execution of the research work. The research design enables identification of the suitable means and procedure of data collection and how the data shall be analyzed using the appropriate statistical tools and software (Pedler, 2012). Thus, research design forms the foundation of the study. Following are the subsections that explicate the various aspects of the research design.

3.2.1 Research Methods

The research methods adopted by scholars can be categorized as exploratory, descriptive and explanatory research designs. The research method is selected based on the nature of the problem at hand (Beri, 2007). The exploratory design is basically centered on secondary data to exploring innovative ideas and insights (Rajasekar et al., 2013). The problem of the study is resolved on the inferences drawn from the secondary data and thus, appropriate interpretation. On the contrariwise, the descriptive research design is adopted when the scholar aspires to analyze the characteristics of a specific group, incidence or circumstance and portray an accurate profile. Lastly, the explanatory or causal research design is applied for research work where the scholar attempts to develop a cause and effect relationship between the variables under consideration.

The research design appropriate for the study under consideration is explorative in nature. This approach is suitable as the study investigates the potential of supply chain collaboration in the manufacturing industry of Iceland and the study will explicate the applicability of supply chain collaboration in enhancing the performance of the manufacturing firms in the country.

3.2.2 Research Approach

Deductive and inductive approaches are the two types of research approaches predominantly used. Deductive approach is applicable for the researches where the scholar aspires to test the already established theoretical models. This approach involves development of hypotheses and then testing the data with the primary data (Blaikie, 2009), thereby, laying emphasis on causality as it is through primary data that inferential arguments are deduced.

On the other hand, the inductive approach is primarily linked with establishing generalized statements and subsequent theory from the assimilated data. Thus, the inductive approach helps the scholar to come up with innovative suggestions and theoretical models from the

primary data. Hence, inductive approach is applied when the scholar attempts to develop a new theory or unleash a new dimension of the prevalent theory (Blaikie, 2009).

Deductive approach has been adopted for the study as the study involves understanding the impact of the supply chain collaboration on organizational performance of the manufacturing firms of Iceland.

3.2.3 Research Strategy

The research strategy can be viewed as the basic plan for seeking solution to the problem at hand keeping the aim and objectives of the study in mind and select the best suited tools and mechanism for data collection and analysis (Singh & Nath, 2007). The research strategy helps the scholar in analyzing the data and testing the hypothesis. For data collection, the scholar carried out a primary study comprising of both qualitative and quantitative studies. The quantitative study helps the scholar to get an idea about the employee perception about the supply chain collaboration from the five case companies A, B, C, D and E. For this, a survey was conducted amongst 20 employees and distributors per company to understand how IT enabled collaborative SCM have enhanced their operational process. Further, to get the expert opinion, the scholar conducted a qualitative study consisting of interviews of 5 Supply Chain Managers in the case manufacturing firms to understand their views on collaborative SCM. This facilitated a comprehensive knowledge creation. The data collection process was carried out in a phased manner as conducting interviews required prior appointments and conducting a survey also required visits to the respective case companies. Thus, the research strategy has been especially designed for the purpose of meeting the requirements of the research objectives and questions.

3.3 Data Collection Means and Protocols

Data collection is perhaps the most vital aspect of any research study as it is the data gathered, on the basis of which the scholar attempts to find solutions to the issues under consideration and achieve the research objectives (Babbie, 2013). Thus, it is imperative to ensure that the data collection process is ethically and authentically carried out. For conducting a study within the assigned time frame and to ensure utmost efficiency and cost effectiveness, most studies collect data through a suitable sampling plan. This section highlights the data type and sampling plan used for the study.

3.3.1 Data Type

There are two types of data chiefly gathered for any study: primary and secondary data. The primary data refers to the data that is the most authentic data which has been gathered purposely for the study only (Pawar, 2004). However, in order to attain the research objectives, along with primary data, every study needs a robust theoretical based that is established by the secondary data (Solorzano & Yosso, 2002).

For the study, the scholar gathered both primary as well as secondary data.

Secondary Data: The secondary data for the research study has been collected by way of an extensive literature review. The secondary data is assimilated from several secondary sources and lays the foundation of theoretical framework for the inferences drawn from primary data. The secondary data was collected from multiple reliable sources like news articles, several informative portals, and magazines, reports by consultancy firms and industry-specific organizations and books written by other authors. The secondary data helped to identify the gaps which shall be covered by the primary data.

Primary Data: For this research, primary data of both qualitative and quantitative nature was gathered. For qualitative data, interview method was adopted while for quantitative data, survey method was applied. Separate questionnaires were developed and served to the

respondents. Qualitative questionnaire comprised of open-ended questions while quantitative questionnaire was structured with close-ended questions. The respondents for both studies were from the case companies A, B, C, D and E.

For the study, a sample of 100 employees from the case companies A, B, C, D and E was selected (20 from each company) and furnished with the questionnaire. The survey was conducted at the company premises after obtaining the requisite permission from the authorities. Likewise, interviews with 5 supply chain managers (1 from each company) were also conducted at the company offices at prior appointments.

3.4 Sampling Plan and Methods

Since the study caters to the entire manufacturing industry of Iceland, it was impossible to study the industry in entirety. Thus, sampling technique was adopted. Sampling is a research technique wherein a subset of the entire applicable population is studied and the inferences drawn are generalized for the entire population (Babbie, 2010). There are two types of sampling: probability and non-probability sampling. Under probability sampling, each unit of the population has an equal chance of getting selected for the sample while in non-probability sampling, such homogenous probability is missing and chances of selection of each unit of the population is not homogeneous (Pride & Ferrell, 2008).

For this study, non-probability sampling has been adopted for selecting the sample. The methodology adopted for the study is convenience non-probability sampling wherein the respondents were chosen on grounds of availability and free will of the participants. Non-probability convenience sampling is best suited as there was no access to all the employees of all the case organizations. The sample selected for the study comprised of 20 employees from each of the five case companies (total of 100 respondents) and 5 supply chain managers (1 from each case company).

3.5 Data Analysis procedures

The quantitative data can be appropriately analyzed through statistical analysis. After data collection, questionnaires were duly checked for completion. Then the data was compiled onto an MS Excel worksheet and rechecked for any clerical errors. This worksheet was then transferred to the SPSS software where for inferential analysis, frequency analysis, correlation and regression tests were applied. For the qualitative data, descriptive analysis was done.

3.6 Verifying Data Accuracy

Researchers have time and again asserted the importance of verification of data accuracy as an essential aspect of data collection and analysis (Kothari, 2012). This is because verifying the data accuracy on the data collected is essential for sustaining the integrity of the project and thus needs to be imperiously carried out (Miller & Yang, 2007).

For the study, both the validity and reliability of the data has been tested.

3.6.1 Validity

Validity can be defined as, "*the extent of systematic error in measurement- the extent to which a specific measurement provides data that relate to commonly accepted meanings of a particular concept"* (Rubin & Babbie, 2010).

Internal validity, external validity and constructive validity are the three major classifications of validity. The internal validity is based on the postulation that the outcomes can be righteously attributed to independent variable and do not need any other form of contrary justification. The external validity stands for the level to which the conclusions of the study can be generalized with ease. In other words, external validity happens when the outcomes of the study is in line with the external suppositions. Contrary to both these validity, construct

validity allows the scholar to determine whether the findings of the study are in line with the theoretical expectations or not.

For this study, to ensure data validity authentic data was gathered. The primary data was collected, compiled and analyzed by the scholar himself. Due care was taken to avoid clerical errors while compilation of the data. For eradicating methodological errors, the questionnaire was pilot tested and cross verified. Further, the questionnaire is developed and designed in a cross-check mechanism wherein each question serves as a cross-checker for the preceding question.

3.6.2 Reliability

Reliability has been defined by Rubin & Babbie (2010) " *Reliability concerns the amount of random error in a measure and measurement consistency. It refers to the likelihood that a given measurement procedure will yield the same description of a given phenomenon if that measurement is repeated."*

It is important for the scholar to safeguard the reliability of the study in order to draw relevant conclusions which are aligned with the aim and objectives of the research. The reliability of the findings of the research can be testified by applying them to a larger field or population. There are many ways to assessing the reliability of the data. For the study at hand, the scholar applied the reliability testing tool which is basically a statistical tool, Cronbach alpha's coefficient (α). In case the coefficient is more than that of 0.6, the data is known to be reliable. The Cronbach alpha's coefficient for the study was 0.83. Thus, the reliability test conducted for the study under consideration has showed that the findings have been instrumental in accomplishing the aims and objectives of the study. The results will be presented in the next chapter.

3.7 Limitations of the methodology

The research methodology used in this study suffers from a few limitations explained below:

- The study is entirely academic in nature, thus, the time and resources were extremely limited. This restricted the collection and analysis of data.
- For suitability, the sampling was done only amongst 100 employees from the five case companies. This limits the study from being comprehensive.
- The study was also limited to only five firms of the manufacturing industry of Iceland. This restricted the wide-ranging nature of the study.

3.8 Ethical Issues

In the due course of the conduct of the study at hand, the scholar adopted utmost care for conducting the study in the ethical manner and avoids the influence of all the probable limitations. The respondent participation was completely voluntary in nature and no coaxing or pressure was exerted by the scholar or any other person. It was ensured that no confidential information communicated by the employees of the case companies is revealed or disclosed and the primary data is only used for the purpose of this study and nowhere else. No sensitive questions were asked to the respondents to offend their sentiments and values and no kind of biases were involved.

3.9 Summary

The research methodology undertaken for this research is well-structured. Every aspect of data collection and data analysis was carried out with supreme care and diligence to keep the limitations at minimal level.

Chapter: 4 DATA ANALYSIS AND INTERPRETATIONS

4.1 Introduction

In this chapter, the data analysis of the primary data gathered is presented. The primary data gathered was compiled into a Microsoft Excel sheet and then transferred on to the SPSS software. It was through this software that the statistical tools of frequency analysis and correlation and regression were applied.

The data analysis is presented in a chronological order. Firstly, the quantitative data is analyzed section wise, demographic profile and collaborative supply chain management. Then, the qualitative data is analyzed.

4.2 Quantitative Analysis

4.2.1 Demographic Profile

4.2.1.1 Age and Gender

Findings

Age	Frequency
21-30 years	23
31-40 years	28
41-50 years	27
51years and above	22
Total	100

Gender	Frequency
Male	68
Female	32
Total	100

Table 4.1 Age and Gender of Respondents

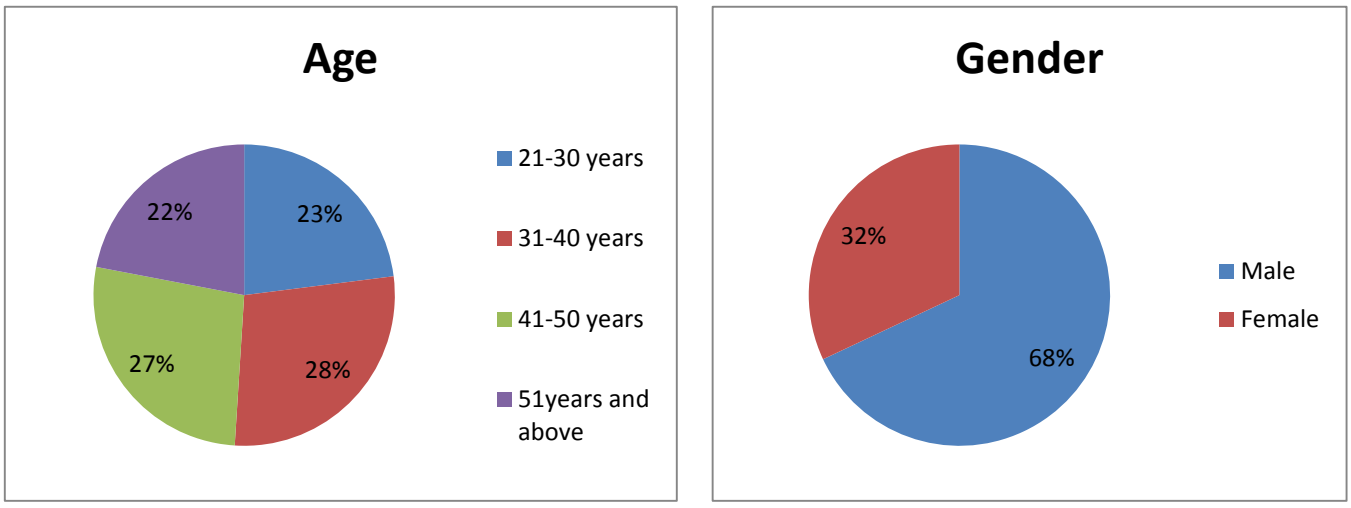


Figure 4.1 Age and Gender of Respondents

Data Analysis:

The primary data analysis shows that the employees of the manufacturing firms in Iceland are majorly young and middle-aged with 28 percent of the respondents falling into the age group of 31-40 years; 23 percent into 21-30 years. 27 percent of the respondents fall into the age group of 41-50 years and 22 percent into the age group 51 years and above. Gender wise, 68 percent of the respondents were male and only 32 percent was females.

4.2.1.2 Experience with the Organization

Data Presentation:

Experience	Frequency
Up to 5 Years	14
6-10 years	49
11-15 years	9
16-30 years	17
21 years and above	11
Total	100

Table 4.2 Experience of the Respondents with their respective organizations

Data Presentation

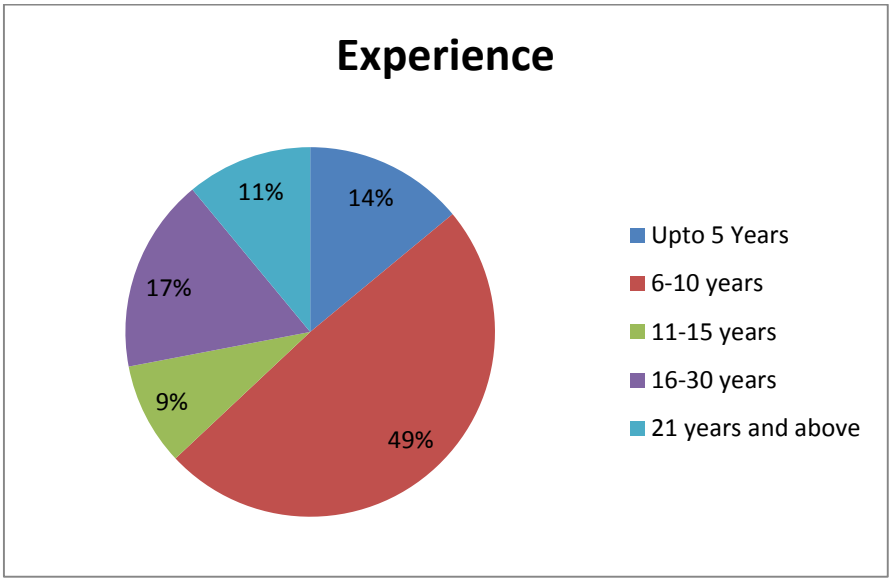


Figure 4.2 Experience of the Respondents with their respective organizations

Data Analysis:

The frequency analysis of the primary shows that majority of the employees have been associated with their current employer company for 6-10 years while only 17 percent are working for the same organization for 16-30 years and 11 percent for 21 years and above. Only 9 percent was working from their current company for 11-15 percent and only 14 percent were newly joined with experience of up to 5 years with the current organization. This may indicate towards high employee loyalty and preference to long-term association by the people of Iceland.

4.2.1.3 Current position within organization

Findings:

Position	Frequency
Junior Level Management	33
Middle Level Management	48
Senior Level Management	19
Total	100

Table 4.3 Current position of the respondents within their organizations

Data Presentation

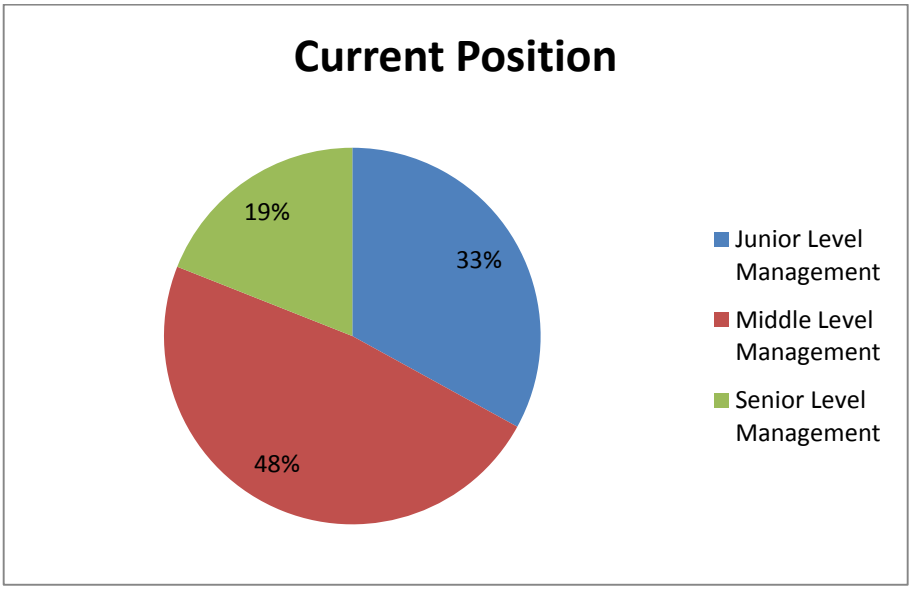


Figure 4.3 Current position of the respondents within their organizations

Data Analysis:

The frequency analysis of the primary data shows that most of the respondents are at middle level management (48 percent) while 33 percent are at junior level management and only 19 percent were at senior level.

4.2.1.4 Does your organization have collaborative supply chain management?

Findings

Collaborative Supply Chain	Frequency
Yes	63
No	31
Don't Know	6
Total	100

Table 4.4 Presence of Collaborative Supply Chain Management in Organizations

Data Presentation

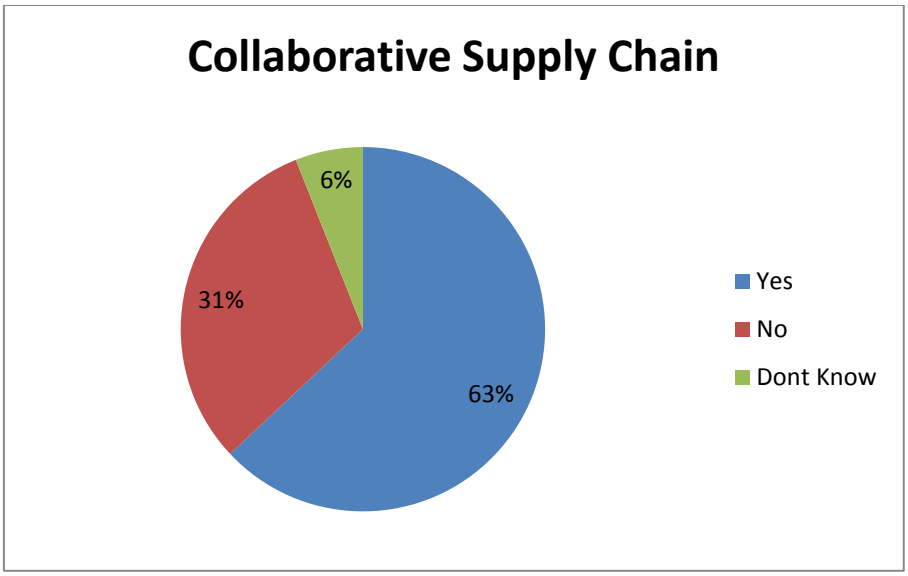


Figure 4.4 Presence of Collaborative Supply Chain Management in Organizations

Data Analysis:

The frequency analysis indicate that majority of the organizations have collaborative supply chain management initiatives adopted within their organizations with nearly 63 percent of the participants responding in conformity. Only 31 percent said that their organizations have not yet resorted to the IT enabled collaborative supply chain management practices and 6 percent are unaware whether their organizations have implemented any collaborative supply chain management practices or not.

Apart from the descriptive analysis, inferential analysis was also conducted between the importance of supply chain collaboration for an organization and internal organization functions, relationship with suppliers, relationship with clients, objectives of supply chain collaboration, factors of effective supply chain relationships and major barriers to collaborative supply chains. For this, suitable hypotheses has been developed and tested.

4.2.1.5 Rate the Principle objectives in developing manufacturing supply chain collaboration.

Findings

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Cost Reduction within the Organization	84	10	3	3	0
Increased Market Competitiveness	81	7	6	6	0
Improved Customer Service	75	15	3	5	2
Benefits to Suppliers	18	77	2	3	0
Benefits to Customers	68	23	3	5	1
Overall Supply Chain Reduction	70	11	6	8	5

Table 4.5 Principle Objectives in Developing Manufacturing Supply chain Collaboration

Data Presentation

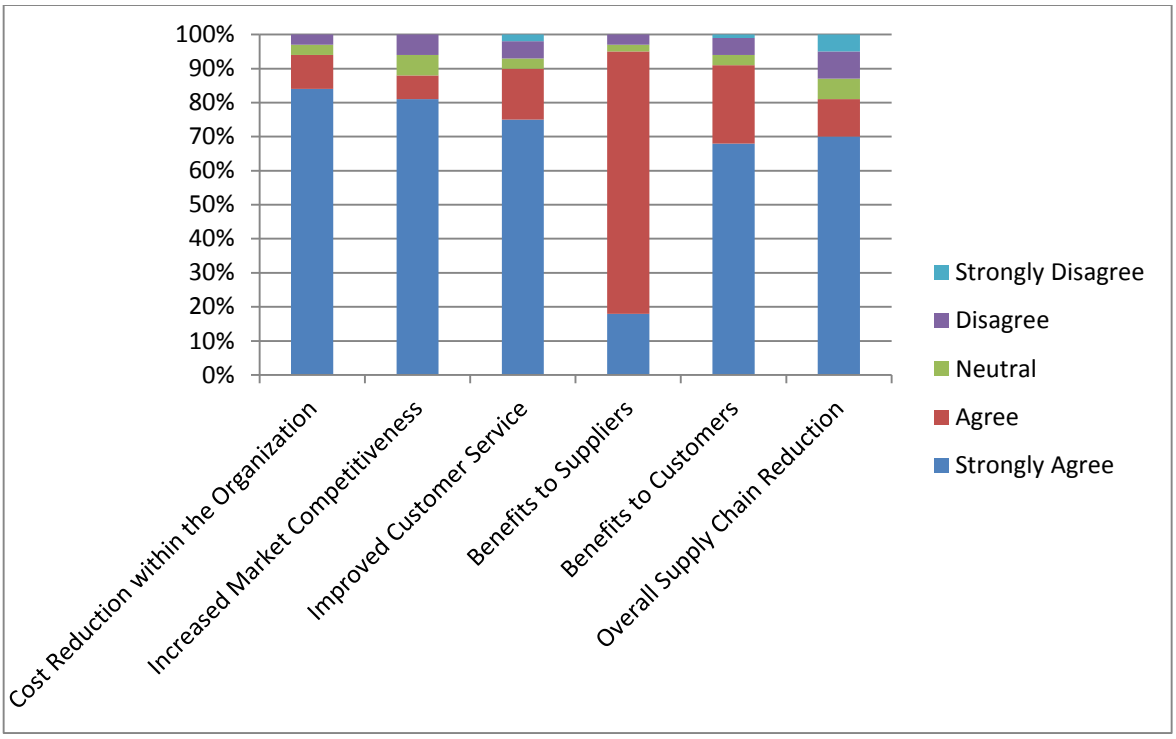


Figure 4.5 Principle Objectives in Developing Manufacturing Supply chain Collaboration

Data Analysis:

The frequency analysis of the primary data gathered reveals that most of the respondents have ranked cost reduction within the organization, increased market competitiveness, improved customer service and overall supply chain reduction as the prominent intentions of the firms to resort IT enabled supply chain collaboration. This indicates towards the intensifying market competition and firms desire to excel in their sectors and gain a competitive edge over its counterparts.

4.2.1.6 Rate the key factors in the effective construction of supply chain relationships.

Findings:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Reliability of Supply	84	11	2	2	1
Top Management Support	66	29	2	3	0
Mutual Interest	65	21	5	7	2
Joint Business Planning	74	13	6	5	2
Free Flow of Information	24	66	3	5	2
Closer Links between Supply/Demand	38	51	4	5	2

Table 4.6 Key factors in the effective construction of supply chain relationships

Data Presentation:

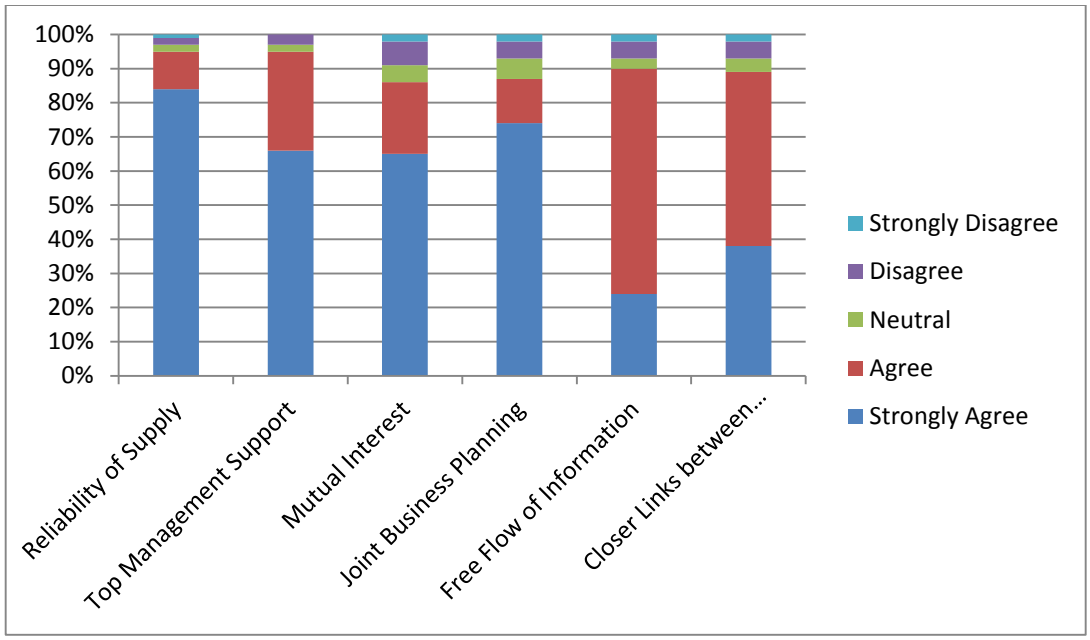


Figure 4.6 key factors in the effective construction of supply chain relationships

Data Analysis:

When respondents were asked about the key factors that are instrumental is developing effective construction of supply chain relationships, the prominent factors identified through the frequency analysis of the primary data were reliability of supply, joint business planning by all the channel partners, support from the top-level management and mutual interest of the parties involved. This indicates that collaborative supply chain requires a lot of mutual agreement and efforts to develop and prosper.

4.2.1.7 Rate the Major barriers to construction supply chain relationships

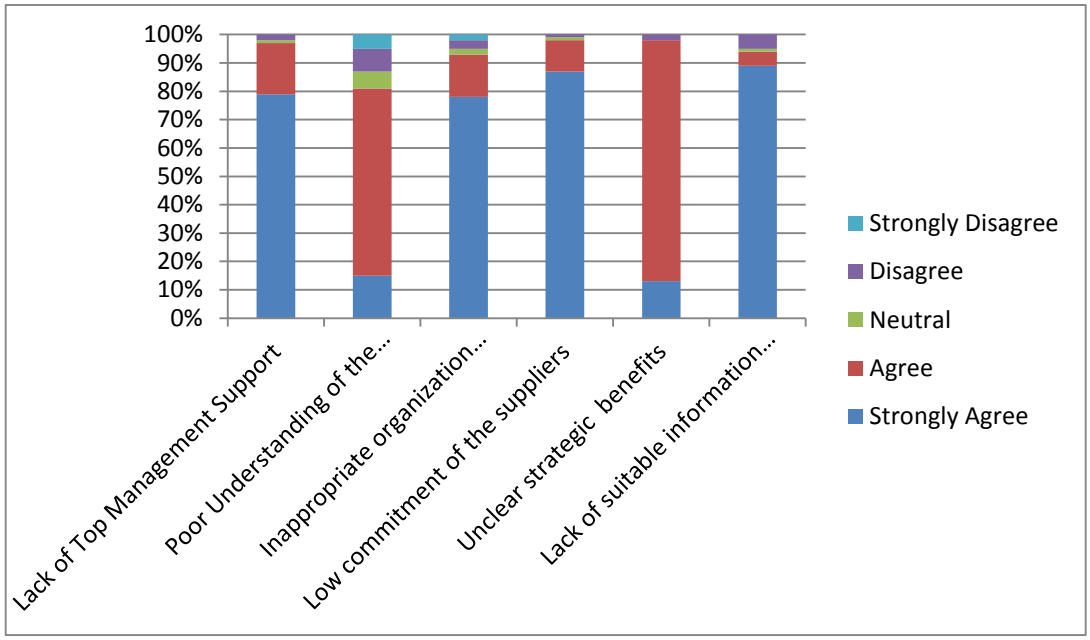
Findings

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Lack of Top Management Support	79	18	1	2	0
Poor Understanding of the Concept	15	66	6	8	5
Inappropriate organization structure	78	15	2	3	2
Low commitment of the suppliers	87	11	1	1	0
Unclear strategic benefits	13	85	0	2	0
Lack of suitable information technology	89	5	1	5	0

Table 4.7 Major Barriers to Construction of Supply Chain Relationships

Data Presentation:

Figure 4.7 Major Barriers to Construction of Supply Chain Relationships



Data Analysis:

The frequency analysis of the primary data collected indicates that lack of top management support, inappropriate organization structure, low commitment of the suppliers and lack of suitable information technology are the major barriers to development of collaborative supply chains. Also, poor understanding of the concept and unclear strategic benefits are also significant barriers to collaborative supply chain relationships. This indicates that multiple factors are responsible to establishing collaborative supply chain management.

4.3 Inferential Analysis

4.3.1 Rate the Internal organization functions important to supply chain management of your organization

For this, the following hypothesis is developed:

$H1_0$: The internal organization functions do not influence the importance of supply chain collaboration in an organization.

$H1_1$: The internal organization functions do influence the importance of supply chain collaboration in an organization

For this, correlation was carried out with importance of collaborative supply chain management as dependent variable and internal organization functions as independent variables. The results of correlation (Table 4.5) shows that the Pearson correlation coefficient between importance of collaborative supply chain management and internal organization function of product planning is 0.590 and 2-tailed significance is 0.000 (correlation is significant at 0.05 level). Likewise, the Pearson correlation coefficient between importance of collaborative supply chain management and internal organization function of purchasing is 0.861 and 2-tailed significance is 0.000 (correlation is significant at 0.05 level). Further, the Pearson correlation coefficient between importance of collaborative supply chain management and internal organization function of storage is 0.633 and 2-tailed significance is 0.000 (correlation is significant at 0.05 level). These are the three apparent correlations recognized though remaining factors also exhibit a positive relationship with the dependent variable.

Correlations		
		Importance of Supply Chain collaboration
Importance of Supply Chain collaboration	Pearson Correlation	1
	Sig. (2-tailed)	
	N	100
Product Planning	Pearson Correlation	.590**
	Sig. (2-tailed)	.000
	N	100
Purchasing	Pearson Correlation	.861**
	Sig. (2-tailed)	.000
	N	100
Transport	Pearson Correlation	.563**
	Sig. (2-tailed)	.000
	N	100
Storage	Pearson Correlation	.633**
	Sig. (2-tailed)	.000
	N	100
Inventory	Pearson Correlation	.530**
	Sig. (2-tailed)	.000
	N	100

Table 4.8 Correlation between internal organization functions and the importance of collaborative supply chain management

Along with correlation, regression analysis was conducted on the same subset of dependent and independent variables. The results of regression analysis (Table 4.6) shows that the adjusted R square value of 0.765 which reflects that only 76.5% variation in the frequency of importance of supply chain collaboration is reflected by different internal functions of an organization. Since the value of r^2 is close to 1, regression equation is instrumental in forming predictions. Moreover, the results of ANOVA (Table 4.7) with F-value of 165.544, significant at p= 0.000 suggesting that the internal functions of an organization have significantly explained 76.5% variance in the importance of collaborative supply chain management. T-Test (Table 4.8) show that the internal organization functions, product planning (t=3.277; p=0.030) purchasing (t=10.050; p=0.000) and storage (t=2.920; p=0.004) are significant contributors of importance of collaborative supply chain management. This value was significant at 5% (0.01) significance level. Thus, the hypothesis, $H1_0$ that states that the internal organization functions do not influence the importance of supply chain collaboration in an organization is rejected and the alternate hypothesis is accepted.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.882[a]	.777	.765	.380

Table 4.9 Regression between internal organization functions and the importance of collaborative supply chain management

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.209	5	9.442	165.544	.000[a]
	Residual	13.541	94	.144		
	Total	60.750	99			

Table 4.10 Anova Table

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.014	.087		-.155	.037
	Product Planning	.013	.048	.019	3.277	.030
	Purchasing	.899	.089	.912	10.050	.000
	Transport	-.049	.051	-.069	-.954	.020
	Storage	.164	.056	.193	2.920	.004
	Inventory	-.134	.050	-.193	-2.700	.008

Table 4.11 T-Test and Significance

4.3.2 Rate the Factors in supply chain relationship with suppliers that are important for your organization

For this, the following hypothesis is developed:

$H2_0$: The supply chain relationship with supplier does not influence the importance of supply chain collaboration in an organization.

$H2_1$: The supply chain relationship with supplier does influence the importance of supply chain collaboration in an organization

To test this hypothesis, correlation was carried out with importance of collaborative supply chain management as dependent variable and factors in supply chain relationship with supplier as independent variables. The results of correlation (Table 4.9) shows that the Pearson correlation coefficient between importance of collaborative supply chain management and better service quality by the supplier is 0.903 and 2-tailed significance is 0.000 (correlation is significant at 0.05 level). Likewise, the Pearson correlation coefficient between importance of collaborative supply chain management simplifying of the manufacturing process by the supplier is 0.633 and 2-tailed significance is 0.000 (correlation is significant at 0.05 level). These are the two most significant correlations recognized though remaining factors also exhibit a positive relationship with the dependent variable.

		Importance of Supply Chain collaboration
Importance of Supply Chain collaboration	Pearson Correlation	1
	Sig. (2-tailed)	
	N	100
Better Quality Service	Pearson Correlation	.903**
	Sig. (2-tailed)	.000
	N	100
Cost Benefits	Pearson Correlation	.417**
	Sig. (2-tailed)	.000
	N	100
Simplifying the Manufacturing Process	Pearson Correlation	.633**
	Sig. (2-tailed)	.000
	N	100
Simplifying the ordering process	Pearson Correlation	.590**
	Sig. (2-tailed)	.000
	N	100

Table 4.12 Correlation between the factors in supply chain relationship with supplier and the importance of collaborative supply chain management

Along with correlation, regression analysis was conducted on the same subset of dependent and independent variables. The results of regression analysis (Table 4.13) shows that the adjusted R square value of 0.831 which reflects that only 83.1% variation in the frequency of importance of supply chain collaboration is reflected by different factors in supply chain relationship with supplier. Since the value of r^2 is close to 1, regression equation is instrumental in forming predictions. Moreover, the results of ANOVA (Table 4.11) with F-value of 122.907, significant at p= 0.000 suggesting that the four factors of in supply chain relationship with supplier have significantly explained 83.1% variance in the importance of collaborative supply chain management. T-Test (Table 4.15) show that the factors in supply chain relationship with supplier, better quality service (t=13.119; p=0.000), simplifying the ordering process (t=2.322; p=0.022) and simplifying the manufacturing process (t=2.295; p=0.024) are significant contributors of importance of collaborative supply chain management. This value was significant at 5% (0.01) significance level. Thus, the hypothesis, $H2_0$ that states that the supply chain relationship with supplier does not influence the importance of supply chain collaboration in an organization is rejected and the alternate hypothesis is accepted.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.915[a]	.838	.831	.322

Table 4.13 Regression between the factors in supply chain relationship with supplier and the importance of collaborative supply chain management

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	50.912	4	12.728	122.907	.000[a]
	Residual	9.838	95	.104		
	Total	60.750	99			

Table 4.14 ANOVA Table

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.001	.082		.011	.019
	Better Quality Service	.700	.053	.765	13.119	.000
	Cost Benefits	-.006	.033	-.009	-.185	.044
	Simplifying the Manufacturing Process	.110	.048	.129	2.295	.024
	Simplifying the ordering process	.134	.058	.117	2.322	.022

Table 4.15 T-Test and Significance

4.3.3 Rate the Factors in supply chain relationship with clients that are important for your organization

For this, the following hypothesis is developed:

$H3_0$: The supply chain relationship with clients does not influence the importance of supply chain collaboration in an organization.

$H3_1$: The supply chain relationship with clients does influence the importance of supply chain collaboration in an organization

To test this hypothesis, correlation was carried out with importance of collaborative supply chain management as dependent variable and factors in supply chain relationship with clients as independent variables. The results of correlation (Table 4.16) shows that the Pearson correlation coefficient between importance of collaborative supply chain management and cost benefits for clients is 0.384 and 2-tailed significance is 0.000 (correlation is significant at 0.05 level). Likewise, the Pearson correlation coefficient between importance of collaborative supply chain management and simplifying the ordering process for the clients is 0.566 and 2-tailed significance is 0.000 (correlation is significant at 0.05 level). Also, the Pearson correlation coefficient between importance of collaborative supply chain management and standardization of the customer care process for the clients is 0.436 and 2-tailed significance is 0.000 (correlation is significant at 0.05 level). These are the three most significant correlations recognized though remaining factors also exhibit a positive relationship with the dependent variable.

Correlations		
		Importance of Supply Chain collaboration
Importance of Supply Chain collaboration	Pearson Correlation	1
	Sig. (2-tailed)	
	N	100
Cost Benefits	Pearson Correlation	.384**
	Sig. (2-tailed)	.000
	N	100
Simplifying the Manufacturing Process	Pearson Correlation	.221*
	Sig. (2-tailed)	.027
	N	100
Simplifying the ordering process	Pearson Correlation	.566**
	Sig. (2-tailed)	.000
	N	100
Standardization of Customer care Process	Pearson Correlation	.436**
	Sig. (2-tailed)	.000
	N	100

Table 4.16 Correlation between the factors in supply chain relationship with clients and the importance of collaborative supply chain management

Along with correlation, regression analysis was conducted on the same subset of dependent and independent variables. The results of regression analysis (Table 4.17) shows that the adjusted R square value of 0.740 which reflects that only 74% variation in the frequency of importance of supply chain collaboration is reflected by different factors in supply chain relationship with clients. Since the value of r^2 is close to 1, regression equation is instrumental in forming predictions. Moreover, the results of ANOVA (Table 4.18) with F-value of 120.478, significant at p= 0.000 suggesting that the four factors of in supply chain relationship with clients have significantly explained 74% variance in the importance of collaborative supply chain management. T-Test (Table 4.16) show that the factors in supply chain relationship with client, cost benefits (t=3.127; p=0.002), simplifying the ordering process (t=4.627; p=0.000) and standardization of customer care process (t=3.344; p=0.001) are significant contributors of importance of collaborative supply chain management. This value was significant at 5% (0.01) significance level. Thus, the hypothesis, $H3_0$ that states that the supply chain relationship with clients does not influence the importance of supply chain collaboration in an organization is rejected and the alternate hypothesis is accepted.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.880[a]	.763	.740	.586

Table 4.17 Regression between the factors in supply chain relationship with clients and the importance of collaborative supply chain management

ANOVA[b]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.128	4	7.032	120.478	.000[a]
	Residual	32.622	95	.343		
	Total	60.750	99			

Table 4.18 ANOVA Table

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.103	.175		.588	.558
	Cost Benefits	.216	.069	.245	3.127	.002
	Simplifying the Manufacturing Process	.080	.051	.127	1.579	.018
	Simplifying the ordering process	.335	.072	.394	4.627	.000
	Standardization of Customer care Process	.198	.059	.270	3.344	.001

Table 4.19 T-Test and Significance

4.4 Qualitative Analysis

For gaining an expert view on the importance and development of the collaborative supply chain, one supply chain manager from each of the case companies, A, B, C, D and E were interviewed at the office premises with prior appointments. A questionnaire with open-ended questions was served as the tool. To maintain the anonymity of the respondents, the managers are addressed as Mr. A, Mr. B, Mr. C, Mr. D and Mr. E throughout the analysis.

4.4.1 According to you what is the need of collaborative supply chain in manufacturing sector?

Based on the responses of the supply chain managers, it was deduced that the need for collaborative supply chain in the manufacturing sector is on a continuous rise. This is because the markets are becoming constricted, the prices of fuel and raw materials are on a rise and working capital is difficult to source. Thus, companies not only in the manufacturing sector, but across vertices, are looking for means to reduce the wastage in the conventional supply chains and to look for innovative collaboration options that can mutually benefit the participants. Collaborative supply chain provides answer to these impending concerns through facilitating cost efficiencies and economic conveniences.

Mr. A replied, "*More and more companies are adopting collaborative supply chain practices as they not only result in economic efficiencies but also enable the supply chain participants to cater to consumer expectancies better, expand markets and enhance their competitive edge".*

Mr. D presented another realistic perspective, "*Companies are facing global competition and the trend of outsourcing has become a norm and organizations are surviving in a "networked" business environment. With globalization, supply chains have become highly complex. This has fostered the need for collaborative supply chains."*

Mr. E replied, "*It is high time that organizations radically reengineer the conventional supply chains from linear, chronological processes into a more responsive network of firms that are highly customer centric and demand-driven, ready to share expertise and respond proactively to the dynamic market conditions".*

4.4.2 What kind of collaboration can be achieved in supply chain collaboration?

Supply chain collaboration is being extensively used for reducing the time involved in product development, enhancing delivery flexibility. This is stemming because of the rise in market pressure and lower capital availability. Companies are focusing on establishing more collaborative supply chain network. Based on the responses it was found that collaboration in supply chain is focused on joint planning and coordination, knowledge and process integration amongst partners with the intention to optimize cost and increase responsiveness. Collaboration can be both logistic and non-logistic in nature.

Mr. B commented, "*Collaborative supply chain intends to have collaboration between firms to exploit the localized facilities, improved internal integration, business process reengineering, revamping of business network and widening the business scope. This is possible through information sharing, process and resource synchronization and robust reporting and accountability system."*

Mr. C responded, *"Collaboration in supply chain can be both of logistics and non-logistics in nature. Logistically, collaboration is done by the firms in practices associated with logistics and manufacturing processes. On the other hand, non-logistic collaboration involves an array of business processes surpassing logistics and firms. Such collaboration is more strategic in nature and can be done between firms, suppliers and customers functional in different sectors, in different stages of supply chain to make a single system."*

4.4.3 What are the advantages of collaborative supply chain?

The supply chain managers have highlighted several advantages of collaborative supply chains. Such alliances help the firms to combat dynamic and uncertain business scenarios strongly and also leverage the resources and knowledge of the channel partners to develop collaborative competitive advantage through creating synergies, cost optimization and augmented performance.

Mr. A elucidated the advantages of collaborative supply chain as, "*Collaborative supply chain has immense benefits to offer: cost optimization, improved return on investments, better reliability and supply of resources and products and increased proactive outlook of the manufacturing units. With the mounting usage of IT in business, communication, strategic partnering and outsourcing have become a lot easier as well."*

Mr. E commented, "*Collaborative supply chain revamp the conventional supply chain into a more productive one and offer benefits likes escalated sales, more accurate market forecasts, easily assimilation and dispersal of information, lowered inventory costs and better customer focus and service."*

Mr. D further added, "*Collaborative supply chain are mutually benefitting. They increase the profitability, eliminate excessive wastage, inventory, lead time and stabilize and strengthen the inter-relationship among the participating firms and other partners for improved sustainability".*

4.4.4 What are the costs involved in collaborative supply chain?

Most of the managers did admit that implementation of the collaborative supply chain initiative can be quite a costly affair but with the amount and long-term benefits it can reap, it is worth the investment. The costs involved can be categorized as the total cost of ownership and partnership opportunity cost. However, the costs can be of both quantifiable and non-quantifiable nature.

Mr. B stated that, "*The cost of development and implementation of collaborative supply chain is subject to the nature of manufacturing and scale of operation. However, the cost involves the total cost of ownership related to the infrastructure, IT systems, usage, maintenance, communication and failures of processes involved. Another integral part of the cost is the opportunity cost which represents the benefits declined by not adopting a more beneficial partnership."*

Mr. D explained the quantifiable costs as, "*adoption of collaborative supply chain, apart from the cost of infrastructure, resulted in 50 percent rise in labor costs, 20 percent in travel costs and 20 percent rise in the training and consultation costs in the initial year of implementation. However, gradually it was leveraged through the benefits and increased profit margins."*

4.4.5 What are the barriers of collaboration?

Most of the managers were of the view that the expansive and long-term benefits provided by the supply chain collaboration blindfold the managers to ignore the major barriers of collaboration. Even the lack of awareness about the potential barriers to collaboration of supply chain encumbers the ability to leverage the advantages of collaboration.

Mr. C explained the barriers as, "*there are many barriers that my firm confronted while implementing the collaborative supply chain. Firstly, there was resistance to change, not only from employees but also the structure of the organization poses initial hindrances. Also, non-synchronized intentions of the participations, poor level of cooperation and coordination and lack of trust amongst the firms were the major barriers confronted."*

Mr. E cited the barriers as, "*Absence of the encouragement and patronage from the top-level management, lack of alignment between strategic and operational values and practices, disinclination to share information, risks and rewards, cross-functional organizations, irregular and insufficient performance measurement protocols and lack of training are the key barriers."*

Mr. D added, *"Many a times, only one firm is the recipient of the majority of benefits, managers tend to focus extensively on the short-term agendas, inappropriate and insufficient IT infrastructure, risk and bureaucracy are also significant barriers to collaborative supply chain".*

4.4.6 What are the IT requirements for collaborative supply chain?

From the interviews of the supply chain managers it was deduced that the role of IT is instrumental in collaborative supply chain as with the development of a suitable IT and communication system enables easy and prompt information sharing and is the primary catalyst of the system. Thus, it calls for all the suitable IT tools like MIS, internet, customized software and requisite hardware requirements.

Mr. C commented, "*For collaborative supply chain, effectual information and knowledge integration technologies are required for better management of the intricate networks. This calls for development of inter-organizational information systems and other systems based on radio frequency identification to enable better coordination and integration of supply chain processes."*

Mr. A responded to the question, "*In today's digitalized world, missing out the potential of internet for improving business efficiency is totally unacceptable. Thus, for supply chain collaborations, internet-based solutions are an essential requirement especially for the e-commerce ventures."*

Mr. D responded, "*IT enabled systems like ERP, SAP, SCM and other logistics software form the core requirements of the collaborative supply chain. Along with these fundamental systems, CRMs and internal communication systems are also significantly required."*

4.4.7 How supply chain collaboration can be improved in the manufacturing units of Iceland?

Most of the managers felt that there is still a lot of untapped potential of the collaborative supply chain initiatives taken by the manufacturing units of Iceland. The manufacturing units are not focusing on treatment of uncertainty as it should be. Information systems need to be improvised along with augmenting the respective business processes through improved information systems. However, it should be noted that even efficient collaborative supply chain systems cannot make up for the already imperfect and operationally weak manufacturing and distribution scenario of the country.

Mr. B recommended, "*The focus must not be only to leverage the strengths but also make up for the weaknesses. Thus, the Icelander manufacturers need to ensure that they establish a suitable supporting infrastructure before taking up any sort of collaboration. This involves ensuring commitment from the senior level managers and suitable IT infrastructure".*

Adding further, Mr. E said, "*Collaborations work only when they are based on right benefit sharing model that creates a win-win situation for all the channel partners. This way the savings from the process optimization can be invested further to generate more sales."*

Mr. E said, "*Icelander manufacturers need to learn to choose their channel partners on the grounds of their competence, strategic intentions and value potential."*

4.5 Summary

The data collection and analysis provided a lot of impetus to the overall learning and experience of the scholar and also enhanced the practical understanding of the concept of supply chain collaboration and how does it works. It was found that though many manufacturing units of Iceland have adopted collaborative supply chains but they are far from being highly effectual and confront several barriers. The study is concluded with the key findings and recommendations in the next chapter.

Chapter: 5 CONCLUSIONS & RECOMMENDATIONS

5.1 Introduction

The study aimed to understand the practical application of the concept of the collaborative supply chain by investigating the presence and current scenario of the manufacturing industry of Iceland. Studies on collaborative supply chain management for the manufacturing firms of Iceland have been rare in the past. For this, the secondary data on the collaborative supply chain was extensively explored. Based on the literature review, an extensive primary study was carried out which involved a survey amongst 100 employees of the five case companies A, B, C, D and E; and interviews of one supply chain manager from each of the case companies. From the data gathered, demographic profile, inferential analysis involving correlation and regression and descriptive analysis were carried out in line with the aim and objectives of the study. The findings of the study add conformity to the theoretical findings of the review of literature.

5.2 Conclusions

5.2.1 Objective 1: To evaluate the current supply chain elements and its contribution towards manufacturing

Findings from the Secondary Study: From the literature review it was deduced that the supply chain collaboration made sense as the conventional supply chain models have their inherited issues like unfamiliar customer expectations and costs and efficiency concerns and suppliers together can provide a much superior customer service to the customers. The supply chain collaboration allows the firms to be more prompt to customer expectations, better product offerings innovations and foresee customer needs. Collaboration of supply chain can be understood as the sharing of mutual objectives; a sense of commitment; trust and respect;

skills and knowledge; and intellectual alertness (Tsai, 2006). Thus, supply chain collaboration can be viewed as a competitive weapon that can enhance organizational performance. It enables the development of strategic partnerships with suppliers and other trading partners in order to accomplish mutually advantageous goals and shared business processes and information. Supply Chain collaboration allows firms to drive market share, sales that culminates into maximization of return on assets (ROA) and return on investment (ROI) (SAP, 2007). The advantages of supply chain collaboration over supply chain management are: lower inventory requirements and higher inventory turns; reduced transportation and warehousing expenditure; decreased out-of –stock levels; reduced lead times; augmented customer service; proactive market intelligence; competence of shaping demand; prominence in customer demand and supplier performance; prompt decision making; better utilization of resources and capacity (SAP, 2007). Cao & Zhang (2012) highlighted the elements that need to be coordinated under supply chain collaboration. These elements are from diverse disciplines like customer relationship management (marketing), inventory, production and distribution management (operations management), and strategic alliances etc. Ahmed & Ullah (2012) assert that there are three types of collaborative relationships established under supply chain collaboration: collaborative transaction management; collaborative event management and collaborative process management. Collaborative transaction management is described by high-volume data exchange and task alignment based on operational concerns. Collaborative event management is done for combined planning for a particular event like product launch or especial promotional events. The third type of collaboration is for process management wherein a comprehensive strategic collaboration based on knowledge sharing and mutual decision making. It takes place for more integrated supply chain processes that result in united problem solving and long-term combined business planning.

Gaps Identified: What are the key elements of supply chain collaboration that help the manufacturing units of Iceland?

Findings from the Primary Study: Primary study shows that majority of the organizations have collaborative supply chain management initiatives adopted within their organizations. These endeavors have been undertaken with the primary objectives of cost reduction within

the organization, increased market competitiveness better customer service and overall supply chain reduction. The key benefits of such collaboration for the manufacturing units of Iceland are reliability of supply, joint business planning, mutual interest, free flow of information. This is all the more beneficial as majority of the manufacturers are into the food trade.

5.2.2 Objective 2: To understand the collaborative supply chain practices and existence in Iceland's manufacturing industry

Findings from the Secondary Study: Focusing on SCM practices in Nordic countries, it was observed that at present, most firms have delegated the supply chain management function down the leadership hierarchy and is majorly managed through its fragmented components like procurement, transportation, distribution and inventory. SCM is not regarded as a considerable aspect of the company's overall business strategy and is not included in the planning process. Nordic companies follow demand-driven programs that focus on savings in purchases. This is because in many areas and sectors, the competition is majorly centered on price, demand- driven SCM tend to influence the savings. This savings is irrespective of the fact that whether marketing is involved in the planning process or not. However, the biggest let down is the fact that though the countries are IT advanced but technological advancements are not being efficiently and effectively used in decision making across the supply chains (Heckmann, Shorten, & Engel 2003). The manufacturing sector of Iceland has some unique characteristics. Firstly, the manufacturing sector is majorly concentrated into two prominent sub-sectors: food processing and aluminum production. These sectors collectively account for more than 80 percent of the total manufacturing production. The manufacturing of machinery and other capital goods is reasonably small. The need for supply chain collaboration is immense in the country. Hameri & Palsson (2003) asserted that since nearly 70 percent of the Iceland's total export is food related, its geographical distance from its prominent markets like Europe, US and Japan, efficient supply chain management is of paramount importance. With fluctuating raw material supply and stringent quality demands,

collaborative supply chains can be instrumental in meeting the customer expectations, stabilize material flow and meet the objectives set for efficient supply chain management.

Gaps Identified: What are the barriers that the manufacturing firms confront in Iceland for adopting collaborative supply chain?

Findings from the Primary Study: Lack of management support, inappropriate organizational structure, low commitment of the suppliers and lack of suitable information technology infrastructure were regarded as the key barriers by the employees of the five case manufacturing companies. On the other hand, supply chain managers view that there are many implicit barriers like resistance to change, not only from employees but also the structure of the organization, non-synchronized intentions of the participations, poor level of cooperation and coordination and lack of trust amongst the firms, lack of alignment between strategic and operational values and practices, disinclination to share information, risks and rewards, cross-functional organizations, irregular and insufficient performance measurement protocols, lack of training and extensive focus on the short-term agendas are the prominent barriers.

5.2.3 Objective 3: To recommend time bound strategies for a comprehensive collaboration in supply chain domain in Iceland manufacturing industry

Findings from the Secondary Study: Nordic companies follow demand-driven programs that focus on savings in purchases. This is because in many areas and sectors, the competition is majorly centered on price, demand- driven SCM tend to influence the savings. This savings is irrespective of the fact that whether marketing is involved in the planning process or not. However, the biggest let down is the fact that though the countries are IT advanced but technological advancements are not being efficiently and effectively used in decision making across the supply chains (Heckmann, Shorten, & Engel, 2003). However, Arlbjørn, Haas, Mikkelsen, & Zachariassen (2010) asserted that the Nordic region is predominantly a logistical market and the market is characterized by high purchasing and spending power. The region is developed in terms of IT. For many global brands, Nordic region serves as a

perfect choice for pilot testing. This is because there is a unique business- to-consumer cross border network in the region and also a business-to-business network amongst the countries that have the same legal structure and common IT platform. These act as chief catalysts for supply chain collaboration in the region. Holweg, Disney, Holmström, & Småros (2005) explored the concept of collaboration in supply chain and found that the adoption of collaborative supply chain is retarded mainly because of the absence of understanding of the process and the implications involved in collaboration of external factors with the internal production and inventory control. The supply chain collaboration can be effective by focusing on two factors: intensity of the integration of internal and external factors and the degree of alignment of the supply chain initiatives with the geographical distribution network, demand patterns and the nature of product.

Gaps Identified: How collaborative supply chains can be improved in the manufacturing sector of Iceland?

Findings from the Primary Study: From the primary study, it was identified that there are several necessary factors that are integral for an effectual collaborative supply chain management like reliability of supply, top management support, mutual interest of the parties, required IT infrastructure and joint business planning. Based on these findings, suitable recommendations have been made in the next section.

5.3 Recommendations

Based on the study, following recommendations are made:

- **Proper Usage of IT advancements:** It is ironical to note that the IT sector of Iceland is globally acclaimed but still the manufacturing sector is lagging behind in leveraging its advantages for making its supply chain more effective. Since, most of the manufacturing firms are into the food and beverage manufacturing, it is highly essential to have a robust and efficient supply chain in order to deliver the goods

promptly as food items have restricted shelf life. Thus, adoption of the advanced IT tools and software is essential.

- **Better Market Forecast:** It was found that firms are unable to handle uncertainty of the business environment. Thus, it warrants the firms to be better prepared for the future. For this again, better IT tools can be utilized and also managers are required to do extensive market research and derive information that can help in gauging the future and adapt accordingly. With globalization, companies need to internationalize to sustain and this is possible only through commendable and dependable supply chain collaboration with may also help in better market forecasts.
- **Right choice of the channel partners:** Channel partners are very important. In order to develop effective and efficient collaborative supply chain, the choice of channel partners is very crucial. The partnership or collaboration is to be developed to create a win-win situation for all and no major favor for one or few parties. Only then the collaboration can be sustained for long.
- **Ensuring alignment of strategic goals, value creation and top-level commitment:** Companies building the collaborative supply chain must have mutually agreed upon strategic goals and aim at developing complementary value creation. Also, the unconditional support from the top-level managers is a must for the successful implementation of collaborative supply chains.
- **Developing a joint performance management system:** The firms who already has collaboration with its supply chain partners can improvise its performance through development of an effectual performance management system which can help in ensuring that the projects are going as per plan and perceived outcomes can be expected. This system should be used by all the channel partners, that will allow easy monitoring, tracking and sharing of information and derailment of performance from the track can be immediately diagnosed and revised.

5.4 Future of Supply Chain Collaboration

The study shows that the collaborative supply chain in Iceland is undermined and there is ample of scope for better application of the concept as the country hosts some of the best IT service houses. The approaching time is an era of more intricacy, stiffer competition and rapid change. Companies have to struggle to come up innovations at a much more rapid pace. Technology is becoming an integral part of carrying out business and will continue to be the key stimulator for growth, sustainability and competitive advantage. For collaborative supply chains, IT is the fundamental element wherein even more power tools backed by the internet can be developed to transform the way goods are transferred from one place to another and how information is exchanged with the parties involved. Collaborative supply chains will make the conventional supply chains obsolete as they bring better efficiencies propelled by the internet aided tools. This holds true for services as well. Supply chains are crucial for any country and there is an ardent need to the supply chains to evolve to be more proactive rather than reactive to meet the expectancies generating of the emergent global economy. Collaborative supply chains built on the grounds of electronic collaboration will result in reengineering of the conventional business models and these chains will be used to gain competitive edge as armament in the tryst for market share. The world is on the threshold of this paradigm shift. Since companies are steadily becoming a part of the globalized market place to counterbalance the saturating local markets, the emerging "new" firms imperatively need to streamline the distribution function through adoption of new generation of collaborative supply chains that are beneficial for all.

5.5 Summary and Scope for Further Research

The study aimed in understanding the role of collaborative supply chains in the manufacturing industry of Iceland. It was found that the new generation supply chains are not extensively adopted in the sector and there is tremendous scope for adoption of such IT based supply chains to boost the business prospects in the future. The findings of the study can be helpful for the manufacturing units that are looking to improvise their supply chains to get a source of competitive advantage not only in Iceland but also other Nordic countries. Even the findings can be extended to other sectors and countries. Since the collaborative supply chain is an area which is under explored in Iceland, there is ample of scope for further investigation.

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APPENDIX I: QUANTITATIVE QUESTIONNAIRE

Demographic Profile

Q.1 Age

- 21-30 years
- 31-40 years
- 41-50 years
- 51 years and above

Q.2 Gender

- Male
- Female

Q.3 Experience within organization

- Up to 5 years
- 6-10 years
- 11-15 years
- 16-20 years
- 21 years and above

Q.4 Current position within organization

- Junior level management
- Middle level management
- Senior level management

Section 2: Collaborative Supply Chain Management

Q.5 Does your organization have collaborative supply chain management?

- Yes
- No
- Don’t Know

Q.6 The supply chain collaboration and management is important for your organization

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strong Disagree

Q.7 Rate the Internal organization functions important to supply chain management of your organization. *(Mark X in the appropriate box)*

Functions	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Product Planning					
Purchasing					
Transport					
Storage					
Inventory					

Q.8 Rate the Factors in supply chain relationship with supplier that are important for your organization. *(Mark X in the appropriate box)*

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Better Quality Service					
Cost Benefits					
Simplifying the Manufacturing Process					
Simplifying the Ordering Process					

Q.9 Rate the Factors in supply chain relationship with clients that are important for your organization. *(Mark X in the appropriate box)*

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Cost Benefits					
Simplifying the Manufacturing Process					
Simplifying the Ordering Process					
Standardization of the customer care process					

Q.10 Rate the Principal objectives in developing manufacturing supply chain collaboration.

(Mark X in the appropriate box)

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Cost Reduction within the Organization					

Increased Market Competitiveness					
Improved Customer Service					
Benefits to Suppliers					
Benefits to Customers					
Overall Supply Chain Reduction					

Q.11 Rate the key factors in the effective construction of supply chain relationships.

(Mark X in the appropriate box)

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Reliability of Supply					
Top Management Support					
Mutual Interest					
Joint Business Planning					
Free Flow of Information					
Closer Links between Supply/Demand					

Q.12 Rate the Major barriers to construction supply chain relationships.

(Mark X in the appropriate box)

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**

Lack of Top Management Support					
Poor Understanding of the Concept					
Inappropriate organization structure					
Low commitment of the suppliers					
Unclear strategic benefits					
Lack of suitable information technology					

Thank you for your time!!

Any other comments

_____

_____

APPENDIX II: QUALITATIVE QUESTIONNAIRE

1. According to you what is the need of collaborative supply chain in manufacturing sector?

   _____

   _____

   _____

2. What kind of collaboration can be achieved in supply chain collaboration?

   _____

   _____

   _____

3. What are the advantages of collaborative supply chain?

   _____

   _____

   _____

4. What are the costs involved in collaborative supply chain?

   _____

   _____

   _____

5. What are the barriers of collaboration?

   _____

   _____

   _____

6. What are the IT requirements for collaborative supply chain?

   _____

   _____

   _____

7. How supply chain collaboration can be improved in the manufacturing units of Iceland?

_____

_____

Any other comments

_____

_____