SUPPLY CHAIN UPSTREAM INTEGRATION THROUGH INBOUND LOGISTICS. (The Case of Kality Metal Products Factory)

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Supply Chain Upstream Integration through Inbound Logistics

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DECLARATION

I hereby declare that the work which is being presented in this thesis entitled "**Supply Chain Upstream Integration through Inbound Logistics** "is original work of my own, has not been presented for a degree of any other university and all the resource of materials used for this thesis have been accordingly acknowledged.

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Special thanks go out to Kality Metal Industry p.l.c (Tsehay industry s.c)who the owner of my project title without Kality Metal industry permission , help and encouragement I could not have proceeded to complete this thesis work. Kality Metal Industry provided me different data's manuals and suggestion from past experience. We would also like to thank all the Kality Metal products factory workers for their special cooperation and continual support they provided at all levels of the thesis work. Finally, I want to give immense thanks to all my families for their encouragement, continual support and love at all time in my work.

Abstract

This paper aims to explore whether inbound logistics improvement in the supply chain fosters an improvement of upstream supply chain integration. An explorative research design is implemented; correlation analysis is used to identify linear relationships between dependent and independent variables. In the analysis result it is clearly seen that, all the dimensions of an inbound logistics are positively and linearly correlated with upstream integration. Results highlight the importance supply chain professionals of taking an internal supply chain dimensions rather than focusing only on intra-company drivers. It also suggests the importance of exploring supply chain integration by considering core value chain activities. Past research has identified the impacts of supply chain integration intra-company drivers without addressing the importance of how much of the supply chain internal functions should be involved in such improvement efforts. This study provides empirical support for the need to involve supply chain internal dimensions of the supply chain

Keywords: Supply chain upstream Integration, Inbound logistics, Inter-company driver

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List of Acronyms and Abbreviations

GTP- Growth and Transformation Plan

ISCM- Implementing Supply Chain Management

MOFED-Ministry of finance and economic development

GDP-Gross domestic product

TQM-Total quality management

BOR-Business process re-engineering

LPI- Logistics Performance Index

MIDI- Metal Industry development Institute

MOTI- the Ministry of Trade and Industry

SCI- supply chain integration

SWOT- Strength, Weakness, Opportunity and Threats

UNIDO- United Nations Industrial Development Organization

ASN-advance ship notice

B2C-Business to consumer

SEM- Structural equation modeling

3PL-Third party logistics service providers

EIA- Enterprise Application Integration

Chapter One

Introduction and Background of the Study

1.1Introduction

Metal industry is the critical back bone of the industrialized value chain and is with latent growth potential. As a result, it becomes the crucial concern of not only at company level but also a nationally. For developing countries, it is a priority sectors to orchestrate the move towards industrialized economy and is identified as one of the priority sectors with particular importance to the realization of the growth and transformation goals (MOFED, 2012). It has a great economic contribution that, the sector has contributed a large amount of value addition to the manufacturing sector, it's potential of creating Employment opportunity are some of the factors.

The success of all other sectors is dependent on the success of these industries, such as: agriculture, automotive, construction, power and communication sectors are some. All of these sectors can be thought as a range of businesses and organizations involved in contributing to economic development of a country. To compete in today's competitive market; every industry has to continuously assure improvement of its performance to be mandatory. Hence Most of the factories in Ethiopia, including metal industries are working hard as a means of sustaining their competitive advantage. These Companies used to follow two approaches in this improvement process. The first of these approaches is improvement of Operational effectiveness (doing individual activities well) and the other is having own Competitive Strategy: choosing a different set of activities to deliver a unique mix of value. (Porter, 1996).

The improvement of these processes is not sufficient to gain a sustained continuous advantage according to literatures. That is the today's above average performing companies are those carefully linked their internal processes to external suppliers and customers in unique supply chains (Arana-Solaris et al., 2011: Lockamy and McCormack, 2010).

1.2 Background and Justification of the Study

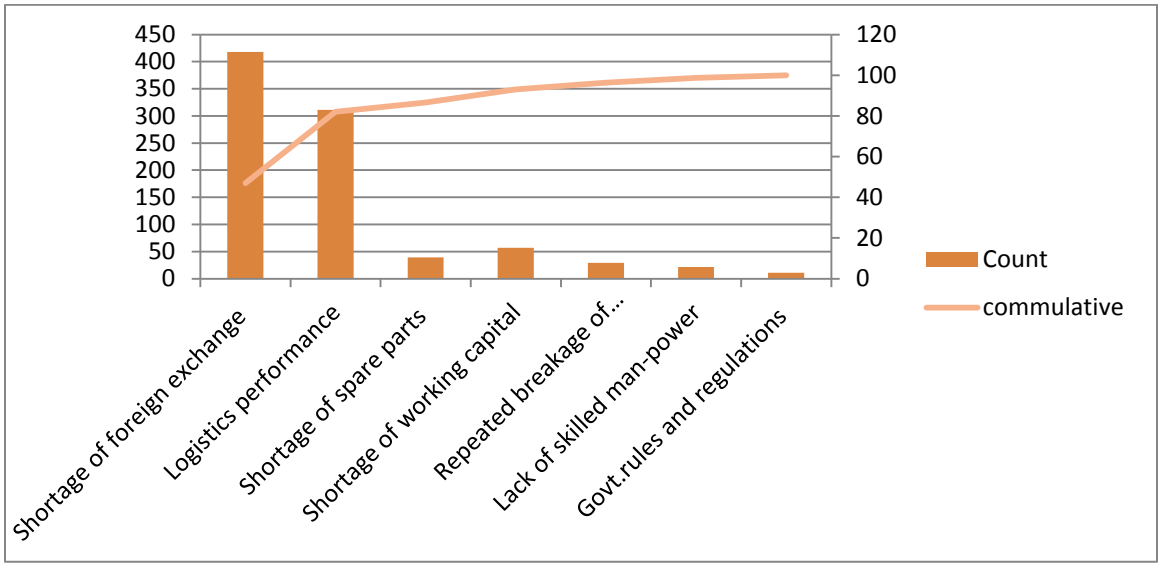
High dependency on imported raw materials and intermediate goods and the High cost of importing raw materials from foreign market, the Limited supply of raw material in domestic market and High logistics and transportations costs together with low logistics performance are the characteristics of Ethiopian manufacturing sector in general and kality metal in particular. This is seen by the World Banks' report on logistics performance states that, Ethiopia is categorized under the poorly performing countries in logistic related activities. In particular, tracking and tracing, international shipments, infrastructure, customs and logistic competence services are not only poor but also have shown no improvements and ranks ethiopia170 out of 175 countries. Ethiopia, one of the five fast growing countries in the world and the leading in Africa with a long history of manufacturing, is characterized by a growing market resulted from the shift in policy, population increase and globalization. But on the present state of the industries is characterized by its inability to supply the need by the market.

These performance perspectives are used for the reason that, at present metal industry quality, customer responsiveness and competitiveness are the main challenges for the strength of the performance of the sector. Based on its findings, the research suggests insight about what Ethiopian metal industries should do to integrate their supply chain. A few studies attempted to address this problem but the gap remains unanswered still.

1.3 Statement of the Problem

According to the Ethiopia country report, (2014) research conducted on eastern Africa's manufacturing sector, poor logistics performance and low access to finance are the major stumbling blocks that hinder manufacturing industries performance. The major raw material for metal industries is coiled steel and other truck spare-parts whose absence obstructs the production flow. Lack of this material leads the company to production interruption and dalliance of delivery dates. As a consequence the metal companies are expected to be in competitive position in the international market. This has made supply chain managers and professionals to look at integration as a possible strategy of creating Strategic partnerships to improve supply chain performance and achieve manufacturing cost and lead time reduction (Kumar et al., 2017).

The management of supply chain focuses on three flows. These are: logistics, Finance and information management. Logistics management is divided into two: Inbound and outbound. And inbound logistics is becoming the focus of management as source of attaining competitive advantage. Due to its large potential in the process of achieving a significant amount of cost saving, further the cost quality and the availability of the end product are directly related with it. And the worst case if there are problems all activities following it necessarily fail. Inbound logistics performance is the major activity that creates a huge bottle neck to hinder the supply chain performance of Ethiopian metal manufacturing industries in general and kality metal products factory in particular. The following figure shows the percentage contribution of problems that hider manufacturing industry performance.



(Source: Central statistical Agency report,2018)

Accordingly, this is seen on the pre assessment process conducted on kality metal products factory, and some of the problems related to logistics performance include: Lack of information infrastructure, tender based purchase resulting in lack of long term relationship with suppliers, Inability to broaden the supply chain vision beyond procurement, poor supplier selection procedure resulting in the existence of Lost sales due to out of stock created by problem of demand forecasting and backlog delay because

of the dalliance on the application of Enterprise Resource Planning. Hence the company is working under capacity at 30% projected plan and 10% of the design capacity.

Owing to this fact, there is a huge gap of evidence that, there is a need to improve inbound logistics performance from the perspective of supply chain integration. Therefore it is timely and important to address this point. Therefore, this study is to explore and determine the effect of inbound logistics on supply chain upstream integration. Considering this burning issue, this thesis paper raises three fundamental questions as described below.

1.3.1 Research Questions

- What are the key factors that affect supply chain integration in metals manufacturing industry?
- What is the level of supply chain integration in Kality metals factory?
- How does improvement of Supply Chain integration be achieved through inbound logistic?

1.4. Objectives of the Study

1.4.1. General Objective

The main objective of this study is to investigate the supply chain integration of Kality metals factory through inbound logistic.

1.4.2. Specific Objectives

- To identify the main factors that affect improvement of supply chain integration of metal manufacturing industry
- To assess the level of supply chain integration in Kality metals factory.
- To investigate how improvement of supply chain integration be achieved through inbound logistics of Kality metals factory

1.5 Expected Results

The success story of all the world leading companies is being attributed to their tightly designed supply chains and companies are being focused in improving their supply chains. A number of studies are made in the area apart from previous studies engaged in

the sector; this research assesses and examines the existing supply chain linkages of Kality metal industry. Therefore, this study is believed to contribute much to the basic metal sector by revealing how inbound logistics decisions impact supply chain integration and the performance. And it proposes recommendations and solutions which are compatible with Ethiopian basic metal industries in order to improve their performance.

1.6 Scope of the Study

The scope of the research is to conduct, review and analyze supply chain practices of Kality metal products factory p.l.c (Tsehay industry s.c). The research is limited to inbound logistics activity and other core activities of the industry are not covered such as operation, outbound logistics, and marketing and after sales services. Regarding the source of data the research doesn't consider the view of customers and suppliers that are part of the supply chain. The research has mainly be focused to assess the supply chain integration dimension (supplier integration) of the industry and to identify the gap and develop a competitive inbound logistics frame work that will indicate intervention areas based on international best practices.

1.7 Significance of the Study

The first beneficiary of the research will be the case company as well as other manufacturing industries which are dependent on imported raw materials for the majority of the inputs, governmental and nongovernmental bodies participating in the basic metal and engineering sector. Generally the result of the study will positively affect the different actors, stakeholders, small business owners and investors, etc that are participated in the steel manufacturing processes. Other priority sectors that are identified by the Growth and Transformation Plan (GTP) are also being benefited by this studythrough fast and efficient sourcing of raw materials, accessories and related imputes. Finally the country will be benefited by saving the foreign currency resulted from the import substitution of quality engineered steel products to the national market as well as getting foreign currency by starting exporting of different products to the global competitive market. The study is an enhancement to the existing knowledge in the area

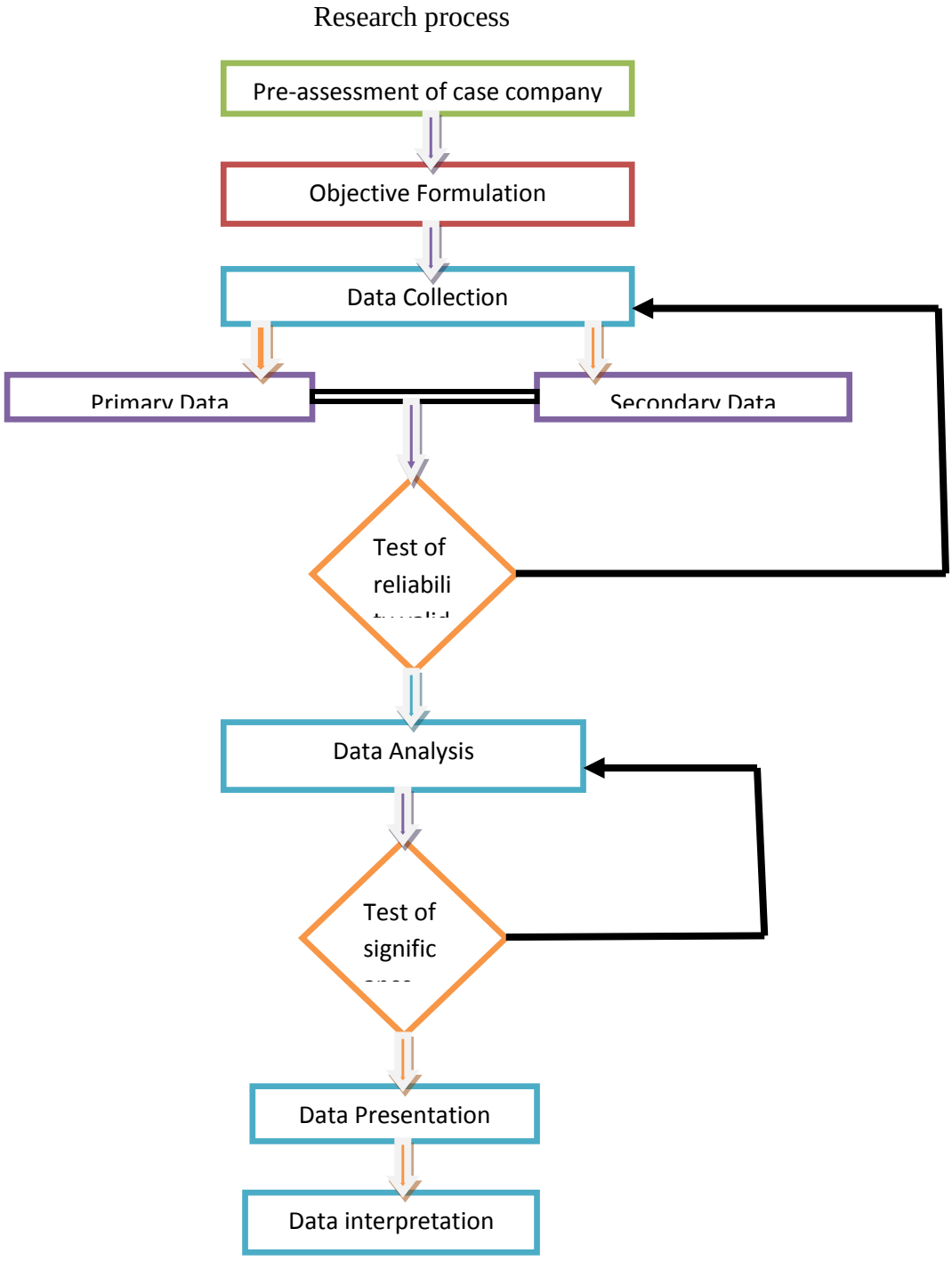
of supply chain. And it can also be used as a spring board to researchers, as a source of reference material on the subject.

1.8 Organization of the Study

The thesis comprises seven chapters. The first chapter is the Introduction part and it discusses the background of the study, statement of the problem, objective of the study,

scope, significance of the study, organization of the thesis and definition of key terms are included. The second chapter addresses Review of related literature on supply chain improvement. The third chapter provides methodology of the study. The fourth Chapter discusses Data Analysis, presentation of analyzed data and summary and findings of the study. chapter five shows the presentation of conclusion , Recommendation and future research directions

1.9 Research Process



(Source: Researcher's Compilation, 2019

Figure 1 Showing research Process

Chapter Two

Related Literature Review

2.1. Introduction

The literature review of the study covers an explanation about the basic concepts of supply chain integration, logistics practices and the recent trends. The review also discussed about the different challenges in manufacturing firms by the intention of contributing to theory building through a thorough systematic and in-depth analysis of how prior studies have been conducted. It tries to address the fundamental concepts, as supply chain integration, inbound logistics, drivers of integration, criteria used to measure integration and methodologies used to analyze data in the research are reviewed. In finding out the research Gap in the body of knowledge, the premises, methodologies and their findings are carefully seen. In reviewing previous researches, it is tried to make the papers be very much related to subject under consideration and given priority to the recent papers. In the following section different topics related with the study is addressed.

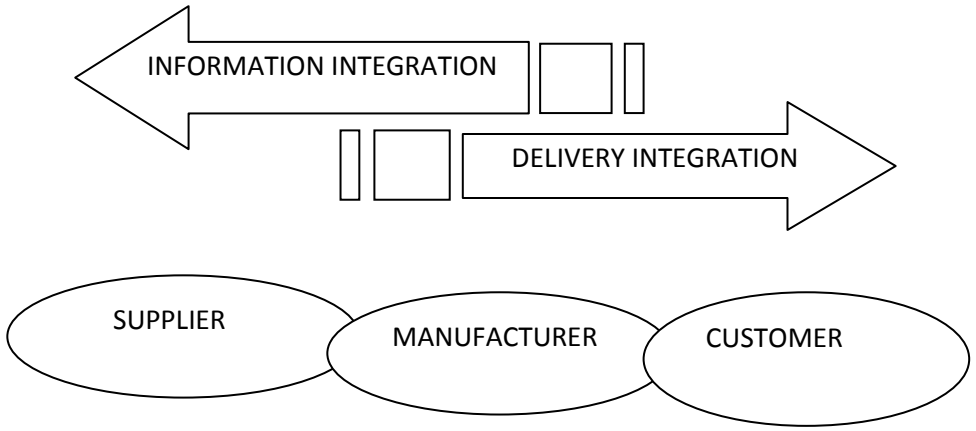
2.2. Supply Chain Integration

Different authors defined supply chain integration in quite different ways; the definition by each writer is being tailored by the scope of the study, the span and objective of their research. While reviewing these papers it is seen that, the central message of their definition is to be similar. That is Supply chain integration is the process of collaborating key business activities within an organization, its suppliers and customers so as to attain some specific objectives of satisfying end customer and achieving company and chain strategy (Barbara, 2010: Vijay, 2010). According to Rhian, (2012) achieving efficient flows of product and services information, money and decision to provide maximum value to the customer at low cost and high speed is the aim of integration.

The essence of satisfying customers is central in most modern management systems such as in TQM and ISO, “customer focus”, since customer is the central reason of existence.

The process of responding customer request demands collaboration of chain members through modernizing and automating the supply chain drivers: Information and Logistics

flow (Antonio *et al.,* 2017; Myerson, 2015). Others work by Daniel *et al.*(2012), described the characteristics of an integrated supply chains is to be seen by coordination of the firm's logistics activities with those of its suppliers and customers, and an almost nearly invisible boundary between logistics activities of the firm and those of its suppliers and customers. According to literatures companies integrate in two different ways. The first type of integration involves coordinating and integrating the forward physical flow of deliveries between suppliers, manufacturers, and customers. And the other type of integration involves the backward coordination of information technologies and the flow of data from customers to suppliers. The following figure shows the integration types that those companies integrate with their chain partners.



(Source from Froehlich, 2014)

Figure 2 Integration in the supply chain

The success story of all the world leading companies is being attributed to their tightly designed supply chains (Edward, 2012). Wall-Mart, Zara and Dell the world leading companies with their respective products, their success story is attributed to the implementation of comprehensive information technology throughout their supply chain, strategic partnering with their suppliers and the implementation of an innovative logistics strategy called cross-docking (Chopra and Mendel, 2007).

Recent trends in supply chain management brought the idea of green supply chain management (GSCM) to integrate environmental thinking into supply chain management

It is important in influencing the total environment impact of any organization involved in supply chain activities (Suleiman, 2015). Managing suppliers strategically brings the group to improve operational performance, in terms of dependability, flexibility, cost, and Quality. This is seen in the works of Narasimhan and Jayaram, (1998) who argues that, in managing Supplies strategically, an organization is able to improve operational performance, in terms of dependability, flexibility, cost, and quality with proper interactions with its Suppliers.

Logistics management is the task of managing material flow and information flow, and it is a key part of the overall task of supply chain management. Alan et al. (2011), states Supply chain management is concerned with managing the entire chain of processes, including raw material supply, manufacture, packaging and distribution to the end-customer. In performing this, Logistics management is that part of a supply chain focused in managing two key flow: material and information flows and the Logistics' role are to provide time and place utilities.

Time and place Utilities facilitate the creation of global scale and scope economies while enhancing a firm's ability to provide high levels of seamless customer satisfaction (McGrath and Hoole, 1992). Logistics management is a dynamic entity that can be modeled again and again to cope with requirement of the market by protecting the competitive advantage of a company. Different logistics strategies are in use in the today's competitive market that suit customer needs. Some of the major recent trends in logistics practices are described by different scholars as follows: Cross Docking: is the practice of expediting the flow of product from receiving to shipping with a minimum of handling in between. To enable proper Cross Docking system, it is indicated that there should be sound processes, supply chain relationships and clearly established systems like automated material handling, Warehouse Management Systems (WMSs), order processing systems, and quality controls systems (Shiromi, 2008). Quick Response (QR) QR is a market driven business strategy in which supply chain members work together to react quickly to volatile market demand (Martin, 2011).Third party logistic providers 3PL Companies handle outsourced logistics function for clients' businesses inbound and outbound shipping freight and parcel distribution in import /export services (Shiromi,

2008).With the globalization of markets, companies are increasingly focusing on their core competencies. Electronic Commerce Fax, Email, voice mail, Electronic Funds Transfer (EFT), internet, intranet, image processing, barcode and electronic data interchange (EDI) uplift the standard of logistics practices (Glauser, 2005 as cited in Shiromi, 2008).

2.4. Inbound Logistics

Objective behind logistics is to make sure the customer receives the desired product at the right time and place with the right quality and price (chopra and Mendel, 2008). This process can be divided into two subcategories: inbound logistics and outbound logistics. Inbound logistics covers the activities concerned with obtaining materials and then handling, storing and transporting them. It deals with receiving, storing and distributing of inputs. And outbound refers to the activities related to distribution of products to the customer.

(Source from Froehlich 2014)

Figure 3 Diagram showing the core activities of a value activity

2.6 Inbound Logistics and Upstream Integration

In the literature reviews, it is seen that there is a strong relationship between inbound logistics decision and supply chain integration. Integrated inbound logistics enables

multiple real-time processes to be managed seamlessly and information shared securely across the logistical supply chain to provide comprehensive visibility into Linkages to supply chain management systems. This paper makes its base from the eight golden rules by Volvo logistics management "Lowest Total acquisition cost" in improving the company's performance and mandatory in supplier selection. Such a firm must then make a trade-off between efficiency and responsiveness (chopra and Mendil,2008).The main aim of analyzing inbound logistics is its potential in achieving competitive advantage (Porter, 1985). Inbound logistics activities Includes the following activities: Inventory Management, Supplier Selection, Visibility, Transportation Management and Information technology. Each of the dimensions of the inbound logistics activity are discussed as follows

2.6.1 Inventory Management

"Inventory" means physical stock of goods, which is kept in hands for smooth and efficient running of future affairs of an organization at the minimum cost of funds blocked in inventories. Inventory management is the integrated functioning of an organization dealing with supply of materials and allied activities in order to achieve the maximum co ordination and optimum expenditure on materials (Tom *et al*., 2013).

Having excess inventory hurts return on equity and assetsby tying up working capital. Inventory shortages, on the other hand, can lead to plantShutdowns, lost sales, and a loss of customer confidence. Inventory is the buffer betweenSupply and demand variability, at multiple nodes in a complex value chain (Aghezza *et al.,* 2001). Emerging Trends show these initiatives are greatly dependent on shared control and visibility of Inventory availability upstream in the supply chain. Managing inventory skillfully has become critical to staying profitable and finding growth opportunities.

2.6.2 Supplier Selection

Supplier selection is not only one of the most important decisions but also one of the critical success factors In competitive rivalry. That defines the performance of the company. In selection of vendors, first rule is the suppliers' assessment of the association. The second rule is to work with a few vendors that submit high quality product and service , instead of doing business with several supplier that offer low

prices. In selection of suppliers, there exist many other secondary important criteria while these two approaches are the fundamental. In this study, before defining supplier criterions the classification of suppliers are preferred and they are grouped into three categories.

2.6.3 Visibility

Refers to the characteristics of a supply some process to "see" from one end to the other and it relies on the shared data and information among the members (Mary, 2011) visibility includes all company processes including production lines, distribution lines and sharing data on Real" demand – point-of-sale data (Barratt and Oke, 2007), Shipping schedules; advanced ship notices (Moberg et al., 2002), Order status tracking (Simatupang et al., 2002). Firm raw materials, inventory and Firm inbound shipments. Visibility makes companies to operate with less overhead and inventory and react to fluctuations in demand more quickly. They're able to manage risk more effectively, using agility to help them face unexpected disruptions. To deal with the sharp increase in complexity as global supply chains grow and diversify, companies need technology that can provide visibility across a large network of trading partners. They need the ability to see order statuses, shipments, in-transit goods, trade documents, and costs as inventory moves along the supply chain. Visibility drives process efficiency and improves collaboration between suppliers and buyers. Data on supplier activity is available to all involved parties, and companies can identify and address changes, delays, or problems as they arise.

2.6.4 Transportation Management

Supply chains are only as effective as the people operating them, the technology that informs them and transportation management. Specifically the transportation management is key to achieve the supply chain goals. Because it consisted of services including route guide execution, activity based consolidation / optimization, RFP management, vendor management, freight bill and auditing, and reporting to ensure the operation runs smoothly. Create a low cost solution in step with today's modern supply chain

2.6.5 Information Technology

Information and Communication Technology (ITC) exists in every aspect of modern society. Flexible learning location, reduced costs. IT in SCM is useful in reduction of the costs of operational processes (manual work), improvement of information quality by eliminating human errors, and speeding up the transfer of information between organizations. It is also assumed that supply chain coordination information is shared especially in volatile, unpredictable, and logistically demanding business environments. (Jaana et al., 2008)

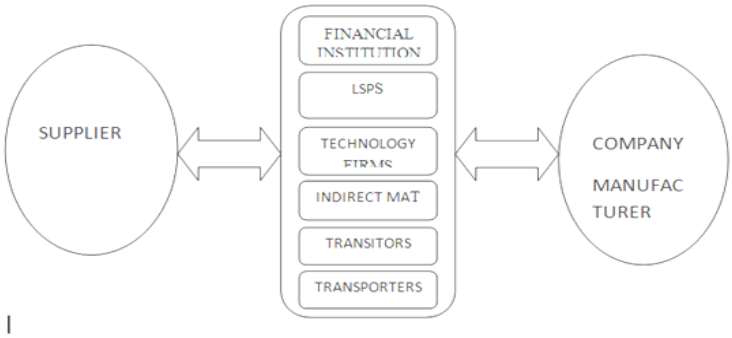
2.7 Actors in a Supply Chain

The upstream integration of a supply chain involves the management of different actors that involve directly (direct stake holders) and the facilitating companies. The direct stakeholder firms are comprised of two entities the focal company (manufacturer) and the supplier which are involved directly in logistics activity and information exchange. While the facilitating companies, as their name indicate facilitate the smooth flow of logistics between the supplier firm and the focal company. Manufacturers provide the form utility of goods by transforming raw materials, parts, and components into products that are beneficial to end users. Suppliers include a wide array of supply chain participants that provide essential inputs to the production process of a manufacturer. This broad category of organizations includes raw material extractors and processors, parts producers, component assemblers, and similar entities that support the creation of finished goods.

Other companies involved in the supply chain process are the facilitators. These companies include: Logistics services providers, Technology firms are also grouped in the facilitator group that facilitate rapid flows of critical information across the supply chain and direct stakeholders rely upon technology companies to provide supply chain planning, execution, and event management tools that generate cross-chain visibility, increase control, and support decision making(Haozhe,2013). The other facilitators are indirect material suppliers. They provide goods that support the operation of the supply chain, but are not directly associated with a specific product. These include consumables, tools, and supplies that facilitate the efficient production of goods. Similarly, packaging and material handling supplies are needed to ensure the safe and accurate delivery of

goods, financial institutions and government agencies are also having important roles in the supply chain. Banks and related institutions facilitate trade through working capital management, payment and cash management, and contract execution support. They help to reduce risk in global supply chain transactions and to reduce inventory costs (Brian et al., 2013). Government regulatory agencies mandate product standards, labor laws, equipment requirements, and transportation regulations to promote supply chain safety. Other agencies provide import/export support to encourage trade, control borders to ensure supply chain security, and collect fees to support the supply chain infrastructure.

A key to success in supply chain management is to actively engage essential participants in the planning and development of key requirements. Information sharing about expected demand, timing issues, location, and special needs is essential for all participants. This dialogue with direct stakeholders and facilities will help them marshal the necessary capacity, inventories, and labor needed to pursue perfect fulfillment of demand (Brian et al., 2013). The following figure shows the actors in a supply chain.



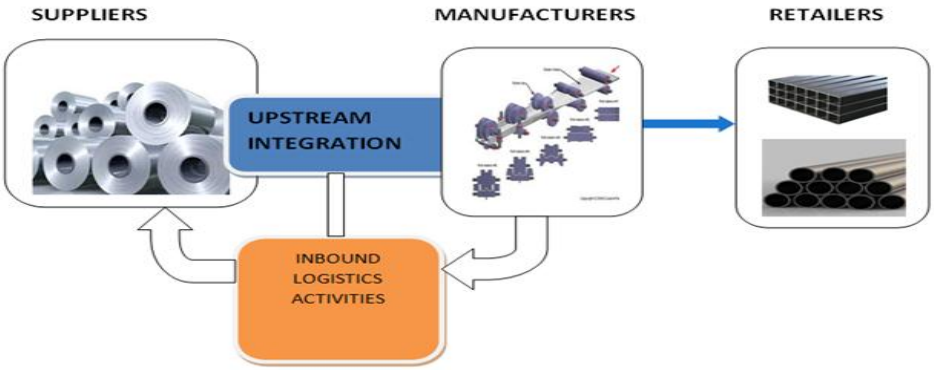
(Source: Researcher's Compilation

Figure 4 Actors in a Supply Chain

The identification of actors majorly focuses on the management of costs associated with fulfilling customer requests. Starting from the request of purchase up to the delivery of raw materials to the production facility.

2.8 Benefits of Upstream Integration

Upstream integration is the firm's network that includes its suppliers and all of the suppliers' upstream partners. It has different advantages to all the supply chain partners. Even though the study of the inbound activities and upstream integration is one segment of supply chain, it has a multi dimensional effect for the whole supply chain members.



(Source: researcher's compilation)

Figure 5 Upstream integration

2.7. Supply Chain Improvement Studies

The review study types are published articles from different journals, literature reviews, concept papers and general reviews collected from different websites mentioned in the methodology. The analysis and discussion of the articles is carried out based on their context, the structures and methods used for the study, and outputs of supply chain management improvements and models. In analyzing the papers the main reason behind analyzing the papers is either The Response Time that Customer are Willing to Tolerate is not met, The Variety of Products Needed, The Service Level Required and the need to reduce the cost of acquisition

Table 1 Review of related literature

No	Author	Title	Publisher	Purpose	Methodology	Result	Paper type
1.	Oded. B and Qian.W, 2006)	Inbound Logistic Planning: Minimizing Transportation and Inventory Cost	transportation science vol. 40, no. 3, august 2006, pp. 287–299issn 0041-1655 eissn 1526-5447 06 4003 0287	Aimed at selecting the appropriate distribution strategy for delivering a family of products from a set of suppliers	Heuristic approach	When the inventory weight increases, the direct transportation cost decreases	Research paper
2.	Gimenez, (2011)	" Supply chain integration and performance: the	Supply Chain Management: An International	Aimed at investigating the	Questionnaires for data collection and Factor analysis and	supply chain integration increased	Research paper

		moderating effect of supply complexity"	Journal, 17(6), 596-610	effectiveness of supply chain integration in different context	regression analysis were performed to analyze the data	performance if supply complexity was high,	
3.	Luu Tien Dung (2015)	factors affecting the collaboration in supply chain of mechanical enterprises in Vietnam	International Journal of Managing Value and Supply Chains(IJMVSC) Vol. 6, No. 4, December2015 DOI:10.5121/ijmvsc.2015.6402 17	Aimed at identifying the factors that affect collaboration of supply chain members	Testofhypothesis,Convergent Validity, Discriminant Validity	(i)trust;(ii)power; (iii) maturity; (iv) frequency; (v) distance; (vi) culture; (vii) strategy; (viii) policy; (ix) are factors affecting the collaboration in supply chain	Research paper
4.	Alam et al. (2014)	"The mediating effect of logistics integration on operational performance"	The International Journal of Logistics Management,	Aimed at analyzing the impact of individual logistics-related	Descriptive statistics, Harman's one-factor test, Cronbach's alpha and composite	While logistics integration had a very significant direct effect on operational	Research paper

			25(3), 553-580.	factors, namely, supplier involvement, length of supplier relationship, use of information technology, and logistics integration on a firm's operational performance.	reliability measures, validity, t-statistics tests were performed	performance.	
5.	Markus Hesse and Jean-Paul Rodriguez (2009)	The transport geography of logistics and freight distribution	Journal of Transport Geography xxx (2004) xxx–xxx, ELSEVIER	Aimed at providing an overview of the emerging transport geography of logistics and freight distribution	literature review	because of logistical integration, transport cannot be solely considered as derived demand, but as an integrated	Research paper

						demand where physical distribution and materials management are interdependent	
6.	Zhao et al. (2013)	"The impact of supply chain risk on supply chain integration and company performance	Supply Chain Management: An International Journal, 18(2), 115-131.	Aimed at empirically exploring the Relationships among supply chain risks, supply chain integration, and company performance in a global context.	Validity, reliability, and structural equation modeling methods were used	Supply chain risks, especially supply delivery risk, negatively related to supply chain integration. While supplier, internal, and customer integration affects the Competitive performance and customer satisfaction.	Research paper

7.	Daniel Prajogo and Jan Olhager (2011)	Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration	International journal of production economics 135(2012) 514-522,ELSEVIER	Aimed at investigating the integrations of both information and material flows between supply chain partners and their effect on operational performance	Scale validity and reliability structural equation model (SEM) , Harman's single-factor test to check for common method variance, chi-square test	Information technology capabilities and information sharing both have significant effects on logistics integration	Research paper
8.	Marinos et al.(2004)	Evaluating the integration of supply chain information sy.stems:	European Journal of Operational Research 159 (2004) 393–405,ELSEVIER	Aimed at Analyzing the effects of integration technologies in unifying inter organizational and intra organizational information systems	Enterprise application integration (EAI) software	information systems integration has a significant from both intra- and inter-organizational levels	A case study

9.	Gangue Xiong& Petri Helo	Challenges to the supply chain in the steel industry	International Journal of Logistics Economics and Globalizations (IJLEG).	Aimed at discussing challenges to the supply chain in today´s steel industry	Advanced Planning & Optimization (SAP APO). SAP APO	proposes an optimized supply chain and -"Win-Win" path in visibility across all participant	Research paper
10.	JayanthJayaramandKeah-Choon Tan (2010)	Supply chain integration with third-party logistics providers	Int. J. Production Economics 125 (2010) 262–271,ELSEVIER	Aimed at identifying premises that information integration, 3PLselection criteria, performance evaluation, and relationship building are positively correlated with firm performance.	literature review Factor analysis Pearson correlation (2-tailed test). t-test	information integration, 3PL selection criteria, performance evaluation, and relationship building are positively correlated with firm performance	Empirical study
11.	Alhasan.Y	Managing	Proceedings of	Aimed at	Process mapping	presents a novel	Research

	and Linda. L. (2014)	Upstream Supply Chain Complexity based on Purchasing Competencies	the 2014 International Conference on Industrial Engineering and Operations Management Bali, Indonesia, January 7 – 9, 2014	assisting organizations in developing fundamental competencies in the purchasing function to minimize upstream supply chain complexity		purchasing competency model	paper
12.	Yuliang et al.(2007)	Supply chain integration in vendor-managed inventory	Decision Support Systems 43 (2007) 663–674,ELSEVIER	Aimed at developing an analytical model that explores how important supply chain parameters affect the cost savings to be	Model development for economic order quantity. under different scenarios	Results also show that these benefits are disproportionally distributed between buyers and suppliers. suppliers benefit from JIT only if they have	Research paper

				realized from collaborative initiatives such as vendor-managed inventory (VMI)		high holding costs and low ordering costs relative to their customers	
13.	Ting long et al. (2007)	An integrated vendor-managed inventory model for a two-echelon system with order cost reduction	Int. J. Production Economics 109 (2007)241–253,ELSEVIER	Aimed at analyzing an integrated vendor-managed inventory (VMI) model is presented for a single vendor and multiple buyers, where the vendor purchases, and processes raw materials and	Model development for economic order quantity, under different scenarios	A solution procedure of the optimal investment amount and replenishment decision for all the buyers and the vendor is proposed	Research paper

				then delivers finished items to multiple buyers			
14.	Juliana HsuanMikkola&TageSkjøtt-Larsen (2017)	Supply-chain integration: implications for mass customization, modularization and postponement strategies	Production Planning & Control The Management of Operations, Taylor & Francis	Aimed at analyzing the effects of mass customization, postponement and modularization	Mathematical modeling	The system perspective to the management of modularization is closely linked with platform management of product architectures	Empirical study

15.	Nathalie et al. (2017)	Supply chain integration: the role of logistics service providers	International Journal of Productivity and Performance Management, Vol. 58Issue: 1, pp.711,doi:10.1108/17410400910921092	Aimed at Investigating whether the role of logistics service providers (LSPs) in supporting SCI and clients' performance	literature review	The roles LSPs can play in supply chains is not considered in most of SCI phenomenon.	Empirical study
16.	Vijay R,(2010)	Supply chain integration: cluster analysis of the impact of span of integration	Supply Chain Management: An International Journal,Vol. 15 Issue: 3, pp.207-215, doi: 10.1108/13598541011039965,emerald insight	Aimed at Exploring whether the span of integration affects supply chain performance	Cluster analysis of survey data	a broad span of integration have a greater focus on alignment with suppliers and customers, and have more of a supply chain focus than those with a narrow span	Case study
17.	Antonio K,	Supply chain	International	Aimed at	Structural	Information	An

	(2010)	integration and product modularity	Journal of Operations &Production Management, Vol. 30 Issue: 1, pp.2056, doi10.1108/01443571011012361,emeraldinsight	identifying purpose of this paper is to examine the relationship between SCI and modular product design, as well as their impact on product performance	equation modeling.	sharing, product co-development and organizational coordination), which affect modular product design and product performance.	empirical study
18	Sabyasachi and Vinod (2008)	Supply chain integration and shareholder value:	Journal of Operations Management 26 (2008) 96–114ELSEVIER	Aimed at Analyzing SCI on share holders' value creation	Cross-sectional regression analysis, Hierarchical regression analysis	firms with greater bargaining power and higher process efficiency benefit more from participation in industry	An empirical study

						exchanges	
19.	Theodore P. Stank and Thomas J. Goldsby(2017)	A framework for transportation decision making in an integrated supply chain	Supply Chain Management: An International Journal, Vol. 5 Issue: 2, pp.71-78,doi: 10.1108/13598540010319984,emeraldinsight	Aimed at clarifying the major transportation decision areas and position transportation management within the overall integrated supply chain environment	literature review	The role of transportation has changed from operationally meeting low cost or high service criteria	Empirical study
20.	RhianSilvestre.(2014)	Integrating financial and physical supply chains: the role of banks in enabling supply chain integration	International Journal of Operations & Production Management, Vol. 34 Issue: 3, pp.298-324,	Aimed at developing a model of physical and financial SCI,	comparative analysis	banks can support buyers and suppliers by contributing to the enablers of SCI, namely coordination,	case study)

			doi: 10.1108/IJOPM-04-2012-0131,emeraldinsight			collaboration, information sharing and information visibility	
21.	Bogale,(2015)	Supply Chain Collaboration Practices (A Study on Manufacturing Companies – Ethiopia)	Industrial Engineering Letters www.iiste.org ISSN 2224-6096 (Paper) ISSN 2225-0581 (online) Vol.5, No.12, 201	multidimensional role of supply chain collaboration in the current serious competitive business world	Both qualitative and quantitative data analysis tools were used as per the nature of data	positive effect between the collaborative supply chain practices and the companies' productivity	An empirical study
22.	Indrė, Justina,(2014)	THE IMPACT OF SUPPLY CHAIN COST ON THE PRICE OF THE FINAL PRODUCT	Business, Management and education ISSN 2029-7491 / eISSN 2029-6169 2014, 12(1):	focuses on the main processes in the logistics chain and their component logistics chain costs and their	In-Depth Interviews, Linear programming	supply chain expenses play a colossal role in the cost of the final product	An empirical study

			109–126 doi:10.3846/bme.2014.08	minimization as an assumption for the competitiveness of the final price			
23.	Amrita,2017	Improving logistics performance through investments and policy intervention: a causal loop model	Int. J. Productivity and Quality Management, Vol. 20, No. 3, 2017 363	Filling the gap in available literature to improve the logistics services in India	a causal loop model	information technology on reduction in logistics cost, reduction in time, improvement in reliability, improvement in flexibility	An empirical study
24.	Piotr S AND Hanna,(2013)	Logistics process improvement using simulation and stochastic multiple criteria decision aiding	EWGT2013 – 16th Meeting of the EURO Working Group on Transportation,	improvement of a delivery process of parts and components for a vehicle production	stochastic decision aiding method	proposed a four-stage solution procedure	An empirical study

			ELSEVIER	company based on just-in-time system			
25.	FASIKA,(2014)	Identifying the Characteristics of the Supply Chain Processes in Developing Country: A Manufacturing Industry Perspective	WSEAS TRANSACTIONS on BUSINESS and ECONOMICS, E-ISSN: 2224-2899 Volume 11, 2014	outline the characteristics of business processes based on the data collected from the Ethiopian manufacturing industries practices	Semi-structured interview results	The field result brought out specific characteristics of the supply chain processes from Ethiopia, identifying appropriate key performance indicators (KPI) and best practices that suits developing countries situations.	An empirical study
26.	Markham et al.(2001)	Arcs of integration: an international	Journal of Operations Management 19	Aimed at investigating supplier and	summary statistics and confirmatory factor analysis	The widest degree of arc of integration with	Research paper

		study of supply chain strategies	(2001) 185–200,ELSEVIER	customer integration strategies		both suppliers and customers had the strongest association with performance improvement	
27.	Shawnee et al.(2003)	The effects of an integrative supply chain strategy on customer service and financial performance:	Journal of Operations Management 21 (2003) 523–539,ELSEVIER	Aimed at examining the performance implications of an integrated supply chain strategy, with customer service performance followed by financial performance	Correlation matrix and summary statistics and confirmatory factor analysis	positive *direct* relationships between (1)information and supply chain integration, (2) supply chain integration and customer service, and (3) customer service and firm performance	an analytical study
28.	Kanda Boonsothonsatit(2017)	Supply Chain Causal Linkage-based Strategic	Journal of Advanced Management	Aimed at designing a causal linkage-	Clarification of Vision and Mission ,Synthesis of	It proposed a conceptual framework of	Research paper

		Map Design	Science Vol. 5, No. 3, May 2017	based strategic map	Strategy	causal linkage-based strategic map design	
29.	Peter W. Stone braker and Jianwen Liao (2017)	Supply chain integration: exploring product and environmental contingencies	Supply Chain Management: An International Journal, Vol. 11 Issue: 1, pp.34-43, doi:10.1108/13598540610642457,emerald insight	Aimed at examining the notion that supply chain integration is an extension and application of vertical integration theory	Theoretical model development and test of hypotheses	the stage of life cycle variables is associated with the various dimensions of supply chain integration	case study

2.7.1 Summary of the Reviewed Literatures

From the above literature review, it is clearly seen that supply chain integration is a vast topic that, the writers tried to address from specific point of view. These are: Analyzing the effects that integrated supply chain have on performance, factors and drivers of affecting SCI, dimensions of a supply chain, the levels of SCI, barriers of SCI and diverse conditions that are necessary for success of supply chain integration and other factors that need to be considered while analyzing supply chain integration.

The first premise in the analyzed papers is the Effects and outcomes of an integrated supply chain, which accounts about the 14.28 % of the total revised papers. According to Theodore the role of transportation is changes from operationally meeting low cost or high service criteria to fulfilling the supply chain goal. And the work of Bogale, (2015) has also shown that an integrated supply chain brings an improvement of productivity. The cost a product is also affected by the integration effect (I, Justine, 2014). Further the work of Shawnee et al.,(2003)shows the improvement of customer and financial performance is influenced by the integration effect. The effects of an integrated supply chain is not limited to the above points but generally speaking , the successful implementation of supply chain helps in achieving an improved firm performance through product availability, product quality and procurement performance. (Bower sox et al., 1989; McGinnis and Kohn, 1990). Supply chain performance is the net balance of creating responsiveness and the cost of creating that customer responsiveness which is termed as efficiency (chopra and Mendel, 1996).

Supply chain has becoming a necessity for an industry in gaining competitive advantages (Kim, 2009). Companies gain their sustained competitive advantage through coping with the need of the current day market. Such as: Product modularity, mass customization postponement strategies. The companies who benefit from the integration effect are those companies with greater bargaining power and high process efficiency.

Cristina Gimenez (2012) supply chain integration increases performance if supply complexity is high. In some cases where the level of complexity is low supply chain integration still affects company performance. The most important point to be noted from the review is that supply chain integration is effective and important only when the

manufacturing process is characterized by complex supply. The summary of related literature has shown that supply chain integration to be instrumental and with growing attention for a company in sustaining its competitive advantage. But On the contrary, some literatures try to show that integration isn't the only solution to a company in achieving strategic fit and are shifting from holistic integration towards semi-integrated supply chains and disintegration (Prabir, 200). The works of Vijay R. (2010) shows that, span of integration has a greater impact on alignment with suppliers and customers, and have more of a supply chain focus than those with a narrow span. As Markham al, (2001) the widest degree of arc of integration with both suppliers and customers had the strongest association with performance improvement.

34.3% papers focus on analyzing supply chain improvement from the view of different factors. These are: Just in time approach in which, the implementation of a just in time approach is to be efficient only if suppliers have high holding costs and low ordering costs relative to their customers therefore a vendor managed inventory has positive effect on supply chain integration. In a vendor managed inventory company engages itself in core activities and as a result becomes effective. geography as a driver of SCI is necessary only when physical distribution and materials management are inter-dependent. In the review papers there is an indication of the barriers of supply chain integration. As stated by the writers "fire-fighting" and "functional-silo mentalities" are barriers to SCI.

In analyzing the methods used in the reviewed papers, Different methods have been used as a research methodology depending on the premise and objective of writing. Some of these methods are Literature review. Literature review is the method of finding research gaps in previous works as a spring board to a research and as a means of coming to conclusion in Literature based papers. Some of the papers in the reviewed literature are (Nathalie et al, 2017; Markus and Rodriguez, 2009 But literature needs to be analyzed before coming to conclusion. Surveys and interviews are the methods which are used in the 21.8% of the review papers. 3.125% of the reviewed papers used structured questionnaire as a method of data collection. The use of an e-mail is also among the method of data collection used by some of the research papers. These methods are open

to self-report biases, such as respondents' tendency to give socially desirable answers rather than honest opinions. But are helpful in managing data in a scientific manner. Observations are also among the data collection methods used by the researchers but are susceptible to observer biases, such as seeing what one wants to see rather than what is actually there. Because of the biases inherent in any data-collection method, it is best to use more than one method when collecting diagnostic data.

The second part of the methodology is validation of the survey data. To perform data validation the researchers used Confirmatory factor analysis to check the validity of the instrument, Cronbach's alpha value to check for Reliability of data. Discriminant validity test12.5% of the papers performed test of the reliability of their data before performing the data analysis. Cronbach's alpha and composite reliability measures are used to check the validity And Dimensional reduction, confirmatory factor analysis. Factor analysis of Pearson correlation (2-tailed test).

As a method of data analysis Descriptive Statistics is used: Mean, standard deviations are calculated. 40.5% of the papers used correlation analysis to identify the relationships between different drivers and factors of supply chain integration and their effects on the level of integration of supply chain. T-test and summary statistics are used to test the significance of the analysis result. Multiple Regression analysis, Cross-sectional regression analysis, and Hierarchical regression analysis Cluster analysis are used to develop pattern, SEM to develop relationships and ANOVA to determine relationship.

After performing the data analysis 10% of the researchers used Modeling approach: of the papers use the approach of using modeling. Model development for economic order quantity under different scenarios, Heuristic approach, Enterprise application integration (EAI) software, Agent-mediate decision, comparative analysis and Process mapping approaches are used.

2.7.2 Expected Contribution of Current Study as Compared with Previous Studies

In the process of reviewing literature it is tried to make selection of the papers based on their relation to the subject under consideration: supply chain integration. And the time

of publishing is later than 2010 to understand the state of the art in supply chain. When summarizing the review it is seen that, the most of the writers confirmed that, supply chain integration to be a vast topic that it is difficult to address with a single study. So that the writers tried to address from a specific point of interest. Some from the point of analyzing the effect of integration on performance improvement dimensions and some from the view point of analyzing different drivers of integration. And have shown that different drivers affect supply chain integration in different ways.

The current study may have the following contribution compared to previous studies:

1. Purpose: Most of the previous studies were conducted to measures supply chain integration from intra-company perspective. Whereas this study considered intercompany perspectives (Inbound Logistics).

2. Industry: Previous researches were conducted on different industries, but very few considered Metal industry in their research with the aim of analyzing effects of an integrated supply chain. This study is dedicated to metal manufacturing industries from the view point of value activities.

3. Environment: Most of previous researches have been carried out in different countries of the developed economy, while the current study was conducted in Ethiopia, as one part of developing countries

Chapter Three

Research Methodology

3.1 Introduction

This chapter explores the research methodology used in carrying out the research study by describing the research design, research process, population and sampling size determination, sampling methods, data collection approaches and instruments of data collection are presented. Finally Method of testing data reliability and validity, data analysis and data presentation is also presented in this chapter. Generally Selection of research methods depends on the research objectives and type of the research. And the method which best fits the problem under consideration which is identified from their view related literature.

3.2 Study Design

An Explorative research design with a cross-sectional study design that employs both quantitative (employees survey) and qualitative data collection methods (key informants interview and personal observation) is employed as data collection methods. The use of qualitative and quantitative approach is important in order to reduce the limitation and increase the quality and flexibility of the data (Robinson, 1998). It also help gather data at a particular point in time with the intention of describing the nature of existing condition, or identifying standards against which existing conditions can be compared, or determining the relationships exists between specific events of the practices (Louis, Lawrence and Keith, 2011).

3.3 Sources of Data

Primary data were obtained from managers, supply chain experts, engineers, marketing professionals, workshop foremen and shop floor workers and secondary data is taken from publications and government reports.

3.3.1. Employee Survey

Questionnaire consists of both open and closed ended questions were prepared (see annex 5) Closed ended questions are developed using a five point Linker scale ranging

strongly agree (1) to strongly disagree (5). And it was used to acquire information from the population of 408 staff 82 sample staff were selected. However, 68 staff was completed and responded the questionnaires. According to Fowler (2002) a 75 percent response rate is considered adequate. Therefore the response from the questionnaire is sufficient for the analysis regarding the respondents' response rate. This survey was used to gather background information on the company, supply chain integration and possible related problems that hinder customer responsiveness and product availability. Originally the questionnaire was prepared in English language. But because of the truth that most of the employees are shop floor workers, it was translated into Amharic language. And then distributed through the factory marketing manager. In developing surveying questions for this research, several questioners developed by Chen and raj (2004) are used.

3.4. Population, Sample and Sampling Techniques

A representative sample for questionnaire was selected from the employees of the company based on probability sampling of proportional stratified simple random sampling. Stratified sampling was employed based on the strata of the departments and simple random sampling is taken. The reason for using stratified simple random sampling is that first, we can have more precise information inside the sub-population about the variables we are studying. And second, we can raise precision of the estimate of the variables of the whole population

3.5 Required Sample Size

According to (Israel, 2009), this study applied a simplified formula to determine the required sample size at 90% confidence level, and allowable error = 0.1% and the total number of employees is taken as the population.

Sample size determination formula

n=N/ (1+N(e)2

Where

n= sample size

N= Population (408)

e=acceptable amount of sampling error (10%)

n= 408/(1+408(.1)2

= 81.31

=82

3.6 Study Variables

3.6.1 Dependent Variable

Supplier integration: is measured through the level of information exchange with suppliers through internet, establishment of quick ordering system with major supplier, level of strategic partnership with major supplier and stable procurement through network with major supplier (Narasimhan& Kim, 2002; Morash& Clinton, 1998)

3.6.2 Independent Variables

The independent variables in this study are Inbound logistics dimension; Inventory management, Supplier selection, Visibility, Transportation management and Information technology

3.7 Data Reliability and Validation

To make the instruments measure what was intended to measure the respondents are clearly communicated on the contents of the questionnaire as well as the objectives of the research. To keep consistency of the research it is used Cranach's Alpha. According to Zikmud et al (2010) Cranach's alpha is a measure for the internal consistency of items to the concept. And the Scales with coefficient alpha above 0.7 are considered to have very good reliability and according to (Kaiser, 1994) validity of data above 0.5 is acceptable

3.7.1 Data Reliability

Golafshani (2003) defines reliability as the extent to which results of a study are consistent over time and there is an accurate representation of the total population under study. According to Toke et al., (2012), the aim of reliability analysis is to find the extent

to which a measurement procedure produced the same result if the process is repeated over and over again under the same conditions. The most common technique used in the literature to assess the scale's reliability and stability is use of the Cranach's Alpha Statistics for Reliability. It should be over 0.70 to produce a reliable scale and any scale with Cranach's Alpha less than this standard should be eliminated Sekaran (2005). The reliability test results are presented in the following table.

Table 2Reliability of survey data

No	variables	Cranach's alpha value
1.	supplier integration	.778
2.	inventory management	.760
1.	supplier selection	.717
2.	visibility	.859
3.	transport mgt	.835
4.	information technology	.885

Since the Cronbach's alpha value of the variables is greater than 0.7 all the collected data is good to produce a reliable scale and any scale with Cronbach's Alpha less than this standard should be eliminated Sekaran (2005). The reliability test results are acceptable

OVERALL DATA RELIABILITY

The overall data reliability is test of data for reliability considering all the dependent and independent variables.

Table 3 Overall data reliability Cronbach's alpha value

Cranach's Alpha	N of Items
.966	48

The overall Cronbach's alpha value is over 0.70 to produce a reliable scale and any scale with Cronbach's Alpha less than this standard should be eliminated Sekaran (2005). The reliability test results are acceptable.

3.7.2 Data Validation Factor Analysis Result

Measures sampling adequacy for each variable in the model and for the complete model Kaiser-Mayer-Olkin (KMO) Test is performed to test the validity of the data.

Table 4 Test of Validity

	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	**Bartlett's Test of Sphericity**		
		Approx. Chi-Square	df	Sig.
Supplier integration	.704	320.573	28	.000
Inventory management	.643	235.703	28	.000
Supplier selection	.644	322.326	28	.000
Transportation management	.783	330.243	28	.000
Visibility	.692	361.059	28	.000
Information technology	.804	377.303	28	.000

According to Kaiser, (1994) KMO value greater than 0.5 is acceptable and the data is to be taken as valid. Therefore the collected data is found to be valid

3.8 Method of Data Analysis

After sorting out the data obtained from the questioners, from the distributed 82 questionnaires, 68 completed questionnaires from employees of different departments are returned and used for the analysis. The data were checked, corrected, coded and entered into SPSS 22.0 for analysis. Summary statistics to determine mean is used. Correlation analysis is used to determine the relationship between variables. The dependent variable is improvement of supplier integration and the independent variables are inbound logistics dimensions: Inventory management, supplier selection, Visibility, Transport management and information technology. To fill the information gap that could possibly occur in the data collected by questionnaire some qualitative information are used. Figures tables and charts are used to present the results of the study

Chapter Four

Result and Discussion

4.1 Introduction

Under this chapter the analysis and interpretation were carried out based on the data collected through questionnaire from five departments (i.e. Top management, logistics and supply chain management, sales & marketing, supervisors and shop floor workers, So as to attain total involvement. The data was analyzed using Statistical Package for Social Science (SPSS v.22.0).Based on the methodologies, research design and tools of the proposal the data was distributed to 82 respondents. From the total of 82 questionnaire distributed, 68 were returned from which 83% response rate is. According to Fowler (2002) a 75 percent response rate is considered minimum level of acceptable response rate. Therefore it will be used as source of sufficient information to the data analysis. Demographic characteristics, Descriptive statistics, Correlation analysis, Test of significance, discussion and interpretation of the results are presented in the following subheadings.

4.2 Descriptive Statistics

The mean or average is a measure of central tendency that offers a general picture of the data without unnecessarily covering one with each of the observations in the data set. The mean of respondents in each dimensions of supply chain integration suggest that the average amount that each dimension has positive or negative response of respondents. In this case, the mean of each item together with their respective dimension overall mean or average mean was calculated in order to conclude the overall supply chain integration of Kality metal. The mean statistical values of the items were based on the 5 point Likert scale and will be illustrated through the following assumptions: if the mean (M) score is below 2.5 it implies that, the respondents agree with the statement, if the mean score is equal to 2.5 it indicates Neutral, and finally if the mean score is above 2.5 it implies that the respondent disagree with the statement. Accordingly, the mean scores have been computed for all the six dimensions that includes supplier integration, Inbound logistics dimensions (Inventory management, supplier selection, visibility, transportation

management and information technology. The average mean result of each supply chain integration dimension together with their respective variables was separately presented, analyzed and interpreted in the following section.

4.2.1 Supplier Integration

Table 5 Result of Descriptive Statistics on Supplier Integration

Descriptive Statistics	N	Mean
There are direct computer-to-computer links with key suppliers	68	1.7353
Suppliers are provided with any information that might help them.	68	2.0000
Exchange of information takes place frequently and/or in a timely manner.	68	2.9559
Keeping each other informed about events or changes that may affect the other party.	68	3.9853
Frequent face-to-face planning /communication	68	2.8971
Integrated of logistic activities with suppliers	68	2.7059
Integration of inbound and outbound distribution of goods with Your company's suppliers is good	68	2.1618
Flow of Information and materials is smoothly with supplier firms.	68	4.2500
Valid N (list wise)	68	

The analysis result in Table 5 depicts the average mean value of respondents perception on The smooth flow of Information about logistics and events or changes that may affect the other party and materials between the company and supplier firms is with mean value (M= 4.2500, S.D= 1.26225) and (M=3.9853, S.D=.92224) respectively. This represents that highest mean value that the company's effort to improve information flow is very low. Information technology assisted communication with its suppliers Followed by provision of information that might help suppliers with a mean value of (M=2.000, SD=1.58350). This shows that the company has a good experience of information

provision to its suppliers but it not a formal manner. Frequent face-to-face planning /communication with suppliers is with (M=2.8971, S.D=1.29453). Integrated logistics activity with suppliers is with mean value (M=2.7059, S.D= 1.31647). Direct computer-to-computer links with key suppliers and the process of integration of Inbound and outbound distribution of goods with the company's suppliers is scored (M=1.7353, S.D=1.15407) (M=2.1618, S.D=1.52208) respectively. This shows that the company tries to communicate with its suppliers in a traditional way through e-mails, and fax no advanced information technology infrastructure are implemented yet. As the results acquired from Kality metal indicated that, there is no strong integration with supplier and businesses are undertaken through traditional way of operation which in turn affects the total supply chain performance of the chain members. The extent of information and material flow between the chain members is one area that is neglected and it is not in a timely manner. The face-to-face planning with suppliers is not given due attention. Logistics integration is also given less attention and computer-to-computer links with key suppliers are responded by the respondents to be relatively good it is done in a traditional way and since the complexity of the supply is low it may not be a problem. This implies that, the firm is weak in terms of supplier integration and partnership practices and did not understand the supplier integration practices that can play a great role in achieving total chain integration. In today's business environment, where the supply chain is the major area of competition, companies need to perform in collaboration with TIERS rather than competition (Hefu et al, 2011).

4.2.2 Inventory Management

Table 6 Descriptive Statistics Result of Inventory Management

Descriptive Statistics	N	Mean
Striving to keep the inventories on optimal level.	68	3.4118
Works to make accurate , complete and timely inventory transactions record	68	4.1471
Working to avoid capital tied resulted from inventories	68	3.4265
Working on making records on improving delivery time fluctuations,	68	3.9265
Consideration of Out of stock condition in terms of Lost sales cost, Back order cost	68	2.8088
Use of economic order quantity with considering demand fluctuations.	68	4.6765
Abiding to the policy of its re-order level to make purchases	68	3.7206
Consideration of inventory carrying costs separately as Capital cost, inventory service costs and Storage costs	68	4.0294
Valid N (list wise)	68	

Source: Researcher's survey, 2019

The analysis result in Table 10 depicts the average mean value of respondents perception on inventory management of the focal company with supplier integration is with mean value (M= 4.6765, S.D=.63343). This implies that the company makes order based purchase rather than planning the demand. Followed by the company's habit on working to make accurate, complete and timely inventory transactions record (M=4.1471, S.D=43244). Consideration of Inventory carrying costs are separately is with mean value (M=4.0294, S.D= .51747) improving delivery time fluctuations and the company's experience of abiding to the policy of its re-order level to make purchases are with mean value (M= 3.9265, S.D=.88632) and (M=3.7206, S. D=1.06288) respectively. Keeping the inventories on optimal level (M=3.4118,S.D=.93418) avoid capital tied resulted from inventories (M=3.4265,S.D=1.11055)and considering Out of stock condition

in terms of Lost sales cost, Back order cost scored (M=2.8088, S.D=1.29589). The right level of inventory is necessary. Because both shortage of inventory and its overage affect the company negatively: The shortage of inventory creates unavailability of product and lost sales and the inventory overage creates capital tied up. The practice of the company shows that use of economic order quantity considering demand fluctuation is low in the company inventory management. There is little activity on making records of transaction record in a timely, accurate and complete way. Inventory carrying costs are not considered separately and the company is subjected to incur cost if problem of finance is solved. Delivery time fluctuations are covered with raw material delay and no activity is made on improving it. The company's re-order level needs improvement with considering different factors. The company's practice of keeping the inventories on optimal level also needs further analysis than simply taking the last years demand as a forecast to the present demand.

4.2.3 Supplier Selection

Table 7 Descriptive Statistics Result of Supplier Selection

Descriptive Statistics	N	Mean
Suppliers are selected based on their contribution to the lead time	68	3.8382
Suppliers are selected based on quality of their raw mate	68	3.8382
Supplier's performance should be compared based on the impact on total cost.	68	4.6176
Selection of suppliers is done using a variety of mechanisms, including offline competitive bids, reverse auctions, or direct negotiations	68	3.6912
Suppliers are selected based on passing the assessment process	68	2.1618
Supplies are selected based on the reliability of their supplies	68	2.1471
Negotiation with suppliers is based on t a win-win outcome	68	2.9118
Manufacturers can use buy-back contracts to increase their own profits as well as total supply chain profits	68	4.2059
Valid N (list wise)	68	

(Source: Researcher' survey result, 2019)

Table 11 depicts the average mean value with regard to supplier selection of the focal company with its suppliers the mean value of supplier selection shows the overall practice of the company in selecting suppliers. In which most of the responses are above the mean value. Performance of the supplier is the major selection criteria used by the company is with mean (M=4.6176, S.D=.59924). The company's use of buy-back contracts to increase their own profits as well as total supply chain profits scored(M=4.2059, .93934) Suppliers are selected based on their contribution to the lead time and quality of their raw material are each with mean values (M=3.8382,S.D=.92414) and (M=3.8382,S.D=.83951)Followed by suppliers selection is done using a variety of mechanisms, including offline competitive bids, reverse auctions, or direct negotiations is with mean value(M=3.6912 ,S.D=1.04034) and the measure of negotiation with suppliers is based on t a win-win outcome is with mean value (M=2.9118 ,S.D=1.04718). Assessment as a selection procedure process and reliability as a measure of supplies rating are with mean value (M= 2.1471, S.D=1.41700) and (M=2.1471.S.D=1.41700).

Different measures of supplier selection are used to find the right supplier in terms of cost, quality sustainability and dependability. The contribution of suppliers to the lead time is the measure of how much a company responds to customer request. The primary goal is "maximization of market share" instead of traditional "maximization of profits (Suleiman et al.,2009). The result of Supplier selection in the company is performed including offline competitive bids, reverse auctions, or direct negotiations is given low in the company and even these approaches do not guarantee the best suppliers. Win - win outcome is the basis of relationship building instead local optimization and further subject to competitive approaches that depend on the "win-lose" philosophy and trade relations ceased after the contract duration or, in some situations, straight away (Moussa et al.,2009)

4.2.4 Transportation Management

Table 8 Descriptive Statistics Result of Transportation Management

Descriptive Statistics	N	Mean
Evaluation of the strengths and weaknesses of different modes of transportation before deciding	68	2.3676
Consideration of both in-house and outsourced transportation before outsourcing the process.	68	2.0294
Identification of trade-offs that shippers need to consider when designing a transportation network	68	2.3676
Use of technology to improve transportation performance.	68	4.5882
Design flexibility into the transportation network	68	3.8235
Bearing the differences in transportation costs in order to meet the deadlines of supplying orders to customers	68	4.2500
Decision of transport includes analyzing transportation and inventory cost trade-off	68	2.1176
Decision of transport includes analyzing Transportation cost and customer responsiveness trade-of	68	1.8824
Valid N (list wise)	68	

(Source researcher's own survey result, 2019

Table depicts the average mean value with regard to transportation management of the focal company with its suppliers. Uses of technology to improve transportation performance is with mean value (M=4.5882, S.D=.55275) which requires a serious attention for improvement. Followed by bearing the differences in transportation costs in order to meet the deadlines of supplying orders to customers (M=4.2500, S.D=.55651) is also given no attention. Design flexibility into the transportation network and trade-offs that shippers need to consider when designing a transportation network are with mean value (M=2.3676, S.D=1.44454) (M=3.8235, S.D=.92947) respectively. Analyzing Transportation and inventory cost trade-off while deciding transportation selection is with mean value(M=2.1176,S.D=.51144) Evaluation of the strengths and weaknesses of

different modes of transportation before deciding mode of transport is with mean value (M=2.0294,S.D=.96151) and Transportation cost and customer responsiveness trade-off is with mean value (M=1.8824,S.D=.44066).

The use of technology to improve transportation performance is low but in literatures it is the major area to improve the performance largely. TMS software brings about 30% saving in cost. Different measures of transportation management are used to find the mode of transport, in terms of cost, quality sustainability and dependability. The contribution of transport to the lead time is the measure of how much a company responds to customer request primary goal is "maximization of market share through assuring the availability of products". Instead of traditional. Transport selection is included in the decision of selecting third party logistics provider. Win - win outcome is the basis of relationship (Moussa et al., 2009).

4.2.5 Visibility

Table 9 Descriptive Statistics Result of Visibility

Descriptive Statistics	N	Mean
Traceability is a core factor of your company's purchases included in the purchase process	68	2.9265
Inventory is easily traceable.	68	3.7206
Capacity constraints are easily traceable	68	2.5882
Out of stock conditions are flagged.	68	2.4853
Inventory information is accurate, trusted, timely, useful and in readily usable format.	68	2.3088
Uses a multisource orders and fulfillment policy	68	4.7941
Knowledge of total pipeline supplier inventory	68	2.1471
Order and shipment are traceable in the purchase process	68	4.6471
Valid N (list wise)	68	

Source: (Researcher's own survey, 2019)

Table 13 depicts the average mean value with regard to visibility of incoming material and inventory. Company's uses of multisource orders and fulfillment policy scored (M=4.7941.S.D=.47501). Followed by company's order and shipment are traceable in the purchase process is with mean value (M=4.6471, S.D=.59261). Inventory traceable scored (M=3.7206, S.D=.6288). Traceability is core factor of your company's purchase and is included in the purchase process. (M=2.9265, S.D=.15016). Traceability Capacity constraints is with mean value (M=2.5882.S.D=.14911.)Out of stock conditions are flagged and accuracy of inventory information, trustworthiness, timeliness, usefulness and its format is good ranked (M=2.4853, S.D=.25178) and (M=2.3088. S.D=.31872) respectively. Knowledge of total pipeline supplier inventory is with mean value (M=2.1471, S.D=.04045). Refers to the characteristics of a supply some process to "see" from one end of the to the other and it relies on the shared data and information among the members (Mary, 2011) visibility includes all company processes including production lines, distribution lines and sharing data on Real" demand – point-of-sale data (Barratt and Oke, 2007), Shipping schedules; advanced ship notices (Moberg et al., 2002), Order status tracking (Simatupang et al., 2002The company has no flexibility in sourcing. Since the company outsourced its logistics activities visibility is with the logistics provider. Out of stock conditions and accuracy of inventory information are relatively below the mean value indicating that the company works to fill its inventory .though the process is not automated.

4.2.6 Information Technology

Table 10 Descriptive Statistics Result of Information Technology

Descriptive Statistics	N	Mean
Information infrastructure conveys data on Demand forecasting, capacity planning, and modeling based on consumption.	68	3.1324
Information includes Real-time, end-to-end logistics management from point of origin to product delivery point.,	68	3.8971
Information exchange includes Capturing accurate routine administration, delivery, and consumption data.	68	2.8088
Uses of advanced planning and scheduling software.	68	2.5588
Employs forecast / demand management software	68	1.7794
Exchange supply chain data with its suppliers using ICT infrastructure	68	3.7794
Uses core supply chain management software, such as ERP, SAP, Oracle and best-of-breed	68	4.7353
Valid N (list wise)	68	

Source: (Researcher's own survey, 2019)

Table 14 depicts the average mean value with regard to information technology of the focal company with its suppliers. The uses of core supply chain management software, such as ERP, SAP, Oracle and best-of-breed is with mean value (M=4.7353, S.D=.56298) Real-time, end-to-end logistics management from point of origin to product delivery point is included in information management is with mean value (M=3.8971,S.D=.96413). The company works to coordinate with other demand and supply planning systems both within the enterprise and across the supply chain IS with mean value (M=3.7794, S.D=.89519). Capturing accurate routine administration, delivery, and consumption data and inventory management is based rather on historical demand and desired service levels than rules of thumb approach are with mean value (M=2.8088,S.D=.36324 and(M=2.5588,S.D=.26234) respectively.

Information technology has been found to reduce substantially the bullwhip effect across the supply chain (Barratt & Oke, 2007). Many researchers have reported that information sharing leads to better coordination of price, improved decision making and physical movement, and optimal inventory holding policies (Barratt & Oke, 2007). Information and communication technologies are important supply chain strategies to gain and maintain customer loyalty and to successfully implement strategic supply chain plans (Li & Lin, 2006). supply chain managements aims is to link all the supply chain agents to jointly cooperate within the firm as a way to maximize productivity in the supply chain so to do that information sharing used as glue.

4.3 Correlation Analysis

It is known that supply chain is a long process and time taking. And different Authors studied supply chain integration from the perspective of specific supply chain components: Customer Integration (Szulanski, 1996; Griffin and Hauser, 1993 and Internal Integration (Chuda Basnet, 2013; Darja and Sara, 2011) supplier Integration (Ragatz et al, 2009; Un et al, 2010; Wynstra and Weggeman, 2001; Ragatz et al, 2002; Un et al., 2010); So as to address some dimensions of supply chain. In this study the focus of interest is inbound logistics dimensions this study used a correlation analysis. Correlation analysis Spearman's correlation coefficient and statistical package for the Social sciences (SPSS 22.0) is used. The result of the analysis is presented in the following section:

The following table presents the correlation between variables which shows the relationship between the dependent variables and independent variables. The independent variable is "Supplier Integration" and the dependent variables are inbound logistics dimensions (Inventory management, supplier selection, visibility, transportation management and information technology).

Table 11 Correlation among the Variables

			supplier integration	information technology	transportation management	inventory management	supplier selection	visibility
Spearman's rho	supplier integration	Correlation Coefficient Sig. (2-tailed) N	1.000 . 8	.709 .049 8	.864* .006 81	.858* .006 8	.924** .001 8	.943** .000 8
	information technology	Correlation Coefficient Sig. (2-tailed) N	.709 .049 8	1.000 . 8	.724 .042 8	.673* .047 8	.634 .020 8	.626 .047 8
	transportation management	Correlation Coefficient Sig. (2-tailed) N	.864* .006 8	.724 .042 8	1.000 . 8	.898** .002 8	.723* .043 8	.722* .043 8
	inventory management	Correlation Coefficient Sig. (2-tailed) N	.858* .006 8	.673* .047 8	.898** .002 8	1.000 . 8	.634* .047 8	.736* .037 8
	supplier selection	Correlation Coefficient Sig. (2-tailed) N	.924* .043 8	.634 .020 8	.723** .001 8	.634* .047 8	1.000 . 8	.863** .006 8
	visibility	Correlation Coefficient Sig. (2-tailed) N	.943* .043 8	.626 .047 8	.722** .000 8	.736* .037 8	.863** .006 8	1.000 .

Source: (Researcher's own survey, 2019)

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

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

Table 15depicts the interpretation of the results obtained from the spearman's correlation between the dependent and the independent variables is as follows:

- Relationship between Inventory Management and Supplier Integration

The results indicated that inventory management and supplier integration of Kality metal industry are positively and significantly related (.858*, p<.05). This is an indication that improving inventory management practices of Kality metal industry will lead to increased supplier integration. Likewise ignoring inventory management can affect the productivity of the industry. Elements of supplier integration dealt with in this study such as optimal level of inventories, delivery time fluctuations, Reorder level are drivers for improved performance.

- Relationship between supplier selection and supplier Integration

The results indicated that supplier selection and supplier Integration of kality metal Industry are positively related (.924**, p<.01). This means that improving the supplier selection procedure or policy of the industry ensures supplier integration and it has a great potential to improve the industry's competitive advantage. Elements of supplier selection dealt with in this study are contribution to the lead time, quality of their raw mate, impact on total cost, Reliability of their supplies, mechanisms; including offline competitive bids, reverse auctions, or direct negotiations.

- Relationship between Visibility and supplier Integration

  The result indicated that Visibility and supplier Integration of Kality metal industry are positively and significantly related (.943**, p<.01). This means that enhancing the visibility of logistics and information within the industry can improve the integration with suppliers. Previous studies that firms operating in highly collaborative practices with suppliers and customers are likely to have an excellence performance due to the improvement of information visibility in supply chain. Elements of visibility dealt with in this study are traceability of shipment and purchase process, knowledge of supplier total pipeline inventory, traceability of inventory, out of stock conditions and capacity constraints

- Relationship between transportation management and supplier Integration

The result indicated that transportation management and supplier Integration of kality metal industry are positively and significantly related (.864**, p<.01). This means that enhancing the transportation management within the industry can improve the integration with suppliers. Elements of transportation management dealt with in this study are trade-offs between transportation cost and customer responsiveness, Use of technology to improve transportation performance, selection on mode of transport.

- Relationship between information technology and supplier Integration

  The result indicated that information technology and supplier Integration of kality metal industry are positively and significantly related (.709**, p<.05). This means that enhancing the information technology infrastructure within the industry can improve the integration with suppliers. Previous studies have shown that improvement of information in supply chain helps in achieving collaborative practices with suppliers. Elements of information technology dealt with in this study are data on Demand forecasting, capacity planning, Information about Real-time, end-to-end logistics Capturing accurate routine administration, delivery, and consumption data, Demand forecasting and capacity planning based on consumption and inclusion of Real-time, end-to-end logistics management from point of origin to product delivery point.

. Visibilityis the most linearly correlated variable in the correlation result. This implies that most of the logistics problems of Kality metal products factory are closely related to the visibility according to the above correlation table result show. The previous studies that firms operating in highly collaborative practices with suppliers and customers are likely to have an excellence performance in due to the improvement of information visibility in supply chain. Visibility starts from inventory status, order status, the place and status of shipment and which determines the relationship with customers and the production facility (Hsiao and Eric, 2015). Furthermore, to deal with the sharp increase in complexity as global supply chains grow and diversify; companies need technology that can provide visibility across a large network of trading partners. They need the ability to see order statuses, shipments, in-transit goods, trade documents, and costs as inventory moves along the supply chain. Visibility drives process efficiency and improves

collaboration between suppliers and buyers. Data on supplier activity is available to all involved parties, and companies can identify and address changes, delays, or problems as they arise.

The correlation coefficient of supplier selection is the next higher coefficient which shows that the companies' selection of supplier is a factor to determine the competitiveness of the company. Since the choice of the right supplier can give the company a cost and quality advantage and the saving of this cost also determine the competitiveness of the company. In any business strategy cost is the major factor to influence competitive advantage. The company who save its cost can sale large amount of product than its suppliers with lesser price without losing its profit margin. This makes supplier selection to be decisive factor. Transportation management, information technology according to literature 50% communication over the internet is a benchmark. And inventory management: The right level of inventory is since both inventory overage and inventory shortage negatively therefore the right level is positively correlated.

Generally, Firms targeting in high product quality performance require a greater need for supply integration (Focusing on product quality responsiveness) than customer integration. On the other hand, firms that focus on competitiveness need more focus on customer integration (market driven strategy) than supply integration. This result could be explained in two ways: Being more integrated with customers and focusing on the demand side also enables firms to be more competitive in the global market. Internal integration seems to be a requirement for the influence of supply chain integration practice on high product quality and competitiveness performance. Managers must ensure that the entire functional teams within a firm are integrated in order to achieve supply and customer integration.

Previously, Dyer (1996) stated that effective collaboration between functions can increase product quality. Extended to external integration, previous studies have shown that supply integration leads to improved product quality. Erickson et.al (1992) reports that integrating with suppliers, in terms of supplier participation and information sharing; can help companies achieve higher product quality performance.

4.4 Summary of Findings

According to the data analysis in the previous section, summary of the findings is presented as follows.

All the five independent variables of the inbound logistics dimension (supplier selection, Inventory Management, Visibility, Transportation Management and Information technology of the Ethiopian Metal Industry) are positively and well correlated with Supplier Integration. This shows that the performance of the Ethiopian Metal industries increases as a result of the integrated metal supply chain with in the sector.

According to the scope of the study, the areas of supply chain integration strongly correlated with the performance of the metal sector is upstream supplier integration as it is seen in the correlation analysis. So, the focus area of supply chain integration in order to improve the performance of the metal sector should be the supplier side.

The level of supplier integration of Kality Metal industry with regard to the key factors identified is low.

- Advanced communication technology is not used in the industry as a tool of effective communication between the supply chain actors of the metal industry in Ethiopia. Information technology enabled process is not implemented in the company simply fax and telecommunication. They do not use electronic data exchange methods.
- The performance of the Ethiopian Metal industries is low. In addition, the key performance indicators show that there is more to work on the Logistics performance of the sector which there is delay in delivery time, and as well as poor inventory management system and Product unavailability.
- The inventory management is Inefficient or there is no practice of deciding Optimized inventory level. When we see the Economic order quantities that incorporates the costs related with the delay of raw materials resulted from low logistic performance .such as unavailability resulting customer complaint and loss. Transportation activities are not optimally designed both in channel and strategy

- Information flows is performed in a number of ways. Such as: telephone, faxes and e-mails. But no implementation of Electronic links enabled International coordination.
- The company has a standard post delivery criteria which includes the weight material quality= 30%, packing of the material=15%, weight shortage=10%, shipment delivery period=10%, lead time= 15%, Discrepancy registered by the bank=15%. It is good in inclusion of quality and lead time Further the evaluation process is manually performed and needs
- The supplier selection practice in the first place is based on simple search of suppliers and the problem is that low cost suppliers may not be availing themselves on the web and the company will be subjected to lose extra cost.
- The other problem with bidding is that in case of absence of a qualified supplier the condition of re-bid will happen and this creates further long waiting time this contributes to unavailability of products.
- No method of tracing the incoming raw materials and lacks Visibility as a result There is Problems with traceability of shipments, inventory and out of stock conditions.
- Foreign currency shortages, higher taxes, lack of integrated system and long lead time in ports are the major challenges of logistics in the case company as well in the metal sector.
- Because of lack of infrastructure and other policy related problems, no efforts are made by the industries to adopt the technologies used to process the raw materials in house, and are focused on short term profits and hot cakes and this contributes to the shortage of raw materials. From the above summary we can see that the supply chain integration with the upstream supplier is low in the case company.

Chapter Five

Conclusion and Recommendations

In this chapter an effort has been made to wind up the major points of the study. As well some recommendations have been suggested in light of the recognized problems that affect inbound logistics in supply chain integration.

5.1Conclusion

The central theme of this study was to access the effects of an inbound logistics activity in supply chain integration. The analysis performed Based on extensive review of literature five important drivers such as supplier selection, Inventory Management, Visibility, Transportation Management and Information Technology have been selected and evaluated by respondents. Subsequently, the findings of the study indicated that the supply chain upstream integration of kality metal factory is low. With overall supplier selection, inventory Management, Visibility, Transportation Management and Information Technology of the inbound logistics since a shortfall between the expected level of performance and the response by the respondents is found. Accordly, the effects ofthe independent variables on the dependent variables are seen. The highest value of poor performance is The effect of level of low inventory management experience with overall mean value of (3.7684) followed by information technology is low with overall mean value of 3.428313 The level of visibility is low with overall mean value of 3.202213 Transport management is low with overall mean value of 2.928288 and level of supplier integration is with overall mean value of 2.836413. This shows that the level of supply chain integration is low in the company.

5.2 Recommendations

Based on the findings of the study and conclusions drawn from it, the following possible recommendations are suggested for actions to be undertaken by the case company at different levels. The firm can improve its responsiveness to satisfy customers' requests and increase its competitiveness by improving the inbound logistics activities at the first place and the company's inbound logistics decision should be given attention as an improvement variable in the achievement of total chain improvement. Thus

- The visibility dimension of the company is low as is seen from the correlation output. This is the effect of the outsourcing of the logistics activity to a third party logistics provider. Therefore the logistics service needs to be checked again whether it is done by a third party logistics provider or by the focal company.
- Supplier selection is the other inbound logistic dimension that is at low level in the case company. Therefore Instead of tender based purchase the company needs to develop long term relationship with suppliers and continuously search suppliers of low cost and quality materials.
- Use of Scientific methods of supplier selection. such as: Analytical Hierarchic Process (AHP), Analytic Network Process (ANP) and Technique for the Order Performance by Similarity to Ideal Solution (TOPSIS) and Multiple Attribute Utility Theory (MAUT) are best in supplier selection procedures (Vishal, 2015).
- To achieve the upward linkage, the sector should engage in commercial agreement and have long-term relation with its suppliers.
- Improved transport channel and strategy that through Increase Usage of Preferred Carriers, Lower Cost Mode Selections and Better Routing should be sought. In efficient logistics practices such as: Transport management system (TMS) software enables should be implemented: A TMS can reduce overall transportation costs by 30%. If implemented and used properly. Therefore should be implemented.
- Inventory management Economic order quantities that incorporates the costs related with the delay of raw materials resulted from low logistic performance .such as unavailability resulting customer complaint and loss should be seen.
- Information technology ICT is a crucial tool along the entire supply chain. Therefore, Kality metal industry has to be able to develop this infrastructure in order to connect individual departments. This will allow receiving updated demand information, supplier information, central departments to follow sales, thus feeding an intelligent procuring system. Electronic data interchange (EDI) Value-added network (VAN) or internet, cargo canal and GLS systems are best to improve visibility. In order to have good supply chain integration, the technology

enabled communication is mandatory. As literatures show 50% communication over the internet is a benchmark. **(**Laura et al., 2015)

- Ethiopian manufacturing industries are fully dependent on foreign supply for the majority of their supplies, and even though foreign exchange delay and logistics performance is improved the ultimate improvement comes from the in-house extraction of iron ore. Therefore backward integration of the company is necessary. Even though further analysis is needed and the government intervention in infrastructure development and financial provision.

5.3 Future Research Directions

Based on the findings of the study, the following points are presented as future directions for further improvement activity. And In order to improve supply chain integration, the company needs

- To consider improvement of the supply chain using more intercompany activities with value chain model by analyzing value activities across the chain.
- To make Detail study & detailed model development on the metal sector that can bring a better integration improvement by increasing the sample size
- To perform Logistics-related studies that may give lots of research ideas and perspectives because that part of the supply chain is so complex and thus can be researched over and over again.
- As the inbound logistics flow is one key factor for the firms to become cost-efficient and add value to their products, it is an advantage for firms to focus on the inbound logistics functions from the view point of the total chain

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Appendix

Addis Ababa University

Addis Ababa Institute of Technology

School of Mechanical and industrial Engineering

Industrial Engineering Stream

Questionnaire to be distributed to kality metal products Factory

"IMPROVEMENT OF SUPPLY CHAIN INTEGRATION THROUGH INBOUND LOGISTICS': THE CASE OF KALITY METAL PRODUCTS FACTORY P.L.C (TSEHAY INDUSTRY S.C)

Dear respondents:

I Mitiku Solomon, am a post graduate student in Addis Ababa University, Addis Ababa Institute of technology in the school of Mechanical and Industrial engineering .and at this moment I am doing my M.SC Thesis entitled **"**improvement of supply chain integration through optimizing inbound logistics process: the case of kality metal products factory "for partial fulfillment of M.SC in industrial engineering. I would like to forward my sincere appreciation in advance to your Factory and respondents for the valued cooperation they make while undertaking this research. I ask for your kind cooperation in answering the questions as truly as possible. And I would like to make clear that, the information obtained through this questionnaire will be kept confidential and will not be used for any other purposes and for further clarification your company may contact the school.

Supplier Integration

No	Variables	5-Strongly Dis-agree(%)	4- Disagree(%)	3- Neutral(%)	2-Agree(%)	1-Strongly agree(%)
SI.1	There are direct computer-to-computer links with key suppliers					
SI.2	Suppliers are provided with any information that might help them.					
SI.3	Exchange of information takes place frequently and/or in a timely manner.					
SI.4	Keeping each other informed about events or changes that may affect the other party.					
SI.5	Frequent face-to-face planning /communication					
SI.6	Integrated of logistic activities with suppliers					
SI.7	Integration of inbound and outbound distribution of goods with Your company's suppliers is good					
SI.8	Flow of Information and materials is smoothly with supplier firms.					

Inventory Management

No	Variables	5- Strongly disagree(%)	4- disagree(%)	3-Neutral(%)	2- Agree(%)	1- Strongly Agree(%)
IM.1	Striving to keep the inventories on optimal level.					
IM.2	Works to make accurate , complete and timely inventory transactions record					
IM.3	Working to avoid capital tied resulted from inventories					
IM.4	Working on making records on improving delivery time fluctuations,					
IM.5	Consideration of Out of stock condition in terms of Lost sales cost, Back order cost					
IM.6	Use of economic order quantity with considering demand fluctuations.					
IM.7	Abiding to the policy of its re-order level to make purchases					
IM.8	Consideration of inventory carrying costs separately as Capital cost, inventory service costs and Storage costs					

Supplier Selection

NO	VARIABLES	5- Strongly disagree(%)	4- disagree(%)	3- Neutral(%)	2- Agree(%)	1- Strongly Agree(%)
SS.1	Suppliers are selected based on their contribution to the lead time					
SS.2	Y Suppliers are selected based on quality of their raw mate					
SS.3	Supplier's performance should be compared based on the impact on total cost.					
SS.4	Selection of suppliers is done using a variety of mechanisms, including offline competitive bids, reverse auctions, or direct negotiations					
SS.5	Suppliers are selected based on passing the assessment process					
SS.6	Supplies are selected based on the reliability of their supplies					
SS.7	Negotiation with suppliers is based on t a win-win outcome					
SS.8	Manufacturers can use buy-back contracts to increase their own profits as well as total supply chain profits					

Visibility

No	VARIABLES	5- Strongly disagree(%)	4- disagree(%)	3- Neutral(%)	2- Agree(%)	1- Strongly Agree(%(%)
VI.1	Traceability is a core factor of your company's purchases included in the purchase process					
VI.2	Inventory is easily traceable.					
VI.3	Capacity constraints are easily traceable					
VI.4	Out of stock conditions are flagged.					
VI.5	Inventory information is accurate, trusted, timely, useful and in readily usable format.					
VI.6	Uses a multisource orders and fulfillment policy					
VI.7	Knowledge of total pipeline supplier inventory					
VI.8	Order and shipment are traceable in the purchase process					

TRANSPORT MANAGEMENT

	Descriptive Statistics	**5- Strongly disagree(%)**	**4- disagree(%)**	**3- Neutral(%)**	**2- Agree(%)**	**1- Strongly Agree(%)**
TM.1	Evaluation of the strengths and weaknesses of different modes of transportation before deciding					
TM.2	Consideration of both in-house and outsourced transportation before outsourcing the process.					
TM.3	Identification of trade-offs that shippers need to consider when designing a transportation network					
TM.4	Use of technology to improve transportation performance.					
TM.5	Design flexibility into the transportation network					
TM.6	Bearing the differences in transportation costs in order to meet the deadlines of supplying orders to customers					
TM.7	Decision of transport includes analyzing transportation and inventory cost trade-off					
TM.8	Decision of transport includes analyzing Transportation cost and customer responsiveness trade-of					

INFORMATION TECHNOLOGY

No	Variables	(5)Strongly dis-agree	(4)Dis-agree	(3)Neutral	(2)Agree	(1)Strongly agree
IT.1	Information infrastructure conveys data on Demand forecasting, capacity planning, and modeling based on consumption.					
IT.2	Information includes Real-time, end-to-end logistics management from point of origin to product delivery point.,					
IT.3	Information exchange includes Capturing accurate routine administration, delivery, and consumption data.					
IT.4	Uses of advanced planning and scheduling software.					
IT.5	Employs forecast / demand management software					
IT.6	Exchange supply chain data with its suppliers using ICT infrastructure					
IT.7	Uses core supply chain management software, such as ERP, SAP, Oracle and best-of-breed					
IT.8	Information infrastructure conveys data on Demand forecasting, capacity planning, and modeling based on consumption.					