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Effect of Supply Chain Management Practice and Supply Chain responsiveness on Operational Performance of Largemanufacturing Industry in Bahir Dar Ethiopia

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**EFFECT OF SUPPLY CHAIN MANAGEMENT PRACTICE AND
SUPPLY CHAIN RESPONSIVENESS ON OPERATIONAL
PERFORMANCE OF LARGE MANUFACTURING
INDUSTRY IN BAHIR DAR ETHIOPIA**

BY

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June 2018

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**THESIS SUBMITTED TO BAHIR DAR UNIVERSITY SCHOOL OF BUSINESS
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MANAGEMENT IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTERS OF ARTS IN LOGISTICS
AND SUPPLY CHAIN MANAGEMENT**

**BAHIR DAR UNIVERSITY SCHOOL OF BUSINESS AND
ECONOMICS DEPARTMENT OF LOGISTICS AND
SUPPLYCHAIN MANAGEMENT**

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ECONOMICS DEPARTMENT LOGISTICS AND
SUPPLY CHAIN MANAGEMENT**

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AND SUPPLY CHAIN RESPONSIVENESS ON OPERATIONAL
PERFORMANCE IN CASE OF LARGE MANUFACTURING
INDUSTRIES IN BAHIR DAR**

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DECLARATION

I, hereby declare that this research thesis work entitled “ The effect of Supply Chain Management Practices and supply chain responsiveness on operational performance in Case of large manufacturing industries in Bahir Dar” is my original work and has not been presented for a degree in any other university, and that all sources of materials used for the study have been fully acknowledged.

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LIST OF ACRONYMS

APF	Amhara pipe factory
BD	Bahir Dar
BDTM	Bahir Dar textile mills
BDT	Bahir Dar tannery
CR	Customer relationship
CFI	Comparative Fit Index
GFI	Goodness of fit index
AGFI	Adjusted goodness of fit index
RMSEA	Root mean square error of approximation
LPR	Logistic process responsiveness
OP	Operational performance
OSR	Operation system responsiveness
RBV	Resource based view
RDT	Resource Dependent Theory
RMR	Root Mean Square Residual
SCM	Supply chain management
SCMP	Supply chain management practices
SCR	Supply chain responsiveness
SSP	Strategic supplier partnership
SEM	Structural equation modeling
SNR	Supplier network responsiveness

Abstract

The study aims to identify the impact of different dimensions of supply chain management practices (strategic supplier partnership, customer relationship, and information sharing) and supply chain responsiveness on operational performance of large manufacturing industries in Bahir Dar, Ethiopia. The study was employed quantitative method, where judgmental sampling and survey questionnaires were sent to three (3) manufacturing companies in Bahir Dar. The study tests the relationships between supply chain management practices, supply chain responsiveness, and operational performance using **Structural Equation Modeling** based on 111 responses from large manufacturing industries in Bahir Dar, Ethiopia. The study has found many empirical results which indicate that the supply chain management practices have a significant positive impact on supply chain responsiveness and operational performance and supply chain responsiveness have a positive and significant impact operational performance. The study has some limitations; it's focused on the manufacturing sector and only deployed quantitative method.

Keywords: Supply chain management practices, Supply chain responsiveness, and operational performance.

Chapter one

1. Background of the Study

As competition in the 1990s intensifies and markets become global, so do the challenges associated with getting a product and service to the right place at the right time at the lowest cost. Organizations began to realize that it is not enough to improve efficiencies within an organization, but their whole supply chain has to be made competitive. The understanding and practicing of supply chain management (SCM) has become an essential prerequisite for staying competitive in the global race and for enhancing profitability (Childhouse P, Towill DR. , 2003) (Power DJ, Sohal A, Rahman SU, 2001). (Johnson, 2008) stated that, Many organizations have begun to recognize that SCM is the key to building sustainable competitive edge for their products and/or services in an increasingly crowded marketplace. Operational performance is a source of competitive advantage for the enterprise to differentiate itself in the eyes of the customers from its competitors by operating at a lower cost and hence at a greater profit (Christopher, 1992). According to (Siddig Balal Ibrahim¹, Abdelsalam Adam Hamid, 2012) a successful SCM implementation is expected to enhance the relationship between upstream suppliers and downstream customers, and thereby increase customer satisfaction and firm performance.

(Sabath, 1998) States that supply chains need to be managed in a way that enables quick response to cope with volatile demand. For the reason that the new competitive environment is more global, technologically oriented and customer driven, with shrinking product life cycles, ever faster times to market, and customers continually demanding low cost, faster response, and higher quality products and services (Yang, B. and Burns, N. , 2003) (D'Souza, 2002). (Holweg, 2005) states that, it is important to develop responsiveness supply chain, which is the ability of supply chain to rapidly respond to market change and customers demand.

Ethiopian firms are not sufficiently getting the benefits of SCM due to lack of the practice of integration, collaboration and not having willingness and the practice of managing supply chains. The traditional way of managing from suppliers to customers is just a buy and sell (Transactional) relationship, (Belay M., 2011) In addition to that (H/Michael D., 2011) also suggested that supply chain management practice in Ethiopia is in the beginning stages, there are

small numbers of companies integrating it to their organizational system. But, many manufacturers and distributors are waking up to the potential for the major cost reduction and service improvements offered by implementing best practices in their supply chain (Haque& Islam, 2013) (Felke, 2016) adds that, in Ethiopia in most of product and service giving activities have a major gaps regards to their performances . That is due to lack of adequate SCM practices. (Lazarevic et al 2007) suggest that Supply Chain Management is now recognized as a critical business process for companies manufacturing or distributing products. This is because customers' demands for most products are ever more demanding in response time, in choice and in seeking more competitive prices.

On this study three SCM practices were be examined by consolidating prior research (Ashish A. Thatte, Subba S. Rao, T. S. Ragu-Nathan, , 2013) namely strategic supplier relationship (SSR), customer relationship (CR), and information sharing (IS). Supply chain responsiveness (SCR) is constructed by conceptualizing it as a three-dimensional construct (operations system responsiveness, logistics process responsiveness, and supplier network responsiveness (Ashish A. et al. 2013)). Competitive priorities was conceptualize to measure operational performance by using cost, quality, delivery, flexibility, (Miguel, P. L. S., Ledur Brito, L. A. L., 2011)

1.1. Back ground of the organization

1.1.1. Bahir Dar Textile Share Company. Bahir Dar, Ethiopia

Bahir Dar Textile Share Company was established in 1961 in the town of Bahir Dar, 570 Km North West of Addis Ababa. It was a government owned integrated mill manufacturing 100 % woven cotton fabric. In 1989, the factory rehabilitated its spinning and weaving section replacing most of the machines and renovating the rest. The finishing was left for the second phase treatment, which however did not materialize as scheduled. As of September 30, 1999 the factory is changed from public enterprise to share company and financial restructured as present the total capital is Birr 56,808,379. The share company's total land holding is 480,000 square meters of which 39,200 Sq. Mts. is covered by building. The share company currently has 1534 employees.

1.1.2. Bahir Dar Tannery PLC. Bahir Dar, Ethiopia

Bahir Dar Tannery PLC was established in 1998 G.C. at Bahir Dar Town by Mr. Yigzaw Assefa Wonde with a Bachelor of Science in Management from USA and endowed with above three decades of bona fide experience in the leather industry.

The Company was first fundamentally established to process crust and semi-finished leather products for the market with 11 million Birr initial capital. And therefore, it was mainly engaged to produce pickle and wet blue products from the sheep and goat skins. The production capacity of the Tannery was 2,000 pieces of skins per day. Using this production capacity, the Company was exporting these pickle and wet blue products to the international market up to 2009, which was contributing its own share in importing foreign currency to the country Ethiopia. Bahir Dar Tannery PLC currently has 180 employees.

1.1.3. Amhara Pipe Factory PLC (APF) Bahir Dar, Ethiopia

Amhara Pipe Factory PLC (APF) is the biggest among the factories that produce plastic products in Ethiopia since 2003 E.C. The factory is especially manufacturing and supplying products that will be used in the projects related with water sector development and construction sectors according to international standards.

APF is manufacturing two broad categories of products such that Pipes and Plastic sheets. Under the category of Pipes, .APF manufactures UPVC pipes, HDPE pipes, Casing/Screen pipes and Flexible hoses. And under the second category, it manufactures geomebrane sheets and greenhouse film/sheet. APF is a factory awarded with ISO 9001: 2008 quality management system certificates. Currently APF has 150 employees.

1.2. Statement of the problem

The current environments in manufacturing firms' activities have a feature of promoting world competition and more and more demanding customer. The traditional competition which is based on low price and higher quality is significantly changed to supply chain strength. If at the past the competition is between the company and its competitor, however this paradigm is now changing. The competition is no longer between the company and its competitor but the

competition is between a company's supply chain and its competitor's supply chain (Yoshua Hartonoa, Ririn Diar Astantia, The Jin Ai , 2015). For this reason, supply chain management has become a critical factor of success for companies. The reason is that the global markets require faster time to market, low over all cost, rapid response and higher product and service quality (Yang and Burns, 2003; D' Souza, 2002). Therefore, manufacturing company needs implementation of Efficient and Effective supply chain management practice differently than they did in the past.

Manufacturing business in Ethiopia has undergone rapid transformation, but this change has not come without any challenges. From the industrial sector, manufacturing sector contribute 70% for export, employment and national output (over view of manufacturing sectors 2014). However, the manufacturing sector in Ethiopia is still at its infancy in comparison with the agricultural and service sector.

Amhara pipe factory Plc. (APF), Bahir Dar Tannery Plc. (BDT), and Bahir Dar Textile mills S.C., (BDTM) are one of large manufacturing firms located in Bahir Dar city. They are producing plastic products since 2003 E.C, production and exporting of finished leather products starting from 1998, and manufacturing 100% cotton products since 1967 respectively. Due to dynamic business environment the case companies desire to have agile or responsive supply chain and good relationship with partners of the supply chain but, the low level of supplier relationship, information sharing, and customer relation contribute to low performance. Though they are operating in Bahir Dar, they could not address the market requirement of the city. Whereas the customers are looking to the competitors, that are producing the some product in abroad. This is because of inadequate SCM practice and supply chain responsiveness to boost operational performance. (Yohannes A, 2015) states that "Supply chain management is the key drivers for companies performance" According to (Mbuthia, M. G & Rotich, G., 2014) Low level of SCM practice are led to poor performance.

1.2.1. Research Gap

Some of the SCM studies conducted in Ethiopia focus on the relationship between supply chain management and organizational performance (Mohammed, 2014) customer satisfaction (Hana, F. 2016), competitive position (Belay M., 2011) and in the other side some studies focused on supply chain management practice case study (Bogal A., 2015) & (Balda, 2011)), Supply Chain

Performance by (H/Michael D. 2011). Specifically in the supply chain responsiveness (Ashish A. Thatte, Subba S. Rao, T. S. Ragu-Nathan, , 2013) studied and findings point out that higher level of SCM practices can lead to improved supply chain responsiveness and enhanced competitive advantage of a firm. Even though the importance of supply chain management practice and supply chain responsiveness on operational performance there is a lack on the studies that link supply chain management practices and supply chain responsiveness on operational performance in Ethiopia, this study seek to contribute in fill this gap. Due to the lack of studies this study aims empirically test the relationships between SCM practices and supply chain responsiveness on operational performance of large manufacturing industries in Bahir Dar town.

Therefore, the purpose of this study was to examine the effect of supply chain management practice and supply chain responsiveness on operational performance of large manufacturing industry in Bahir Dar Ethiopia.

Basic research questions

This study is primarily aim to answer, what is the effect of supply chain management practice and supply chain responsiveness on operational performance of large manufacturing industry in Bahir Dar Town? And more specifically to answer the following basic research questions.

1. What is the supply chain management practice effect on supply chain responsiveness of large manufacturing industry in Bahir Dar town?
2. What is the effect of supply chain management practice on operational performance directly and indirectly through supply chain responsiveness of large manufacturing industry in Bahir Dar town?
3. What is the effect supply chain responsiveness on operational performance of large manufacturing industry in Bahir Dar town?

1.3. Objectives of the study

1.3.1 General Objective

The general objective of this study was to examine the effect of supply chain management practice and supply chain responsiveness on operational performance of large manufacturing industry in Bahir Dar town.

1.3.2. Specific Objectives

More specific objectives of this study where:

1. To examine the effect of SCM practice on supply chain responsiveness of large manufacturing industry in Bahir Dar town.
2. To examine the effect of SCM practice on operational performance of large manufacturing industry in Bahir Dar town.
3. To examine the effect of supply chain responsiveness on operational performance of large manufacturing industry in Bahir Dar town.

1.4. Significance of the Study

This study will offer useful guidance to the business men, policy-makers, representatives of manufacturers or trade organizations, and others who are engaged in Ethiopian industrial development. The study is particularly designed for those who want to know more about supply chain management practice and how to use them in ways that contribute to sound operational decisions and results for company's development.

Specifically, this study will have the following main significances:

- Policy makers may obtain knowledge of local supply chain management practice dynamics and the appropriate responses for both governmental and non-governmental organizations.
- Guidance can also be obtained from this study in designing appropriate policies that can ensure effective supply chain management especially in manufacturing industry.
- Scholars and academicians may find useful information on supply chain management for use as a basis for further research on supply chain management implementation in the public or private sector.

- More efficient SCM will benefit not only the companies directly involved but also encourage social and economic development within the host country.

1.5. Scope of the Study

Supply chain management covers vast areas of managerial practices. However, it is hard and uncontrollable to perform the study in every single area that summarizes SCM in terms of time, finance, and research manageability. Therefore, the span of this study would be delimited to SCM practices and SCR on operational performance of manufacturing firm in Bahir Dar (i.e. APF, BDT, and BDTM). The unit of analysis is individual based consists from all managers working at this company. The subject scope of SCM practice of this study is also delimited to the companies' point of reference towards, strategic supplier partnership, customer relationship, and information sharing. In terms of firm SCR the study was delimited to operations system responsiveness, logistics process responsiveness, and supplier network responsiveness. And operational performance was by using Cost, Quality, Flexibility, and Delivery. Methodologically, this study is delimited to quantitative survey design

The area of the study is also delimited to the case manufacturing companies, i.e. large manufacturing industry in Bahir Dar Ethiopia, through examining how the companies interact with their upper stream and the down streams of the supply chain.

1.6. Limitations of the Study

This research has significant theoretical and practical contributions and it also has some limitations. In this study it is difficult to cover entire domain of supply chain practices just in one study. The study sample didn't include all the supply chain practices; it used strategic supplier partnership, customer relationship, and information sharing. Future researcher should extend this study by incorporating additional practices. The study is limited to in manufacturing industries it didn't, include the service sector. This could bound conclude the results to other industry types. This researcher deployed quantitative method to get data for this study and there are some issues that should be answered through qualitative but the researcher filled to use.

1.7. Definition of key Terms

- ❖ **Supply chain management practices (SCMP);** it is a number of activities that are accepted by organization to enhance their supply chain effectiveness and efficiency. On this study supply chain management practices are strategic supplier partnership, customer relationship, and information sharing.
- ❖ **Supply chain responsiveness (SCR);** it is the act of supply chain to respond the market change rapidly. For this study operation system responsiveness, logistics process responsiveness, and supplier system responsiveness are used to measure Supply chain responsiveness.
- ❖ **Operational performance (OP);** is the system of producing great value product differently than the competitors. Cost, quality, flexibility, and delivery are used to measure operational performance.

1.8. Organization of the Paper

This project paper is organized into five chapters: Chapter one contains the introduction part dealing with back ground of the study, the research problem, objectives of the study, scope and significance of the study and limitation of the study. The second chapter discusses the literature review about the subject matter. In chapter three the research methodologies were presented. In chapter four presents results and discussion of the study and finally, chapter five presents the summary of major findings, conclusion and recommendation were forwarded by the researcher.

Chapter two

2. REVEIW OF RELATED LITRATURE

2.1. Concept of the Supply Chain

The term 'Supply Chain Management' (SCM) was introduced by consultants in the early 1980s (Lambert, D.M., & Cooper, M.C., 2000) It has its origins in the logistics literature (Bowersox, 1999) and logistics has continued to have a significant impact on the concept. Williams (2006) stated that long term objectives include improving efficiency and effectiveness of supply chain partners, improving market share and profits, and increasing customer satisfaction. Short term objectives of SC include increasing productivity, and reducing cycle time and inventories (Tan, 2002) The scope of SCM has widened over time from intra organizational focus to more inter-organizational issues (Dubois et al. 2004).

A supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain includes not only the manufacturer and suppliers, but also transporters, warehouses, retailers, and even customers themselves. Within each organization, such as a manufacturer, the supply chain includes all functions involved in receiving and filling a customer request. These functions include, but are not limited to, new product development, marketing, operations, distribution, finance, and customer service. (Chopra S, Meindl P , 2007)

The object of SCM obviously is the supply chain which represents a "...network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer" (Christopher M. , 1998)

Over the last decade the competitive landscape has shifted from lowest priced product, highest quality or best-performing product to the ability to respond quickly to market needs and get the right product to the right customer at the right time. This shift toward speed has pushed organizations to compete with their entire supply chain. Consequently understanding and practicing (SCM) has become a mandate to compete and improve supply chain surplus in the global arena. (Anderson, J.C. and Gerbing, D.W. , 1988).

2.2. Supply chain management practices (SCMP)

(Li et al 2006) Stated that, SCM practices is defined as “the set of activities undertaken by an organization to promote effective supply chain management.” ‘SCM practices’ as a multi-dimensional construct that includes both upstream and downstream sides of the supply chain (Li et al. 2005, 2006). The literature identifies various practices as dimensions of this construct:

Table 1- SCM practices

No	Author	Practices
1	Chin et al. 2011	Information sharing, customer relationship, strategic supplier partnership, material flow management and corporate culture.
2	Inda S et al 2012	Strategic supplier partnership , customer relationship , information sharing
3	Chowa S.Wing, et al, 2008	There are four elements (suppliers and customer management, information sharing, speed of communication, supply chain features)
4	Min s., Mintzer J. , 2004	There are seven elements of supply chain practice such as a greed vision and goals, information sharing, risk and award sharing, cooperation, process integration, long-term relationship and a greed supply chain leadership.
5	(Paulraj., 2004)	Using supplier base reduction , long-term relationship , communication , cross-functional teams and supplier involvement to measure buyer supplier relationships
6	(Tan, 2002)	Six elements of supply chain practice (using factor analysis) supply chain integration, information sharing supply chain characteristics customer service management , geographical proximity and JIT capability
7	(Alvarado, U. Y., & Kotzab, H. , 2001)	Using inter-organizational system in supply chain practice such as EDI , and elimination of excess stock levels by postponing customization toward the end of the supply chain
8	(Tan, K. C., Kannan, V. R., & Handfield, R. B , 1998)	Supply chain practice includes purchasing quality, and customer relations
9	(Donlon, 1996)	Supply chain practice includes supplier partnership , outsourcing cycle time compression, continuous process flow and information sharing

In reviewing and consolidating prior literature, (Ashish A. et al 2013 & Siddig Balal Ibrahim et al, 2012) identified strategic supplier partnership, customer relationship, and information sharing

as key SCM practices. The three constructs cover upstream (strategic supplier partnership) and downstream (customer relationship) sides of a supply chain, and information flow across a supply chain. Other factors identified in literature although of great interest, are not included in this study due to length of survey concerns and measurement instrument's parsimony. The present study, therefore, adopts from (Ashish A. et al 2013 & Siddig Balal Ibrahim et al, 2012) strategic supplier partnership, customer relationship, and information sharing as the three dimensions of SCMP. The study, therefore, proposes SCM practices as a multi-dimensional concept.

2.2.1. Strategic supplier partnership (SSP)

SSP is defined as “the long term relationship between the organization and its suppliers. It is designed to leverage the strategic and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits” (Li, et al 2006) In the past two decades there has been a growing trend in long term collaborative relationships by organizations with a few trusted suppliers, instead of the traditional approach of a onetime cost based supplier relationship (Anderson, J. C., Hakansson, H., and Johanson, J., 1994; Wilkinson, 1995; Ford, 1990; Sheth, 1996; Sheth, J. N. and Sharma, A. , 1997; Kalwani, M. and Narayandas, N. , 1995; Dwyer, F. R., Schurr, P. and Sejo, O. , 1987; Spekman, 1988)). Some of the key advantages of long term relationships with suppliers identified in prior literature include: shared benefits and ongoing collaboration in key strategic areas like technology, products, and (Yoshino, M. and Rangan, S. , 1995), Strategic partnerships with suppliers enable organizations to work more effectively with a few important suppliers who are willing to share responsibility for the success of the products. Suppliers participating early in the product-design process can offer more cost effective design choices, help select the best components and technologies, and help in design assessment (Tan, et al 2002). Strategically aligned organizations can work closely together and eliminate wasteful time and effort (Balsmeier PW, 1996). An effective supplier partnership can be a critical component of a leading edge supply chain (Noble, 1997)

2.2.2. Customer relationship (CR)

CR is defined as “the entire array of practices that are employed for the purpose of managing customer complaints, building long-term relationships with customers, and improving customer satisfaction” (Li et al., 2006,) Customer relationship is considered as an important component of

SCM practices (Noble, 1997; Tan et al.,1998). As pointed out by (GS, 2000) devoted relationships are the most sustainable advantage because of their essential barriers to competition. Focusing and maintaining the customer relationship will enable the organizations to be more responsive towards customers' needs and will result creating greater customer loyalty, repeat purchase and willing to pay premium prices for high quality product (Carr A. S. and Pearson J. N., 1999)). Besides, the main goals of SCM are customer satisfaction and their loyalty as (Stalk, G. and Hout, T. , 1990). Customer relationship management is an important component of supply chain management practices (Noble, 1997). The growth of mass customization and personalized service is leading to an era in which relationship management with customers is becoming crucial for corporate survival Good relationships with supply chain members, including customers, are needed for successful implementation of SCM programs. Close customer relationship allows an organization to differentiate its product from competitors, sustain customer loyalty, and dramatically extend the value it provides to its customers (Li et al., 2006)

2.2.3. Information Sharing

Information sharing has two aspects: quantity and quality. Both aspects are important for the practices of SCM and have been treated as independent constructs in the past SCM studies. Level (quantity aspect) of information sharing refers to the extent to which critical and proprietary information is communicated to one's supply chain partner (Monczka RM, Petersen KJ, Handfield RB, Ragatz GL, 2008) Shared information can vary from strategic to tactical in nature and from information about logistics activities to general market and customer information (Mentzer JT, Min S, Zacharia ZG. , 2000)

Many researchers have suggested that the key to the seamless supply chain is making available undistorted and up-to-date marketing data at every node within the supply chain (Childhouse P T. D., 2003). By taking the data available and sharing it with other parties within the supply chain, information can be used as a source of competitive advantage (C., 1998). (BJ, 1998)considers sharing of information as one of five building blocks that characterize a solid supply chain relationship. Supply chain partners who exchange information regularly are able to work as a single entity (Stein T, 1998). Moreover, (Tompkins J, 1999) consider the effective use of relevant and timely information by all functional elements within the supply chain as a key

competitive and distinguishing factor. The empirical findings of (Childhouse P T. D., 2003) reveal that simplified material flow, including streamlining and making highly visible all information flow throughout the chain, is the key to an integrated and effective supply chain.

Information sharing also includes such aspects as the accuracy, timeliness, adequacy, and credibility of information exchanged (Moberg CR, Cutler BD, Gross A, Speh TW. , 2002). While information sharing is important, the significance of its impact on SCM depends on what information is shared, when and how it is shared, and with whom. Literature is replete with example of the dysfunctional effects of inaccurate/delayed information, as information moves along the supply chain (Feldmann M, 2003). Divergent interests and opportunistic behavior of supply chain partners, and informational asymmetries across supply chain affect the quality of information (Feldmann M, 2003).

It has been suggested that organizations will deliberately distort information that can potentially reach not only their competitors, but also their own suppliers and customers (Mason-Jones, 2007). It appears that there is a built in reluctance within organizations to give away more than minimal information since information disclosure is perceived as a loss of power. Given these predispositions, ensuring the quality of the shared information becomes a critical aspect of effective SCM (Feldmann M, 2003).

2.3. Resource Dependent Theory (RDT)

The theory centers on how some firms become reliant on others for needed inputs such as goods and materials, and how firms can manage such relationships (Mbuthia, M. G & Rotich, G., 2014). The asymmetric interdependence that exists in these inter-firm relationships is critical to reduce environmental uncertainty for some firms. As supply chain members work together closely, they often become more dependent on each other thus developing partnerships, alliances and cooperation. Thus, RDT has a high level of value in the supply chain context.

The assumptions in this theory include; commitment to partnership for mutual benefits, creating conditions favorable to be depended on by your partners to create a position of strength, trust in the partnership deal. Thus, from the perspective of best value supply chains, dependencies should be used to create mutual forbearance and trust, not to drive aggressive exploitation of one chain member by another.

2.4. Supply chain responsiveness (SCR)

Responsiveness concept enters SCM literature based on the needs to respond the rapid environment change and 21st century competition. Responsiveness in the beginning was more related with company's internal process; that every company need to have the ability to response to the changes of customers' needs and demands, particularly in industries that are highly affected by customers' preference such as fashion, PC, electronics, construction and vehicle industries (Reichhart, A., and Holweg, M., 2007). Responsiveness concept then developed not only on individual company level but also as supply chain responsiveness. A supply chain with high responsiveness level will be able to respond the demand and customers' preference change compared with unresponsive supply chain. In other word, supply chain responsiveness will, in return, influence performance ((Thatte, 2007); (Roh, 2009)). Responsiveness in general defined as ability to react purposefully and within an appropriate time-scale to customer demand or changes in the marketplace, to bring about or maintain competitive advantage (Kritchanchai, D., and MacCarthy, B.L. , 1999). In supply chain context, responsiveness defined as the capability of promptness and the degree to which the supply chain can address changes in customer demand (Thatt, et al 2013). Responsiveness concept used in this research using (Thatt, et al 2013) suggestion, which distinguish the supply chain responsiveness into three sub-constructs, namely: operation system responsiveness, logistic process responsiveness and suppliers' network responsiveness.

(Gupta, Y. P. and Goyal, S. , 1989) Argue that being responsive is normally considered as an adaptive response to the environmental uncertainty. (Bowersox, 1999) Advocate the need for organizations to be responsive when the penalties associated with uncertainty are higher. These penalties for an organization could include cost of stock outs or carrying the wrong inventory and which can be mitigated through a responsive system, by adopting effective SCM practices as indicated and proposed in this study.

2.4.1. Operations system responsiveness (OSR)

OSR is defined as the ability of a firm's manufacturing system to address changes in customer demand (Thatt, et al 2013). OSR includes both manufacturing and service operations. It would also include the ability to rapidly configure or reconfigure assets and operations of a manufacturing system to cope with consumer trends (Wu, 2001; Lummus, R. R., Duclos, L. K.,

and Vokurka, R. J. , 2003), respond rapidly to changes in product volume, and effectively expedite emergency customer orders. As a supply chain responds to customer demand, the constituent organizations may be required to move quickly from producing one product to another, or quickly change production levels for a given product. From a manufacturing standpoint, the responsiveness of an operations system would be an ability of the manufacturing or production function to respond rapidly to unexpected events, and an ability to swiftly accommodate special or non-routine customer requests. Operations responsiveness at each node in a supply chain is an integral component of SCR, since each entity in a supply chain is required to deliver the product or service in a timely and reliable manner, to satisfy customer demand (Duclos, L. K., Vokurka, R. J. ; Lummus, R. R., Duclos, L. K., and Vokurka, R. J. , 2003)).

The items under this category measure the responsiveness associated with a specific node or firm in a supply chain (Duclos, et al 2003; Lummus, et al, 2003). This firm could be a supplier, manufacturer, or customer, or distributor. (Anderson, D. and Lee, H. , 2000) Identify operations responsiveness as a valuable component of a successful supply chain strategy. Flexibility and speed of response are essential ingredients of a firm's manufacturing system (Holweg, 2005; Holweg, M. and Pil, F. K. , 2001; Meehan, S. and Dawson, C. , 2002; Williamson, 1991).

2.4.2. Logistics process responsiveness (LPR)

LPR is defined as the ability of a firm's outbound transportation, distribution, and warehousing system (including 3PL/4PL) to address changes in customer demand. Logistics and distribution management includes the activities of transportation of goods from suppliers to manufacturer to distribution centers to final points of consumption (Ricker, F. and Kalakota, R. , 1999 Duclos, et al 2003). These activities include warehousing, packaging and shipping, transportation planning and management, inventory management, reverse logistics, and order tracking and delivery. This study focuses on the outbound logistics of the focal firm. (Fuller, J. B., O'Conner, J., and Rawlinson, R. , 1993) Suggest that a firm's logistics system is instrumental in creating value for its customers. This value creation implies ensuring logistics flexibility (Duclos, et al 2003; Lummus, et al, 2003) and speed within the supply chain to serve each distinct customer's needs. A typical response to uncertainty is to build flexibility into the supply (Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E. , 2008). Organizations can minimize risk and stay competitive (Simchi-Levi, et al , 2008) if flexibility can be supplemented by an increased

velocity of sensing and responding. This responsiveness in the logistic processes is a vital component in the success of a responsive supply chain strategy (Fawcett, 1992).

The responsiveness components in the logistics system include - selecting logistics components that: accommodate and respond to wide swings in demand over short periods, adjust warehouse capacity to address demand changes, handle a wide range of products, vary transportation carriers, have the ability to pack product-in transit to suit discreet customers' requirements, and have the ability to customize products close to the customer. It is vital that a firm has easy access to and is able to utilize different modes of transportation to be logistically responsive (Prater, E., Biehl, M., and Smith, M. A. ", , 2001). (Hise, 1995) States that companies need a capability and flexibility to adjust logistic systems quickly to respond to changes in market needs, and the necessitated product assortment. (Lummus, et al, 2003) put forth some of the critical logistics process flexibility aspects of a supply chain, which are vital for supply chain responsiveness. These criteria are adapted for the logistics process responsiveness dimension in this study, and are as follows: logistics system's ability to - rapidly respond to unexpected demand changes, rapidly adjust warehouse capacity to address demand changes, rapidly vary transportation carriers to address demand changes, accommodate special or non-routine customer requests, and effectively deliver expedited shipments.

2.4.3. Supplier network responsiveness (SNR)

SNR is defined as the ability of a firm's major suppliers to address changes in the firm's demand. A key to responsiveness is the presence of responsive partners upstream and downstream of the focal firm (Christopher, M. and Peck, H., , 2004). (Reichhart, A., and Holweg, M., 2007) argue that suppliers' manufacturing systems' responsiveness can be treated as the supply chain's responsiveness. The ability of a firm to react quickly to customer demand is much dependent on the reaction time of its suppliers to address the firm's demand. Thus, responsive firms should be able to select suppliers who can add new products and make desired changes, quickly. Supply chains should be capable and ready to address ripple effects caused by new technologies, terrorist threats (Walker, 2005) or increased competition. (Slack, 1991) Argue that supplier networks are the essential building blocks of a flexible system. Supplier network flexibility (Slack, 1991) and thus supplier network responsiveness is an important part of supply chain

responsiveness. (Holweg, M. and Pil, F. K. , 2001) Argue that flexibility in the supplier network is an important ingredient of being responsive to changes in customer demand.

It is well known that responsive suppliers are a vital resource of a firm when design (McGinnis M. A. and Vallorpa R. M., 1999), (Burt, D. N. and Soukup, W. R. , 1985) and manufacturing of outsourced products are involved. (Fisher M.L., Raman A., and McClelland A.S. ”, , 2000) found that for short lifecycle products, such as fashion apparel, retailers are most successful if they can work with suppliers who can provide initial shipments of products based on forecasts, but then rapidly increase production to the right style, color, size, etc. based on actual sales. They note that fast supply chains can produce products as they sell rather than worrying about accurate forecasts.

2.5. The resource-based view

The resource-based view (RBV) is useful for describing the role of strategic resources and capabilities within the firm and its network (Barney). “Tangible resources (e.g. Facilitators and technologies) and intangible capabilities (e.g. inter organizational relationships, infrastructures, and processes kill-sets) are both critical in enabling firms to implement a responsive product strategy a cross the supply chain” (Cousins, P.D.,Menguc,B.,, 2006). Since responsive supply chain often requires cross-organizational product development, coordination mechanisms among diverse supply chain partners are essential (Hong, P.,Kwon,H.,Roh,J.,, 2009).Thus, a responsive supply chain necessitates higher levels of interactive communications with both upstream suppliers and downstream customers. These communications can be facilitated by the supply chain partners’ information technology infrastructure, internal organizational structure, and manufacturing capabilities (Song, L.,Nagi,R.,,,, 1997); (Sharif, A.M.,Irani,Z.,Lloyd,D.,, 2007).

2.6. Operational Performance

It is no exaggeration to view operations management as being able to either ‘make or break’ any business. This is not just because the operations function is large and, in most businesses, represents the bulk of its assets and the majority of its people, but because the operations function gives the ability to compete by providing the ability to respond to customers and by developing the capabilities that will keep it ahead of its competitors in the future. (Nigel Slack, Stuart Chambers, and Robert Johnston, 2010)

Broad stakeholder objectives form the backdrop to operations decision-making, and top management's objectives provide a strategic framework, but running operations at an operational day-to-day level requires a more tightly defined set of objectives. These are the four basic 'operational performance objectives' and they apply to all types of operation. I.e. **Quality, cost, flexibility, Delivery Dependability, and speed** (Slack, et al 2010). On this study the researcher used the first four objectives of operational performance measurements (**Quality, cost, flexibility, and Delivery**).

While the competitive priorities literature (Ferdows K, & De Meyer, A. , 1990 and Ward, P., McCreery, J.K., Ritzman, L.P., & Sharma D. . , 1998) in operations strategy can offer a useful approach to measure operational performance. Operational performance is a source of competitive advantage for the enterprise to differentiate itself in the eyes of the customers from its competitors by operating at a lower cost and hence at a greater profit (Christopher, 1992).

The idea of competitive priorities has its roots in the trade-off approach (Skinner, W. 1969, 1974), according to which a manufacturing operation cannot perform in all dimensions and has to define priorities, therefore the term competitive and the concept of focused factory proposed by (skinner, W. 1974). The most basic competitive priorities were cost, quality, flexibility and delivery (Boyer K.K., & Lewis, M.W., 2002; Ward et al., 1998), but (Leong G.K., Snyder, D.L., & War P.T., 1990) introduced a fifth, innovativeness, less explored in empirical studies with few exceptions.

The relationship between these competitive priorities is still subjected to debate within the operations management literature. Three approaches can be identified: the trade-off, cumulative, and integrative models (Boyer K.K., & Lewis, M.W., 2002). The trade-off perspective takes the position that often a better performance in one dimension comes at the expense of another dimension where the operation will inherently have a lower performance. Since resources are scarce, management would need to prioritize and choose where to focus time and energy. This would inevitably cause a lower performance in dimensions not so critically prioritized. The trade-off concept and the related focused factory solution to it were originally proposed by the seminal papers of Skinner (Skinner, W. 1969, 1974) and found some support in recent empirical papers (Boyer K.K., & Lewis, M.W., 2002). The cumulative perspective considers the competitive priorities complementary rather than mutually exclusive. With intense and global competition with the help of advanced manufacturing technologies companies need to excel in

all dimensions, breaking the trade-offs (Corbett C., & Wassenhove, L.V. . . , 1993). The integrative perspective attempts to explain the existence of both models. (Hayes R.H., & Pisano, G.P. , 1996), drawing from the then emergent resource-based view of strategy, differentiated between first-order effects (those that affect the firm today) and second order ones that relate to the consequence of capabilities the firm will develop dynamically. The tradeoff does not need to be present when this dynamic approach is considered since simultaneous improvement in several priorities is possible over time due to the development of capabilities. (Schmenner R.W., & Swink, M. . , 1998) added the concepts of operating and asset frontiers. They argued that while trade off might exist for companies that are operating at the asset frontier, for plants where the operating frontier did not reach yet the limits of the asset frontier simultaneous improvement in priorities was possible.

According to (Miguel, P. L. S., Ledur Brito, L. A. L.: , 2011) the competitive priorities framework can also be thought as way to conceptualize and measure operational performance, or even competitiveness. Improvements in performance can manifest themselves in different aspects like inventory reduction, lead time reduction or quality improvement. Grouping these types of improvements under the broader classes of competitive priorities as cost, quality, delivery and flexibility can be a useful measurement approach allowing comparability, comprehensiveness and theoretical underpinning. The different priorities can be taken as different performance dimensions. (Vickery S.K., Dröge, C., & Markland, R.E. , 1997) Used a similar approach, but called these as dimensions of manufacturing strength. If the performance in each dimension is driven by a specific capability associated with this dimension the question whether what is being measured is the performance or the level of the capability is more semantic than practical. Based on these, the four dimensions of operational performance construct will be using in this study are cost, quality, delivery dependability, and flexibility.

2.7. Research hypotheses

There exists evidence that firms are achieving flexibility (Tully, 1994), and thus responsiveness, through the use of SCM practices. SCM practices directly impact the operational flexibility, and firms should use SCM practices to excel in attaining responsiveness (Narasimhan, R. and Das, A., 1999). Successful SCM can result in lower system inventories, a network of firms that respond more quickly to market changes, and products that more closely match customer expectations. Thus, firms pursuing either a differentiation or a cost leadership or a quick

response strategy, or a combination of these, can all find benefits from supply chain management (Porter, 1985).

Strategic supplier partnerships including working closely with suppliers to design or redesign products and processes, solve problems, as well as prepare back-up plans is critical in attaining supply chain (Thatte, et al 2013 & Liu, E. R. and Kumar, A. , 2003) observed that collaborative practices such as 3PL, VMI, and CPFR between supply chain partners led to increased supply chain responsiveness. In a special report of logistics and transport (2003), information sharing and strategic supplier partnership practices have been highlighted as the critical steps to being responsive. Close relationship with suppliers, has been empirically found to positively affect the volume flexibility, mix flexibility and new product flexibility dimensions of manufacturing flexibility (Suarez, F., Cusumano, M. A., and Fine, C., 1995). Numerous studies emphasize the importance of integrating suppliers, manufacturers, and customers in order to achieve supply chain responsiveness (Thatte, et al 2013).

Customer relationship is essential for attaining supply chain wide (Thatte, et al 2013) Information sharing plays an important role in constructing a responsive supply chain network (Lau, H. C. W. and Lee, W. B., 2000). A great amount of visibility is required through the supply chain in order to attain supply chain responsiveness (Storey, J., Emberson, C., and Reade, D., 2005). This would, it is argued, enable all the players in the supply chain “to see from one end of the pipeline to another, in as close to real time as possible” (Storey,et al 2005). Information sharing practice in a supply chain increases responsiveness to customer’s needs (Martin, J. H. and Grbac, B. , 2003; Sheth and Sharma, A. , 1997; Tan et al., 1998; Araujo, L., Dubois, A., and Gadde, L. E. , 1999; Van Hoek, R. I., Harrison A., and Christopher, M., 2001; Christopher M. 2000 ; Lambert, D.M., & Cooper, M.C., 2000 argue and (Thatte, et al 2009) find that a higher level of information sharing practices will lead to a higher level of supplier network responsiveness. Close relationship and open communication can lead to supplier responsiveness (Liker, J. K. and Choi, T. Y., 2004; Handfield, R. B. and Bechtel, C. , 2002; Treleven, M. and Schweikhart, S. B. , 1988). Open sharing of information such as inventory levels, forecasts, sales promotion strategies, and marketing strategies reduces the uncertainty between supply chain partners (Andel, 1997; Lewis, I. and Talalayevsky A. , 1997; Lusch, R. F. and Brown, J. , 1996; Salcedo, S. and Grackin A. , 2000) thus enabling firms to respond rapidly to unexpected events

on either customer or supply (Thatte, et al 2013) & Tan et al., 1998). Therefore; based on this it is hypothesized that:

Hypothesis1;

Strategic supply chain management practices have positive and significant impact on supply chain responsiveness.

Empirically, several research have found the relationship between SCM practices with operational performance (sometimes replace it with competitive advantage) such as (Kim, 2006); (Li, 2006); (Miguel, P. L. S., Ledur Brito, L. A. L., 2011); Thatte, et al 2007 & 2013). Others studies have indicated that the various components of SCM practices (such as strategic supplier partnership, customer relationship, and information sharing) have an impact on various aspects of operational performance which is source of competitive advantage (such as price/cost,, quality, delivery dependability, product innovation, and time to market) Moslem et al. (2013). For example, strategic supplier partnership can improve supplier performance, reduce time to market Moslem et al. (2013) and increase the level of customer responsiveness and satisfaction (Power D., 2005). Therefore, the study hypothesis associated with operational performance is as follow:

Hypothesis2; supply chain management practices have positive and significant impact on operational performance.

Responsiveness concept enters SCM literature based on the needs to respond the rapid environment change and 21st century competition. Responsiveness in the beginning was more related with company's internal process; that every company need to have the ability to response to the changes of customers' needs and demands, particularly in industries that are highly affected by customers' preference such as fashion, PC, electronics, construction and vehicle industries (Reichhart, A., and Holweg, M., 2007). Responsiveness concept then developed not only on individual company level but also as supply chain responsiveness. A supply chain with high responsiveness level will be able to respond the demand and customers' preference change compared with unresponsive supply chain. In other word, supply chain responsiveness will, in return, influence performance (Thatte, et al 2007; Roh, 2009). Responsiveness in general defined as ability to react purposefully and within an appropriate time-scale to customer demand or changes in the marketplace, to bring about or maintain competitive advantage (Kritchanchai, D.,

and MacCarthy, B.L. , 1999). In supply chain context, responsiveness defined as the capability of promptness and the degree to which the supply chain can address changes in customer demand (Thatte, et al 2007).

Numerous researchers have found the relationship between supply chain responsiveness and operational performance or with competitive advantage such as (Thatte, et al 2007 & 2013; (Roh, 2009); and (Sukati, Inda, Abu Bakar Abdul Hamid, Rohaizat Baharun, and Huam Hon Tat , 2010); therefore, the study hypothesis associated with responsiveness is as follow:

Hypothesis3: supply chain responsiveness that positively and significantly impact on operational performance.

2.8. Constructs and conceptual framework

The conceptual framework is shown in Figure 1. The researcher construct that SCM practices have an impact on operational performance both directly and indirectly through supply chain responsiveness. SCM practices and supply chain responsiveness are constructs operationalized in earlier research (Thatte, et al 2013). And operational performance is operationalized in earlier research (Miguel, P. L. S., Ledur Brito, L. A. L., 2011)

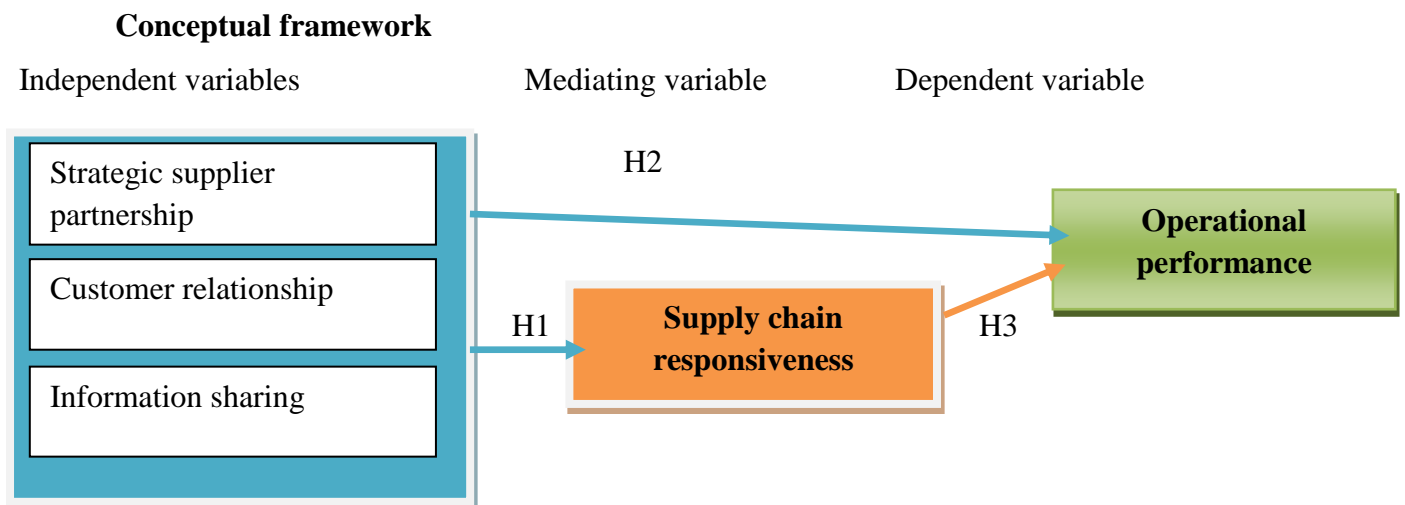


Figure 1- Conceptual framework

Source; (Thatte, et al 2013 & Miguel, P. L. S., Ledur Brito, L. A. L., 2011)

Chapter Three

3. Research design and Methodology

3.1. Introduction

Research methodology is described for the instrument development and data collection in this section, the choice of particular research designs, data type and source of data, research approach, sampling and sampling techniques and data analysis techniques along with an appropriate justification associated with each method

3.2. Research Design

Designing a study helps the researcher to plan and implement the study in a way that will help the researcher to obtain intended results, thus increasing the chances of obtaining information that could be associated with the real situation (Burns & Grove 2001). This study is a basic research which designed to solve theoretical problem and used to contribute to the existing knowledge. The research design for this study was consists of a quantitative design, in the form of a questionnaire. The researcher used Cross-sectional field survey method to assess the relationship between SCM practices and Supply chain responsiveness on one hand and SCM practices with operational performance, and finally the relationship between Supply chain responsiveness and operational performance of large manufacturing industry in Bahir Dar Ethiopia.

3.3. Total Population

The total populations of this study was experienced employees of large manufacturing industry in Bahir Dar Ethiopia, i.e. Amhara pipe factory Plc. (APF) have 150 employees, Bahir Dar tannery Plc. (BDT) 180 employees, and Bahir Dar textile share company (BDTSC) have 1534 number of employees who can be related to this study.

3.4. Sampling Technique

For this study, the researcher used simple random sampling to select large manufacturing firms in Bahir Dar. By prepare a sampling plan, which consist a list of all the large scale manufacturing firms that, date of establishment is greater than five year and from which the

sample is drawn. Table 2 below shows the sample frame of large manufacturing industry in Bahir Dar.

Table 2- large manufacturing firms in Bahir Dar

No	Large manufacturing firms in Bahir dare	Date of establishment
1.	East Africa bottling share company	2016
2.	Tana communication Plc	2010
3.	Bahir Dar pip factory	2013
4.	Amhara pipe factory plc	2009
5.	Amaga plc	2014
6.	Bahir Dar Tannery Factory	1998
7.	Habesha Tanning plc	2010
8.	Bahir Dar Textile Share Company	1961

Source; (office, 2017)

Table 3- Large manufacturing firms in Bahir Dar date of establishment is greater than five year

No	Large manufacturing industry in Bahir Dar	Date of establishment
1.	Bahir Dar Tannery Factory Plc.	1998
2.	Habesha Tanning plc.	2010
3.	Bahir Dar Textile Share Company	1961
4.	Amhara pipe factory plc.	2009
5.	Tana communication Plc.	2010

(Source; 2017 servey)

Therefore, all manufacturing industry got equal chance to select as a sample from a list. Through simple random sampling techniques Bahir Dar Tannery Factory Plc., Bahir Dar Textile Share Company, Amhara pipe factory plc, selected as a case company.

For the purpose of data gathering the researcher used judgmental sampling technique. Based on (Balda, 2011) (Bogale A . , 2015) Judgmental sampling helps to address respondents those who have direct relationship with the purpose of this study.

3.4.1. Sample Size

(Malhotra, N. K., and Peterson, M., 2006; Zikmund, 2003) stated that, the larger the sampling size of a research, the more accurate the data generated However, for this study sample determination method developed by (CarvalhoJ., 1984) was used by researcher as a method to determine a sample size.

3.4.2. Sample Size Determination.

Table 4 sample size determination

Population Size	Sample size		
	Low	Medium	High
51-90	5	13	20
91-150	8	20	32
151-280	13	32	50
281-500	20	50	80
501-1200	32	80	125
1201-3200	50	125	200
3021-10,000	80	200	315
10,001-35000	125	315	500
35001-150000	200	500	800

(Source: (Carvalho, 1984))

Table 5-Sample Size Determination for the study

No	Large Manufacturing industry	Total population
1.	Bahir Dar Tannery Factory Plc.	180
2.	Amhara pipe factory plc.	150
3.	Bahir Dar Textile Share Company	1534
	Total	1864

(Source; 2017 survey)

As the above table indicates that, the total numbers of large manufacturing industry in Bahir Dar Ethiopia employees are 1864. Therefore, from the 1864 employees 125 (medium) were considered as sample size of the study as per Carvalho's sample determination method. Since this study deployed structural equation modeling and for SEM requires at least 200 participants for the sample size to be effective. A sample size of 50-70 would be enough, while a sample size ranging from 30 up to 450 cases (mediation models) is required for SEM (Wolf J. Erika, Harrington M. Kelly, Clark L. Shaunna, Miller W. Mark., 2013)

3.4. Data Gathering Technique and Instruments

There are various mechanisms useful to collect data. The main ones are questionnaires, interviews and observations (Greener & Martelli, 2015). In this research both primary and secondary sources of data were utilized through Questionnaires and literature review. The primary data was gathered particularly using survey questionnaire. The researcher was distributing the questionnaire to sample respondents. For the purpose of this study a quantitative methodology involving a close-ended questionnaire was used as the measuring instrument. The close-ended questionnaires can be administered to groups of people simultaneously. The standard questionnaire used to collect the necessary information regarding the study was adopted from the work (Thatte, et al 2013) to measure supply chain management practice and supply chain responsiveness and (Miguel, P. L. S., Ledur Brito, L. A. L., 2011) measurement for operational performance. The Likert-type scale method a range of responses: 'strongly disagree', 'disagree', 'Neutral', 'Agree', and 'Strongly Agree', applied to collect data from the sample respondents with a numeric value of 1-5, respectively.

3.5. Data Analysis

After the data collection process, structural equation modeling (SEM) with Amos version 23 was used to analyze the information. A SEM analysis was conducted to test relationship among variables i.e. dependent, mediating, and independent variables. The unit of analysis in this study is a firm. Besides structural equation modeling with Amos software the researcher was used descriptive statistics using SPSS software version 20 to analyze respondent's profiles. The analysis would be done to establish how the specific supply chain management practices and supply chain responsiveness impact on operational performance of large manufacturing industry in Bahir Dar town.

3.6. Validity and Reliability

3.6.1. Reliability

Reliability analysis is concerned with the internal consistency of the research instrument (Bryman, A., and Bell, E., 2007). As multiple items in all constructs were used, the internal consistency/reliabilities of SCM practices, operational performance, and organizational performance were assessed with Cronbach's Alpha and the reliability values for all constructs are confirmed as greater than 0.7, which are considered acceptable (Nunnally, 1978).

3.6.2. Validity

This study was addressed content validity, through reviewing of literature and adapting instruments that is used in previous research (Thatte, et al 2013 and Miguel, P. L. S., Ledur Brito, L. A. L., 2011) and convergent validity.

3.7. Ethical Consideration

Ethics are broadly the set of rules, written and unwritten, that governs our expectations of our own and others' behavior. Ethical issues in research are indeed a key part of research ethics; there are also wider issues about standards of conduct. These include the importance of publishing findings in a transparent way, not plagiarizing others' work, and not falsifying work.

The researcher was undertaken the research as competently and responsibly as possible, be sensitive and objective and not make value judgments that might bias the findings. Attempts were also employed to avoid bias and subjectivity by maintaining as much objectivity as possible in the interactions and relationships with the research participants (Strydom, 2005).

Chapter Four

4. Data Presentation, Analysis and Discussion

This chapter discussed the data analysis results, interpretations and discussion of findings. As it is described before this study attempted to examine the Relationship between supply chain management practices and supply chain responsiveness on operational performance in case of manufacturing industries in Bahir Dar Town. The chapter is organized as follows: First it presents the response rate then the background information of the respondents. This is followed by analysis of supply chain management practices, supply chain responsiveness and operational performance. The chapter concludes with an analysis of the relationship between impact of supply chain management practices and supply chain responsiveness on operational performance using SEM analysis.

4.1. Response rate

The study targeted 125 respondents from the manufacturing industries in Bahir Dar. The response rate was as displayed in the table below.

Table 6- Response rate

	Targeted	Achieved	Percentage (%)
Respondents	125	111	88.8

Source: survey data (2018)

From the table above, the original sample for the study was 125, of which 111 questionnaires were returned, giving an overall response rate of 88.8% (111 responses/125*100 questionnaires). Only 111 questionnaires were complete and usable for data analysis. This is a very high response rate and is representative of the targeted sample. This response rate was favorable according to Mugenda and Mugenda (2003)

4.2. Frequency Analysis of the Respondents' Profile

The respondents were asked to indicate their work experience and education qualification. Work experience and education qualification of the respondents' is that, when the respondents are more

experienced and educated, they have better opportunity to understand the case and give better response than else. The table below shows the responses.

Table 7- work experience

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1-3 years	37	33.3	33.3	33.3
4-6 years	35	31.5	31.5	64.9
7-11 years	33	29.7	29.7	94.6
above 11 years	6	5.4	5.4	100.0
Total	111	100.0	100.0	

Source: survey data (2018)

From the table above, most respondents (33.3%) had worked for between 1 and 3 years in their current positions while 31.5% had served for between 4 and 6 years and 29.7% had served for between 7 and 11 and 5.4% had served over 11 years. Thus 66.7% of the respondents had well over six years' experience in their present positions meaning they are competent to answer the questions.

Table 8-Education Qualification

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Certificate	3	2.7	2.7	2.7
college diploma	31	27.9	27.9	30.6
first degree	63	56.8	56.8	87.4
second degree and above	14	12.6	12.6	100.0
Total	111	100.0	100.0	

Source: survey data (2018)

Regarding the respondent's education level only 2.7% respondents have certificate. It is the least percentage out of the valid response. Most of the respondents (56.8%) have first degree and (27.9%) have college diploma. Finally, the rest (12.6) have second degree and above. Therefore, out of valid respondents 69.4% have first degree and above first degree. This implies that they are capable and understand the construct items to fill the response.

4.3. Measurement model

4.3.1. Reliability Test

In this study Cronbach's alpha model was used to measure the overall reliability of the data obtained from a questionnaire. So the overall reliability of the questionnaire above 0.728 which is at good level according to a criterion set by George and Mallery (2003).

Table 9-reliability test

Constructs	NO of item	Cronbach Alpha (α)
Strategic supplier partnerships	6	.851
Customer relationships	5	.810
Information sharing	6	.865
Operational system responsiveness	5	.824
Logistics process responsiveness	4	.844
Supplier network responsiveness	4	.784
Cost	3	.728
Quality	3	.732
Flexibility	4	.812
Delivery	3	.766

Source: survey data (2018)

4.3.2. Validity Test

A Confirmatory Factor Analysis (CFA) was conducted using AMOS 23. Measurement model validity depends on establishing acceptable levels of goodness-of-fit for the measurement model and finding specific evidence of construct validity. Validity is defined as the extent to which data collection methods accurately measure what they were intended to measure (Saunders and Thornhill, 2003). In this study to satisfy the validity procedure, content and convergent validity was used

4.3.3. Content validity

Validity refers to the extent to which a measure adequately represents the underlying construct that it is supposed to measure (Bhattacharjee, 2012). Content validity was checked through getting the questionnaire reviewed by experts. Moreover, the researcher conducted content validity of the questionnaire by selecting 5 sample academic staffs and done a pilot test to make some wording adjustment and to avoid jargon words and languages.

4.3.4. Convergent Validity

Convergent validity is shown when each measurement item correlates strongly with its assumed theoretical construct. In other words the items that are the indicators of a construct should converge or share a high proportion of variance in common. The value ranges between zero and one (0 – 1) .The ideal level of standardized loadings for reflective indicators is 0.70 but 0.60 is considered to be an acceptable level (Barclay et al., 1995). In this study Convergent validity was evaluated for the ten (10) constructs All Factor loadings are significant at $p < 0.01$

Table 10- AMOS Output Extract: Standardized Factor Loadings of Construct Items

No	Construct Item	Standardized factor loadings	No	Construct Item	Standardized factor loadings
1	SSP1	0.757	23	LPR1	0.729
2	SSP2	0.733	24	LPR2	0.813
3	SSP3	0.783	25	LPR3	0.792
4	SSP4	0.683	26	LPR4	0.695
5	SSP5	0.736	27	SNR1	0.684
6	SSP6	0.788	28	SNR2	0.735
7	CR1	0.647	29	SNR3	0.610
8	CR2	0.799	30	SNR4	0.742
9	CR3	0.777	31	C1	0.761
10	CR4	0.720	32	C2	0.784
11	CR5	0.656	33	C3	0.639
12	IS1	0.673	34	Q1	0.694
13	IS2	0.745	35	Q2	0.644
14	IS3	0.714	36	Q3	0.736
15	IS4	0.770	37	F1	0.741
16	IS5	0.738	38	F2	0.758
17	IS6	0.644	39	F3	0.779
18	OSR1	0.763	40	F4	0.627
19	OSR2	0.711	41	D1	0.694
20	OSR3	0.784	42	D2	0.760
21	OSR5	0.711	43	D3	0.725

Source: survey data (2018)

4.3.5. Assessment of normality

Many statistical methods require that the dependent variable is approximately normally distributed for each category of the independent variable Cramer, D. (1998). The table 11 below displays normality test result of the variables. A skewness and Kurtosis Z-values result point out whether the data is normally distributed or not. Skewness and Kurtosis Z-values should be

anywhere in the extent of ± 2 (Cramer, D. (1998)). Based on the table it can assume that the data are approximately normally distributed in terms of skewness and Kurtosis.

Table 11-Assessment of normality

Variable	min	Max	skew	c.r.	kurtosis	c.r.
SNR	7.000	20.000	-.900	-3.869	.767	1.649
Q	4.000	15.000	-1.724	-7.416	3.839	8.256
C	4.000	15.000	-.952	-4.094	.392	.843
D	3.000	15.000	-1.448	-6.229	2.098	6.233
F	5.000	20.000	-1.022	-4.394	1.278	2.748
LPR	4.000	20.000	-1.067	-4.588	1.039	2.234
OSR	8.000	25.000	-1.217	-5.236	1.189	2.557
SSP	10.000	29.000	-1.448	-6.230	2.898	6.233
CR	8.000	25.000	-1.350	-5.807	2.763	5.942
IS	9.000	30.000	-1.567	-6.740	1.280	7.054
Multivariate					60.050	20.419

Source: survey data (2018)

4.3.6. Model type

The hypothesized model is recursive, i.e., uni-directional. Recursive models are the most straightforward and have two basic features: their disturbances are uncorrelated, and all causal effects are unidirectional.

4.3.7. Model Identification

The proposed model in this study is an over-identified model with positive degrees of freedom as shown in table below drawn from the AMOS output. An over-identified model is one which the

number of estimable parameters is less than the number of data points (i.e. variances and co variances of the observed variables). This results in positive degrees of freedom. In this model there are 55 distinct sample moments (i.e., pieces of information) from which to compute the estimates of the default model, and 23 distinct parameters to be estimated, leaving 32 degrees of freedom. Hence the model is an over-identified.

Table 12- Model Identification

Number of distinct sample moments	55
Number of distinct parameters to be estimated	23
Degrees of freedom (DF)	(55 - 23) = 32

Source: survey data (2018)

4.3.8. Model fit

Table 13-Model Fit Summary

Model	RMSEA	GFI	AGFI	CFI	RFI	IFI
Default model	.08	.901	.929	.984	.950	.984

Source: survey data (2018)

The model fit summary table 13 indicates about RMSEA, GIF, AGFI, CFI, RFI, and IFI which are the main to evaluate the model fit of the measurement model to confirm the hypothesized structure. GFI = 1.0 indicates perfect model fit, GFI > .90 may indicate good fit, and values close to zero indicate very poor fit. However, values of the GFI can fall outside the range 0–1.0. Values greater than 1.0 can be found with just identified models or with over identified models with almost perfect fit; negative values are most likely to happen when the sample size is small or when model fit is extremely poor (Joreskog & Sorbom, 1981). From the above table GFI is .901 it is good model fit. Adjusted Goodness of Fit Index (AGFI) is 0.929 that is above the recommended value of 0.90 as well. In the model summery shows that CFI is .984 which implies that the model is good enough. CFI values above 0.90 are usually associated with a model that fits well (Bentler (1999)). RFI coefficient values range from zero to one with values close to one

indicating superior fit (Hu and Bentler, 1999). The RMSEA takes into account the error of approximation and is expressed per degree of freedom, thus making the index sensitive to the number of estimated parameters in the model; a value of less than 0.05 indicates a good fit, a value as high as 0.08 represents reasonable errors of approximation in the population (Browne and Cudeck, 1993), a value ranging from 0.08 to 0.10 indicates mediocre fit, and values greater than 0.10 indicate poor fit (MacCallum et al., 1996). In this study Root-mean-square error of approximation (RMSEA) is equal to 0.08 that is acceptable.

4.4. Structural Equation Modeling (SEM)

Structural Equation Modeling (SEM) is a multivariate technique, which estimates a series of inter-related dependence relationships simultaneously. The term Structural Equation Modeling conveys that the causal processes under study are represented by a series of structural (i.e. regression) equations, and that these can be modeled pictorially to enable a clearer conceptualization of the study. The hypothesized model can be tested statistically in a simultaneous analysis of the entire system of variables to determine the extent to which it is consistent with the data.

Structural equation modeling method was used to test the hypothesized relationships among variables supply chain management practices (strategic supplier partnerships, customer relationship, and information sharing), supply chain responsiveness, and operational performance. SEM is an extension of the general linear model (GLM) that enables a researcher to test a set of regression equations simultaneously.

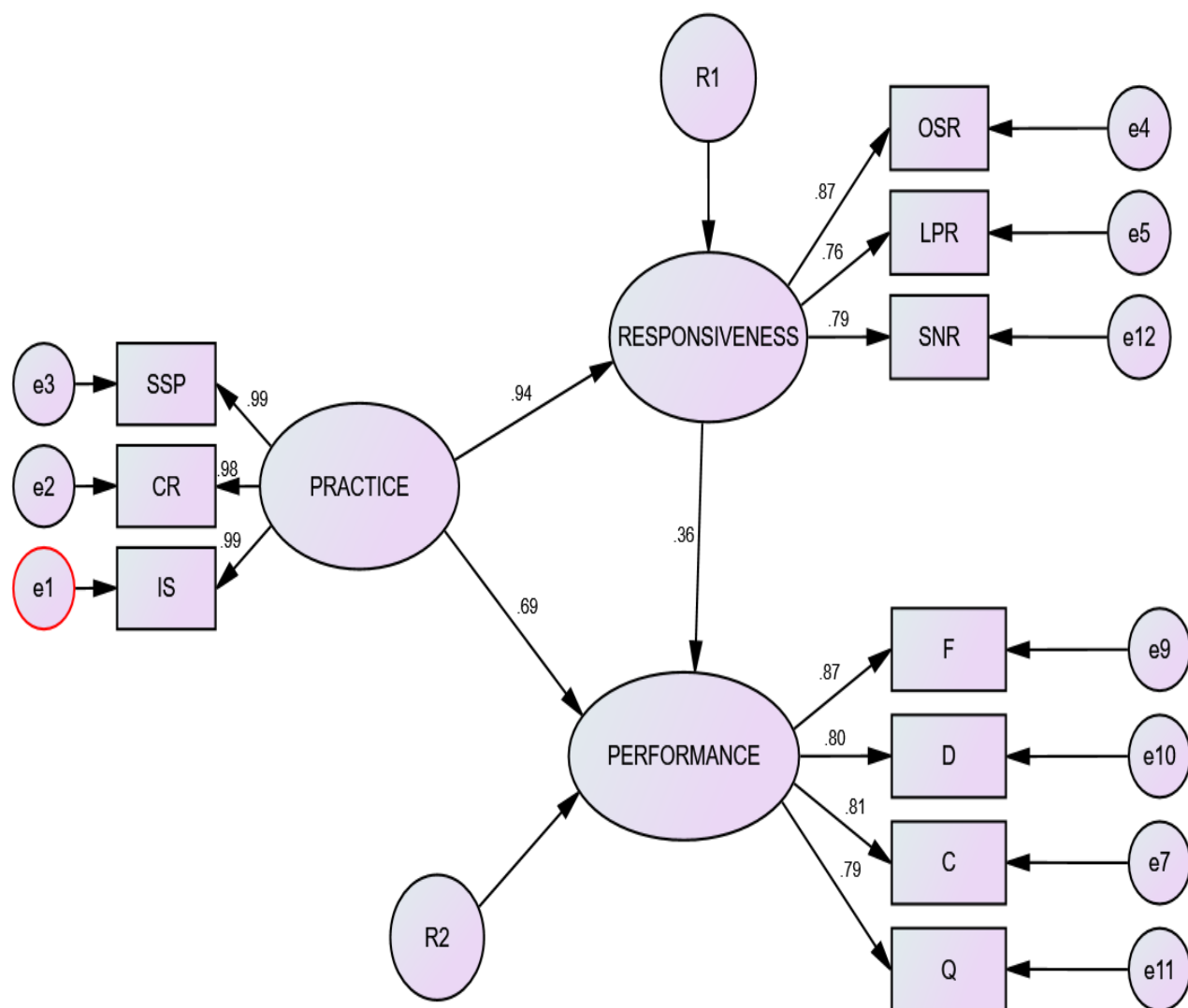


Figure 2- structural equation modeling

The table below shows as the unstandardized regression weights between exogenous (independent variables; they ‘cause’ fluctuations in the values of other variables in the model) and endogenous variable (dependent variables and, as such, are influenced by the exogenous variables in the model, either directly or indirectly). The P value is ($P < 0.05$ level), it means that all relationship is statistical significant.

Table 14-Regression Weights

		Estimate	S.E.	C.R.	P	Label
SCR	<--- SCMP	.789	.054	14.631	***	par_5
OP	<--- SCMP	.326	.062	5.235	***	par_6
OP	<--- SCR	.204	.075	2.724	.006	par_7
IS	<--- SCMP	1.000				
CR	<--- SCMP	.819	.019	42.145	***	par_1
SSP	<--- SCMP	.964	.021	45.605	***	par_2
OSR	<--- SCR	1.000				
LPR	<--- SCR	.774	.078	9.918	***	par_3
F	<--- OP	1.471	.125	11.790	***	par_4
D	<--- OP	1.000				
C	<--- OP	1.128	.107	10.525	***	par_8
Q	<--- OP	.912	.090	10.166	***	par_9
SNR	<--- SCR	.711	.068	10.502	***	par_10

Source: survey data (2018)

4.4.1. Structural Model – Hypotheses Testing

Table 15- Hypothesis testing

Hypotheses	Relationship	Estimate	Hypotheses Result
H1	<i>SCR<--- SCMP</i>	.941***	Accepted
H2	<i>OP<---SCMP</i>	.691***	Accepted
H3	<i>OP<---SCR</i>	.363*	Accepted

* Significant at P < 0.05, *** Significant at P < 0.001,

Source: survey data (2018)

The above table reflects the hypothesis tested result of hypothesized relationships among variables. All hypotheses are accepted

Hypotheses 1 which states about relationship between supply chain management practices and supply chain responsiveness have beta value of ($\beta = 0.941$) were significant at $P < 0.001$ level, that is accepted. The standardized structural coefficients (or effect size) between two constructs is commonly used to compliment structural equation modeling (SEM). An effect size of 0.371 or above is considered large, between 0.100 and 0.371 is considered medium, and 0.1 or below is considered small (Cohen, 1988; 1990). The result values confirm that the relationships between supply chain management practices and supply chain responsiveness have positive and statistical significance. The response confirms that a well implemented supply chain management practice enhance the ability of an organization to respond quickly to changes in demand.

Hypotheses 2 states that relationship between supply chain management practices and operational performance ($\beta = 0.691$, $P < 0.001$). The effect size of supply chain management practices on operational performance is that 69.1% which is considered as laree impact. This means that, when supply chain management practices increases by one (1), operational performance increases by 0.691. The result empirically confirms the positive and significant relationship between supply chain management practices and operational performance.

Hypotheses 3 refer about the relationship between supply chain responsiveness and operational performance. The result support hypothesis 3 since ($\beta = 0.363$, $P < 0.05$); it indicates there is causal relationship between supply chain responsiveness and operational performance. The value of 36.3% implies that supply chain responsiveness can account for 36.3% of the variation in operational performance. Although there might be many factors that can explain the variable on operational performance, nearly 36.3% of it is explained by customer relationship. The impact indicates that customer relationship is significant and positively impact on operational performance.

4.5. Indirect effects of supply chain management practices

The table below indicates that the indirect (mediation) effect of predictor variable on independent variable. Mediation suggests a cause and effect relationship between variables. The issue of mediation is that the variation in one variable on other variable is transmitted through another variable. The mediation effect states that there is partial mediation from supply chain

management practices to operational performance through supply chain responsiveness since the direct effect of supply chain management practices is still significant and beta value of indirect effect is decreased.

The standardized direct (unmediated) effect of supply chain management practices on operational performance is 69.1%. That is, due to the direct (unmediated) effect of supply chain management practices on operational performance, when supply chain management practices goes up by 1 standard deviation, operational performance goes up by 69.1% standard deviations. This is in addition to any indirect (mediated) effect that supply chain management practices may have on operational performance.

The standardized indirect (mediated) effect of supply chain management practices on operational performance is 34.1%. That is, due to the indirect (mediated) effect of supply chain management practices on operational performance, when supply chain management practices goes up by 1 standard deviation, operational performance goes up by 34.1% standard deviations. This is in addition to any direct (unmediated) effect that supply chain management practices may have on operational performance.

Table 16-Indirect effect of supply chain management practices

Hypothesis	Direct effect	Indirect effect	Result
SCMP → SCR → OP	.691***	.341*	Partial mediation

*= p<0.05, ***= p<0.001

Source: survey data (2018)

Chapter Five:

5. Summary of Findings, Conclusions and Recommendations

5.1. Summary of major Findings

This study is intended to test if there is a relationship between SCM practices, supply chain responsiveness, and operational performance. Based on the results of the study the summaries of major findings are explained as follows.

This study supports major finding of related literature (Ashish A. Thatte, Subba S. Rao, T. S. Ragu-Nathan, , 2013, Miguel, P. L. S., Ledur Brito, L. A. L., 2011) regarding the relationship between supply chain management practices, supplier responsiveness, and operational performance. The results prove that the implementation of supply chain management practices should improve supply chain responsiveness and leads to higher level of operational performance.

The study identifies the impact of supply chain management practices on supply chain management responsiveness. The result indicate that there is a positive and significant relationship between supply chain management practices and supply chain responsiveness with beta value of 0.941 (94.1) and it is significant at P value less than 0.001.

The study result indicates supply chain management practices i. e. strategic supplier partnership, customer relationship, and information sharing has a direct positive impact on operational performance at a significant level of P value less than 0.001 and indirectly through supply chain responsiveness. Supply chain management practices have 69.1% contribute for the variation on operational performance. The indirect impact of supply chain management practices accounted 34.1% variation on operational performance. Result of supply chain management practices and operational performance indicates that supply chain management practices have significant positive impact on operational performance.

Finally the study finds the relationship between supply chain responsiveness and operational performance. The result states that supply chain responsiveness has positive and significant impact on operational performance with beta value of 0.363 (36.3%) at P value of less than 0.05.

When supply chain responsiveness goes up by 1 standard deviation, operational performance goes up by 36.3% standard deviations.

5.2. Conclusions

Based on the results of the study obtained and summary of findings the following conclusions are given.

The objective of the study was to examine the relationship between supply chain management practices, supply chain responsiveness, and operational performance. In this study, Supply chain management practices are identified by three categories that are: strategic supplier partnership, customer relationship, and information sharing and supply chain responsiveness in three dimension namely operation system responsiveness, logistic process responsiveness, and supplier network responsiveness and finally operational performance in four dimension i.e. cost, quality, flexibility, and delivery in Bahir Dar manufacturing firms. First the study takes a look the relationship between supply chain management practices and supply chain responsiveness. The study result indicates there is a positive and significant relationship between supply chain management practices and supply chain responsiveness. Supply chain management practices have 94.1% significant positive impact on Supply chain responsiveness. Result implies that responsive supply chain requires great amount of collaborative practices such as 3PL, VMI, and CPFR between supply chain partners, maintaining the customer relationship to be more responsive towards customers' needs, and visibility across the participants of the supply chain. Therefore; there is a supply chain practices within the company there is supply chain responsiveness, since supply chain practices designed to achieve efficiency and responsiveness. .

Second the study test the relationship between supply chain management practices and operational performance directly and indirectly through supply chain responsiveness. The researcher found supply chain management practices have positive and significant relationship impact on operational performance. Supply chain management practices have 69.1% variation on operational performance. Implementing supply chain management practices in large manufacturing industries in Bahir Dar lead to 69.1% improvement on operational performance. From this one can conclude the relationship of supply chain management practices and operational performance is positive and significant.

Finally the study examines the relationship between supply chain responsiveness and operational performance. The result shows that supply chain responsiveness has 36.3% significant variation on operational performance. Previous related researchers have suggested that a supply chain with high responsiveness level will be able to respond the demand and customers' preference change compared with unresponsive supply chain. In other word, supply chain responsiveness will, in return, influence performance (Thatte, et al 2007; Roh, 2009). Therefore; building responsive supply chain in large manufacturing industries in Bahir Dar leads to 336.3% increment on operational performance. The result shows that there is a positive and significant relationship between supply chain responsiveness and operational performance.

Therefore, based on the findings of the study, it is possible to conclude that, the level of supply chain management practices of the study variables are positive and significant cause of supply chain responsiveness and operational performance.

5.3. Recommendations

In view of the finding and conclusion, the following recommendations were forwarded in order to encourage the implementation of supply chain management practices and supply chain responsiveness in the case companies.

The traditional levels of competitions between companies are changed in to supply chain strength. To stay in competition companies must performer differently than they did in the past. In today's more and more competitive worldwide markets, companies that do not exercise effective and efficient supply chain management practices may find themselves unable to compete with their business competitors. The current supply chain management practices of the case manufacturing companies are inadequate (poor). Therefore; the case companies should implement supply chain management practices to improve responsiveness to customers need and support their operational performance. To advance a sustainable operational performance and supply chain responsiveness, supply chain management practices are a necessary variable. The results of this study seem to indicate that supply chain management practices have a positive and significant impact on supply chain responsiveness and operational performance. Therefore, manufacturing industries in Bahir Dar should take an active role in dealing all aspects of supply chain management practices.

For the responsive supply chain, the manufacturing industries must have to work for enhancement of top level management commitment to build responsive supply chain for the purpose of efficient operational performance. To build responsive supply chain, effective implementation of customer relationship must be needed. Customers of the case industries are looking to the competitors who are producing the some product from abroad. The business environment is uncertain, as a result the case manufacturing companies need to build responsive supply chains to reduce cost of stock outs or carrying the wrong inventory and improve customer's satisfaction.

This study did not address the entire level of upstream said of the supply chain; just simply address using survey questioners to the case companies to examines relationship between upstream practices of the supply chain. Future research should expanding this study Supply chain practices and responsiveness matters at the upstream level of the supply chain.

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APPENDICES

APPENDIX 1

BAHIR DAR UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT
MASTERS OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Dear respondents, this questionnaire is to gather data on **The impact supply chain management practices and supply chain responsiveness on operational performance of large manufacturing industries in Bahir Dar Town**, for the partial fulfillment of Master's degree in logistics and Supply chain management at Bahir Dar university. The study is purely for academic purpose and thus not affects you in any case. So, your genuine, frank and timely response is vital for successfulness of the study. Therefore, I kindly request you to respond to each items of the question very carefully

Thank you for scarifying your valuable time in advance!

General Instructions

- There is no need of writing your name
- Where answer options are available please tick (✓) in the appropriate box for part I and circle for your response to each statements of part II.

Part I. Respondents Profile

1. Year of work experience in the organization:

1-3 years 4- 6 years 7-11 years above 11 years

2. Educational Qualification:

Certificate College diploma first Degree Second Degree and above

3. Field of your Specialization _____

4. Your current position _____

APPENDIX 2

Part II: Instruments for supply chain management practices, operational performance and organizational performance

Section one: supply chain management practices

With regard to supply chain management (SCM) practices of your firm, please circle the appropriate number to indicate the extent to which you agree or disagree with each statement. The item scales are five-point Likert type scales with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

N O	supply chain management practices(SCMP)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Strategic supplier partnership(SSP)					
1.	We consider quality as our number one criterion in selecting suppliers	1	2	3	4	5
2.	We regularly solve problems jointly with our suppliers	1	2	3	4	5
3.	We have helped our suppliers to improve their product quality	1	2	3	4	5
4.	We have continuous improvement programs that include our key suppliers	1	2	3	4	5
5.	We include our key suppliers in our planning and goal- setting activities	1	2	3	4	5
6.	We actively involve our key suppliers in new product development processes	1	2	3	4	5
	Customer relationship(CR)					
7.	We frequently interact with customers to set reliability, responsiveness, and other standards for us	1	2	3	4	5
8.	We frequently measure and evaluate customer satisfaction	1	2	3	4	5
9.	We frequently determine future customer expectations	1	2	3	4	5
10	We facilitate customers' ability to seek assistance from us	1	2	3	4	5
11	We periodically evaluate the importance of our relationship with our customers	1	2	3	4	5
	Information sharing (IS)					
12	We inform trading partners in advance of changing needs	1	2	3	4	5
13	Our trading partners share proprietary information with us	1	2	3	4	5
14	Our trading partners keep us fully informed about issues that affect our business	1	2	3	4	5
15	Our trading partners share business knowledge of core business processes with us	1	2	3	4	5
16	We and our trading partners exchange information that helps establishment of business planning	1	2	3	4	5
17	We and our trading partners keep each other informed about events or changes that may affect the other partners	1	2	3	4	5

Section two: Supply chain responsiveness

With regard to supply chain responsiveness of your firm, Please circle the number that accurately reflects the extent of your supply chain's current level of responsiveness.

N O	Supply chain responsiveness(SCR)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Operations system responsiveness (OSR)					
1.	Our operations system responds rapidly to changes in product mix demanded by customers	1	2	3	4	5
2.	Our operations system effectively expedites emergency customer orders	1	2	3	4	5
3.	Our operations system rapidly reconfigures equipment to address demand changes	1	2	3	4	5
4.	Our operations system rapidly reallocates people to address demand changes	1	2	3	4	5
5	Our operations system rapidly adjusts capacity to address demand changes	1	2	3	4	5
	Logistics process responsiveness (LPR)					
6.	Our logistics system responds rapidly to unexpected demand change	1	2	3	4	5
7.	Our logistics system rapidly adjusts warehouse capacity to address demand changes	1	2	3	4	5
8.	Our logistics system rapidly varies transportation carriers to address demand changes	1	2	3	4	5
9	Our logistics system effectively delivers expedited shipments	1	2	3	4	5
	Supplier network responsiveness (SNR)					
10	Our major suppliers change product mix in a relatively short time	1	2	3	4	5
11	Our major suppliers consistently accommodate our requests	1	2	3	4	5
12	Our major suppliers provide quick inbound logistics to us	1	2	3	4	5
13	Our major suppliers effectively expedite our emergency orders	1	2	3	4	5

Section three: operational performance

With regard to operational performance of your firm, Please circle the number that accurately reflects the extent of your firm’s operational performance on each of the following.

N O	Operational performance(OP)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Cost (C)					
1.	Our production cost is decreasing over time	1	2	3	4	5
2.	Our inventory turnover is high.	1	2	3	4	5
3	Our productivity rapidly increasing over time	1	2	3	4	5
	Quality (Q)					
4.	We have lower number of defects per unit of product	1	2	3	4	5
5.	We offer high quality products to our customers	1	2	3	4	5
6	We have lower number of customer’s complaints	1	2	3	4	5
	Flexibility(F)					
7.	Our operation’s has higher Process flexibility	1	2	3	4	5
8..	Our operation’s has higher Customization flexibility	1	2	3	4	5
9	Our operation’s has higher Volume flexibility	1	2	3	4	5
10	We alter our capacity to meet client needs	1	2	3	4	5
	Delivery(D)					
11	We deliver customer order on time	1	2	3	4	5
12	We deliver the kind of products needed.	1	2	3	4	5
13	Time to solve customer complaints is short.	1	2	3	4	5