

**ADDIS ABABA UNIVERSITY  
SCHOOL OF COMMERCE  
GRADUATE STUDIES DEPARTMENT OF LOGISTICS AND  
SUPPLY CHAIN MANAGEMENT**



**UPSTREAM SUPPLY CHAIN INTEGRATION IN ETHIOPIAN  
BREWERY SECTOR: THE CASE OF BGI ETHIOPIA PLC.**

**BY**

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**A THESIS PROPOSAL SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF  
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LOGISTICS AND SUPPLY CHAIN MANAGEMENT**

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**Addis Ababa**

## Statement of certification

This is to attest that this thesis is prepared by Tatek Wosenyeleh Assefa, on the topic entitled “ Upstream Supply Chain Integration in Ethiopian Brewery Sector: The Case of BGI Ethiopia Plc”. It is submitted in partial fulfillment of the requirements for the **Master of Arts Degree in Logistics and Supply Chain Management** adheres with the regulations of the Addis Ababa University School of Commerce and meets the accepted standards with respect to originality and quality.

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I, hereby, affirm that the thesis entitled “Upstream Supply Chain Integration in Ethiopian Brewery Sector: The Case of BGI Ethiopia Plc” is my original work and has never been offered for as a thesis or research study in any other university or academic conference. And all the sources of materials used for the thesis have been duly acknowledged.

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This is to verify that Tatek Wosenyeleh Assefa has carried out his thesis work on the topic entitled “Upstream Supply Chain Integration in Ethiopian Brewery Sector: The Case of BGI Ethiopia Plc” under my guidance and supervision. Accordingly, I hereby assure that his work is appropriate and standard enough to be submitted for the award of Master of Arts degree in Logistics and Supply Chain Management.

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# Table of Contents

LIST OF TABLES .....	1
LIST OF FIGURES .....	II
LIST OF TABLES .....	IV
ABSTRACT .....	VI
CHAPTER ONE.....	1
1.0 INTRODUCTION.....	1
1.1 BACKGROUND OF THE STUDY .....	1
1.2 INDUSTRY OVERVIEW & COMPANY PROFILE.....	3
1.3 STATEMENT OF PROBLEM .....	6
1.4 RESEARCH QUESTIONS .....	8
1.5 RESEARCH OBJECTIVES.....	8
1.5.1 GENERAL OBJECTIVE OF THE RESEARCH .....	8
1.5.2 SPECIFIC OBJECTIVES OF THE RESEARCH.....	8
1.6 SIGNIFICANCE OF THE STUDY .....	9
1.7 SCOPE OF THE STUDY .....	9
1.8 LIMITATION OF THE STUDY .....	105
1.9 DEFINITION OF TERMS .....	10
1.10 ORGANIZATION OF THE STUDY .....	11
CHAPTER TWO.....	12
REVIEW OF RELATED LITERATURE .....	12
2.0 INTRODUCTION.....	12
2.1 THEORETICAL LITERATURE REVIEW .....	12
2.1.1 SUPPLY CHAIN MANAGEMENT(SCM) DEFINITION .....	12
2.1.2 SUPPLY CHAIN MANAGEMENT DEVELOPMENT.....	13
2.1.3 SUPPLY CHAIN MANAGEMENT THEORIES .....	14
2.1.4 OVERVIEW OF SUPPLY CHAIN INTEGRATION(SCI).....	17
2.1.5 UPSTREAM SUPPLY CHAIN INTEGRATION.....	18
2.1.6 BENEFITS OF SUPPLY CHAIN INTEGRATION.....	19
2.1.7 BARRIERS OF SUPPLY CHAIN INTEGRATION .....	20
2.2 EMPIRICAL LITERATURE REVIEW.....	21
2.2.1 INFORMATION INTEGRATION(II) .....	23

2.2.2 COORDINATION AND RESOURCE SHARING(CRS) .....	25
2.2.3 ORGANIZATIONAL RELATIONSHIP LINKAGE (ORL) .....	26
2.2.4 MANAGEMENT COMMITMENT .....	26
2.3 CONCEPTUAL FRAME WORK .....	32
2.4 IDENTIFIED LITERATURE GAP .....	36
CHAPTER THREE .....	37
METHODOLOGY OF THE STUDY.....	37
3.1 INTRODUCTION .....	37
3.2 RESEARCH APPROACH .....	37
3.3 RESEARCH DESIGN .....	38
3.4 POPULATION& SAMPLING TECHNIQUE .....	38
3.4.1 TARGET POPULATION.....	38
3.4.2 SAMPLING .....	38
3.5 DATA SOURCES AND DATA COLLECTION INSTRUMENT .....	40
3.6 DATA ANALYSIS .....	40
3.7 RELIABILITY & VALIDITY TEST .....	41
3.7.1 RELIABILITY TEST .....	41
3.7.2 VALIDITY TEST .....	42
3.7.3 TRIANGULATION .....	45
3.8 ETHICAL CONSIDERATIONS .....	45
CHAPTER FOUR .....	47
RESULTS, DISCUSSION AND INTERPRETATION.....	47
4.1 INTRODUCTION.....	47
4.2 THE QUESTIONNAIRE’S RESPONSE RATE .....	47
4.3 DEMOGRAPHIC DATA PRESENTATION AND ANALYSIS .....	48
4.3.1 NUMBER OF EMPLOYEES .....	48
4.3.2 BUSINESS EXPERIENCE WITH BGI ETHIOPIA( in Yrs).....	48
4.3.3 POSITION OF RESPONDENTS & SEX .....	49
4.3.4 EDUCATION QUALIFICATION .....	50
4.3.5 WORK EXPERIENCE IN Yrs.....	51
4.4 DESCRIPTIVE STATISTICAL ANALYSIS TOWARDS THE PERCEPTION OF UPSTREAM SUPPLY CHAIN INTEGRATION .....	52
4.4.1 INFORMATION INTEGRATION(II) .....	53
4.4.2 COORDINATION AND RESOURCE SHARING(CRS) .....	60
4.4.3 ORGANIZATIONAL RELATIONSHIP LINKAGE(ORL) .....	66

4.4.4 MANAGEMENT COMMITMENT(MC).....	71
4.4.5 LEVEL OF UPSTREAM SUPPLY CHAIN INTEGRATION .....	76
4.5 INFERENTIAL STATISTICAL ANALYSIS TOWARDS THE PERCEPTION OF UPSTREAM SUPPLY CHAIN INTEGRATION .....	78
4.5.1 ASSUMPTIONS OF LINEAR REGRESSION.....	79
4.5.2 TEST OF NORMALITY & HOMOSCEDASTICITY.....	79
4.5.3 TEST OF LINEARITY .....	81
4.5.4 ASSUMPTION OF MULTICOLLINEARITY .....	82
4.5.5 MODEL SUMMARY: REGRESSION STANDARDIZED COEFFICIENTS .....	83
4.5.6 MODEL GENERALIZATION.....	84
4.5.7 ANALYSIS OF VARIANCE /ANOVA/ TEST.....	85
4.5.8 REGRESSION MODEL PARAMETERS.....	86
4.6 CHALLENGES OF UPSTREAM SUPPLY CHAIN INTEGRATION .....	89
CHAPTER FIVE.....	91
5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .....	92
5.1 SUMMARY OF MAJOR FINDINGS .....	92
5.1.1 SUMMARY OF FINDINGS ON DEMOGRAPHIC ANALYSIS .....	93
5.1.2 SUMMARY OF FINDINGS ON SUPPLY CHAIN INTEGRATION PRACTICE BASED ON THE DESCRIPTIVE STATISTICAL ANALYSIS RESULTS .....	93
5.1.3 SUMMARY OF FINDINGS ON SUPPLY CHAIN INTEGRATION FROM FOCUS GROUP DISCUSSION OF UPSTREAM SUPPLY CHAIN ACTORS.....	97
5.1.4 SUMMARY OF FINDINGS ON SUPPLY CHAIN INTEGRATION PRACTICE BASED ON THE INFERENTIAL STATISTICAL ANALYSIS RESULTS.....	98
5.2 CONCLUSION.....	99
5.2.1 CONCLUSION FROM DEMOGRAPHIC ANALYSIS .....	99
5.2.2 CONCLUSION FROM DESCRIPTIVE STATISTICAL ANALYSIS.....	100
5.2.3 CONCLUSION FROM THE FOCUS GROUP DISCUSSION .....	100
5.2.4 CONCLUSION FROM THE INFERENTIAL STATISTICAL ANALYSIS.....	101
5.3 RECOMMENDATIONS .....	102
5.4 LIMITATION OF THE STUDY.....	105
5.5 SUGGESTION FOR FURTHER STUDY .....	105
6.0 BIBLIOGRAPHY .....	105

**ANNEX:**

**Annex 1: Questionnaire .....I**

**Annex 2: Interview questions to BGI Ethiopia ..... II**

**Annex 3: Sample Size Determination Using Krejcie and Morgan Table .....III**

**Annex 4: Content Validity Ratio Table ..... IV**

**Annex 5: Test of normality results ..... V**

<b>List of tables</b>	<b>Page no.</b>
Table 1.2 Local brewery production capacity	5
Table 2.2.1 Summary of Empirical literature Review	29
Table 3.4.1 Sample size	39
Table 3.7.1. The Cronbach's $\alpha$ result	42
Table: 3.7.2 The content validity result	44
Table 4.3.1 Numbers of Employees	48
Table 4.3.2 Business experience with BGI Ethiopia ( in Yrs)	49
. Table 4.3.3 Position of respondents & Sex	50
Table 4.3.4 Education Qualification	50
Table 4.3.5 Business experience with BGI Ethiopia ( in Yrs)	51
Table 4.4.1.1 Information Integration(II) sub-dimensions Survey Result	53
Table 4.4.1.2 Information Integration(II) Survey Result	60
Table 4.4.2.1 Coordination and Resource Sharing Sub-dimensions Survey Result	61
Table 4.4.2.2 Coordination and Resource Sharing Survey Result	65

Table 4.4.3.2 Organizational Relationship Linkage(ORL) sub-dimensions Survey Result	69
Table 4.4.3.3 Organizational Relationship Linkage(ORL) Survey Result	70
Table 4.4.4.1 Survey Result of Management Commitment(MC) Sub- dimensions	72
Table 4.4.4.2 Management Commitment(MC) Survey Result	74
Table 4.4.5.1 Level of upstream supply chain integration Survey Result	77
Table 4.5.3 Pearson Correlation Information	82
Table 4.5.4: Test of Multicollinearity test statistics	83
Table 4.5.5. Model Summary	84
Table 4.5.7 Anaysis of Variance /ANOVA/	86
Table 4.5.8 Regression Model	88

<b>List of figures</b>	<b>Page no.</b>
Figure 1.2.1 Local brewery production capacity	5
Figure 2.2.1 Supply Chain integration Framework	23
Figure 2.3.1 conceptual frameworks Upstream supply chain integration	35
Figure 4.3.3 Position of respondents & Sex .	49
Figure: 4.3.4 Education qualification	51
Figure 4.4.2.1 Coordination and Resource Sharing Survey Result	65
Figure 4.4.3.1 Distribution of Organizational Relationship Linkage(ORL) Survey Result	66
Figure 4.4.4.1 Distribution of Management Commitment(MC) Survey Result	75
Figure 4.4.5.1 Level of upstream supply chain integration Survey Result	78

## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>AAPOR</b>	American Association for Public Opinion Research
<b>BGI</b>	Brasseries Et Glaciers Internationals (Commonly known as St George Beer factories)
<b>BPR</b>	Business Process Reengineering
<b>BSC</b>	Balanced Score Card
<b>CLM</b>	Council of Logistics Management
<b>CSCMP</b>	Council of Supply Chain Management Professionals
<b>CRS</b>	Coordination and resource sharing
<b>ERP</b>	Enterprise Resource Planning System
<b>ICT</b>	Information Communication Technology
<b>II</b>	Information Integration
<b>ISO</b>	International Standard Organization
<b>JIT</b>	Just-in-Time
<b>KAIZEN</b>	Japanese word to mean change for the better
<b>LR</b>	Linear regression
<b>M</b>	Mean
<b>MD</b>	Median
<b>ORL</b>	Organizational Relationship Linkage
<b>NT</b>	Network Theory

<b>NPI</b>	New product innovation
<b>PAT</b>	The principal-agent theory
<b>RBV</b>	Resource based view
<b>SC</b>	Supply Chain
<b>SCI</b>	Supply Chain Integration
<b>SCM</b>	Supply Chain Management
<b>SD</b>	Standard deviation
<b>SK</b>	Skewness
<b>SPSS</b>	Statistical Package for Social Science
<b>SSCM</b>	Sustainable Supply chain Management
<b>TCA</b>	Transactional Cost Analysis
<b>TQM</b>	Total quality Management
<b>USCI</b>	Upstream Supply Chain Integration
<b>VIF</b>	Variance Inflation Factor

## Abstract

*The objective of this study was to assess the Upstream Supply Chain Integration in Ethiopian Brewery Sector by taking the case company, BGI Ethiopia Plc. To carry out this task an explanatory type of research design was adhered. The target populations were upstream BGI Ethiopia partners & Supply Chain staff, and their total number were 860( 851 suppliers and 9 BGI staff) out of which a sample size of 274 ( 265 suppliers and 9 BGI staff) units has been determined. Whereas, a clean response of 235 questionnaires were effectively used for analysis that shows response rate of 85.8%.The major findings of the study indicates that the practice of upstream supply chain integration in the case company is very weak. Very few variables of the upstream supply chain integration considerations were practiced. These include the accuracy of information sharing (mean value of 2.76), operating with supply contract/commitment (mean value of 2.5), and informal & personal relationship (mean value of 2.9). The Pearson correlation analysis result indicated that there were positive relationship between all of independent variables and the dependent variable. Furthermore, the linear regression model revealed that out of the four predictors the two predictors organizational relationship linkage (b coefficient 0.63) & management commitment (b coefficient 0.48) has been founds as a predictor variables that have got high level of intensity to influence the response variable, upstream supply chain integration. Finally, the researcher recommended that getting organizational legal ground through the inculcation of upstream supply chain integration in the sourcing policy and procedure is the foundation work which should be accompanied with continuous learning, and sourcing reform.*

**Keywords:** - *upstream supply Chain Integration, Information Integration, Coordination & Resource sharing, Organizational relationship linkage, and Management Comment.*

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 BACKGROUND OF THE STUDY

In today's dynamic business setting, firms are facing challenges in their attempt to ensure sustainable & high-performance supply chain structure. This changing business environment has created a gradual stress that leads organizations to rethink a systematic approach to supply chain management & enlighten them the importance of cooperative, mutually beneficial supply chain relationship (Wisner & Tan, 2000; Lambert & Cooper, 2000).

Chopra & Meindl (2007) have notified the existence of the challenging tension in current business environment. And added that the competitive paradigm is not between firms, rather among the supply chains. And hence, the success of any firm will be contingent upon how well it manages its supply chain relationships. In addition, scholars advised the importance of close supply chain integration (SCI) between supply chain partners is a toolkit to cope with the current business dynamics (Armistead & Mapes, 1993; Lambret, et al., 1978).

Based on the various scholars advise supply chain integration (SCI) could be distinguished as one of the strategic area to work on. However, the journey is not expected to be flat. Because, the task requires right attitude, knowledge, hands-on experience and crossing own firm territory. Senge et al. (1999) pointed that the major confrontation for a business firm is that to design appropriate supply chain governance system that will balance the self-sufficient decision-making tendency which is oriented with self-interest against the mutually beneficial manner among partners. Richey et al. (1999) also stressed the SCI is not an easy practice. They consulted that this governance contest denotes the philosophy behind supply chain management, in that firms within a supply chain must have an equilibrium between self-interest and interdependency, in an effort to work together to advance overall supply chain performance.

Supply chain integration (SCI) can be understood as the extent in which the manufacturer systematically collaborates with its supply chain partners and collaboratively manages

intra- and inter-organization courses (Flynn, et al., 2010). Where the main purpose is to meet effective and efficient flows of products and services, information, money and decisions, to offer maximum value to the customer at low cost and high speed (Frohlich, 2002).

Zhao, et al. (2013) in their global research, *The impact of supply chain risk on supply chain integration*, confirmed this area ( Supply Chain Integration) is still in its embryonic stage and further empirical studies are required to reveal the factors that impact the level of SCI. In the scholarly work related to SCI on the developing countries, BeteGeorgise, et al.(2014) elaborated the case of developing countries, like Ethiopia, with the progression of information and communication technologies, supply chain integration has been well-thought as a strategic tool for firms to advance their competitiveness. Nevertheless, deficiency of an appropriate literature and hands-on experience in supply chain integration in developing countries are identified as one of the challenges.

When we look down to the Ethiopian macro level context, the government has got a plan to make the manufacturing sector to be a prime mover for the national economy. Nevertheless, the actual economic momentum showed this is a pure day dream. In 2017/18 the nation had an 11% GDP growth target, but the actual achievement was 7.7%. Nonetheless, it is far better than sub Sharan countries attainment of 3.3% . This low performance was attributed to the instability of the political environs in the nation. To make the manufacturing sector a game changer, the state has laid down a very optimistic plan of 20%; however, 5.5% had been the actual success in 2017/18 which is far from the ambitious state plan. The Ethiopian government has admitted manufacturing sector as a low performing sector that needs due attention during the budget review in June/2018 (MOFEC, 2019).

To realize the national plan, the state officials had tried to adopt various management programs Like KAIZEN, BPR, BSC, TQM & ISO to boost the manufacturing sector on various periods. But proper paybacks have not yet been garnered as expected. In addition, these tools are production & efficiency oriented. Currently, firms vs firms competition have been replaced by SC Vs SC. So, SC integration is expected to benefit business organizations through constantly changing business dynamics (BeteGeorgise, et al., 2014).

Though the upstream side of supply chain is vital in the chain, proper attention has not yet been given at state level & various private owned firms.

Lack of sufficient literature in Ethiopian upstream supply chain context has been one of the drives for this study. In addition, empirical study on the factors affecting the upstream SC integration at the national context is hardly available. This situations together with other factors are believed to lay their shadows for the practitioners to give less attention while operating in the competitive business arena.

This study emphasized that the upstream supply chain integration is a key tool kit to make continual improvement on the supply chain & needs to be studied more. And hence, it focused on capturing major variables that affect the intensity of Supply chain integration, specifically in the upstream zones. It went further to make quantitative analysis to examine the level of association between these variables & the level of supply chain integrations. And tried to identify which variables were more influential on the level of Supply chain integration.

For this research area, the Ethiopian local brewing manufacturing sector is selected. Among the local brewers, BGI Ethiopia PLC will be a case company for making detail upstream supply chain analysis & examine its current practice. This company is selected due its willingness to share relevant study data, to take research result as an area of improvement in the supply chain integration operation especially in the upstream line and as a global brewer to share its current practice.

## 1.2 INDUSTRY OVERVIEW & COMPANY PROFILE

The Ethiopian brewery industry traces its roots back to 1922 with the establishment of the St. George brewery. Today, the country produces approximately 17 million hectoliters of beer per year, a figure which is set to grow as popularity for the beverage continues to rise. There are currently six main brewers that together own 13 breweries producing at least 24 different brands of beers. As is the case globally, multinational brewers have a strong presence in Ethiopia and there are high levels of foreign investment in the sector. Table 1.2 & figure 1.2 clearly showed their Production capacity.

Established in 1922, by a Belgian national, Mr Hal, BGI Ethiopia is a pioneer local brewer (with current annual production capacity of 4.600 million hectoliter) and operating with lion market share in Ethiopia. It has got five breweries at various locations in Ethiopia ( these are Addis Ababa, Hawassa, Kombolcha, Maichew & Wolkitae). It is one of the wings of Groupé Castel, a global brewer, operating internationally in more than 53 countries. The company is producing four brands of products (Castel beer, St. George beer, Raya beer, and Zebidar Beer) both in draft and bottle (BGI, 2019).

Heineken was the next foreign player to enter the market, acquiring two breweries in 2011( Harar & Bedele)and opening a third in 2014(Kilinto greenfield). Heineken is currently the top producer, with capacity of 5.6 million hectoliters a year.

The oldest, Dashen, was established in 2000 and now has two breweries with a production capacity of 2.9 million hectoliters, making it the third-largest brewer. UK-based investors Vasari Global and Duet Group hold a 51% stake in the company, acquired in 2012 in a partnership with TIRET Group, a local endowment fund.

In 2012 another international giant, Diageo, entered the market by acquiring Meta Abo Brewery, which had been established in 1967. And, now has the fourth-largest market share at 1.7 million hectoliters annually, all based at a single facility.

Habesha Brewery launched in 2015 and is now the fifth largest brewer with production capacity of 1.5 million hectoliters annually. It is 60% owned by Bavaria, a Dutch brewing company.

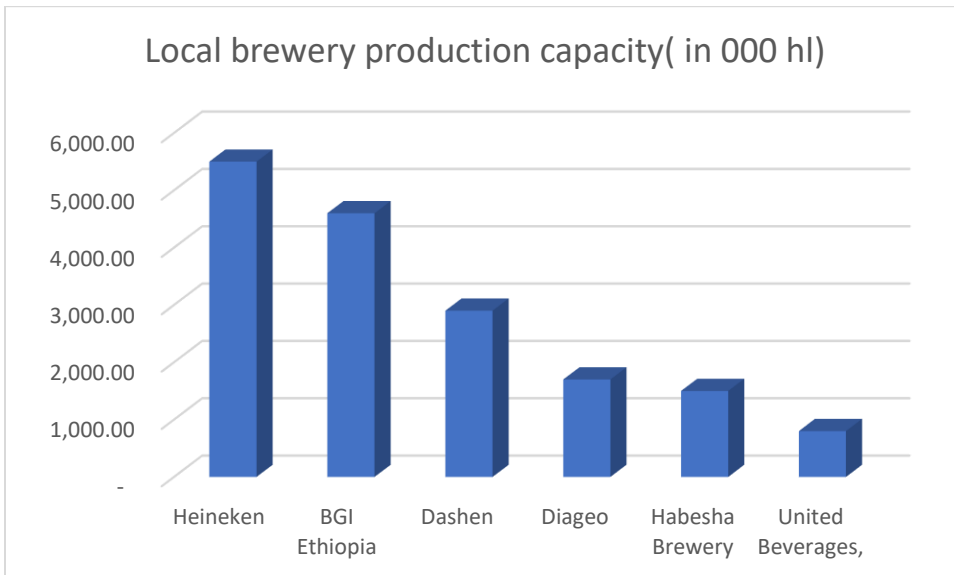
United Beverages, a newly formed joint venture between local family-owned Kangaroo Industrial Group and United Africa Beverages Company, has launched the ‘Anbessa Beer’ in the country’s beverage market. The brewery has got 800 thousand hectoliter capacity per annum.

Table 1.2 Local brewery production capacity.

s/n	Brewery	Production capacity ( in 000 hl)
1	Heineken Brewery	5,500.00
2	BGI Ethiopia	4,600.00
3	Dashen Brewery	2,900.00
4	Diageo	1,700.00
5	Habesha Brewery	1,500.00
6	United Beverages,	800.00
	Total	17,000.00

Source: ( Asoko Insight, 2020) and (Foodbusinessafrica, 2019)

Figure 1.2 Local brewery production capacity.



### 1.3 STATEMENT OF PROBLEM

As a zone of investigation, the SCI (supply chain integration) construct is a relatively new area that needs to be studied very well (Fawcett & Magnan, 2002; Spekman, et al., 1998). Few researchers measure SCI as one dimension (Cousins & Menguc, 2006), but more studies are now considering SCI as a multi-dimensional construct. These studies identify supplier integration, customer integration, and internal integration as three major types of SCI. Where supplier and customer integration can be further collapsed into external integration (Narasimhan & Jayaram, 1998; Flynn, et al., 2010; Swink, et al., 2007). Based on this viewpoint, this research paper based on the multi-dimension perspective of SCI & works on the upstream supply chain integration.

Though supply chain integration is one of the weapons to possess continual competitive advantage; scarce literature, skill & hands-on experience is a typical phenomenon in Ethiopia (BeteGeorgise, et al., 2014). There is no formal framework at national level for Ethiopian manufacturers to establish systematic integration with upstream partners. This situation has harbored ignorance & retarded the manufacturing sector from tapping the valuable benefits from upstream supply chain integration. Even if there are few global literatures on upstream supply chain integration, they need to be empirically tested to local industry context before consumption. This shows that there is bulk of research area to be addressed. The above factors are the main prime movers to select this widely open research field.

A study by Atnafu (2018) illustrated that SCI is at an infant stage in Ethiopia where many obstacles are hindering the growth. These includes but not limited to lack of top management commitment, lack of channel trust and commitment, inflexible organization system & resistance to change. In addition, a research carried out by Bete Georgise, et al.(2014) in the Ethiopian manufacturing firms revealed that most firms have got limited awareness about upstream SCI and their relationship with supplier is at transactional level. This phenomenon shows that the problem is deep rooted mostly to high level managers level. Unless the managers perception toward SCI is reverted, the task would be challenging. It is believed that continuous study need to be carried out on SC integration area.

This study focused on a deep but narrow area of upstream supply chain integration context. The research emphasized on developing empirical study to identify basic factors that influence the SCI in local manufacturing sector, the extent of association between these factors and SCI, and the level of their impact on the SCI. In addition, it examines the upstream supply chain integration practice of a case company, BGI Ethiopia PLC. The findings, discussion points & conclusion are believed to show the basic factors influencing SCI. And also, the best practice & gaps from BGI Ethiopia will also be assumed to narrow the knowledge gap in local manufacturing firms.

The assessment has revealed that there is no formal study made on the upstream SCI practice of the Ethiopian breweries. This shows that the existence of gap regarding identification of the pivotal major factors affecting the upstream SCI, the level of association between these key factors & the upstream SCI, and the extent to which these factors affect the upstream SCI. Identifying these pivotal factors has got great importance in prioritizing resource allocation while implementing the SCI program.

In addition, pre-assessment task of the BGI upstream SCI has revealed that irregularity of relationship between suppliers & the buyer(BGI) i.e. there has been transactional level relationship with many suppliers, collaborative level relationship with some & strategic/alliance level partnership with very few suppliers. Furthermore, lack of formal upstream SCI system is noted. The supply chain assessment report of BGI Ethiopia shows the existence of non-systematic relationship with upstream partners. Lack of various benefits like timely delivery, price discount, smooth communication with partners, and sustainable relationship have been recorded (BGI, 2019). So, this study will also further examine the current practice & the level SCI for the case firm.

Though this research focused on one manufacturing plant, the findings could be extended to other firms. Accordingly, the researcher desires to lay a brick as a contribution to the nation upstream supply chain integration in the manufacturing sector. In addition, the researcher wishes to ignite a light on the importance of SCI to the nations manufacturing industries so that state officials could consider launching Supply Chain Integration, SCI, practice as a package to private & government industries. This initiation would be believed to create an affirmative & fair benefit to all actors in the chain & leads to maximizing the value creation of products & service to end user.

## 1.4 RESEARCH QUESTIONS

Key research queries that direct the research are :

- What is the impact of Information Integration (II) on upstream SC integration?
- What is the impact of Coordination & Resource Sharing (CRS) on upstream SC integration?
- What is the impact of Organization & Relationship Linkage (ORL) on upstream SC integration?
- What is the impact of Management Commitment (MC) on upstream SC integration?

## 1.5 RESEARCH OBJECTIVES

### 1.5.1 GENERAL OBJECTIVE OF THE RESEARCH

To Assess the upstream supply chain integration in BGI Ethiopia will be the general objective of the study.

### 1.5.2 SPECIFIC OBJECTIVES OF THE RESEARCH

The specific objectives of the study are:

- To analyse the impact of Information Integration (II) on upstream SC integration,
- To analyse the impact of Coordination & Resource Sharing (CRS) on upstream SC integration,
- To analyse the impact of Organization & Relationship Linkage (ORL) on upstream SC integration,
- To analyse the impact of Management Commitment (MC) on upstream SC integration,

## 1.6 SIGNIFICANCE OF THE STUDY

The primary importance of the study will surely be to BGI Ethiopia PLC. This includes SCM executives, the technical sourcing managers, and the commercial department executives. In line with this, partners of BGI Ethiopia in the upstream line (Manufacturers, wholesalers and retailers) will also be believed to get valuable inputs for their mutual & sustainable business relationship.

The study result of the upstream supply chain management integration is expected to have substantial importance for other local brewing firms & the benefits could also be extended to local manufacturing firms as well.

The study also offers key information that can be consumed as an input for policy makers, industry consultants that are working on national level supply chain & value chain practice, and strategy development.

Furthermore, the production of the research is expected to be a base for academicians & investigators to fill the gap and address limitations that has been acknowledged by this study.

## 1.7 SCOPE OF THE STUDY

This study is demarcated on the upstream supply chain integration of the local brewery industry especially on BGI Ethiopia & its five branch factories suppliers. The factories are located at Addis Ababa, Hawassa, Kombolcha, Maichew( Tigray region) & Gubre( around Wolkite). Since most materials are sourced from central Procurement office( by Supply chain Department), all upstream supply chain partners working with central procurements are considered for the study. The geographical location of the respondents Addis Ababa, Surrounding, and two major global supplier at Switzerland(Geneve) & Gibraltar.

The conceptual scope of the research will be limited to the upstream basic supply chain integration variables: Information Integration (II), Coordination & Resource Sharing (CRS), Organization & Relationship Linkage (ORL), and Management Commitment (MC) & the upstream supply chain integration of the case company. Since this study have been planned to be carried out in two semesters of academic calendar, time was also the limiting factor.

## 1.8 DEFINITION OF TERMS

Major conceptual terms that will be employed in the study are defined as per below:

### **Supply Chain management**

It is the management of upstream and downstream affairs with suppliers and customers in order to bring more customer value at less cost to the supply chain as a whole. Where the focus of SCM is upon the management of relationships in order to realize a further profitable outcome for all parties in the chain (Christopher, 2011).

Supply chain management is an integrating function with prime accountability for integrating chief business functions and business processes within and across companies into a cohesive and high-performing business model (CSCMP, 2019).

### **Upstream Supply Chain**

The upstream supply chain is a segment of supply chain that focusses the buy-side of the firm which are principally its suppliers passing by any existing intermediaries where the main activities related to this supply chain model are procurement and inbound logistics (Shkoukani, et al., 2013).

### **Supply Chain Integration (SCI)**

Supply chain integration could be defined as the extent to which a manufacturer strategically works in partnership with its supply chain associates and collaboratively manages intra- and inter-organization processes. The goal is to realize effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer at low cost and high speed (Flynn, et al., 2010).

Zhao, et al. (2008) gave a clear definition for supply chain integration as the extent to which an organization strategically collaborates with its supply chain partners and manages intra and inter-organization processes in order to attain effective and efficient movement of products and services, information, money, and decisions with the purpose of attaining the maximum value to the customer at low cost and high speed.

## 1.10 ORGANIZATION OF THE STUDY

The study is organized into five chapters: Chapter one encompassed the introductory part covering on background of the study, the research problem, research questions, objectives of the research, significance of the study, scope of the research, limitation of the study and definition of terms.

The second chapter discussed related literature review on upstream supply chain integration. In this chapter, the scholar focused on related theoretical & empirical literatures in supply chain to develop conceptual frame work which will address the statement of the problem & objectives designated in chapter one.

In chapter three, the research design and methodologies has been delivered. Population, Sample and sampling techniques, source of data, data collection instruments, methods of data analysis, test of data reliability & validity, and ethical considerations in data collection & analysis was discussed.

Discussion and findings was placed on chapter four. This chapter included the survey result data analysis in a descriptive & inferential statistical scheme. Furthermore, result interpretation, comparison with other best practice studies has also been made. Here major challenges in the upstream supply chain integration practice of the case company has also been included.

In conclusion, chapter five has encompassed primarily summary of the research findings, and conclusions. The summary would also be made based on findings and results which was stated in chapter four, and classified based on the demographic, descriptive statistics, focus group discussion, and regression analysis results. Finally, this chapter wound up by making recommendations, and limitations of the study.

## CHAPTER TWO

### REVIEW OF RELATED LITERATURES

#### 2.0 INTRODUCTION

The main theme of the review of related literatures laid on three foundations. Primarily, to assess the basic theoretical framework on the study (Denney & Tewksbury, 2012). Secondly, to get the result of other studies that are closely related to the study being to be carried out, empirical literature review (Frankel & N, 1990). Thirdly, to recognize gaps in the existing body of knowledge & paves away to contribute to fill gaps, i.e. conceptual frame work & identification of literature gap (Marshal & G, 1989)

Where the themes & subthemes of this research interwoven with the research questions, objectives, methods & findings of prior studies. According to Ridley(2008) , literature review is a tool to identify theories & previous research which has influenced researcher choice of research topic & methodology adopted.

#### 2.1 THEORETICAL LITERATURE REVIEW

It is a reviewing phase in research process where the existing framework founded on an existing theory reflects the hypothesis of the study. It is a blueprint that is often borrowed by the researcher to build his/her own research inquiry. Theoretical literature review aids as the basis upon which a research is erected. The theoretical framework entails, the theoretical principles, constructs, concepts, and tenants of a theory (Adom & Hussein, 2018).

##### 2.1.1 SUPPLY CHAIN MANAGEMENT(SCM) DEFINITION

Supply chain management incorporates the planning and management of entirely actions involved in sourcing and procurement, conversion, and all logistics management activities. Prominently, coordination and collaboration with channel partners, which can be suppliers, intermediaries, and customers (CSCMP, 2019).

Christopher (2011) in his book *Logistic & Supply Chain Management*, clearly defined SC Management from the integration perspective as a pivotal concept of value adding tool to customers by managing upstream and downstream interactions of suppliers and customers.

### 2.1.2 SUPPLY CHAIN MANAGEMENT DEVELOPMENT

Both industrial engineering and operations research have their roots in logistics. Fredrick Taylor, who wrote *The Principles of Scientific Management* in 1911 and is considered the father of industrial engineering, has got a research that focused on how to advance manual loading processes. Operations Research commenced when scientists established the value of analytics in the study of military logistics problems in the 1940s as a result of the complex requirements of World War II. While Industrial Engineering and Operations Research have each tried to uphold separate identities, many of their principal achievements have occurred when used in an integrated framework that addressed the future supply chain and logistics concepts. At that time, this is referred as Supply Chain Engineering (Robinson, 2019).

In the 1940s and 1950s, the attention of logistics research was on how to use mechanization. In the mid 1950s, this perception was stretched to transportation management with the development of intermodal containers together with ships, trains, and trucks to handle these containers. This was a precondition for the supply chain globalization that was to come much later. Although the terms “warehousing” and “materials handling” were used to describe many of these efforts (Southern, 2011).

By the 1960s, a clear trend had developed in shifting from material handling to *Physical Distribution*. The National Council of Physical Distribution Management was formed in 1963 to focus industry attention on this area and quickly became the principal organization in the field. Academic researches and education followed this trend to gratify the growing industry recognition of the needs in this area. Prior to the 1960s, virtually all transactions and record keeping were done manually. During 1970s, the computerization revolution opened the door to a huge prospect for innovations in logistics planning, optimization of inventory and truck routing. In the early 1980s, this advancement provided tremendously better computer access to planners, a flood of new technology including flexible

spreadsheets and map-based interfaces. In 1985, the National Council of Physical Distribution Management changed its name to the Council of Logistics Management (CLM). The reason given for the name change by the new CLM was to reflect the evolving discipline that included the integration of inbound, outbound and reverse flows of products, services, and related information (Robinson, 2019).

The logistics boom was fueled further in the 1990s by the advent of Enterprise Resource Planning (ERP) systems. The widespread recognition of the term “supply chain” has come primarily as a result of the globalization of manufacturing since the mid 1990s. Then, the Council of Logistics Management’s changed its name to the Council of Supply Chain Management Professionals in 2005. They make the distinction that Logistics was that part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers’ requirements. While Supply Chain Management was the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole (Southern, 2011).

The later part of the 1990s is remembered as the time when the use of the terms supply chain and supply chain management rose to prominence. The core of SCM is integration and that the importance of partnering will likely remain unchanged. However, the ways a company interacts and manages its integration will change (Min, et al., 2019). Hammer(2001) foresaw that restructuring of cross-company processes in to integration is the next frontier for reducing costs, enhancing quality, and speeding operations.

### 2.1.3 SUPPLY CHAIN MANAGEMENT THEORIES

Wecker (1998) have defined the importance of theory as providing a framework for analysis, facilitates the efficient development of the field, and is needed for the applicability to practical real world problems.

Scholars highlighted that the advance of diverse theories are the fundamental basics of business studies (Lagat, 2013). The basic theories in which supply chain management literatures explored are resource based view(RBV), transactional cost analysis(TCA), network perspective(NP) and principal-agent theory(PAT). These concepts help to broaden the understanding of supply chain management from various perspectives (Holldorsson, et al., 2007).

### **RESOURCE BASED VIEW (RBV)**

While the classical RBV literature focused on the firm's internal resources, recent researchers have underlined the importance of external resources available to the firm through its networks (Hunt & Donna, 2008; Zaheer & Bell, 2005) . Embeddedness of firms in external relationship networks holds significant implications for firm performance. Therefore, the relevance of RBV to supply chain process integration becomes evident because of the engagement of both internal and external resources (Gulati, et al., 2000). In addition, researchers have settled that the alignment of strategy and structure is a baseline prerequisite for organizational integration & performance (Miles, et al., 1978).

### **TRANSACTION COST ANALYSIS (TCA)**

Andreson & Weitz (1992) highlighted that transactional cost analysis (TCA) theory proposed that interfirm coordination leads total transactions costs reduction. When firms establish partnership in either a formal or informal way with external partners, like suppliers, linking and simplifying supply chain processes offers an outstanding opportunity to reduce both transaction related costs and production costs. Chen, et al.(2009) and Grant(1991) also confirmed that process integration leads to achieve cost advantage since it reduce redundancies & enhance efficiencies.

Cost orientation is a noteworthy driver of supply chain process. Firms hunting a low-cost strategy may see integration as a treasured means to realize cost reduction through business process streamlining and the exclusion of redundancies. Transaction Cost Analysis (TCA) provides strong support for the supply chain process integration (Chen, et al., 2009).

## **THE NETWORK PERSPECTIVE**

The network theory perceives the actors on the supply chain as their performance not only depend how efficiently they cooperates with their direct partners, but also on how well these partners cooperate with their own business partners (Oliver & Shapiro , 1990). Principally the network theory is considered to describe the relationships in which companies, suppliers, customers or buyer are engaged (Wellenbrock, 2013). Harland (1996) defined the network as a specific type of relationship linking a defined set of persons, objects or events. Whereas Thorelli (1986) elaborated that the term network refers to two or more firms involved in long term relationships.

The network theory also extends its perspective in relation to resource as the value of a resource of an organization will have more impact when it is combined with other organizations resource. This concept of network perspective has similarity with modern resource-based view(RBV). In addition, Hakansson & Ford(2002) affirmed that companies that has got network with another company are observed to get benefit in their SC performance.

## **THE PRINCIPAL-AGENT THEORY (PAT)**

Agency theory is relevant for the situations wherein one party (the principal) delegates authority – in terms of control and decision-making about certain tasks – to another party (the agent) (Eisenhardt, 1985). PAT also provides a useful framework for explaining how problems surrounding the issue of the separation of control (for example, agents acting independently) from ownership (the principal's desire to manage and maximize their resources) can be minimized (Halldórsson & Skjott-Larsen, 2006).Agency problem arise between the owner(principal) and the agent. The focus of the principal-agent theory is to design a contract to ease this problem. PAT has no direct relation to supply chain integration (Eisenhardt, 1998; Logan, 2000)

In addition, Stock (1997) posits that agency theory may also assist managers in understanding SC behavior by focusing attention on major issues like: the development of

inter- and intra-organizational relationships; the maintenance of complex relationships between suppliers and customers (e.g. vendors and third-party logistics providers); the dynamics of risk sharing, capital outlay, power and conflict between channel intermediaries; and identifying the costs and benefits of SC integration.

#### 2.1.4 OVERVIEW OF SUPPLY CHAIN INTEGRATION(SCI)

SCI is a notion that concentrates on accomplishing the enhanced synchronization of processes and the improved exchange of high quality information throughout the SC, in order to improve both SC and operational performance (Huang, et al., 2014). SCI is often postulated as comprising of both internal and external integration dimensions (Zhao, et al., 2011; Campbell & Sankaranl, 2005).

Internal SC integration could be defined as the quality of the state of collaboration that occurs among departments that are required to realize unity of effort by the demands of the environment (Chen, et al., 2007). The scholarly work of Flynn et al. (2010) put a conscience definition for internal SCI as the extent to which a manufacturer organizes its own strategies, practices and processes into collaborative, synchronized processes, in order to fulfill its customers' requirements and efficiently interact with its suppliers. So one can consider internal integration as an efforts within the focal firm to overcome functional boundaries and advance the level of cooperation and process alignment within the firm.

In their research Flynn et al. (2010) defined external SC integration as the degree to which a manufacturer collaborates with its external partners to structure inter-organizational strategies, practices and processes into collaborative, synchronized processes. External integration is commonly categorized as into customer and supplier integration, with each of these endeavoring to upsurge the amount of high quality information that is shared between SC partners, and their level of process alignment (Stevens & Johnson, 2016; Stank, et al., 2001). And hence, external integration could be though as the exertions to collaborate, share information and align processes with external SC partners.

According to Mackelprang, et al.(2014), the performance enhancements associated with SCI are normally categorized into business and operational performance improvements. Regarding the improvements of operational performance, it has been suggested that SCI improves the efficiency and flexibility of logistics processes, the quality of outputs, and the visibility and quality of information throughout the firm. The improvements extend to advance customer service levels, and operational costs reduction. Regarding business performance, Chang, et al(2015) explained that the operational paybacks that SCI offers allow for lower running costs relative to competitors, infusing the firm with superior financial performance with regard to profit margins and return on investment.

Outcomes from several authors show that most firms have a narrow scope of integration and that firms with broad scopes are rare (Schoenherr & Swink, 2012; Childerhouse & Towill, 2012).This situation inhibits firms from harvesting the full benefits of SC integration. True supply chain integration embraces both upstream and downstream players, while internal integration provides the foundation for both (Stevens, 1989).

Both internal and external integration can support to accomplishing reductions in costs, stock-outs, and lead-time, and can lead to competitive advantage. Therefore, a firm is likely to obtain superior performance when achieving high levels of integration both internally and externally (Gimenez & Eva, 2003; Hillebrand & Biemans, 2003).

#### 2.1.5 UPSTREAM SUPPLY CHAIN INTEGRATION

Council of Supply Chain Management Professionals (2019) defined as upstream supply chain as the supply zone in the supply chain where supplier are expected to offer goods and services to the organization needed to please demands which emanated from buyers.

Upstream supply chain integration refers to the process of interaction and partnership between an organization and its suppliers to safeguard an effective flow of supplies. It is also called ‘backward’ integration (Frohlich & Westbrook, 2001). Integration with suppliers signifies a change from a confrontational to a cooperative attitude, commencing with product development, the supply of high-quality products, the processing and incorporation of changes in specifications, technology exchange and design support (Gelagay, 2018).

A firm is believed to have a high level of upper SCI when its information systems are linked with those of the suppliers, both parties can access accurate and real-time information, and there are effective means of communication between the two parties (Liker, et al., 1995).

#### 2.1.6 BENEFITS OF SUPPLY CHAIN INTEGRATION

Nevertheless, few organizations have genuinely made the most out of the potential of supply chain collaboration (Barratt & Oliveira, 2001). Supply chain collaboration appears to have excessive opportunity, but more enquiry is desired to spot its worth (Goffin, et al., 2006). Companies that has integrated their supply chain activity & took advantage are very few in developing countries (Hosseini, et al., 2012). In developing countries, the practice of SC integration in manufacturing sectors like garment, leather & textile is at an infant stage & expected benefit has not yet been harvested (Bete Georgise, et al., 2014).

Firms hunt SCI for the valuable effects. These benefits are commonly characterized as improvements to either operational or business performance. In terms of operational performance improvements, external SCI advances process alignment, efficiency and information flow between SC partners, improved customer service. In terms of business performance, the key benefit recognized from external SCI is cost savings. These benefits associated with internal SCI comprised the improved availability of high quality information & increased process adherence (Mostert, et al., 2017).

Numerous authors come to an agreement that a high level of integration have a positive impact on corporate and supply chain performance (Frohlich & Westbrook, 2001; Vickery, et al., 2003; Childerhouse & Towill, 2003). So, identifying factors that affect the intensity of SCI & examining the level of association between influencing factors & level of SCI has got paramount importance.

### 2.1.7 BARRIERS OF SUPPLY CHAIN INTEGRATION

In spite of the acceptance and benefits of supply chain integration, numerous partner relationships fall short of meeting the members' expectations (Barringer & Harrison, 2000). Poor exchange of information, less skill & know-how, lack commitment & trust have been identified as the basic factors for the failure of SC collaboration (Tuten & Urban, 2001; Chen & Paulraj, 2004; Heyns & Luke, 2012)

Even though SCI is a stunning goal for firms and SC practitioners alike, the truth is that the fruitful implementation is a challenging task. Subsequently, few firms have achieved (Dey & Cheffi, 2013; Fawcett & Magnan, 2002; Bowersox, et al., 2000).

The external SCI, i.e. the upstream & downstream SCI requires characteristically a resource-intensive process, requiring investments in process re-engineering and technological capabilities. This represents a major barrier to successful SCI initiatives (Huang, et al., 2014). Whereas the internal SCI gets challenge regarding lack of cooperation and alignment between business functions, and an absence of top managerial support (Ellinger, et al., 2006).

BeteGeorgise, et al.(2014 ) found that an absence of awareness of the latent paybacks of SCI serves to obstruct SCI alongside operational inefficiencies. In addition Moster, et al.(2017) pointed that external SCI barriers related when suppliers lacking resources and capabilities, the complexity, and the transactional nature of retailer-supplier relationships.

A study conducted on the Ethiopian soap & detergent manufacturing study found that inflexible organization system , lack of channel trust and commitment, resistance to change, lack of top level management commitment and cross functional conflicts were identified as the top five critical challenges for adopting and implementing supply chain integration process in the manufacturing firms (Gelagay, 2018)

The bullwhip effect has an undesirable consequence on SCI at every stage and thus hurts the relationships among various SC Partners. This situation creates a tendency to give blame to other partners of the supply chain for each stage feels it is doing the best it can. The bullwhip effect thus leads to a loss of trust between different partners of the supply chain and makes any potential SCI efforts more difficult (Chopra & Meindl , 2007).

## 2.2 EMPIRICAL LITERATURE REVIEW

The empirical literature review is expected to focus on the previous research findings that the researcher wants to cite or make comparison. This section of the study shows the perspective of various researcher regarding the pivotal factors that influence the SC integration. In addition, a summary table is built to show a concise picture of the scholars.

It has been noted that various scholars expressed variables that influence SC integration. Lee(2000) developed a frame work of three dimensions: information integration, coordination and resource sharing and organizational relationship linkage. Luque, et.al.(2012) has made thorough literature review and developed Lee(2000) work by identifying variable for each dimensions.

In this study the perception of various Authors have been reviewed & a tabular summary has been developed at the end of empirical literature review. However, a new fourth influencing dimension of SC integration has been proposed with sub variables, which will help to develop an adopted conceptual frame work.

Since the stream of Supply chain integration is at embryonic stage few authors perceive SCI with single dimension while many with multiple dimensions (Luque , et al., 2012). Mostert,et al.(2017) in their study *Supply chain integration in the product return process* has pointed that upstream SCI efforts related to: the use of contracts, objective alignment, enhancing the flow of information between firms through electronic information exchange, and the alignment of inter-firm processes. The study findings also supported the enabling role of IT and close relationships in information exchange to enhance the relationship intensity and interdependence are positively linked to the level of external SCI.

A study made on *Supply chain integration and performance* reveals the effective and communal exchange of information between firms is vital to supplier integration and is often permitted through integrated information systems and direct contact (Prajogo & Olhager, 2012).

Mentzer, et al.(2008) in their work *Supply chain management and its relationship to logistics, marketing, production, and operations management* notified that coordination

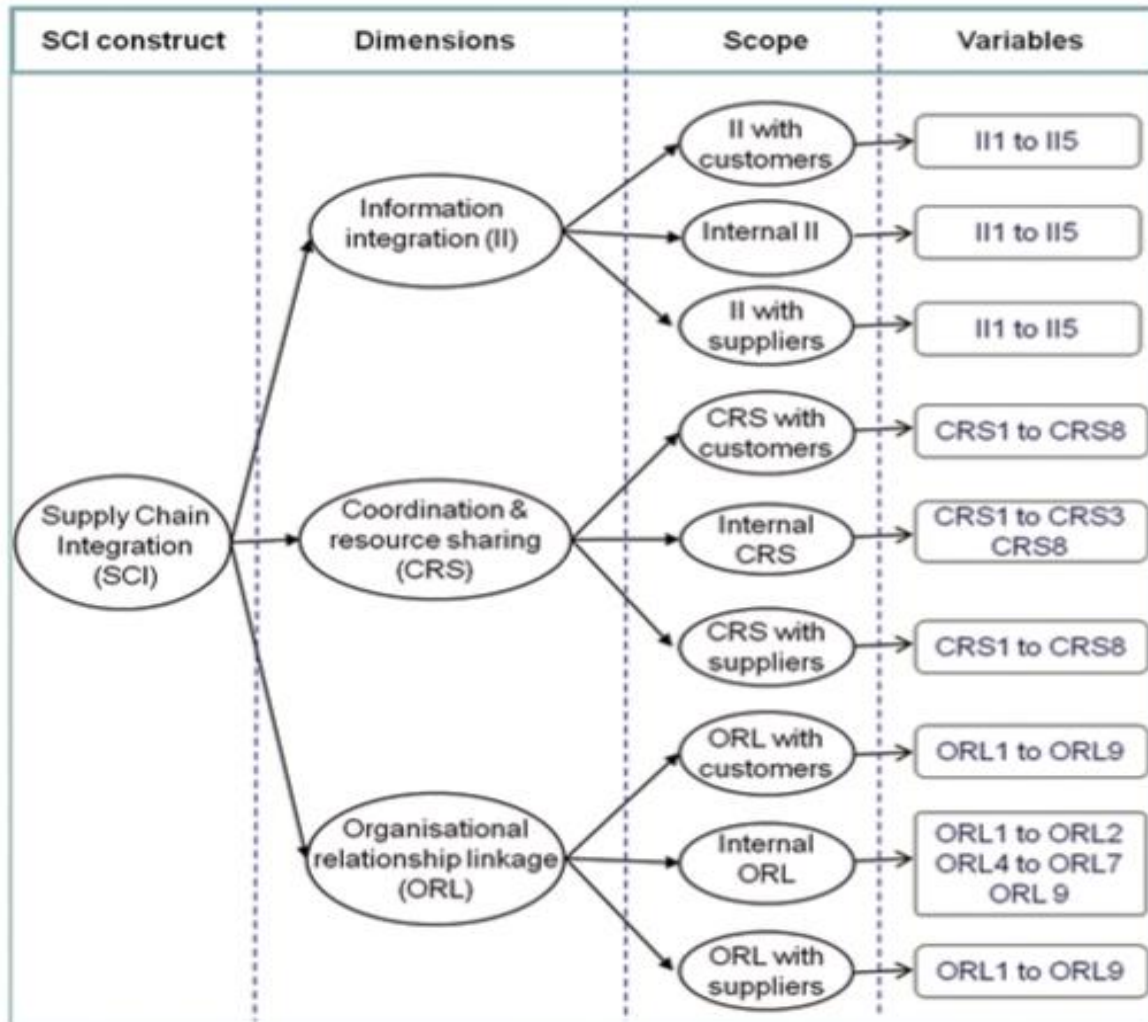
and collaboration with suppliers and customers is the key element of supply chain integration.

A research conducted on the Ethiopian Soap and Detergent Manufacturing firms shows, coordination, collaboration, interaction, information flow linkage and business process linkage become the key components of supply chain integration (Gelagay, 2018).

Simatupang and Sridharan(2005) have established the supply chain integration frame work on five pillars namely: information sharing; a collaborative performance system (CPS); decision synchronization; incentive alignment; and integrated supply chain processes. These features interact each other with respect to overall performance. In addition, the scholars pronounced that the supply chain members are expected to make exchange of ideas about these key features of collaboration and to teach each other to their needs in the joint development of a mutually beneficial collaboration process.

In the scholarly work of Lee(2000) entitled *Creating value through supply chain integration*, he revealed that **information integration, coordination and resource sharing and organizational relationship linkage** are three major dimensions for SCI. The proposed framework aids to integrate both upstream suppliers and downstream customers with the focal organization. It also allows measuring SCI using both qualitative and quantitative approach. In addition, the three dimensions identified by Lee(2000) have been more examined, elaborated & supportive literature review have been done by Luque, et.al.(2012). These scholars have also developed a supply chain integration frame work that has been depicted below:

Figure 2.2.1 Supply Chain integration Framework.



Source: Luque, et.al.(2012)

### 2.2.1 INFORMATION INTEGRATION(II)

In order to survive and compete in today's global economy, manufacturing sector strongly needs to create, share and disseminate up-to-date and appropriate knowledge and information. Therefore, organizations must implement a strategy for integration with the SC partners (Nunes, et al., 2006).

The integration of the organizations should start with the exchange of information as it is one of the key factors for SCI (Lee, 2000). Furthermore, Lotfi, et al.(2013) elaborated that Information Integration is an essential pillar of supply chain integration. Where the

advancement in information and communication technology has made information integration more conceivable. Moharana, *et al.*(2012) reflected that information exchange is one of the most important element in supply chain management Integration. And can be considered as a glue which holds together different parts of the supply chain structure.

Min et al.(2019) represent information Integration as the heart of supply chain collaboration. This means that more attention needs to be given to information sharing. Information which is shared among actors in the supply chain is expected to increase operational efficiencies & lower cost which in turn creates competitive advantage for all in the chain. Therefore, organizations must implement a strategy for integration with the SC partners.

Stevens & Johnson(2016) argued that both supplier and customer integration primarily require high quality information to be shared along SC partners which will then helps as a base for process alignment. Khurana, et al(2011) elaborated the idea that information sharing is basic elements of SCI. In addition, Schoenherr & Swink (2012) explained external integration as exertions to collaborate, share information and align processes with external SC partners. (Wellenbrock, 2013)

Moharan, et al. (2012) in their scholarly work, *Coordination, Collaboration and Integration for Supply Chain Management* stress that information sharing has got pivotal role in the supply chain integration and paves a road to coordinated forecasts. Wellenbrock(2013) in his research stressed that information and knowledge sharing is the basic pillars of partners in supply chain integration. Khurana, et al.(2011) elaborated the idea that information communication technology (ICT) systems are basic elements of SCI. Since a pile of data is generated in the supply chain line, usage of ICT helps to structure the data flow. In addition, decision associated with supply & demand will also be facilitated by the ICT (Chopra & Meindl , 2007).

Lummus and Duclos (2003) narrated that Supply chain strategy which is an element of information integration dimension is prerequisite of the integration of supply chain. A study carried on *Strategy, Structure and Performance: A Framework for Logistics Research* made a proposition that the success of supply chain process integration is dependent on whether it can offer a strategy-structure fit (Chow, et al., 1995). It's basic

tenet is that a firm's strategy drives the development of organizational structure and process (Miles, et al., 1978). Since SC integration needs a formal communication in all process, organizations are expected to give due concern to their structure before implementation (Cai, et al., 2010; Jin & Hong, 2007). A feasible structure creates accountability & responsibility. Furthermore, it helps to allocate proper resource to SCI implementation, monitoring & maintenance

### 2.2.2 COORDINATION AND RESOURCE SHARING(CRS)

Coordination and resource sharing describes the firm interest of supply chain partners looking for synergy based on trust and the dependence (Luque , et al., 2012). Coordination and resource sharing is described as separate entities that work together for decision making to enhance overall supply chain performance (Moharana, et al., 2012).

Due to the increased emphasis on efficiency, modern supply chain processes are no longer labor-intensive, nor independent resource owners, it is rather a chain based on shared resources. Where the supply chain objectives can't be achieved unless the resources of different industry bodies are integrated. The coordination & supply chain resource sharing aims to integrate different resources in the value chain. These includes goal setting, logistical resources & decision making (Lu, 2015).

Resource sharing is one of the most critical factor for effective coordination in supply chain management (Arshinder & Deshmukh, 2007). However, not all suppliers or customers are going to have the same level of integration, as this will depend on the mutual interest of the companies (Lambert & Cooper, 2000).

Fugate, Sahin and Mentzer (2006) found that contracts between SC partners can enhance process alignment by ensuring that each partner pursues the same goal instead of seeking to maximize their own firm's benefits. Powers and Jack (2015) similarly found that contracts can improve performance in relationships between SC partners.

SCM commitment is a promise or agreement to do something in the future in supply chain relationships. Commitment is defined as the desire on the part of each party to a business relationship to maintain and strengthen that relationship (Morgan & Hunt, 1994).

Commitment provides the basis for a cooperative spirit in marketing Channel relationships and leads to an overall stronger partnership (Anderson & Weitz , 1992).The understanding that commitment is crucial to the long-term success of a business relationship is central to understanding organizational success (Andaleeb, 1996). Wu, et al.(2012) found that there is a positive relationship between SCM Commitment and SC Integration.

### 2.2.3 ORGANIZATIONAL RELATIONSHIP LINKAGE (ORL)

In recent years, many organizations have changed attitude towards their suppliers and customers. Today focal organizations seek to work together with their suppliers and customers to plan and operate for greater success than work in isolation (Simatupang & Sridharan, 2002). Ebers(2012) defined interorganizational relationships as the longer-term relationships between and among organizations (e.g., suppliers, customers, and focal firms) that are pursuing a mutual interest while also remaining independent and autonomous, thus retaining separate interests.

Organizational relationship linkage refers a clear common strategic vision & objectives among partners in the supply chain. Furthermore, it encompasses risk sharing, operational cost reduction, promoting reward, developing skills and institutional culture, and defining joint performance measures. It is necessary to design communication channels and create cross-functional teams along the SC (Luque , et al., 2012). Therefore, building long-term relationships among the SC members is necessary to develop SCI.

Trust among upstream supply chain partners involves a belief that each partners are concerned in the others' welfare and will not take actions without considering their impact on the other stages. This includes partners are more likely to take the other party's objectives into consideration when making decisions, joint price setting, etc. (Chopra & Meindl , 2007).

### 2.2.4 MANAGEMENT COMMITMENT

The success of various organizational initiatives is highly associated with the management commitment. Because the commitment given by the top management to a business system

is in terms of support and attention to various strategic issues like SC integration. The commitment expressed in terms of resource allocation to run the system (Tarigan, et al., 2017). The affirmative impact of SC integration need to be inculcated in the mind of business managers. Tan, et al.(2006) and Fawcett, et al.(2008) asserted that the management from both organizations are expected to view the partnership as a shared growth strategy and be fully committed so that they trust each other to act in their mutual best interest. A research by Lee et al.(2016) reveals that the top management commitment increases the effectiveness on sharing information & knowledge among organizations in the chain so that it will ease the implementation of SC integration.

Top level management commitment has a noteworthy relationship with SC collaboration that could leads responsive supply chain. Because if they are not making effort, the overall coordination in supply chain cannot achieved. Decisions related to resources allocation, Culture of organization, training of employees, supply chain strategy formulation, and development of suppliers are done by top management (Kumar , et al., 2015).

Long term relationship requires management commitment from all supply chain partners. Establishing commitment amongst supply chain partners will leverage the working activities and facilitate informative transactions and helps to avoid conflicts between supply chain partners (Kim, et al., 2010). Higher management commitment amongst supply chain partners will lead to higher supply chain collaboration (Stefany & Sunardi, 2017).

The networks of informal, and personal relationships influence business activities. Berlin,et al(2019) confirmed informal, and personal relationships is like a lubricant in SC integration. Furthermore, the scholars elaborated by developing a frame work for Informal mechanisms. The framework includes three basic factors : lateral relations(Cut across the formal structure and includes direct contact between suppliers & focal firm managers), informal communication(the creation of a network of informal and personal contacts among managers in the chain), and socialization( a process of socialization of individuals among partners).

**Informal, and personal relationships** have got influence on the business activities in developing countries (Lovett, et al., 1999). For a firm, these informal relationships constitute social capital at the organization level (Luk, et al., 2008).Through these

networks, firms can obtain knowledge about changing rules, regulations, and incentive in the supply chain system, as well as information about new product features, technical advances, and manufacturing technologies from managers of other firms (Luk et al., 2008). Child et al. (2003) also alerted that the importance of personal relationship as a crucial institutional force that is embedded in intra-firm's integration. In the developing countries, the legal system is not updated to the current business dynamics & the legal enforcement is weak, where in such situations the personal relationship play the leading role in establishing & nurturing collaboration among main actors in the supply chain. (Brown , et al., 1995).

For management has got a significant & irreplaceable role in SC integration role, their level of commitment need to be measured. Johari, et al.(2018) proposed that establishing policies and plans to achieve the goals., providing training and ongoing support & continuous improvement, regularly performance reviews and ensuring control at all levels of organization are basics variable to measure the effort of management (Johari, et al., 2018).

Summary of empirical literature review has been presented in the below table.

Table 2.2.1 Summary of Empirical literature Review

S/n	Authors	Journals	Influencing variable of SC Integration.	Dimension of SC Integration
1	(Cai, et al., 2010)	Journal of Operations Management	Structure	II
2	(Chopra & Meindl , 2007).	Supply Chain Management Strategy, Planning, and Operation(book)	Information & communication technology (ICT)	II
3	(Chow, et al., 1995)	Logistics and Transportation Review	Strategy-structure fit	II
4	(Gelagay, 2018)	Journal of Management and Business Research	Interaction, information flow	II
5	(Lee, 2000)	Supply Chain Management Review	Information integration	II
6	(Min, et al., 2019)	Journal of Business Logistics	Information Integration ,	II
7	(Mostert, et al., 2017)	Acta Commercii	contracts, objective alignment, flow of information, electronic information exchange	II
8	(Stevens & Johnson, 2016).	International Journal of Physical Distribution & Logistics Management	High quality information, process alignment.	II
9	Moharana, et al.(2012)	International Journal of Interscience Management Review	Information exchange	II
10	(Jin & Hong, 2007)	Journal of Enterprise Information Management	structure	II
11	(Khurana, et al., 2011)	International Journal of Manufacturing Systems	Information sharing	II
12	(Khurana, et al., 2011)	International Journal of Manufacturing Systems	Information & communication technology (ICT)	II
13	(Lotfi, et al., 2013)	Procedia Technology	Information Integration, information and communication technology	II
14	(Lummus & Duclos, 2003)	Supply Chain Management-an International Journal	Strategy	II
15	(Moharan, et al.,2012)	International Journal of Interscience Management Review	Information sharing	II
16	(Prajogo & Olhager, 2012)	International Journal of Production Economics	integrated information systems, direct contact.	II

S/n	Authors	Journals	Influencing variable of SC Integration.	Dimension of SC Integration
17	(Schoenherr & Swink, 2012)	Journal of Operations Management	Collaborate, share information	II
18	(Simatupang & Sridharan, 2005)	The International Journal of Logistics Management	Information sharing; a collaborative performance system (CPS); decision synchronization;	II
19	Leque, et.al.(2012).	Production Planning & control	Information integration(II) as a dimension( variables includes: Accurate information sharing, Collaborative planning & strategy, Joint replenishment system, Information & communication Technology(ICT)),	II
20	Wellenbrock(2013)	Journal of Economics	Information and knowledge sharing	II
21	(Arshinder & Deshmukh, 2007).	Production Planning & Control: The management of operations	Resource sharing	CRS
22	(Lee, 2000)	Supply Chain Management Review	Coordination and resource sharing and organizational relationship linkage	CRS
23	(Wu, et al., 2012)	Asia Pacific Journal of Marketing and Logistics	Commitment	CRS
24	(Fugate, Sahin and Mentzer, 2006)	Journal of Business Logistics	Contracts	CRS
25	(Lu, 2015)	International Journal of simulation modeling	Integrate different resources	CRS
26	(Mentzer, et al., 2008)	Journal of Business Logistics	Coordination and collaboration with suppliers and customers	CRS
27	(Powers and Jack, 2015)	International Journal of Retail & Distribution Management	Contracts	CRS
28	Leque, et.al.(2012).	Production Planning & control	Coordination & Resource Sharing(CRS)( variables includes: Integrate shared decision making, Reorganizing outsourcing, Contractual agreement, Process integration)	CRS

S/n	Authors	Journals	Influencing variable of SC Integration.	Dimension of SC Integration
29	(Ebers, 2015)	International Encyclopedia of the Social & Behavioral Sciences	Longer-term relationships	ORL
30	(Gelagay, 2018)	Journal of Management and Business Research	Coordination, collaboration, & business process linkage	ORL
31	(Lee, 2000)	Supply Chain Management Review	Organizational relationship linkage	ORL
32	(Chopra & Meindl , 2007).	Supply Chain Management Strategy, Planning, and Operation( Book)	Trust	ORL
33	(Fugate, Sahin and Mentzer, 2006)	Journal of Business Logistics	Process alignment	ORL
34	Leque, et.al.(2012).	Production Planning & control	Organization & Relationship Linkage(ORL) ( variables includes: Regular communication channel ,Performance measurement, Incentive realignment, Integrated behavior, Sharing skill, idea best practices, Forging trust & long term relationship, Creating team work).	ORL
35	(Mostert, et al., 2017)	Acta Commercii	Alignment of inter-firm processes,	ORL
36	(Simatupang & Sridharan, 2005)	The International Journal of Logistics Management	Incentive alignment; and integrated supply chain processes.	ORL
37	(Stevens & Johnson, 2016).	International Journal of Physical Distribution & Logistics Management	Process alignment.	ORL
38	(Berlin, et al., 2019).	Supply chain collaboration in circular supply chains: The example of Swedish steel recycling(Conferece proceeding)	Informal, and personal relationships	MC

S/n	Authors	Journals	Influencing variable of SC Integration.	Dimension of SC Integration
39	(Brown , et al., 1995).	Journal of retailing	Personal relationship	MC
40	(Johari, et al., 2018)	Cogent Business & Management	Establishing policies and plans to achieve the goals., providing training, ongoing support & continuous improvement, regularly performance reviews and ensuring control at all levels of organization	MC
41	(Kumar , et al., 2015).	IIMB Management Review	Resources allocation, culture of organization, training of employees, supply chain strategy formulation, and development of suppliers	MC
42	(Tarigan, et al., 2017)	International Journal of e-Education	Resource allocation to run the system	MC

.Source: Author compilation.

## 2.3 CONCEPTUAL FRAME WORK

A conceptual framework is a structure which the researcher trusts can best elucidate the natural progression of the phenomenon to be studied (Camp, 2001). The conceptual framework pronounces the relationship between the main concepts of a study. It is organized in a logical structure to offer a picture or visual demonstration of how ideas in a study associate to one another. It is the modest way through which a researcher offers his/her firmed medications to the problem defined in the study (Adom & Hussein, 2018).

Accordingly, the integration of the SC is a key element in the SCM strategy ( Cigolini & Rossi, 2008).Previous studies, both empirically and theoretically come to an agreement that the higher the level of integration with suppliers and customers results the greater the potential benefits (Frohlich & Westbrook, 2001; Rosenzweig, et al., 2003; Li, 2009) . However, researches have not found a clear relation between the level of SC integration and the pivotal factors influencing the SC integration (Hertz, 2001; Swink, et al., 2007).

Based on the theoretical & empirical literature review, it has been noted that many variables are identified by various scholars as having influence on SC integration. The three dimensional frame work of Luque, et al.(2012) has been found that it has encompassed most influencing variables; however, Luque study has overlooked the major impact of Management commitment. Where the role of management is significant & irreplaceable in SC integration. So, this fourth dimension has been added and an adopted conceptual frame work was deployed throughout. And hence, we will have information integration(II), coordination and resource sharing(CRS), organizational relationship linkage(ORL) and management commitment(MC) dimension of SC integration in this study.

(Chopra & Meindl , 2007) particularized that information integration among upper supply chain partners has got a pivotal role to realize SCI. Sharing of accurate information that is trusted by every stage result in a better matching of supply and demand throughout the supply chain and a lower cost. Based on Luque, et al.(2012) the information integration practice encompasses accurate information sharing, collaborative planning & strategy, and joint replenishment system which is assisted by information & communication Technology(ICT).

Due to the increased emphasis on technology & efficiency, modern supply chain processes are no longer labor-intensive. Rather they are capital intensive (Lu, 2015). This setting needs a new management paradigm. Unless firms make coordination and resource sharing as a strategic area to work on, they might lose the competitive arena. The competition is not among firms rather among supply chain. According to Luque, et al.(2012), supply chain coordination & resource sharing aims to integrate shared decision making, reorganizing outsourcing (like common use of third party logistics), Commitment(contractual agreement), and process integration.

Organizational relationship linkage(ORL) refers as formal arrangements that bring together tangible and intangible assets to various legally independent organizations with the purpose to produce joint value adding to the ultimate customers (Benchmann & Witteloostuijn, 2006). Organizational relationship linkage(ORL) is a pivotal dimension in supply chain integration that encompass maintaining of regular communication channel for partners, laying down performance measurement, Incentive realignment( including

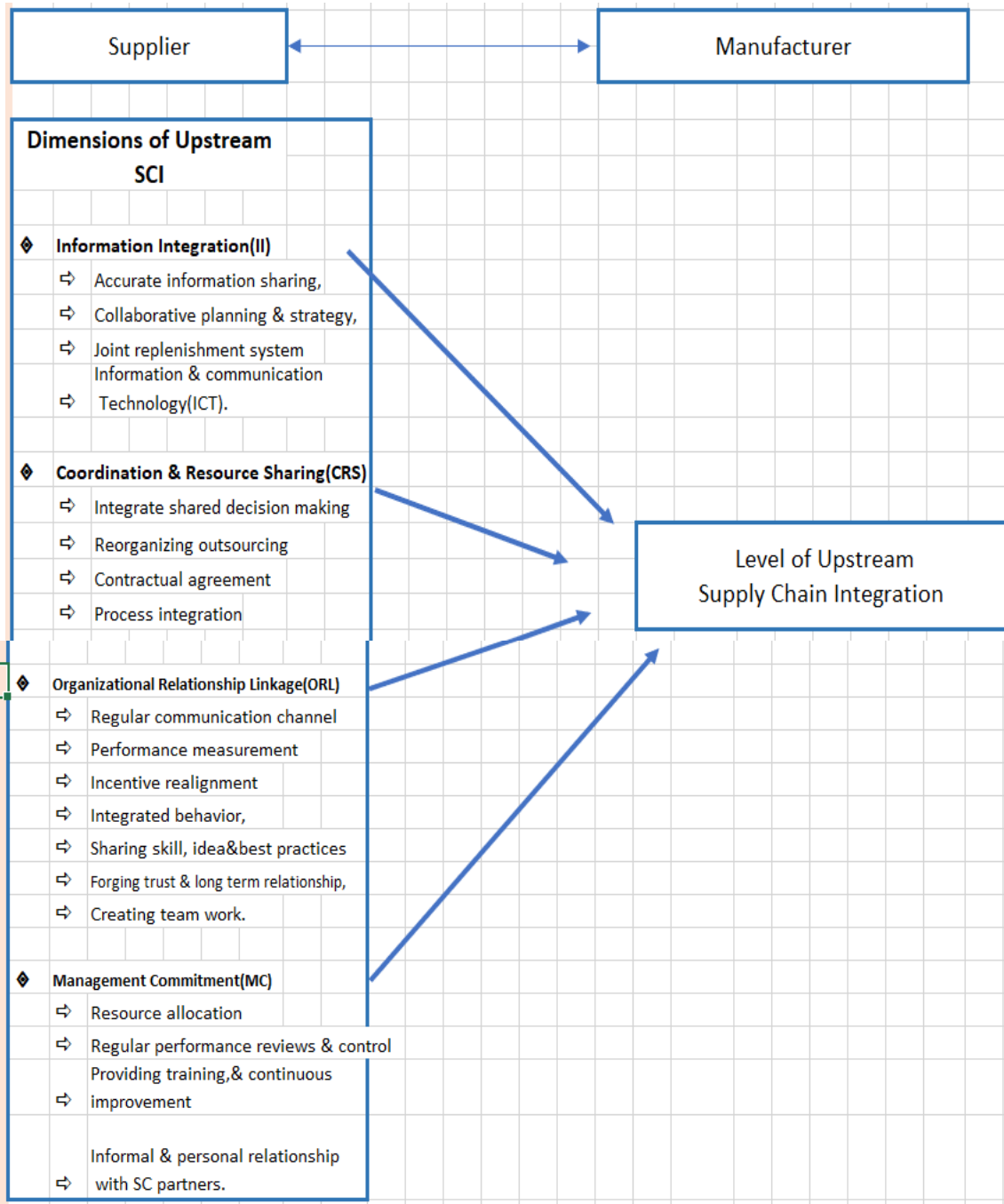
risk/cost), establishing integrated behavior, joint objective, sharing skill, ideas and best practices, forging trust & long term relationship, and creating team work.

The role of management in SC integration is irreplaceable. Since SCI involves coordinated decision making, joint work processes, strategic connection among partners based on trust, commitment, and long-term orientation. These basic foundations should be laid by the authorized person, management. McIvor et al(2006) and Agile(1997) clearly notified that SC integration is enhanced by both top management commitment & their role is critical.

The practice of SC integration requires structural change from the conventional way of working in the SC line. Firms are expected to assign resource (people, system, etc) primarily by developing the organizational structure in a way that it allows formal & smooth operation for SC integration rather than in ad hoc state. This paradigm involves putting SC integration as a strategic issue to be addressed, developing SC integration procedure, identifying roles assigning responsibility/accountability in hierarchical manner, modifying organizational structure to strengthen the SC integration system (USAID, 2011).

Accordingly, the bellow conceptual framework is adopted for upstream SC integration analysis of BGI Ethiopia PLC. This conceptual frame work is the base of the research questionnaire. It is attached on annex I. The questionnaire is carefully examined & adopted from (Zenebe, 2018).

FIGURE 2.3.1 CONCEPTUAL FRAMEWORKS  
UPSTREAM SUPPLY CHAIN INTEGRATION(USCI)



Source: Combined from (Luque , et al., 2012; Hudnurkar, et al., 2014)

## 2.4 IDENTIFIED LITERATURE GAP

Many Scholars notified that SCI is a powerful weapon to make significant improvement in SC performance & could be perceived as a major competitive advantage, and yet the concept & implementation has got numerous unanswered questions (Zhao, et al.,2011, Flynn, et al.,2010, Frohlich, et al.,2002). In addition Zhao, et al. (2013) in their Global research, *The impact of supply chain risk on supply chain integration*, have clearly explained that empirical study on factors influencing SC integration & the level of their impact on SC integration is an open research area. These scholars also extended the same proposal for factors that are barrier to SCI. Whereas this research focus on the former issue, i.e it operates to the bridge this literature gap by taking a case company to make empirical study on factors influencing SC integration & the level of their impact on SC integration.

Fiurthermore, in the schloary work of Luque, et al.(2012) entitled *Supply chain integration framework using literature review* notified that even if there are few research work in the area of SC integration, a comprehensive and integrated approach was still missing. This entails more empirical research, with clear definition and appropriate measures are needed regarding the supply chain integration. In addition, the scholars notified the level of impact of pivotal variables influencing supply chain is still an open area of research. Further they explained the need for empirical research for examining the three dimesuions of SCI,i.e information integration, Coordination & resource sharing, and Organizational relationship linkage.

So, this research work will also focus to fill the litrature gap which is identifying emperically verified dimesions of SC integration influencing factos by considering a case company, BGI Ethiopia.

## CHAPTER THREE

### METHODOLOGY OF THE STUDY

#### 3.1 INTRODUCTION

The focus of the study is to detect basic variables influencing level of upstream supply chain integration, explore their correlation, level of their impact, and examine the real practice of a case company regarding the upstream supply chain integration in brewery industry.

This part of the study presents research methodology. It comprehends research design, population, sample & sampling techniques, data source, types & data gathering tools, data collection procedure, methods of data analysis, data validity & reliability, and finally ethical considerations while doing the research work will be covered.

#### 3.2 RESEARCH APPROACH

This research objective has got the intension to examine the relationship & the impact of basic factors affecting the upstream supply chain integration. To carry out this task, the research approach has been a mixed, i.e both quantitative & qualitative. The quantitative research covers the descriptive statistical analysis & inferential (regression analysis) section. In addition, test of correlation will be deployed to examine the level of association between pivotal influencing factors (independent variables) and the level of SC integration (dependent variables). Whereas the qualitative approach covers the BGI Ethiopia actual practice of SCI where the information is gathered through focus group discussion & interviews from the BGI Ethiopia SC team and vendors. As per (Sandelowski, 2000), researchers have progressively turned to mixed-method techniques to enlarge the scope and improve the analytic power of their studies.

### 3.3 RESEARCH DESIGN

The type of research design selection usually roots in the research questions & objectives. This study is an explanatory type of research design which will show the level of correlation between factors like information integration(II), collaboration & resource sharing(CRS), organizational & resource sharing(ORS), and Management commitment(MC) against upper SCI. In addition, it tries to examine the impact of these variables on the level of upper SCI by developing a regression model.

Thus, the investigation is an empirical study( it bases on the survey data gathered from both supplier & focal firm side) that tries to examine a current phenomenon of upstream supply chain management integration in the case brewery factory, BGI Ethiopia.

### 3.4 POPULATION& SAMPLING TECHNIQUE

#### 3.4.1 TARGET POPULATION

The study covered BGI Ethiopia upstream supply chain partners including the suppliers in Addis Ababa and surrounding towns. The sourcing activities of BGI Ethiopia is structured in a centralized manner where more than 95% of the procurement activities of all plants are carried out centrally. But, small size purchases where material are available around the sites are done by the respective plant factories. In this supply chain line, there are 851 suppliers (Extracted from BGI ERP Systems). The target population has been identified after filtering partners that are subjected to black listed, terminated operation or shifted business area after making transaction, etc. This filtering technique is done on the supplier module of the ERP. The procurement unit periodically update supplier information. The ERP makes filtration based on active supplier screening module. In addition, 9 BGI Procurement staff are also considered. Based on this activity, sampling frame (list of suppliers & focal firm respondents) have been developed.

#### 3.4.2 SAMPLING

Sampling is the representative selection of a subset of individuals from within a population to estimate the characteristics of whole population (Singh & Masuku, 2014). The study has deployed a probability sampling design called simple random sampling technique to select sample units from pool of suppliers. Though a more costly technique in terms of time and

energy, simple random sampling scheme has got the greatest freedom from bias, has got simplicity & allows generalization (Brown, 1947).

Since the population is known, 851 suppliers, the sample size is based on 95% confidence interval and 5% error margin can be determined using Krejcie & Morgan (1970) sample size determination table( Sample size determination table is attached in the annex). So, a Sample units of 265 will be considered from the sampling frame of upstream SC partners. The actual selection of 265 suppliers’ are made based on the random number table after extracting the 851 active suppliers from the ERP. In addition all 9 BGI procurement & contracting unit staff were covered.

Table 3.4.1 Sample size

S/N	Items	Total
1	Suppliers	265
2	BGI	9
	Total	274

Source: Own survey result, 2019

To make selection from manufacturer, BGI side, specifically stakeholders purposive sampling technique is used. The reason is SC manager, category manger, supervisors & experts are direct actors(stakeholders) from BGI side to offer knowledge-based information to the study. Sampling is contextual. Though Purposive sampling is a non-probabilistic sampling scheme, it is a preferred method when randomization is impossible. It is a thoughtful choice of a participant due to the qualities of the participant possesses. The researcher purely adopts what needs to be selected and set out to find people who can and are willing to provide information by virtue of knowledge or experience (Bernard, 2002).

In addition, to gather data for the semi-structured questionnaire a focus group discussion has been held at BGI with 8 procurement staff & telephone interview with 5 plant managers from BGI Ethiopia . And from supplier side 10 vendors has been communicated through telephone interview to collect information for the semi-structured query.

While quantitative research preferably contains probability sampling to permit statistical inferences to be made (Sandelowski, 2000), qualitative research classically involves purposeful sampling to enhance thoughtful of the information-rich case (Patton, 1990).

### 3.5 DATA SOURCES AND DATA COLLECTION INSTRUMENT

Primary type of data has been used in the study. Questioners was the instrument for collecting data from suppliers & focal firm. Whereas interview & focus group discussion tools used to gather data from BGI Supply chain executives, Vendors, the five plant managers regarding the practice of BGI on the supply chain integration. For this purpose a semi-structured query has been developed.

Questioner has been found appropriate to gather data due its merit regarding the data comparability& standardization, respondent anonymity, and scalability. Regarding the collection of data from BGI Executives & Vendors on BGI the practice of upstream SC integration, interview & focus group discussion has been used. These instruments are preferred due its ability to explore topics in depth, and to understand processes (Weller, et al., 2018).

### 3.6 DATA ANALYSIS

The collected data will be checked, coded and entered in to data analysis software. Response rate was checked simultaneously. The quantitative data analysis shall be done using descriptive & inferential statistics. These include computation of the central tendencies, variances, correlations & regression model using a statistical tool known as SPSS v.23.0.0.0. The results of every variables was presented using figures, tables, percentages, and graphs.

The independent variables are four: information integration(II), collaboration & resource sharing(CRS), organizational & resource sharing(ORS), and Management commitment(MC) whereas the dependent variable is level of upstream supply chain integration (SCI). Correlation analysis has been carried out among the independent &

dependent variables to examine the level of association between them. In addition, the researcher has examined further the level of the impact of these independent variables on the dependent variables, i.e. which independent variable has got more impact on the dependent variable, level of upstream supply chain integration. This activity gear towards identifying major independent variables which would then be a very helpful information for academicians & practitioners in allocation of resource, giving due care & taking precautions. For this task linear regression model has been used.

The qualitative data to be collected from BGI executives, experts & vendors will help for further detail awareness about the findings of the quantitative data. The demographic background information of the respondent will be presented using descriptive statistics.

### 3.7 RELIABILITY & VALIDITY TEST

Reliability and validity are the two most important and fundamental features in the evaluation of any measurement instrument or tool for a good research. Reliability refers to the internal consistency or the faith that one can have in the data obtained from the use of an instrument. Whereas, validity signifies the accuracy or the truthfulness of the measure. In the context of measurement, both consistency & accuracy are equally important.

#### 3.7.1 RELIABILITY TEST

Reliability test is a basic test measurement tools in research. It is the degree of consistency with which an instrument measures the constructs it is designed to measure. Reliability signifies to what extent the research findings can be replicated if another study is undertaken using the same research methods (Marczyk, et al., 2005). A measuring instrument (questionnaire) is referred as reliable when it offers consistent results with repeated measurements of the same subject of the study and with the same instrument.

Cronbach's  $\alpha$  (the Greek letter alpha) is the most commonly used statistic to determine the internal consistency of an instrument. In this statistic, the average of all correlations in every combination of split-halves is determined. The Cronbach's  $\alpha$  result is a number between 0 and 1. An acceptable reliability score is 0.7 and higher (Heale & Twycross, 2015). According to William and Barry (2010) a coefficient alpha between 0.80 and 0.96

are considered to have very good reliability, between 0.70 and 0.80 are measured to have good reliability, and alpha value between 0.60 and 0.70 indicates fair reliability and when the coefficient alpha is below 0.60, the scale has poor reliability.

Accordingly, a sample of 42 respondents are considered in the pilot survey, and their response is compiled & fed to SPSS V23.0.0.0. The Cronbach's  $\alpha$  measurement is computed, and hence the output is shown on Table 3.7.1. The Cronbach's  $\alpha$  result for all variables are above 0.8 which shows strong internal consistency of the instrument measurement & fair response of the respondents.

Table 3.7.1. The Cronbach's  $\alpha$  result

S. No	Variables	Items	Cronbach's Alpha Value
1	Information Integration	4	0.903
2	Coordination and Resource Sharing	4	0.891
3	Organizational Relationship Linkage	7	0.875
4	Management Commitment	4	0.891
5	Level of Upstream Supply Chain Integration	1	0.940
	Cumulative Cronbach's Alpha Value		0.89

Source: Own survey result, 2019

### 3.7.2 VALIDITY TEST

To put simply, validity is related to research methodology because its primary purpose is to increase the accuracy and usefulness of findings by eliminating or controlling as many confounding variables as possible, which allows for greater confidence in the findings of any given study.

Validity test is the extent to which an instrument(questionnaire) accurately measures what is supposed to measure. Marczyk,et al.(2005) structurally categorized validity as in to two different dimensions : internal and external validity. Internal validity is the extent to which the measurements of the questionnaire provide the data needed to meet the purpose of the study or validity refers to the extent to which the questionnaire measures what the researcher intends to measure.

Whereas, external validity concerned with the extent to which the research findings can be generalized to wider population. Technically putting, it refers the extent in which the statistical inferences can be generalized from the population and setting studied to other populations and settings, where the “setting” refers to the legal, policy, and physical environment and related salient features.

Taherdoost, H.(2016) clearly classified validity in to four types. Face validity (researchers’ subjective assessments of the relevance of the measuring instrument as to whether the items in the instrument appear to be relevant, unambiguous and clear); Content validity refers all the items that are essential and eliminates undesirable items to a particular construct domain (Lewis et al., 1995); Construct validity ( It refers how well the researcher translated or transformed a concept or idea that is a construct into a functioning and operating reality) and criterion or concrete validity. This type of validity shows the extent to which a measure is related to an outcome.

Face validity is arguably the weakest form of validity test & the researcher has made own screening while developing the instrument. Regarding the content validity the researcher have made literature reviews, and communicated industry experts and incorporated feedback on questionnaire development (using selected supplier/buyer experts). In addition, the content validity ratio (CVR) has also been calculated for each item by employing a revised statistics of Lawshe (1975) index. Where the revisited statistics is made by Ayre & Scally(2014). 15 experts( a mix of industry experts & scholars) are selected to examine all items in the questionnaire. The minimum CVR standard for 15 experts is 0.80( that means 12 experts should agree) for each items. Attached at annex 3 Content validity ratio (CVR) ) of revised CVR index by Ayre & Scally(2014).

Below is a summary result of content validity ratio(CVR) for the instrument(questionnaire). 15 experts were selected to give feedback on the instrument. During the survey, a three-point scale (not necessary(0), useful but not essential(0.5) and essential(1)) were used.

As per the below table 3.7.1.It can be seen all variables has got 0.8 and above result. Which means the evaluators has favored that the variables are essential & relevant to measure the supply chain integration, and fulfilled the of content validity requirement to proceed.

Table: 3.7.2 The content validity result:

S/n	Dimensions of Upstream SCI	CVR Ratio.	Remark
1	<b>Information Integration(II)</b>		
1.1	⇒ Accurate information sharing,	1	
1.2	⇒ Collaborative planning & strategy,	0.83	
1.3	⇒ Joint replenishment system	0.93	
1.4	⇒ Information & communication Technology(ICT).	1	
	□		
2	<b>Coordination &amp; Resource Sharing(CRS)</b>		
2.1	⇒ Integrate shared decision making	1	
2.2	⇒ Reorganizing outsourcing	0.83	
2.3	⇒ Contractual agreement	0.8	
2.4	⇒ Process integration	0.9	
3	<b>Organization &amp; Relationship Linkage(ORL)</b>		
3.1	⇒ Regular communication channel	0.93	
3.2	⇒ Performance measurement	1	
3.3	⇒ Incentive realignment	1	
3.4	⇒ Integrated behavior,	0.83	
3.5	⇒ Sharing skill, idea & best practices	0.93	
3.6	⇒ Forging trust & long term relationship,	0.83	
3.7	⇒ Creating team work.	1	
4	<b>Management Commitment(MC)</b>		
4.1	⇒ Resource allocation	1	
4.2	⇒ Establishing policies and plans	1	
4.3	⇒ Regular performance reviews & control	1	
4.4	⇒ Providing training, & continuous improvement	1	
4.5	⇒ Informal & personal relationship with SC partners.	0.83	

Source: Own survey result, 2019

### 3.7.3 TRIANGULATION

Researchers have always got the intention to ensure that the information derived from the sample units accurately reflects the truth about the phenomenon under investigation. Moon(2019) clarified that triangulation is one method to increase the reliability & validity of research findings. It is a research method strategy that uses multiple data source, researchers theories, research methods to ensure that the data, analysis and conclusions of a research study are as comprehensive & accurate as possible. Decrop(1999) also confirmed that triangulation can reduce or eliminate personal and methodological biases and increase the probability of generalizing the findings of a study as the data is gathered from different angles and by different methods.

There are commonly four types of triangulation.(1) methods triangulation( it is using multiple methods on data collection) ; (2) Investigator triangulation( using more than one researcher during data collection & analysis); (3) Theory triangulation( to use more than one theory to guide research design, interpretation); and (4) Data source triangulation (obtaining data from multiple source) (Moon , 2019). In this study, the data is collected using questionnaire , interview & focus group discussion method, regarding source of data primary sources of different respondents including suppliers and buyer sides are covered. In addition, it bases different theories like Resource based view, supply chain network theory & Transactional cost analysis. Therefore, Method, data source, and theory triangulation was used in this study to ensure reliability of the findings.

### 3.8 ETHICAL CONSIDERATIONS

Ethics is one of the pillars in research activities. Indeed, researchers are expected to face an array of ethical requirements. And hence, they are encouraged to employ knowledge of research ethics throughout the research activities.

Ethical practice has been considered simultaneously throughout this research process. This includes but not limited to during literature review, data collection, administration of the research instrument, the data analysis and writing up of the final report.

Purpose of the study has been notified to respondents a head, and then their willingness is ensured before getting down to queries. In addition, clear message was conveyed that the result of the study highly bases on their genuine response & so that they will take responsibility & feel that they are part of the research process. Furthermore, they are advised that they will have access to final study if they are curious.

Participants are also well-versed about their right to evade participation in the study at any time if they are not interested to be part of it. Questions & clarifications was freely entertained as per the request of the attendants. Finally, the researcher assured the respondents on confidentiality of the responses and anonymity of the participants.,i.e their response will be used for research purpose only & identity will not be disclosed throughout (Mostert, et al., 2017).

To avoid the issue of plagiarism, the acknowledgement & paraphrasing made to all materials and literatures referred, consulted and/or quoted. In addition, right attitude is set regarding getting credits. In addition, the data analysis, findings & interpretation is carried out in a neutral manner to avoid biases. Pertaining to sensitive information, the researcher has asked data based on official letter & permission. This will bind both parties(to be responsible on management of sensitive data). However; the researcher has tried his effort to give due care while handling and dealing with sensitive data during the collection, processing, handling and storing data throughout the research process.

## CHAPTER FOUR

### RESULTS, DISCUSSION AND INTERPRETATION

#### 4.1 INTRODUCTION

The main objective of this research is to assess the upstream supply chain integration in BGI Ethiopia. Accordingly, questionnaire is developed in line with the objective. The questionnaires are distributed & collected from the target groups in the upstream supply chain (BGI suppliers) & main BGI concerned supply chain staff. And hence, the data analysis and interpretation of results are discussed in this chapter. Statistical Package for Social Science (SPSS v.23.0.0.0) has been deployed for the data analysis.

#### 4.2 THE QUESTIONNAIRE'S RESPONSE RATE

Based on Baruch(1999) and Lynn, et al.(2001) conclusion, researcher should clearly state the sample unit responses based on their characteristics or non-respondent components, and in situations where there is significant deviation of the response rate, proper explanation(justification) should be made. Because the response rate shows the survey quality. Based on the methodologies, research design and tools of the proposal a total of 274 questionnaires was distributed, 265 for supplier & 9 for BGI procurement staff . 13 were partially filled , unusable & rejected; 5 refused by suppliers to fill, 17 were busy suppliers & had no answer ; 4 were not correctly filled and rejected. Therefore , a clean response of 235 questionnaires were effectively used for analysis that shows response rate of 85.8% . All 9 responses from BGI were clean and included in 235 clean report. The response rate was calculated using AAPOR response rate calculator (AAPOR, 2020). According to Baruch & Holtom(2008), when the response rate resulted 50% is 'adequate', and the higher the rate the better. According to Smith (2002) when the return or success rate 50% is 'adequate'; 60% response rate is 'good' and 70% rate or higher is 'very good'. Based on scholars recommendations, the response rate of this study is in better category.

### 4.3 DEMOGRAPHIC DATA PRESENTATION AND ANALYSIS

The main purpose of demographic analysis is to give picture of the demographic composition of the respondents. This includes defining the characteristics of the sample units such as business experience with the focal firm (BGI Ethiopia), proportion of male and female in the sample, managerial position of respondents, academic qualification of respondents and experience of respondents. Consequently, these variables are summarized and pronounced in the tables shown below.

#### 4.3.1 Numbers of Employees

From the table 4.3.1 , we can see that 77.4 % of the Suppliers has got less than 100 employees. This shows that most of the upstream suppliers run business with less labor-intensive mode. They may be middle party traders, i.e they don't produce, or they may deploy capital intensive manufacturing facility. And 13.2 % of the suppliers has got employees more than 500 number. These are attributed to input material, label, cork manufacturers, vehicle assemblers & dealers.

**Table 4.3.1 Numbers of Employees**

Variable		Frequency	Percent	Cumulative Percent
Numbers of employees	<100	182	77.4	77.4
	101-250	11	4.7	82.1
	250-500	11	4.7	86.8
	> 500	31	13.2	100.0
	Total	235	100.0	

Source: Primary data collected, 2020

#### 4.3.2 Business experience with BGI Ethiopia ( in Yrs)

53.6% of upstream suppliers has got 10 year or more business experience with BGI Ethiopian(shown below on table 4.3.2). On the other end, 46.3%, has 10 years and less experience. This shows that significant proportion of suppliers has got many years of engagement with BGI Ethiopia.

**Table 4.3.2 Business experience with BGI Ethiopia ( in Yrs)**

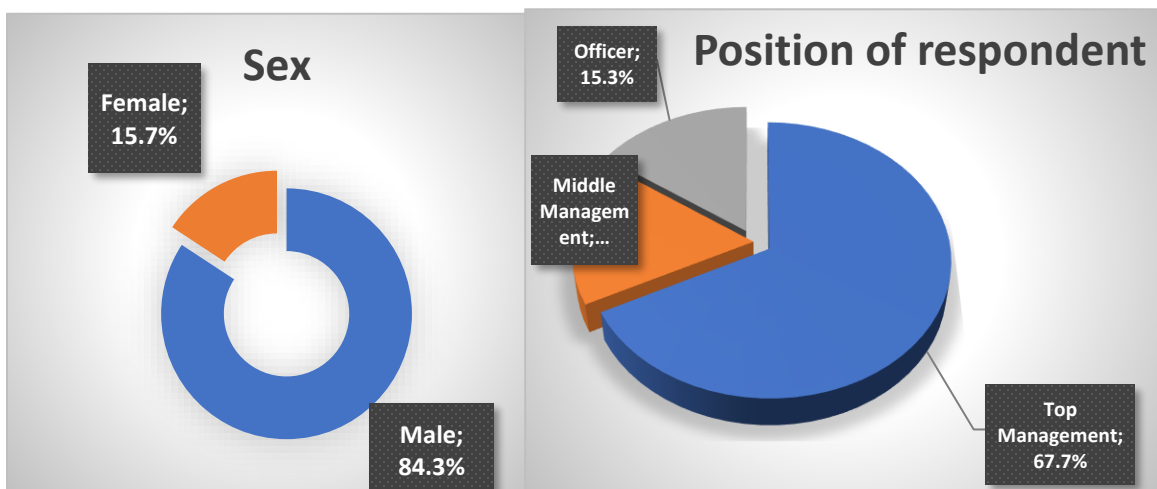
Variable		Frequency	Percent	Cumulative Percent
Business experience with BGI Ethiopia ( in Yrs)	<5	41	17.4	17.4
	5-10	68	28.9	46.4
	11-15	18	7.7	54.0
	16-20	36	15.3	69.4
	>21	72	30.6	100.0
	Total	235	100.0	

Source: Primary data collected, 2020

### 4.3.3 Position of respondents & Sex

The pie-chart at figure 4.3.3 & Table 4.3.3 (below) depicts that lion share of respondents, 67.7% ,are from top management position of upstream suppliers, which has a lot to do with understanding the query & getting accurate information with level of integration among supplier & BGI Ethiopia. 17% were middle level management and the remaining 15.3% are officers level. Regarding the type of sex of respondents, the doughnut shaped graph (figure 4.3.3 T & table 4.4.4, below) vividly showed 84.3% of the responds are attributed to male persons. Which shows most business owners or managerial position of the business is occupied by male persons. On contrary, 15.7% of respondents are female, that shows less participation of women in business practice. This needs to be improved with proper gender main streaming, mentoring, and promoting the female business professionals.

**Figure 4.3.3 Position of respondents & Sex**



**Table 4.3.3 Position of respondents & Sex**

Variable		Frequency	Percent	Cumulative Percent
Sex	Male	198	84.3	84.3
	Female	37	15.7	100.0
	Total	235	100.0	
Position of respondent	Top Management	159	67.7	67.7
	Middle Management	40	17.0	84.7
	Officer	36	15.3	100.0
	Total	235	100.0	

Source: Primary data collected, 2020

#### 4.3.4 Education Qualification

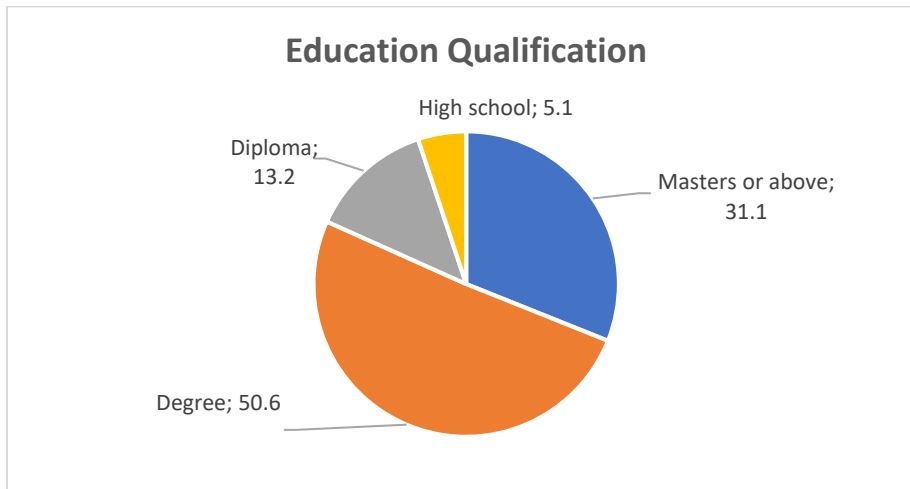
Regarding the education qualification, from below figure 4.3.4 & table 4.3.4 , we can see that 81.7% of the respondents has got first level degree or more. 13.2% are diploma holders, and 5.1% are high school graduates. Since grate amount of the brewery inputs needs technical knowledge, the job position demanded a good education level. In addition, this profile has helped to ease communication & create more understanding during data collection.

**Table 4.3.4 Education Qualification**

Variable		Frequency	Percent	Cumulative Percent
Qualification	MA or Above	73	31.1	31.1
	BA/BSC	119	50.6	81.7
	Diploma	31	13.2	94.9
	High School and Less	12	5.1	100.0
	Total	235	100.0	

Source: Primary data collected, 2020

**Figure: 4.3.4 Education qualification**



#### 4.3.5 Work Experience in Yrs

Great number of respondents, 59.6%, have got 11 years or more work experience in the business while 23% have got from 5 to 10 years of business exposure and the youngest team, with minimum experience i.e less than 5years have attributed to 17.4%. This profile has helped to extract weakness and strength regarding the supply chain integration.

**Table 4.3.5 Work experience of respondent ( in Yrs)**

Variable		Frequency	Percent	Cumulative Percent
Work Experience in Yrs	<5	41	17.4	17.4
	5-10	54	23.0	40.4
	11-15	46	19.6	60.0
	>15	94	40.0	100.0
	Total	235	100.0	

Source: Primary data collected, 2020

## 4.4 DESCRIPTIVE STATISTICAL ANALYSIS TOWARDS THE PERCEPTION OF UPSTREAM SUPPLY CHAIN INTEGRATION

In this section, the perception of upstream supply chain players( both the suppliers & focal firm, BGI) toward supply chain integration(SCI) has been analyzed using descriptive statistical methodologies. The four basic pillars of upstream SCI, which is identified in the conceptual frame works have been considered & detail discussion has been made based on the survey result. These were Information Integration(II), Coordination and Resource Sharing(CRS), Organizational Relationship Linkage(ORL), and last but not least Management Commitment(MC).

Measure of central tendencies, dispersions, and tabular & graphical illustrations, pertaining to the data has been presented simultaneously to give clear picture of the result. These basic statistical analysis tools are geared toward answering the research questions.

The mean value of the survey result in each dimensions of upstream supply chain integration suggests that the average amount that each dimension has positive or negative response of respondents. In this case, the mean value of each item showed the level and practice of upstream supply chain integration of BGI Ethiopia .

The mean statistical values of the items were constructed on the 5 point Likert scale and established through the following assumptions: if the mean (M) score is below 2.5, it implies that the respondents disagree with the respective statement; if the mean score is equal to 2.5, it indicates that the respondents are indifferent; and if the mean score is above 2.5 it implies that the respondents favor or agree with the respective statement.

Regarding the standard deviation, it measures the variability of the score from the mean. Lower standard deviation shows the data set is clustered to the mean while higher standard deviation represents, the data set is spread out or variable (McClave, et al., 2001).

In addition, for the last question in the query( which is a response variable), the response for the level of supply chain integration was done based on the 5 point Likert scale, and the interpretation will be as follow. 1-2 will be transactional level relationship, 3-4 will be , collaborative level relationship and 5 will be strategic/alliance level partnership.

#### 4.4.1 INFORMATION INTEGRATION(II)

This section of the study discusses on the perception level of the respondents, (upstream supply chain players) towards Information Integration (II). To this end, four major questions have been raised to understand the level of Information Integration (II) between Suppliers & the buyer, BGI Ethiopia. Thus, table 4.4.1.1-2 discusses on the perception level of the respondents on Information Integration (II)..

**Table 4.4.1.1 Information Integration(II) sub-dimensions Survey Result**

Items	Accurate information exchange		Collaborative planning & strategy		Joint replenishment system of materials to run BGI operation		Utilization of modern Information & communication technology to access information	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Strongly Agree	2	0.9	2	0.9	2	0.9	2	0.9
Agree	58	24.7	42	17.9	22	9.4	49	20.9
Neutral	102	43.4	29	12.3	36	15.3	52	22.1
Disagree	28	11.9	111	47.2	87	37.0	59	25.1
Strongly disagree	45	19.1	51	21.7	88	37.4	73	31.1
Mean(M)	2.76		2.29		1.99		2.35	
Standard Error(SE)of Mean	0.068		0.067		0.065		0.075	
Standard Deviation(STD)	1.055		1.03		0.991		1.150	
Median(MD)	3		2		2		2	
Skewness	-0.456		0.592		0.813		0.245	

Source: Field Survey, 2020

Lee(2000) and Moharana, *et al.*(2012) notified that the supply chain integration of the organizations should begin with the exchange of information, for it is key pillar of the SCI. And can be perceived as a glue which binds together different parts of the supply chain structure. In addition, Lummus and Duclos (2003) advised that the information integration dimension is prerequisite of the integration of supply chain.

Stevens & Johnson(2016) suggests players in the upstream supply chain line primarily require high quality information to be shared which will then helps as a base for process alignment. Table 4.4.1.1 reveals that 25.6% of respondent agree the existence of accurate information among suppliers & BGI Ethiopia. While majority of respondents, 43.4%, are neutral. And those that disagree with the existence of quality information exchange are 31%. In general, a mean value of (M=2.76, STD=1.055) has been found. And result of a median(MD) value is 3 and skewness is -0.456. This shows that the distribution for accuracy of information exchange is skewed to the left and more data are piled on the right side(agreement end). That shows there is moderate accurate information exchange practice among upstream suppliers and BGI Ethiopia.

Liker & Choi(2004) has made detail study how Toyota & Honda plant in US outshine other US automakers. The achievement covers many areas. First the auto component vendors(upstream SC partners) prefers Toyota & Honda as the most preferred companies to work with. Second, while U.S. automakers took two to three years to design new cars, Toyota and Honda have consistently been able to do so in just 12 to 18 months. Third, Toyota and Honda brought down the manufacturing costs of the Camry and the Accord by about 25% during the 1990s. Fourth, the two companies have appeared at the top on initial quality and long-term durability. Fifth, they produced the most reliable cars and recalled fewer vehicles in the United States in the past ten years than GM, Ford, or Chrysler did.

Research revealed that the mystery behind the two successful giant auto makers were they have established strong information integration with upstream suppliers. Regarding quality information exchange , Toyota and Honda believed in communicating and sharing accurate information with suppliers selectively in a careful manner and in a structured fashion. Meetings have clear agendas, specific times, and places. There are rigid formats for consistent information sharing with each supplier. The information exchange are expected to fulfill the five criterion: Accuracy, Timeliness, Reliability, Relevant , Completeness. The information exchange includes material demand & inventory level, new product development program, annual plans, expected price reduction from vendors. In addition, Toyota & Honda gather technical capacity information from vendors so that they can identify area of intervention to assist the vendors to meet their requirement in terms of new product innovation(NPI), cost reduction, bulk order delivery. These two-way information exchange frame work makes

vendors to prefer Toyota & Honda , and it also help the vendors to adjust their work plan so that they can make continuous material supply on time & at competitive price.

The survey result of BGI Ethiopia partners showed moderate practice regarding accuracy of information exchange. In addition, focus group discussion revealed that BGI Ethiopia does not have full trust to share annual plan, new product innovation programmers to upstream suppliers due the intense competitive environment in the local beverage industry. Only, limited information on material demand is shared periodically.

The intensity of auto market competition is similar with the brewing industry; however, Toyota & Honda have managed by developing a gradual information integration platform with upstream players. So, BGI Ethiopian need to integrate this practice with its vendors. In addition, BGI-Ethiopia should understand that upstream partners are the supply chain's lifeblood.

Moharan, et al. (2012) in their scholarly work, *Coordination, Collaboration and Integration for Supply Chain Management* informed that information sharing has got pivotal role in the supply chain integration and creates conducive environment for joint planning & strategy deployment.

The data result in table 4.4.1.1 showed the lion share of study participant,68.9%, disagree on the existence of joint collaborative planning & strategy with BGI Ethiopia. While 18.8% of the respondents agree on the practice of joint planning, and the remaining small proportion, 12.3% of the respondents are neutral. Furthermore, the central trendies result showed (Mean(M)=2.29, SD=1.03) and Median(MD)=2.2. Here, MD< M, and skewness = 0.592. This shows the collaborative panning distribution is positively skewed and more data are concentrated at the lower end (disagreement end). This means most study participant agreed that the level of Collaborative planning & strategy practice among suppliers and BGI is very weak.

The liker & Choi(2004) case study analysis has shared impressive collaborative planning & strategy practice of the successful two giant automakers, the Toyota & Honda plants in US soil. Honda has got annually a top management meeting, or *jikon*, to share its annual plans

with each supplier. The meetings involve a Honda team—usually two vice presidents of supplier management and a supplier executives team. The *jikon* happen within three months of the end of the fiscal year, which is when most suppliers make investment decisions and other strategic plans. Only core suppliers participate in the meetings, which take place at the regional and global levels. Honda invites one supplier from each region to the global *jikon* in Tokyo every year; it held one-to-one meetings with 35 North American suppliers . The discussions covers top-level strategic issues. Honda tells the suppliers what kinds of products it intends to introduce and what types of markets it plans to cultivate in the coming years. The company then discusses the supplier’s strategic direction in terms of technology, globalization, major investments (such as capital goods and plant expansion), and ideas about new products. The meetings also cover improvements that will be necessary in the quality, cost, and delivery of the vendor’s products.

This way of working help Toyota & Honda to get what they want from vendors regarding price, bulk delivery, continuous supply, long term strong relationship & to be preferred customer for vendors than their relative US rivals.

The study made on upstream supply chain partners of BGI showed (Mean(M)=2.29, SD=1.03) which told the existence of very weak collaborative planning & strategy practice among suppliers and BGI Ethiopia. The practice of Toyota & Honda showed that when upstream partners know the focal firm plan they geared their operation & work plan toward the client requirement on new product development, cost reduction, timely delivery and sustainable supply. This is a big issue to be addressed by BGI Ethiopia, and it will add the basic competitive advantage.

Joint replenishment system of materials is a well-known practice under supply chain integration. Where the focal firm continuously supply inventory level & material demand information to vendors & the supply will be made accordingly. This way of working ensures sustainable supply of material, reduces inventory holding & ordering cost. This is one of the benefits of SCI regarding operational efficiency (Poorbagheria & Niakib, 2015).

The frequency distribution on in table 4.4.1.1 depicts that 74.4% of the respondents disagree on the existence of joint replenishment system in the business transactions with BGI Ethiopia. Where 15.3% are indifferent on the issue, and the remaining few participants

,i.e,10.3%, agree that they are practicing joint inventory management. A summary statistics of (Mean(M)=1.99, SD=0.991) and Median(MD)=2 is computed. Moreover, the measure of symmetry, showed a positive skewness of 0.813. These results gave a picture that the responses were positively stretched and significant data are on the left side (disagreement end). The survey result showed majority suppliers that has got a business relationship with BGI admitted the weak practice regarding the joint replenishment system of materials.

A study conducted by Wen,et al.(2015) showed that when the inventory management task of a manufacturing plant is managed by Vendors in a joint information exchange firms will get many benefits like reduced inventory level that leads to low inventory management cost, better response to market changes, to be flexible to demand uncertainties, and more flexibility in production planning and distribution. This way of managing inventories is practiced by Toyota, it was also popularized by the successful partnership between Wal-Mart and Proctor & Gamble since 1985. Since then, other companies such as Shell Chemicals, HP, Campbell Soup, and Johnson & Johnson have adopted the same approach. The advantages of implementing joint inventory replenishment program is very significant.

The study result of BGI Ethiopia and its partners showed (Mean(M)=1.99, SD=0.991) regarding joint inventory replenishment system practice. This result showed such inventory management system not fully practiced. The focus group discussion showed that for few critical materials like Malt, enzymes, glue, labels & corks. The vendors know the annual requirement of BGI Ethiopia, got in to annual contract & delivery will be made smoothly, then. But for most materials BGI Ethiopia usually make a monthly inventory review and inform suppliers to participate in a competitive bid. This way of working doesn't show good partnership relationship & vendors may or may not have the requested material at its stock. What has been practiced for critical items need to be scale-up to other materials as well.

Lotfi, et al.(2013) discussed that Information Integration is an indispensable enabler of supply chain integration. Where the progression in information and communication technology has made information integration more possible. Khurana, et al.(2011)

explained the idea that information communication technology (ICT) systems are basic elements of SCI because the management of pile of data which is produced through the the supply chain transaction needs the assistance of ICT. An accurate & timely information exchange, information based decision is facilitated by the ICT. Table 4.4.1.1 clearly depicts that 56.2% of respondents admit that they are not utilizing modern information & communication technology in their transaction with BGI Ethiopia. This showed that most vendors are exchanging information in the traditional way. While 22.1% are neutral and the 21.8% expressed that they practice modern ICT with BGI Ethiopia. Furthermore a mean value of (M=2.35, SD= 1.150) has been found . The median value( MD= 2) and Skewness coefficient is 0.245. Here also MD<M and a positive skewness showed most respondent favor that they are not utilizing modern ICT to the expected level in the business relationship with BGI Ethiopia.

The case study of Liker & Choi(2004) on Toyota & Honda plants also shared how the utilization of modern information & communication technology created ease and added greater leverage to exchange information with upstream partners. The material demand & inventory level data are shared to core suppliers from the main ERP( Enterprise Resource Planning) system of Toyota & Honda so that the system gave them a daily stock level information & a replenishment order when the inventory level reached at re-order point. This system resource helped the vendors to get prepared a head & to make delivery on time. This way of working enables Toyota to implement JIT(Just-in-Time) inventory management system with its partners. The main advantage of this modality is to reduce the inventory holding cost, unnecessary motions and wastes due excess inventory.

The actual survey result of BGI Ethiopia showed a mean value of (M=2.35, SD= 1.150) pertaining to utilization modern information & communication technology, which is at lower end. The actual observation of the BGI Ethiopia & focus group discussion showed business work flow is aid by high level of ICT to enhance internal integration. AX ERP & Opti-Maint ERP are used to manage the supply chain, financial & technical materials inventory & order processing. In addition, many in house developed application are in place. But, the information exchange with upstream partners are limited to traditional way of working(fax, letter, phone call, etc). some of its vendors even don't have internet connectivity to exchange information through mail . This gap is partly due focal firm (BGI

Ethiopia) lenient perspective on information integration with partners. It should be one of the improvement areas to be filled.

Min et al.(2019) consulted that information Integration as the core element of supply chain collaboration. This tends that proper priority needs to be given to information integration. Proper information sharing among actors in the supply chain is expected to increase operational efficiencies & lower cost which in turn creates competitive advantage for all players in the chain. A summery survey result at table 4.4.1.2 vividly depicted that 55.3% of BGI vendors admits the existence of gap regarding the proper practice of information integration in their daily today transaction. While 36.6% of the respondents are neutral & only 8.0% of suppliers are satisfied with proper information sharing & joint operation with BGI. In addition, the mean value of survey result also support this idea by showing (M= 2.35, SD=0.760), and Median value & skewness(SK) (MD=2.25, SK=0.714) consecutively. This showed that most respondents response fall at the left(lower end) & the distribution is skewed to the right, and most of them are disagree with the existence of proper information integration.

Furthermore, a confidence interval can be constructed to see how the sample mean value 2.35 is close to the population mean. This is done based on Field(2005) suggestion as per below formula:

For 95% confidence interval, the Z value is 1.96, then

Confidence interval(CI) for lower boundary=  $M-(1.96 \times SE)$

Confidence interval(CI) for upper boundary=  $M+(1.96 \times SE)$

Where M= 2.35 and SE is 0.05.

Substituting this value to the formula gave:

Confidence interval(CI) for lower boundary=2.25

Confidence interval(CI) for upper boundary= 2.45

This result shows that the true mean value for practice of BGI Ethiopian with its upstream SC partners lie between 2.25 and 2.45 at 95% confidence level, which is still below 2.5. This result also confirmed weak information integration exists along the upstream SC line.

**Table 4.4.1.2 Information Integration(II) Survey Result**

Items	Information Integration	
	Frequency	%
Strongly Agree	2	0.8
Agree	17.0	7.2
Neutral	86.0	36.6
Disagree	117.0	49.8
Strongly disagree	13.0	5.5
Mean(M)	2.35	
Standard Error(SE)of Mean	0.050	
Standard Deviation(STD)	0.760	
Median(MD)	2.25	
Skewness	0.714	

Source: Field Survey, 2020

#### **4.4.2 COORDINATION AND RESOURCE SHARING(CRS)**

This section of the study explained on the perception level of the respondents (upstream supply chain partners) of BGI Ethiopia pertaining to Coordination and Resource Sharing(CRS) .dimensions

**Table 4.4.2.1 Coordination and Resource Sharing Sub-dimensions Survey Result**

Items	Partners involves in key decision-making process		There is common use of logistical resource		There is contract/commitment on delivery frequency, payment, quality, quantity, place, etc		There is process integration	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Strongly Agree	2	0.9	2	0.9	2	0.9	2	0.9
Agree	105	44.7	9	3.8	113	48.1	44	18.7
Neutral	1	0.4	-	-	-	-	-	-
Disagree	8	3.4	-	-	-	-	-	-
Strongly disagree	119	50.6	224	95.3	120	51.0	189	80.4
Mean(M)	2.43		1.15		2.48		1.60	
Standard Error(SE)of Mean	0.097		0.044		0.099		0.079	
Standard Deviation(STD)	1.490		0.679		1.514		1.213	
Median(MD)	1.00		1.00		1.00		1.00	
Skewness	0.147		4.440		0.056		1.569	

Source: Field Survey, 2020

Coordination and resource sharing is explained when separate entities that work together establish synergy based on trust & make joint decision making to boost the overall supply chain performance (Moharana, et al., 2012).

Table 4.4.2.1 depicted that 54.0% of respondents accepted that BGI Ethiopian push them back from joint decision-making process while 45.6% favored BGI Ethiopia by giving them a chance to involve on Supply chain decision process, and minor proportion of suppliers, i.e 0.4%, have become indifferent. Though majority of respondents admit the weak way of working with the brewery, significant proportion of suppliers explained their

involvement in decision process. The focus group discussion revealed that selected suppliers that are engaged on the supply of imported materials have been invited by BGI Ethiopia to make discussion before getting in to contract. The discussion includes detail supply plan like when is the material at critical stock level to BGI, delivery time, delivery frequency, source of fund( including Forex), expected cost & incentive alignment, etc. The mean value showed that ( $M=2.43$ ,  $SD=1.49$ ) which is way below 2.5, and a median value and skewness ( $MD=1$ ,  $SK=0.147$ ) . These result supported that the key decision making variable is skewed to the right most responses are concentrated at lower end, i.e most partners are not comfortable with the existing sole decision making practice of BGI Ethiopia.

Due to the ever escalated demand for efficiency, the current supply chain processes are no longer labor-intensive, nor independent resource owners, it is rather a process based on shared resources. Where the supply chain goals are met by integrating & deploying the resources of different industry bodies. These includes goal setting, logistical resources & decision making (Lu, 2015).

Pertaining to the common use of logistical resource almost all partners of BGI Ethiopia, 95.3%, expressed the major gap on Table 4.4.2.1. Where only 4.7 % of respondent agree on the existence of common use of logistical resources. This shows both the focal firm & upstream SC partners are using own logistical resources that could have been shared for the same purpose. This could include shared transport, shared ICT infrastructure, pool of experts, warehouse, clearing agent, etc. The mean value of respondents also agree with low practice level, ( $M=1.15$ ,  $SD=0.679$ ). and the Median & skewness result also support this as ,( $M=1.00$ , $SK=4.440$ ).

Supply commitment is a promise or consent to do something in the future in business relationships. Commitment is explained as the interest on the part of each party to a business relationship to maintain and strengthen that relationship (Morgan & Hunt, 1994). Powers and Jack (2015) found that contracts can improve performance in relationships between SC partners.

The BGI Ethiopia partners practice regarding the supply commitment resulted nearly equal proportion result for both agreement & disagreement. As per table 4.4.2.1, 51.0 % of the

suppliers expressed the absence of contract for the delivery of materials while 49% favored the presence of agreement. This is due the existence of flexibility in BGI Ethiopia way of working. All importation supply and large volume purchases has got a contract while the medium & small value supplies are processed through PO(Purchase Orders). In addition, the central tendency measurement supported the frequency distribution result ,i.e a mean value of (M=2.48,SD=1.514). Here the variability is very high (SD=1.51), this is due to the opposite experience of suppliers. Large volume delivery vendors vs. small & medium size delivery vendors. Further the median & skewness value was (MD=1.00, SK=0.056). This result shows the existence of positive skewness & more response at the lower end.

Regarding the process integration, about 80.4% of partners accepted that there is no process integration practice in their business relationship with BGI Ethiopia. While 19.6% favor the existence of the process integration. The mean value survey response also revealed that (M=1.6, SD=1.213). Further, the Median & skewness result also support this as, (MD=1.00,SK=1.569). This result confirmed the existence of major gap regarding process integration.

The second giant global brewer, Heineken, practice shows that the process integration has benefited a lot the global brewer. The basic input of beer, barley, is normally supplied by malting suppliers in the upstream lines. However, Heineken, initiated a program called local sourcing(CRATE Project), and established process integration encompassing from farmers unions, and malting companies based on its annual requirement. Heineken helped farmers with technical support (better yield seed, advise on farming) & Financial support. The farmers union made better harvest & deliver the barley to malting companies, and then to Heineken. With this process integration named local sourcing Heineken deploy 140,000 farmers globally( out of which 40,000 are Ethiopian farmers), achieved 49% of global annual barley demand came from local sources in 2019, reduced the duty & related customs charges that was occurring during import, this resulted acquiring low cost barley, and ensured sustainable malt supply. Since Heineken understood well the benefit of process integration, it has planned to establish two giant malting companies with annual capacity of 120,000 tons each (Heineken, 2020).

The BGI Ethiopia has got a local sourcing program like Heineken regarding malt delivery; however, it is at an infant stage. So, BGI Ethiopia is expected to give due attention to harvest the benefits of process integration.

In general, the Coordination and Resource Sharing dimension summary statistics at table 4.4.2.2 & Figure 4.4.2.1 displayed that most of the partners of BGI Ethiopia, i.e 66.0% agreed on the existence of weak practice of coordination & resource sharing. Furthermore, the mean response value showed ( $M=1.91$ ,  $SD=0.060$ ) and median & Skewness ( $MD=1.75$ ,  $SK=.774$ ). This result explained that the coordination & resource sharing practice of BGI Ethiopian with its upstream partners were weak. Most response of the partners were concentrated at lower end and distribution is extended to the right hand-side.

Besides, a confidence interval could be constructed to see how the sample mean value, 1.91, is closer to the true mean. This is done based on Field(2005) suggestion as per below formula:

For 95% confidence interval, the Z value is 1.96, then

Confidence interval(CI) for lower boundary=  $M-(1.96 \times SE)$

Confidence interval(CI) for upper boundary=  $M+(1.96 \times SE)$

Where  $M= 1.91$  and  $SE$  is 0.06.

Substituting this value to the formula gave:

Confidence interval(CI) for lower boundary=1.79

Confidence interval(CI) for upper boundary= 2.03

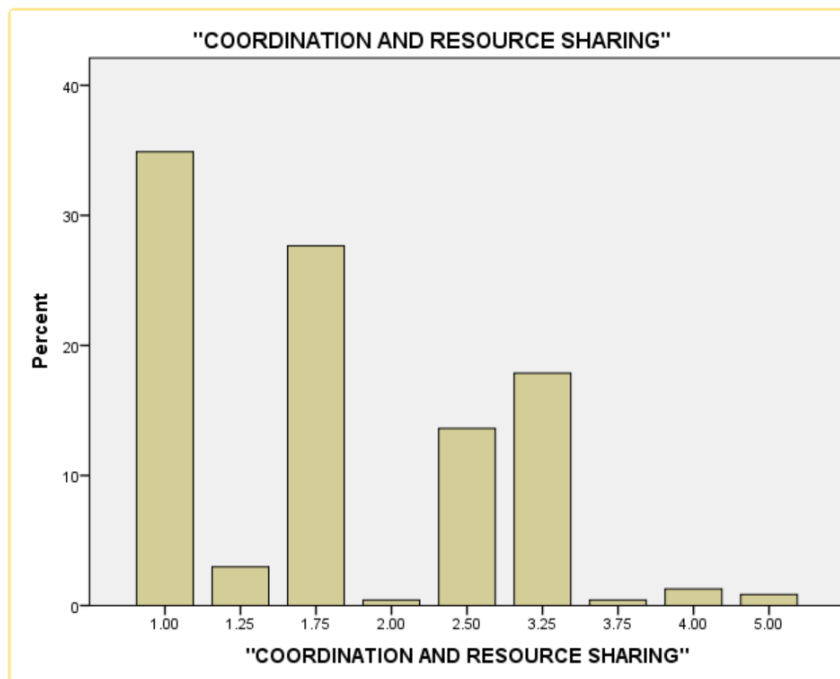
This value indicates that the true mean value for coordination and resource sharing practice of BGI Ethiopia with its partners lie between 1.79 and 2.03 at 95% confidence level. Which has confirmed the existence of loose coordination and resource sharing practice.

**Table 4.4.2.2 Coordination and Resource Sharing Survey Result**

Items	Coordination and Resource Sharing	
	Frequency	%
Strongly Agree	2	0.9
Agree	4	1.7
Neutral	74	31.5
Disagree	66	28.1
Strongly disagree	89	37.9
Mean(M)	1.91	
Standard Error(SE)of Mean	0.060	
Standard Deviation(STD)	0.912	
Median(MD)	1.75	
Skewness	0.774	

Source: Field Survey, 2020

**Figure 4.4.2.1 Coordination and Resource Sharing Survey Result**



Source: Field Survey, 2020

#### 4.4.3 ORGANIZATIONAL RELATIONSHIP LINKAGE(ORL)

This section of analysis discuss the level & practice of Organizational Relationship Linkage(ORL) between BGI Ethiopia and its upstream partners. This basic dimension of Supply Chain Integration(SCI) has got seven subdivisions to examine the practice of ORL. These are : Regular & active communication channel, Key performance indicators(KPIs), Incentive realignment has been set jointly, Integrated behavior has been established, A practice of sharing of skill, ideas, knowledge, and institutional best practices.

**Table 4.4.3.1 Organizational Relationship Linkage(ORL) sub-dimensions Survey Result**

Items	Regular & active communication channel		Key performance indicators(KPIs)		Incentive realignment has been set jointly		Integrated behavior has been established	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Strongly Agree	2	0.9	-	-	-	-	2	0.9
Agree	89	37.9	61	26.0	20	8.5	53	22.6
Neutral	-	-	26	11.1	23	9.8	-	-
Disagree	31	13.2	45	19.1	59	25.1	67	28.5
Strongly disagree	113	48.1	103	43.8	133	56.6	113	48.1
Mean(M)	2.30		2.30		1.70		2.00	
Standard Error(SE)of Mean	0.092		0.081		0.062		0.079	
Standard Deviation(STD)	1.410		1.248		0.959		1.211	
Median(MD)	2.00		2.00		1.00		2.00	
Skewness	0.345		0.444		1.215		0.897	

Source: Field Survey, 2020

Organizational relationship linkage denotes a pure joint strategic vision & objectives among partners in the supply chain. Furthermore, it encompasses risk sharing, operational cost reduction, promoting reward, developing skills and institutional culture, and defining joint performance measures. It is essential to plan regular & active communication channels and create cross-functional teams along the SC (Luque , et al., 2012). Therefore, establishing long-term relationships among the SC members is necessary to develop SCI.

Table 4.4.3.1 clearly showed that 61.3% of BGI Ethiopia partners disagree on the existence of regular & active communication channel among members of the supply chain; and again

nearly the same proportion of respondents, 62.8% also admit, lack of Key performance indicators(KPIs) to measure the supply performance. The two sub-dimension of ORL,i.e , regular communication & performance measurement has got both identical mean & median value of 2.3 & 2.00 respectively, which is at the low end.

As per Heinken(2020), the Heinken has got a supply chain integration program to source malt in Ethiopia for its brewing activity. This program is named as CREATE Ethiopia and expected to reach a target of 60% raw materials to be sourced locally. To achieve this, Heinken has established integration with farmers through their union. The farmers are expected to produce barley in a productive manner & deliver to malting companies. Then, the malting companies will convert barley to malt, which is an input for beer. To materialize this program, Heinken has got a dedicated team that are regularly & actively making communication with farmer unions.

In the barely sourcing integration program, discussion agenda is clear, which focused on progress of farming, challenges, identifying support area, target achievement, formal report evaluation. And, the communication is regularly, every fifteen days. In addition, it is accompanied by the field visit at least once per month. This practice has created to create common understanding, alignment, and achievement of target. Initially, 2 tons per hectare was the average harvest of farmers. After the Heinken offered technical assistance through, improved seed, training, and finance, the key performance indicator(KPI) was increased to 5 tons per hectare. As a result 200,000 tons of barley were produced by farmers in 2019.

When we come to the practice of BGI Ethiopia, there is limitation to make regular communication with partners, establish & monitor the key performance indicators(KPI). This situation is expected to be curbed.

The weak practice of setting incentive realignment & low effort to build integrated behavior has been admitted by 81.7%, and 76.6% of upstream SC members, respectively. In addition, their rate regarding the level of joint incentive setting and level of effort to establish common behavior has been found 1.7 and 2.00, respectively. As per the focus group discussion, BGI Ethiopia has got a practice of making negotiation and setting incentives only for bulk importation orders. Fair surplus sharing for all partners along supply chain line is ensured if there is a practice of joint incentive alignment along the

chain. Joint incentive realignment habit has a significant contribution to establish transparent & long term relation among partners in the chain. In addition, it has got direct contribution on value adding effort to consumer, by sustaining fair price for products. Regarding the integrated behavior, BGI Ethiopia is operating in local brewing industry. And has got its own work culture & behavior that help its employees to drive its performance in the competitive beverage industry. This behavior needs to be integrated with suppliers so that they could understand they are playing pivotal role in the business. Though these two parameters are basic in the Organizational Relationship Linkage(ORL), BGI Ethiopia has been observed to give less notice.

Trust among upstream supply chain members comprises a belief that each partners are worried in the others' welfare and will not take actions without considering their effect on the other parties. This embraces partners are more likely to take the other party's goals into consideration when making decisions, joint price setting, etc (Chopra & Meindl , 2007).

Table 4.4.3.2 presented the actual response of BGI Ethiopia upstream partners regarding Continuous effort among partners to improve trust & long-term relationship. 60.8% of partners agree that there is weak effort on both side ( suppliers & focal firm) to improve trust & long-term relationship. But, few suppliers ( 39.3%) favor on the existence of continuous effort to improve trust & long-term relationship on both side. The average response value for this issue was (M=2.42, SD=0.088) . Furthermore, the median & skewness result was (MD=2.00,SK=.238). These result showed that most partners response is on the lower end that express the absence of proper effort. The information captured from the focus group discussion showed that there is an effort & practice of building trust & long-term relationship building with selected suppliers only. But this practice need to be extended for others as well.

The survey result regarding the skill development & a team building effort showed that 86.8% and 80.4% of the upstream partners agree on the absence, respectively. Refer table 4.4.3.2. This response is also supported by the central tendencies' measurements. A mean value of 1.66 and 1.52 has been computed, respectively. This result showed that most responses are way below from the expected average 2.5, which indicates the skill development & a team building effort practice is weak between BGI & its partners.

**Table 4.4.3.2 Organizational Relationship Linkage(ORL) sub-dimensions Survey Result**

Items	A practice of sharing of skill, ideas, knowledge, and institutional best practices		Continuous effort among partners to improve trust & long-term relationship		Existence of system to encourages team building	
	Frequency	%	Frequency	%	Frequency	%
Strongly Agree	2	0.9	2	0.9	2	0.9
Agree	29	12.3	90	38.3	22	9.4
Neutral	-	-	-	-	22	9.4
Disagree	60	25.5	56	23.8	3	1.3
Strongly disagree	144	61.3	87	37.0	186	79.1
Mean(M)	1.66		2.42		1.52	
Standard Error(SE)of Mean	0.068		0.088		0.069	
Standard Deviation(STD)	1.04		1.35		1.05	
Median(MD)	1.00		2.00		1.00	
Skewness	1.583		0.238		1.740	

Source: Field Survey, 2020

Ebers(2012) elaborated interorganizational relationships as the longer-term relationships between and among partners (e.g., suppliers, customers, and focal firms) that are desiring a joint interest while also remaining independent and autonomous, thus retaining separate interests.

In general, the BGI Ethiopia and its upstream supply chain members practice regarding Organizational Relationship Linkage(ORL) is presented at table 4.4.3.2 & Figure 4.4.3.1. The lion share of partners, i.e 74.9% of them agree on the weak practice & the improvement area to be corrected. These respondents rated the mean level of practice to 1.97 with SD=0.689. In addition, the median result & Skewness was found as (MD=1.86, SK=0.899). This result showed that most partners responses were on the lower end and the Organizational Relationship Linkage(ORL) distribution is positively skewed, where most responses are piled at the lower end. Figure 4.4.3.1 below also depict this result clearly.

Besides, a confidence interval could be constructed to examine how the sample mean value 1.97 is close to the population mean. This is done based on Field(2005) suggestion as per below formula:

For 95% confidence interval, the Z score is 1.96, then

Confidence interval(CI) for lower boundary=  $M-(1.96 \times SE)$

Confidence interval(CI) for upper boundary=  $M+(1.96 \times SE)$

Where  $M= 1.97$  and  $SE$  is  $0.045$ .

Substituting this value to the formula gave:

Confidence interval(CI) for lower boundary= $2.06$

Confidence interval(CI) for upper boundary=  $1.88$

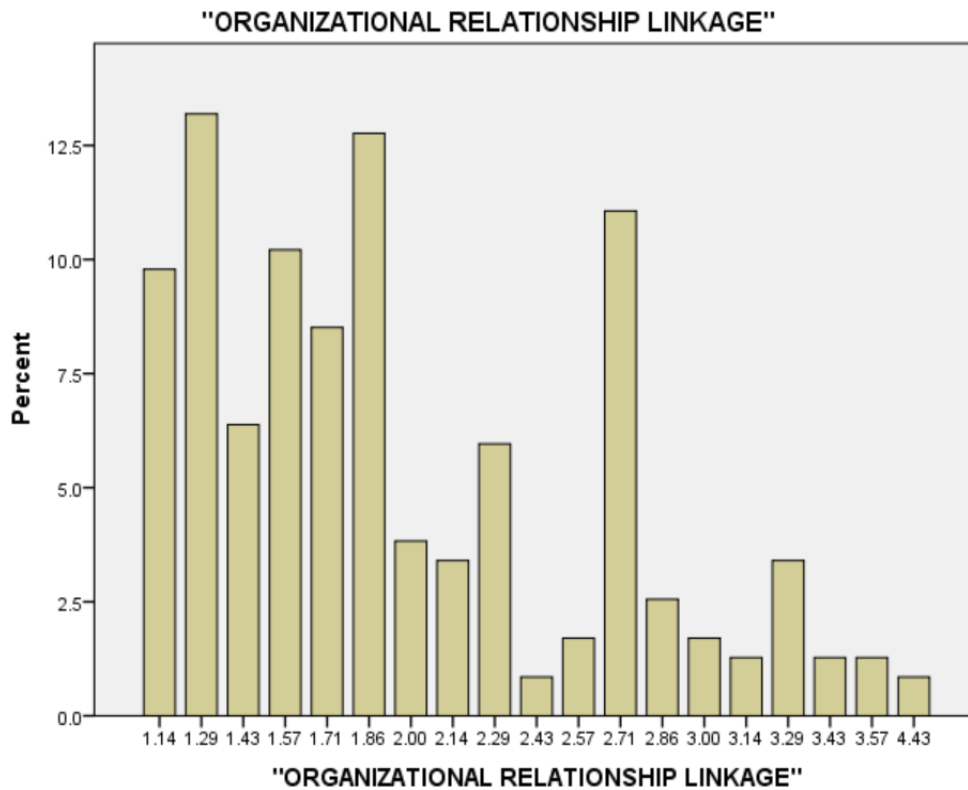
This result indicates the population mean value for the organizational relationship linkage practice of BGI Ethiopia with its upstream SC partners lied between  $2.06$  and  $1.88$ . Which is still confirmed the existence of weak practice of organizational relationship linkage.

**Table 4.4.3.3 Organizational Relationship Linkage(ORL) Survey Result**

Items	Organizational Relationship Linkage(ORL)	
	Frequency	%
Strongly Agree	-	-
Agree	5	2.1
Neutral	54	23.0
Disagree	107	45.5
Strongly disagree	69	29.4
Total (N)	235	100
Mean(M)	1.97	
Standard Error(SE)of Mean	0.045	
Standard Deviation(STD)	0.689	
Median(MD)	1.86	
Skewness	0.899	

Source: Field Survey, 2020

**Figure 4.4.3.1 Distribution of Organizational Relationship Linkage(ORL) Survey Result**



Source: Field Survey, 2020

#### 4.4.4 MANAGEMENT COMMITMENT(MC)

This section of the study elaborate the basic dimension of Supply chain integration (SCI), i.e Management Commitment(MC) between BGI Ethiopia and its Upstream Supply Chain partners. This dimension has got four perspectives to examine the level of integration & its practice. These are : Allocation of the required resources, Regular performance reviews & control, Maintaining training & continuous improvement regarding collaboration, and last but not least a practice of informal & personal relationship.

Table 4.4.4.1 Survey Result of Management Commitment(MC) Sub-dimensions

Items	Allocation of the required resources		Regular performance reviews & control to enhance integration		Maintaining Training & continuous improvement regarding collaboration		A practice of informal & personal relationship	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Strongly Agree	18	7.7	17	7.2	4	1.7	60	25.5
Agree	-	-	10	4.3	19	8.1	46	19.6
Neutral	-	-	6	2.6	18	7.7	21	8.9
Disagree	35	14.9	23	9.8	24	10.2	24	10.2
Strongly disagree	182	77.4	179	76.2	170	72.3	84	35.7
Total (n)	235	100	235	100	235	100	235	100
Mean(M)	1.46		1.57		1.57		2.89	
Standard Error(SE)of Mean	0.071		0.078		0.068		0.108	
Standard Deviation(STD)	1.083		1.194		1.045		1.658	
Median(MD)	1.00		1.00		1.00		3.00	
Skewness	2.684		2.075		1.736		0.041	

Source: Field Survey, 2020

The achievement & sustainability of various organizational programmes are highly correlated with the management commitment. Because the commitment given by the top management to a business system is clearly articulated in terms of resource allocation to run the system (Tarigan, et al., 2017).

Table 4.4.4.1 vividly depicts that 92.3% of response showed BGI Ethiopia & its partners have refrained from allocating required resources for collaboration work. In addition, the mean level of resource allocation has been computed as (M=1.46, SD=0.071) and Median value of (M=1.00, SK=2.684). This result indicates, due attention need to be given by the management of both parties to sustain & boost the level integration.

Business managers has got a substantial role in SC integration. They are expected to set policies and plans to achieve the goals, provide training customized to sustainable business collaboration, making regular supply performance reviews and at all levels of organization are basic variables to ensure long term relationship with partners & also to measure the effort of management. (Johari, et al., 2018).

The practice of regular performance reviews & continuous training on SCI is observed as being weak. 86% and 82.5% of respondents expressed the absence of periodical supply review & continuous development work on SCI, respectively. The partners also rates both variables with Mean, ( $M=1.57$ ,  $SK=0.078$ ), and ( $M=1.57$ ,  $SK=0.068$ ), respectively.

Informal, and personal relationships have got effect on the business activities in developing countries (Lovett, et al., 1999). Berlin, et al (2019) established that the impact of informal, and personal relationships is like an engine oil that lubricates various components in SC integration. It helps to create trust, ease of doing business with partners, and facilitates information sharing.

Child et al. (2003) also alerted that the value of personal relationship as a central institutional force that is rooted in intra-firm's integration. In addition, Brown, et al. (1995) added in the developing countries, where the legal system is not compatible to the current business practice & the rule enforcement is low, the informal & personal relationship play the principal role in creating & fostering collaboration with upstream SC partners.

BGI Ethiopian has got relatively better performance on this regard. Nearly equivalent proportion of partners responded both extremes. 45.9% of the response showed there is weak practice regarding informal relationship. While 45.1% favors the existence of personal relationship between BGI Ethiopia & SC partners. The mean rate showed that ( $M=2.89$ ,  $SD=0.108$ ) and Median value of ( $MD=3.00$ ,  $SK=0.041$ ). The central tendency statistics showed that relatively more partners are satisfied in this regard. Both the mean & median level of informal relationship value showed above the average 2.5 rate.

In summary, the Management Commitment (MC) dimension of SC integration practice among BGI Ethiopia and its vendors were low as per table 4.4.4.2 and bar graph at figure 4.4.4.1 below. 74.9% of BGI partners admitted the management of both partners didn't put upstream SCI as a strategic agenda. In addition, the central tendency statistics also support this argument. ( $M=1.87$ ,  $SD=0.050$ ) and ( $MD=1.75$ ,  $SK=0.808$ ).

Besides, a confidence interval could be constructed to examine how the sample mean value of 1.87 is close to the population mean. This is done based on Field (2005) suggestion as per below formula:

For 95% confidence interval, the Z score is 1.96, then

Confidence interval(CI) for lower boundary=  $M-(1.96 \times SE)$

Confidence interval(CI) for upper boundary=  $M+(1.96 \times SE)$

Where  $M= 1.87$  and  $SE$  is  $0.05$ .

Substituting this value to the formula gave:

Confidence interval(CI) for lower boundary= $1.77$

Confidence interval(CI) for upper boundary=  $1.97$

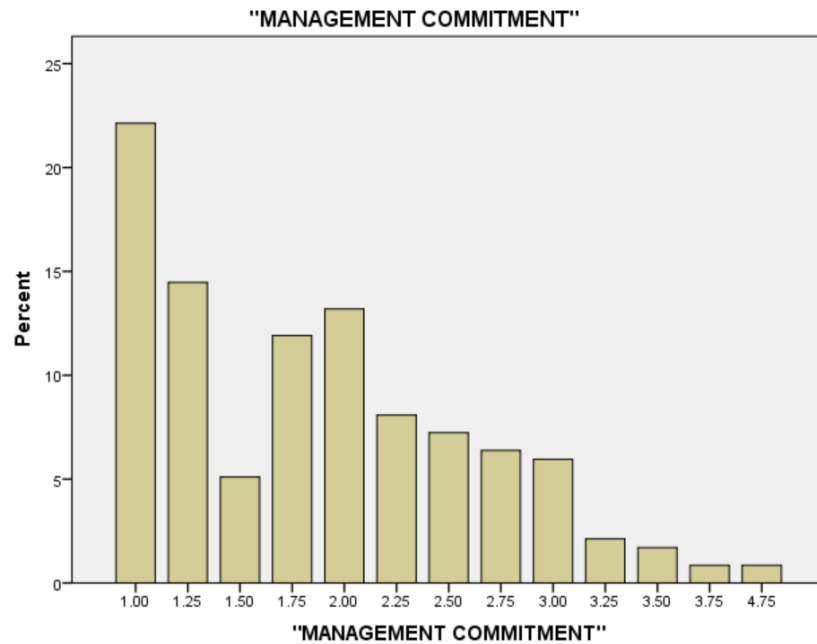
This result shows the true mean value for management commitment practice of BGI Ethiopia and its suppliers lied between  $1.77$  and  $1.97$  at 95% confidence interval. This result confirmed the existence of loose management commitment.

**Table 4.4.4.2 Management Commitment(MC) Survey Result**

Items	Management Commitment	
	Frequency	%
Strongly Agree	2	0.85
Agree	6	2.55
Neutral	51	21.70
Disagree	90	38.30
Strongly disagree(	86	36.60
Total (n)	235	100.00
Mean(M)	1.87	
Standard Error(SE)of Mean	0.050	
Standard Deviation(STD)	0.767	
Median(MD)	1.75	
Skewness	0.808	

Source: Field Survey, 2020

**Figure 4.4.4.1 Distribution of Management Commitment(MC) Survey Result**



Source: Field Survey, 2020

The case study made on Swedish steel recycling industry by Berlin(2019) has revealed the impact of management commitment on the upstream supply chain integration to acquire steel scrap which is one of the basic raw materials for the steel industries. There are five big steel industries in Sweden & eight large steel scrap dealers. It is a usual market situation where the steel scrap supply is less than the steel producers demand. To avoid the fierce competition among steel producers, a procurement intermediary company has been established by steel producers.

At the mid of every month, the procurement intermediary company collect the next month demand of the five steel producers and communicates the eight scrap dealers their next month supply. Based on this information, the procurement intermediary makes scrap allocation to be supplied to each steel producers. Around the 22<sup>nd</sup> of each month, representatives of both steel producers and scrap dealers meet to determine steel scrap unit price. The international steel scrap selling price, the demand, supply, the import price, the scrap dealers' average acquisition, and fair profit margin to scarp dealers are the basic information to be supplied for discussion. In addition, scrap dealers site audit will be conducted to ensure quality of materials.

Based on the discussion, the steel producers ensure a price which is less than global steel scrap price. Then, the procurement intermediary develops a logistic plan (from which scrap dealers' site to which steel producer), and deploy third party logistics company. In addition, the procurement intermediary, follow up steel scrap delivery, and payment of scrap dealers from steel producers. The procurement intermediary CEO is always recruited from senior ex-staff of steel producers. This situation creates a broad base experience of the industry and secure their interest. For this service activity, the procurement intermediary company earn minimum revenue to cover all its administrative expense.

When we examine the Swedish steel industry based on the sub-dimension of management commitment (MC) of supply chain integration, it has got the following result. The focal firms( steel producers) have allocated resource to establish the procurement intermediary to manage upstream SCI of the flow of scrap steel. There is a monthly performance review that ensures allocation of scrapes, price, and mutual benefit of all parties. There is a practice of informal & personal relationship between the procurement intermediary and steel producers, since the CEO of the procurement intermediary came from steel producers and its office is in the steel producer's association.

The overall practice of Swedish steel industry lets the industry to be competitive in the global market and also ensured, and the use rate of recycled steel is close to 90%.

When we examine the management commitment of BGI Ethiopia in the upstream SCI practice, there are various gaps regarding the resource allocation, regular performance reviews & control to enhance the collaboration, Training & continuous improvement should be maintained for concerned employees that are dedicated on collaboration work.

#### 4.4.5 LEVEL OF UPSTREAM SUPPLY CHAIN INTEGRATION

Table 4.4.5.1 below illustrated the perception of BGI Ethiopia partners regarding the level of upstream supply chain integration(SCI) with the focal firm. The construction of the table and interpretation will be as per section 4.4. The upstream SC partners of BGI were asked to express their perception regarding the level of supply chain integration with BGI Ethiopia on a the 5 point Likert scale, and the interpretation will be as follow: 1-2 would

represent suppliers have got transactional level relationship, 3-4 would be collaborative level relationship and 5 would be strategic/alliance level partnership.

Accordingly, 60% of the partners believed that their business relationship with BGI is at collaborative level; whereas 25.5% perceived that they got transactional level relationship, and the remaining vital few, 14.5% responded that they have got Strategic level partnership with BGI Ethiopia. The overall response of the partners regarding the level of relationship is summarized by the mean value as (M=3.18, SD=1.018) and median and Skewness value of(MD=.00, SK=0.346), respectively.

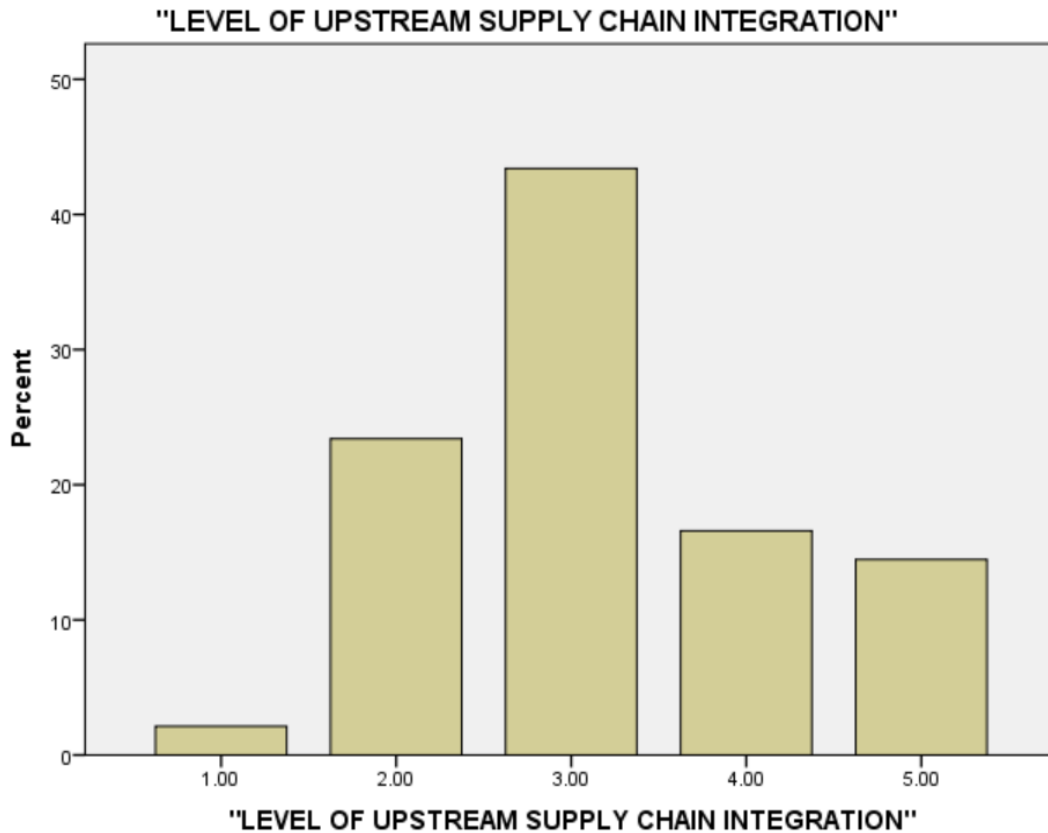
In previous sections, it has been observed that the partners admitted the existence of many weak practices regarding SC integration; however, their perception toward the level of supply chain integration with BGI Ethiopia has become relatively affirmative. As a result, a mean supply chain integration level (which is 3.18), represented a collaborative level relationship. This result seemed an exaggerated response.

**Table 4.4.5.1 Level of upstream supply chain integration Survey Result**

Items	Level of upstream supply chain integration	
	Frequency	%
Strategic/alliance level partnership	34	14.5
Collaborative level relationship	141	60.0
Transactional level relationship	60	25.5
Total (n)	235	100
Mean(M)	3.18	
Standard Error(SE)of Mean	0.0664	
Standard Deviation(STD)	1.018	
Median(MD)	3.00	
Skewness	0.346	

Source: Field Survey, 2020

**Figure 4.4.5.1 Level of upstream supply chain integration Survey Result**



Source: Field Survey, 2020

#### **4.5 INFERENTIAL STATISTICAL ANALYSIS TOWARDS THE PERCEPTION OF UPSTREAM SUPPLY CHAIN INTEGRATION**

This section of the study examine the level of upstream Supply Chain Integration(SCI) using Linear Regression model. The main intension of the study is to assess the effect of the four dimensions of supply chain ( Information Integration(II), Coordination and Resource Sharing(CRS), Organizational Relationship Linkage(ORL) , Management Commitment (MC) on the level of Upstream Supply Chain Integration(SCI). Hence, level of upstream SCI would be the response variable while the four dimensions would be the predictors.

Since the regression model requires various assumptions before implementation, the model assumptions testing have been carried out. Finally, a multivariate linear representative model with interpretations have been presented.

#### 4.5.1 ASSUMPTIONS OF LINEAR REGRESSION

Linear regression(LR) is a powerful statistical model where it operates based on the analysis that measures whether one or more predictor variables explain the dependent (criterion) variable (Casson, et al., 2014). Testing of assumptions of linear regression is an important task for the researcher utilizing multiple regression (Williams, et al., 2013).

When used appropriately, LR is a powerful statistical tool that can explain and predict real-world phenomena, but a misunderstanding of its assumptions can lead to erroneous and misleading conclusions (Casson, et al., 2014).The linear regression has got four main assumptions: Normality, Homoscedasticity, Linearity, and Multicollinearity.

#### 4.5.2 TEST OF NORMALITY & HOMOSCEDASTICITY

The assumption of normal distribution is relevant to multiple regression where the LR model requires normally distributed errors(residuals ). The errors(residuals )are defined as the differences between the observed response variable values and the values predicted by the estimated regression model. (Williams, et al., 2013).

Where Homoscedasticity refers that the variance of errors is the same across all levels of the independent variables. When the variance of errors differs at different values of the independent variables, heteroscedasticity is indicated. Minor heteroscedasticity has little effect on significance tests; however, when heteroscedasticity is marked it can lead to major distortion of findings and seriously weaken the analysis thus increasing the possibility of a Type I error. This assumption can be checked by visual examination of a plot of the standardized residuals (the errors) by the regression standardized predicted value (Osborne & Waters, 2002).

In order to determine normality graphically, we can use the output of a normal Q-Q Plot(Quantile-Quantile plots) & detrended normal Q-Q plot. If the data are normally distributed, the data points will be close to the diagonal or the horizontal line. If the data points stray from the line in an obvious non-linear fashion, the data are not normally distributed (Augustina, et al., 2012). The standard residuals( the error in prediction) are plotted by SPSS are presented on the annex-5, Figure 1-A, B & C. As we can see from the two normal Q-Q plots below, the data set are following the lines which shows the standard residuals dataset has got a normal distribution. In addition, the histogram on figure 1- C, approached to normal.

In the annex-5, figure 1-B shows the residuals scattered randomly across the horizontal line; however few outliers are observed to lower end. In general , we can observe the standardized residual random scattered around the horizontal line and the existence of homoscedasticity.

Though, the graphical test shows the standard residuals has fulfilled the normal distribution, the numerical methods helps to validate our argument. Acknowledging the scholars that developed the test statistics four kind of numerical test statistics have been deployed. These are the Kolmogorov-Smirnov Test , Shapiro-Wilk Test, Fisher Skewness & kurtosis, and finally Pearson skewness test.

If the Significant value of the Kolmogorov-Smirnov Test and Shapiro-Wilk Test is greater than 0.05, the data is normal. If it is below 0.05, the data significantly deviate from a normal distribution (Razali & Wah, 2011). In the annex-5, Table 1 shows SPSS output of standard error for the test of normality and the level of significances are 0.2 and 0.244 for the Kolmogorov-Smirnov Test and Shapiro-Wilk Test, consequently. This shows the test statics is above 0.05, so we can consider the standardized error has got a normal distribution.

In addition, the test of normality for standard errors has also been also examined with Fisher & Pearson skewness coefficient. Pett (1997) suggested if fisher skewness coefficient is with in  $\pm 1.96$ , or Pearson skewness coefficient is with in  $\pm 0.5$ , then the level of skewness is acceptable. And, if Fisher coefficient of kurtosis is with in  $\pm 1.96$ , the data set is mesokurtic, i.e near to normal.

Accordingly, computation has been done for standard error, and result is displayed at the annex-5, table -2 up to table 4 below. It has been found that a the Fisher Skewness Coefficient is -1.079 that shows the standard error distribution is negatively skewed. For the acceptable range is  $\pm 1.96$ , it is within range. In addition, the Pearson skewness coefficient has been computed is 0 (not perfectly zero, has got numbers after many decimal numbers). Since the range of acceptance is  $\pm 0.5$ . The result is acceptable. The difference in level of significance between the two test is due to the Fisher Skewness test statistic is too sensitive than Pearson skewness test (Pett, 1997). Furthermore, Fisher coefficient of kurtosis has been -0.808. The negative sign indicates the residual distribution is a little bit platykurtic. Since the acceptable range is  $\pm 1.96$ , it is within range. We have numerically tested normal distribution using four techniques, and found identical result, both results are within acceptable range.

#### 4.5.3 TEST OF LINEARITY

Standard multiple regression can only precisely estimate the association between dependent and independent variables if the relationships are linear in nature (Osborne & Waters, 2002). Correlation describes the strength of linear relationship between two random variables in terms of a single unitless value (denoted as  $r$ ; the correlation coefficient) between  $-1$  and  $1$ . If  $r = 0$ , then there is no relationship between the two variables (they are independent); if it is positive, then as one variable trends upward, so does the other; if it is negative, then as one variable trends up, the other trends down. A Pearson's correlation coefficient is the most widely utilized correlation measure (Casson, et al., 2014).

Pearson correlation is offered in the table 4.5.3 and interpreted by the guide line recommended by Field (2006); he mentioned that the Pearson correlation coefficient reveals the relationship and direction between the predictors and outcome variable. Accordingly, if the relationship is measured in the range of  $0.1$  to  $0.29$  it is a weak relationship,  $0.30$  to  $0.49$  is moderate, above  $0.50$  shows strong relationship; whereas the positive and negative sign tell us the direction of their relationship (Field, 2006).

Based on this reference table 4.5.3 below depicts that the Predictor variables and the outcome variable are linearly correlated at 0.01 significant level. There is statistically significance linear correlation between the predictors variables (Information Integration(II), Coordination and Resource Sharing(CRS), Organizational Relationship Linkage(ORL), and Management Commitment(MC) and the outcome variable, Level Of Upstream Supply Chain Integration(SCI).

**Table 4.5.3 Pearson Correlation Information**

		II	CRS	ORL	MC	level of SCI
Information integration (II)	Pearson Correlation	1	.567**	.601**	.633**	.446**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	235	235	235	235	235
Coordination and resource sharing (CRS)	Pearson Correlation	.567**	1	.803**	.599**	.587**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	235	235	235	235	235
Organizational relationship linkage (ORL)	Pearson Correlation	.601**	.803**	1	.654**	.673**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	235	235	235	235	235
Management commitment (MC)	Pearson Correlation	.633**	.599**	.654**	1	.633**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	235	235	235	235	235
Level of integration (SCI)	Pearson Correlation	.446**	.587**	.673**	.633**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	235	235	235	235	235

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

Source: Field Survey, 2020

#### 4.5.4 ASSUMPTION OF MULTICOLLINEARITY

Multicollinearity arises when independent variables in a regression model are correlated. Predictors must not be highly correlated. If it happens it can cause problems when a model fitting is done and interpretation of the results. when independent variables are correlated, it shows that changes in one variable are associated with shifts in another variable. The stronger the correlation, the more difficult it is to change one variable without changing another. It becomes problematic for the model to estimate the relationship between each

independent variables and the dependent variable independently because the independent variables tend to change in unison.

Table 4.5.4 clearly shows the SPSS out put for multicollinearity test statistics. When the tolerance of collinearity statistics is more than 0.2 it shows absence of multicollinearity (Menard, 1995). In addition, Myers(1990) justified that if the VIF(Variance Inflation Factor) value for collinearity statistics is less than 10, data set are safe from multilinearity symptoms. Accordingly, the minimum tolerance value showed in the table is 0.300 for organizational relationship linkage. And, the maximum VIF figure computed is 3.331 for same variable, so It can be agreed that the data set doesn't show multicollinearity.

**Table 4.5.4: Test of Multicollinearity test statistics**

Model	Collinearity Statistics	
	Tolerance	VIF
1 (Constant)		
"INFORMATION INTEGRATION"	.530	1.885
"COORDINATION AND RESOURCE SHARING"	.340	2.938
"ORGANIZATIONAL RELATIONSHIP LINKAGE"	.300	3.331
"MANAGEMENT COMMITMENT"	.477	2.096

Source: Field Survey, 2020

#### 4.5.5 MODEL SUMMARY: REGRESSION STANDARDIZED COEFFICIENTS

Model summary is one way of assessing the fitness of regression model using various parameters. Regression standardized coefficients could assume any value between 0 and 1, and it measures the proportion of the variation in a dependent variable that can be explained statistically by the independent variables (Saunders, et al., 2007). R shows the value of the multiple correlation coefficient between the predictors & the outcome (Field, 2005). R square means how much of the variability in outcome variable is accounted for by predictor. Or the ability of the model to explain the percentage of variation in the response

variable. And the adjusted value gave information how much variance in dependent variable would be accounted for if the model had been derived from the population from which the sample was taken (Field, 2006; Casson, et al., 2014). Regression coefficients (R) and R Square of the research are discussed below:

**Table 4.5.5. Model Summary**

<b>Model Summary</b>									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.723 <sup>a</sup>	.523	.515	.70929	.523	63.000	4	230	.000

a. Predictors: (Constant), "MANAGEMENT COMMITMENT", "COORDINATION AND RESOURCE SHARING", "INFORMATION INTEGRATION", "ORGANIZATIONAL RELATIONSHIP LINKAGE"

Source: Field Survey, 2020

In the above table 4.5.5, multiple correlation coefficient R of 0.723 indicates the existence of positive correlation among the independent and dependent variables. Furthermore, it explains there is strong relationship between the response & predictors variables. The coefficient of determination, R square is interpreted as 52.3% of the variation in the dependent variable i.e. practices of SCI(Supply Chain Integration) is explained by the independent variables i.e, Information Integration(II), Coordination and Resource Sharing(CRS), Organizational Relationship Linkage(ORL) , Management Commitment(MC).

**4.5.6 MODEL GENERALIZATION**

Model generalization is an important step to make sure generalizability of model figures based on sample survey if we found that our model is not generalizable, and then we should restrict any conclusions based on the model (Field, 2006).The adjusted R square gives the clue of how well the model generalizes. In addition, the adjusted value tells us how much variance in dependent variable would be accounted for if the model had been derived from the population from which the sample was taken.

The model generalization value is calculated by the difference between R square and adjusted R square (Field, 2006). And hence, the model generalization summary of practices of upstream SCI(Supply Chain Integration) is calculated as the difference between R square and adjusted R square. Based on table 4.5.5 above, it has become  $0.523 - 0.515 = 0.008$ , which is about 0.8 %. This shrinkage means that if the model was derived from the population rather than a sample, it would account for approximately 0.8 % less variance in the outcome. Therefore, we can conclude that if this model is applied on the total population, only 0.8 % of variance occurs on the result. Df1(Degree of freedom) is 4 that indicates the number of predictor variables. Df2 is 230 that indicates the number of observations(235) less the number of coefficients to be predicted(5) including the intercept. Field (2005) elaborated that the F change statistics measures to what extent the model has enhanced the prediction of the response variable as compared to the level of inaccuracy of the model. When the model is good, then it is expected the improvement due to the model be large. So it is expected the F statistics to be greater than 1. Table 4.5.5 showed, the change statistics F change is 63.00 which is significant at ( $p < 0.001$ ). This means there is less than 0.1% chance that an F ratio of this large value is happened by chance. Therefore, we can conclude that the regression model significantly predicts the outcome variable, upstream SCI, well.

#### 4.5.7 ANALYSIS OF VARIANCE /ANOVA/ TEST

ANOVA test indicates that whether the model is significantly better at predicting the outcome than using the mean as a “best guess”. ANOVA model is more likely to be significant, indicating that at least one group mean is different from another group mean. While, the F-ratio represents the ratio of the improvement in prediction that result from the model, relative to the inaccuracy that still exists in the model (Field, 2005). ANOVA can be considered as a technique to assess the fit of a regression model.

ANOVA Table 4.4.7 below represents various regression parameter estimates. A sum of square 126.78 showed the improvement in prediction resulting from fitting a regression line to the data rather than using the mean as an estimate of the outcome. A residual sum of square of 115.71 indicated in the table represents the sum of the difference between

the model and the observed data. The degree of freedom(*df*) of 4 represented the number of predictors. The degree of freedom(*df*) for residuals is 230 which indicates the number of sample observation (n=235) less the number of coefficient in the model(5). The average sum of square(31.695) is the sum of square (SS, 126.781) divided by the *df*(4). The average sum of square of 31.695 indicates the average improvement in prediction by the model. The average sum of square for residual,0.503, is the average difference between the model and observed data (which is 115.713/230). The F ratio 63.0 is the division of regression mean square by residuals (which is 31.695/0.503=63.0). The F value 63.0 is significant and unlikely to have happened by chance. This result can be interpreted as the model significantly improved the predicting ability to predict the outcome, since f ratio is more significant.

**Table 4.5.7 Analysis of Variance /ANOVA/**

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	126.781	4	31.695	63.000	.000 <sup>b</sup>
	Residual	115.713	230	.503		
	Total	242.494	234			

a. Dependent Variable: "LEVEL OF INTEGARATION"

b. Predictors: (Constant), "MANAGEMENT COMMITMENT", "COORDINATION AND RESOURCE SHARING", "INFORMATION INTEGRATION", "ORGANIZATIONAL RELATIONSHIP LINKAGE"

Source: Field Survey, 2020

#### 4.5.8 REGRESSION MODEL PARAMETERS

Table 4.5.8 has presented the coefficient of the linear regression(LR) model parameters clearly. The unstandardized regression coefficient (Beta) shows the individual contribution of each predictor to the model (Field, 2005). The *b* values showed the relationship between upstream supply chain integration (SCI) and each four predictors(II, CRS, ORL, MC). If the value is positive we can know easily that there is a positive relationship between the predictor and the outcome whereas a negative coefficient represents a negative relationship (McClave, et al., 2001).

Table 4.5.8 showed that one predictor Information Integration (II) has got negative values but all the other remaining predictors have got positive  $b$  values. Whereas, Coordination and Resource Sharing(CRS), Organizational Relationship Linkage(ORL), and Management Commitment(MC) has got a positive  $b$  coefficient value. However. The  $b$  value for Information Integration(II) was negative. It is not logical to get such result. As information integration increases, it is expected to have a better supply chain integration. This may be due to respondents biased response. As per section 4.3 demographic data analysis of upstream partners, most partners (53.0%), has got many years (more than 10 years) business relationship with BGI. So, even if these partners expressed clearly the weak level & practice of information integration (II), their overall perception to the level of upstream supply chain integration(SCI) with BGI is relatively high. This situation leads the model to generate a negative relationship regarding this specific predictor.

The  $b$  values are sensitive & had the ability to offer so much important information like to what degree each predictor affects the outcome if the effect of all other predictors are held constant.

Information Integration(II) has got a  $b$  value of -0.106. This value indicates that as Information Integration(II) increased by one unit, supply chain integration(SCI) decrease by 0.106. This interpretation is true only if the effects of other predictors(CRS, ORL & MC) are held constant.

Coordination and Resource Sharing(CRS), has got a  $b$  coefficient of 0.084, This value indicates as the level of Coordination and Resource Sharing(CRS) increased by 100%, the level of upstream supply chain integration(SCI) increased by 8.4%. The interpretation is correct if the effects of other predictors are held constant.

Organizational Relationship Linkage(ORL) showed a  $b$  value of 0.628. This could understood as a 100% increment on Organizational Relationship Linkage(ORL) will increase a 62.8% on the level of upstream supply chain integration(SCI). This result is acceptable only if the effect of other variables are held constant. This indicates Organizational Relationship Linkage(ORL) has got high degree of intensity to affect the outcome variable, upstream supply chain integration(SCI).

Management Commitment(MC) has got a *b* value of 0.479. This *b* value indicates a unit increase in MC would result, a 0.479 increment on SCI. This means a 100% increment on the level of management commitment(MC), would result a 47.9% increase in level of upstream Supply Chain Integration(SCI) between BGI Ethiopia and its upstream partners. This indicates management commitment(MC), as a predictor is the second influential variable ( following ORL) to affect the response variable, upstream supply chain integration(SCI).

**Table 4.5.8 Regression Model**

Model		Coefficients <sup>a</sup>				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.139	.164		6.928	.000
	"INFORMATION INTEGRATION"	-.106	.084	-.079	-1.270	.205
	"COORDINATION AND RESOURCE SHARING"	.084	.087	.075	.959	.339
	"ORGANIZATIONAL RELATIONSHIP LINKAGE"	.628	.123	.425	5.110	.000
	"MANAGEMENT COMMITMENT"	.479	.087	.361	5.470	.000

a. Dependent Variable: "LEVEL OF INTEGARATION"

Source: Field Survey, 2020

According to Field(2005), the multiple regression equation has got the below structure:

$$Y = C + b_1X_1 + b_2X_2 + \dots + b_nX_n$$

Where: Y = the response variable

C = constant (Intercept)

$b_i$  = Unstandardized regression coefficients for each predictors

$x_i$  = the predictor variables

Based on this, the researcher developed below regression model:

$$Y \text{ (SCI)} = C + b_1II + b_2CRS + b_3ORL + b_4MC$$

Where: C=1.14, II=-.106, CRS=0.084, ORL=0.628 & MC=0.479

Where: SCI= Supply Chain Integration

II= Information Integration

CRS= Coordination & Resource Sharing

ORL=Organization & Resource sharing

MC= Management Commitment

When we substitute, the *b* coefficients to the model, it becomes:

$$SCI = 1.14 - 0.106 II + 0.08CRS + 0.63ORL + 0.48MC$$

The multiple variable linear regression model showed that the two predictive variables, II and CRS are observed as being very small beta coefficients,, which indicates their impact on the response variable, upstream SCI as being low. Where as the ORL and MC has ben found as having significant impact on upstream SCI.

## 4.6 CHALLENGES OF UPSTREAM SUPPLY CHAIN INTEGRATION

A change to supply chain integration is characterized by the shift from traditional fragmented way of doing business to more synchronized way of value creation so as to minimize cost and maximize benefits of each partners in the chain (Sweeney, 2009). The desire to shift from classical way of doing business to integrated mode requires change management.

The challenges or barriers of upstream supply chain integration was studied by using a semi-structured questionnaire, and through focus group discussion and interviews with BGI Supply team, plant managers & selected suppliers. Based on the assessment the below major challenges has been identified.

**Expertise & due attention:** Most respondents from the focal firm & supplier side has got good education qualifications, and they have got basic knowledge of upstream SCI; however, they lack the practical experience. In addition, they had little awareness about the strategic impact of SCI in adding competitiveness to their respective companies. In addition, they lack the knowledge of systematic approach of the upstream SCI through the basic dimensions like

II, CRS, ORL & MC. Due this reason they lack the motivation to drive the systematic implementation of upstream SCI.

**Lack of trust:** Trust is the basic essence for effective upstream supply chain integration (SCI). However, there is lack of trust among BGI Ethiopia & its partners. This is revealed through weak level performance in information exchange, involvement for planning & strategy. BGI Ethiopia has a fear that its business information could be conveyed to its rivals. Though the brewing industry has got a tense competitive environment, the competitive auto car makers, Toyota & Honda has been observed to build systematically strong trust with their upstream partners.

**Investment cost:** the upstream SCI implementation has got a cost. All phases of implementation and managing the system has got a related cost. The major phases of implementation includes but not limited to : creation of awareness on the upstream supply chain integration(SCI), putting the upstream SCI as a standing strategic management issue in the agenda of top executives, inclusion of upstream SCI in the sourcing policy & procurement procedure, restructuring the existing SC team structure of BGI, development of inhouse software application (SCI application) for interaction of basic information, dedicating resource( finance, professionals, etc), the continuous upstream SCI performance review. All these activities require investment & continuous administrative expense.

**Poor utilization of Information & Communication Technology:** Information and communication technology has got an impeccable role in the SCI. It is an enabler to exchange accurate & consistent business information. In this regard, BGI uses hard copy material request in the form of RFQ( Request for Quotation) or PR(Purchase request), send purchasers to vendor shops, use physical movement, fax, or phone conversation and sometimes mail conversation. Had there been a proper SCI application, the joint inventory replenishment initiative could be applicable. In addition, the system could initiate a request, whenever the stock level is at re-order level.

**Policy Issue:** Organizational policy are a means to carry out actions that leads to strategic goal attainment. One of the challenges for implementation of upstream SCI is lack of organizational legal ground to exercise. The sourcing policy, procurement procedures and

work instructions has been observed and have no clauses, sections that encouraged the implementation & practice of upstream SCI.

### **Support of resource**

One major challenge from upstream suppliers' side is capability to handle bulk orders & delivery of inputs for innovations. This is due the gap on finance to upgrade the existing plants & technical skill gap on new products. But both could be assisted by the focal firm to some extent.

### **Lack of qualified staff on supply chain integration**

Plant managers of BGI Ethiopia admitted that the supply chain team at sites are not well aware of the collaboration-based long term sourcing operation. Employees rather focus solving today's material need of BGI Ethiopia. And, suppliers also respond in the same manner. However, this way of working need to be curbed.

### **Low utilization of ICT(Information and Communication technology)**

Plant managers of BGI Ethiopia pointed out that tough modern information technology contributes a lot to supply chain integration, the real practice with upstream partners is at low level. Site procurement officers usually use hard copy papers( Purchase requests) & physical visits of shops to invite potential supplier. These could have been eased with mail communication, sharing inventory level & making joint replenishment system.

### **Failure to secure top-management sponsorship and leadership.**

Plant managers also added that since supply chain processes influenced so much of a company's critical value-chain, securing top management sponsorship and leadership is vital for cross-functional commitment, driving enterprise-wide accountability, or allocating proper resources to insure a successful implementation. In this regard, BGI Ethiopia is way behind to take the initiative to launch formal program with upstream partners.

## CHAPTER FIVE

### 5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

*This chapter of the research study incorporates the summary of the major findings which are gathered from the questionnaire result & focus group discussion, and conclusions are drawn in line with the objectives of the study. Furthermore, the study presents possible recommendations to the BGI Ethiopia. Finally, it offers suggestion for further study by other researchers in the future.*

#### 5.1 SUMMARY OF MAJOR FINDINGS

The major objective of this research study was to assess the upstream supply chain integration practice of BGI Ethiopia. In addition, it has got four specific objectives:

- To analyse the impact of Information Integration (II) on upstream SC integration,
- To analyse the impact of Coordination & Resource Sharing (CRS) on upstream SC integration,
- To analyse the impact of Organization & Relationship Linkage (ORL) on upstream SC integration,
- To analyse the impact of Management Commitment (MC) on upstream SC integration,

To this effect, the researcher has prepared and distributed questionnaires, made focus group discussion with key staffs working in the supply chain line, and interviewed selected suppliers. Moreover, reviewing of internal company periodical report, sourcing policy, procurement procedures & work instructions of the BGI Ethiopia has also been made., and the summary of major findings are presented as follows:

### 5.1.1 SUMMARY OF FINDINGS ON DEMOGRAPHIC ANALYSIS

Demographic analysis of the upstream SC partners data indicated that majority of the respondents (77.4 %) has got employees less than 100. They may be middle party traders, i.e they don't produce, or they deploy capital intensive manufacturing facility. And 13.2 % of the suppliers has got employees more than 500 number. These are attributed to malt, cork, label manufacturers, and vehicle assemblers & dealers.

67.7% of the questionnaire are responded by top management position holder in the upstream supply chain partners, this has a lot to do with understanding the query & getting accurate information. Predominantly males were the upstream SC practitioners, 84.3 % , whereas the female participation in the SC activity was limited to 15.7%. Regarding the education qualification, it has been observed that 81.7% of the respondents has got first level degree or more. This could be due to the fact that great amount of the brewery inputs needs technical knowledge, the job position demanded a good education level. This situation helped to ease communication & create more understanding during data collection. In addition, 59.6% of upstream suppliers has got 11 years or more business experience with BGI Ethiopia. This indicates most vendors have got long year of attachment with BGI Ethiopia.

### 5.1.2 SUMMARY OF FINDINGS ON SUPPLY CHAIN INTEGRATION PRACTICE BASED ON THE DESCRIPTIVE STATISTICAL ANALYSIS RESULTS

The practice & level of upstream Supply Chain Integration(SCI) among BGI Ethiopia & upstream partners is examined based on the four dimensions: Information Integration(II), Coordination and Resource Sharing(CRS), Organizational Relationship Linkage(ORL), and Management Commitment(MC). These four dimension has got 19 sub-dimensions (perspectives) to make detail assessment. The response of upstream SC partners was analyzed using descriptive statistical analysis. The analysis has identified various gaps based on the perspectives of each dimensions. Out of 19 sub-dimensions(perspectives), BGI Ethiopia has been found to have better performance on three perspectives. Details of major findings has been presented as follows in order for each dimensions.

## **Regarding Information Integration(II) Dimension**

The assessment has been done based on four perspectives and the following major finding has been found.

25.6% of respondents agree the existence of accurate information exchange among suppliers & BGI Ethiopia with a mean value of 2.76.

While regarding the existence of joint collaborative planning & strategy with BGI Ethiopia, the lion share of study participants,68.9%, disagree on the proper practice of collaborative planning & strategy development, and they rate the practice with a mean value 2.29.

The joint material replenishment system practice between BGI Ethiopia and its upstream partners are accepted as being weak by 74.4% of the respondents, and the level of this practice has been rated with mean value of 1.99.

The final information integration sub-dimension is the utilization of modern Information & communication technology in the SC line. 56.2% of respondents admit that they are not utilizing modern information & communication technology in their transaction with BGI Ethiopia and a mean value of 2.35 is recorded.

In general, the level of information integration between BGI Ethiopia & its upstream partners are weak, and 55.3% of BGI vendors admits the existence of gap regarding the proper practice of information integration and mean value of 2.35 have been observed.

## **Coordination and Resource Sharing(CRS)**

The assessment has been carried out with four sub-dimensions and the following observation has been found from the survey.

Regarding the involvement of partners in key decision-making process, BGI has been rated with mean value of 2.43 & 54.0% of respondents accepted that BGI Ethiopian push them back from joint decision making process.

Pertaining to the common use of logistical resource almost all partners of BGI Ethiopia, 95.3%, expressed the major gap, and a mean value of 1.15 has been computed.

Relatively better performance has been found in relation to the practice of supply contract/commitment on delivery frequency, payment, quality, quantity, place, etc 49.0 % of the suppliers favored the presence of contract for the delivery of materials and rated the practice with a mean value of 2.5.

The last but not the least perspective of coordination and resource sharing (CRS) is the practice of process integration. Regarding the process integration, about 80.4% of partners accepted that there is weak process integration practice in their business relationship with BGI Ethiopia and rated with mean value of 1.6.

In general, the coordination and resource sharing(CRS) practice has been found as being weak. Most of the partners of BGI Ethiopia , i.e 66.0% agree on the existence of low level practice of coordination & resource sharing with the mean response value of 1.91.

### **Organizational Relationship Linkage(ORL)**

This is the third dimension to assess the practice of SCI. It has got seven sub-dimensions(perspectives) for the assessment.

61.3% of the respondents disagree on the existence of regular & active communication channel among members of the supply chain and rated the level of practice with mean value of 2.3.

Nearly the same proportion of respondents, 62.8% also admit, lack of Key performance indicators(KPIs) to measure the supply performance with identical mean rate of 2.3.

In addition, the weak practice of setting incentive realignment & low effort to build integrated behavior has been admitted by 81.7%, and 76.6% of upstream SC members, respectively. With mean rate of 1.7 and 2.00, respectively.

Regarding the continuous effort among partners to improve trust & long-term relationship, a response of 60.8% of partners showed that there is weak effort on both side ( suppliers & focal firm) to improve trust & long-term relationship with a mean rate of 2.42.

While the survey result regarding the skill development & a team building effort showed that 86.8% and 80.4% of the upstream partners agree on the low level of practice, respectively. A mean value of 1.66 and 1.52 has been computed, respectively.

In general, the assessment of Organizational Relationship Linkage(ORL) showed a weak level of practice. The lion share of partners, i.e 74.9% of them agree on the weak practice & the improvement area to be corrected. These respondents rated the mean level of practice to 1.97.

### **Management Commitment(MC)**

This is the final dimension of upstream SCI, and has got four perspectives to examine the level & practice of BGI Ethiopia & its upstream partners.

It has been found that 92.3% of response showed BGI Ethiopia & its partners have refrained from allocating required resources for collaboration work, and the mean value is rated as 1.46.

The practice of regular performance reviews & continuous training on SCI is observed as being weak. 86% and 82.5% of respondents expressed the absence of periodical supply review & continuous development work on SCI with a mean value of 1.57 for both.

BGI Ethiopian has got relatively better performance regarding the practice of informal & personal relationship. About 45.1% favors the existence of personal relationship between BGI Ethiopia & SC partners with a mean rate of 2.89.

In general , the Management Commitment (MC) dimension of SC integration practice among BGI Ethiopia and its vendors are low. 74.9% of BGI partners admitted the less attention by both sides, and rated with mean value of 1.87.

### **Upstream Supply Chain Integration(SCI)**

The result of the response variable, level of upstream supply chain integration shows a mean value of 3.18. A per the guide at section 4.4, this figure represents the level of upstream SCI level of BGI Ethiopia with its partners is collaborative level relationship. This

result seemed an exaggerated response. Though partners admitted the existence of many weak practices regarding upstream SC integration, their perception level is relatively affirmative. This biased response may be due the long years of business relationship with BGI. Because the demographic data analysis shows that 53.6% of respondents have got 10 years or more business relationship with BGI.

### 5.1.3 SUMMARY OF FINDINGS ON SUPPLY CHAIN INTEGRATION FROM FOCUS GROUP DISCUSSION OF UPSTREAM SUPPLY CHAIN ACTORS

#### **Policy issue**

During the focus group discussion & secondary data review( BGI Ethiopia Sourcing policy & procurement procedures), there is no clause that encourage the upstream supply chain integration.

#### **Know-how & expertise**

One major cause of for the weak level of practice of upstream SCI by both parties( BGI & Its partners) were, they lack the know-how & expertise to really implement the upstream SCI initiative. In addition, this skill gap also blurred their attitude about the significant impact of SC integration on the business managers.

#### **Support of resource**

Since BGI Ethiopia is a market leader in the local brewing sector with large manufacturing scale, capability of upstream suppliers to manage its orders is major issue identified. Their major gap is associated the limitation to update their manufacturing/ delivery capability. In addition, when BGI Ethiopia initiate new product innovations(NPI), the input for this new products are not easily accessible. Such issues needs the assistance of BGI Ethiopia for a joint success.

#### 5.1.4 SUMMARY OF FINDINGS ON SUPPLY CHAIN INTEGRATION PRACTICE BASED ON THE INFERENTIAL STATISTICAL ANALYSIS RESULTS

This sections of the study briefly indicates the findings related to correlation analysis and the regression model results pertaining to BGI Ethiopia & its partners on the level of upstream SC integration.

##### **Pearson Correlation Analysis & Regression Model Analysis**

The result of inferential statistics revealed that the correlation relationship between predictor variables( II, CRS, ORL & MC) and dependent variable, the upstream supply Chain Integration(SCI) has a positive correlations with all predictor variables at Pearson correlation ( $r$ ).

Based on the Pearson Correlation analysis, the level of association between information integration (II) and SCI has been found 0.446, which positive & moderate level. But, the regression model result showed a  $b$  coefficient of -0.106. This negative coefficient is not logical. As information integration increases , it is expected to have a better supply chain integration. This may be due to respondents biased response. As per section 4.3 demographic data analysis of upstream partners, most partners (53.0%), has got many years (more than 10 years) business relationship with BGI. So, even if these partners expressed clearly the weak level & practice of information integration (II), their overall perception to the level of upstream supply chain integration(SCI) with BGI is relatively high. This situation leads the model to generate a negative relationship regarding this specific predictor. This is due to the biased response of upstream partners.

While the level of association between coordination & resource sharing (CRS) and SCI is 0.587. Even if it shows moderate level of association with upstream SCI, the regression model  $b$  coefficient of 0.08, which is very low impact on SCI.

Regarding the level of association between, organizational relationship & linkage(ORL) , and SCI, the level of correlation has been found as is 0.673. This positive & strong level of correlation is supported by the regression model  $b$  coefficient, which became 0.63. This means, a unit increase in the level of ORL, will result a 0.63 increment in the level of upstream SCI , keeping the effect of other variables constant.

Finally, the level of association between management commitment(MC) and upstream SCI is 0.633. This positive & strong level of association is also supported by the regression model  $b$  coefficient, which became 0.48. This means, a unit increase in the level of MC practice, will result a 0.48 increment in the level of upstream SCI , keeping the effect of other variables constant.

This is a valuable information for scholars & practitioners. Organizational resource linkage (ORL) & management commitment (MC) has been founds as a predictor variable that has got high level of intensity to influence the response variable, upstream supply chain integration(SCI). This identification helps in priority setting & resource allocation

## 5.2 CONCLUSION

Upstream Supply Chain Integration (SCI) has a multi-faceted merits for business organizations to create efficiency, operate at low cost, establish long term relationship with partners and stay competitive in the arena. And hence it is a winning strategy to ensure sustainable success. The conclusion has been classified based on the information from descriptive statistical analysis, focus group discussion and inferential statistics.

### 5.2.1 CONCLUSION FROM DEMOGRAPHIC ANALYSIS

The general profile analysis result of respondents is affirmative. Most upstream SC partners (53.6%) of BGI Ethiopia has got long years of business relationship. This relationship has assisted the study to extract genuinely many weakness openly. However, when the SC partners respond the last question(their perception level on upstream SCI, the response variable), they become more optimistic & affect the result of one regression coefficient, information integration.

Regarding the education qualification, most upstream SC members of BGI Ethiopia(81.7%) has got first level degree or more. This good education qualification has eased the data collection process. Most respondents has got basic concepts of upstream SCI, but lack know-how. Moreover, BGI Ethiopia should take in to note this opportunity. Because. if BGI Ethiopia could initiate the implementation of upstream SCI, the existence of this fertile ground will ease the job.

### 5.2.2 CONCLUSION FROM DESCRIPTIVE STATISTICAL ANALYSIS

From the research findings, this study can conclude that upstream supply chain integration (SCI) are not fully practiced by the BGI Ethiopia & its partners. The overall assessment result of the practice & level of upstream supply chain integration (SCI) based on the four dimensions shows weak practice.

When the examination go to the detail 19 sub-dimensions level, only on the three variables were noted to be moderately exercised. These include the accuracy of information sharing (mean value of 2.76), operating with supply contract/commitment (mean value of 2.5), and informal & personal relationship (mean value of 2.9) to enhance the partnership. But, the assessment of many SCI variables reveals that BGI Ethiopia is way behind best practitioners and expected average performance. So, the overall sourcing practice need to be revisited by BGI Ethiopia top business executives & the company sourcing process should be reformed.

### 5.2.3 CONCLUSION FROM THE FOCUS GROUP DISCUSSION

The focus group discussion, interview & secondary data review has offered the below brief conclusions.

#### **Organizational policy and procedure issue**

The non-inclusion of majority of the upstream SCI considerations as a policy or procedure in their day to day procurement activities bring undesirable consequences. Such loose supply chain integration would result gap between demand and supply. Since the suppliers are not well oriented on detail requirement of BGI Ethiopia, they can't make a long-term plan. Rather, they adjust their plan based on the available market demand information which in turn, may affect BGI Ethiopia. During focus group discussion, it has been noted that there are times where BGI asked suppliers lately critical items, and not found at local market. This situation leads BGI to import items on urgent air, DHL shipment which leads to very costly sourcing practice. Moreover, the weak upstream supply chain integration (SCI) practice also let BGI Ethiopia to loose from getting premium price for inputs. It is a customary practice to make price reduction for long-term business partners in the supply

world. The best practice study of Liker & Choi(2004) on Toyota & Honda plant at US showed that establishing strong SCI with upstream supply chain partners lets to harvest premium price for inputs.

### **Know-how & expertise**

Though the upstream SC actors under study has not an issue on the basic concept of upstream SC integration. They have admitted the lack of practical experience on the implementation of upstream SCI. This issue is a major cause that retard BGI Ethiopia & its partners from garnering the fruit of upstream SCI in the business arena.

### **Support of resource**

The focus group discussion reveals that the upstream suppliers of BGI has got limitation in terms of capacity, technical ability & finance. BGI Ethiopia as market leader in the local brewing sector has got a big input demand to run operation. A supplier which establish a tie with the focal firm need to have the capacity, technical ability, and finance to respond to the client demand. If we consider the annual beer cork demand of BGI Ethiopia, it about 1.061 billion corks. And, there is no single company in Ethiopia who can respond to this. This is due to the capability limitation from supplier side. But, the step by step integration work with various suppliers could ease the issue.

## **5.2.4 CONCLUSION FROM THE INFERENTIAL STATISTICAL ANALYSIS**

### **Conclusion from Pearson correlation result**

From the inferential statistics, it has been observed that, the predictors and response variables have positive correlation. As per Field(2006), the level of associating was strong( which is above 0.5) except information integration(II) & supply chain integration(SCI) which become moderate level of association(0.45).

### **Conclusion from Regression model result**

Furthermore, it can be concluded that both the correlation & regression model revealed that out of the four dimensions(II, CRS, ORL & MC) of upstream supply chain integration(SCI), the two predictors organizational relationship linkage (ORL) &

management commitment (MC) has been found as a predictor variable that has got high level of intensity to influence the response variable, upstream supply chain integration (SCI). Where organizational relationship linkage (ORL) will take the priority (*b* coefficient 0.63). Then management commitment (*b* coefficient 0.48) follow. A unit increase in the two predictor variables will result 0.63, and 0.48 unit increase in the level of upstream supply chain integration (SCI), respectively. This valued information help scholars to broaden their knowledge in the area & practitioners to set priority setting & resource allocation. If a company wants to launch an upstream SCI program, the resource allocation is set based on the most effective predictors that can bring quick change to the over all target, SCI.

### 5.3 RECOMMENDATIONS

Although upstream supply chain integration (SCI) is a pivotal issue in most business organization of the developed countries, it has not yet become an important matter of concern at the local brewing sector & national level industries. Even though BGI Ethiopia spend 60% its total revenue on purchase of manufacturing inputs, proper attention has not been given to upstream SCI. Best practice experience of global firms has showed premium discount could be garnered from upstream SC partners when the level of integration increased.

As per Eshetie(2018) study on the Ethiopia's Manufacturing Industry, the local manufacturing sectors have got weak supply chain integration, lack of research on this issue on local context and high cost of raw material have been noted as the characteristic of Ethiopian industries. Though the upstream SCI has got several benefits to foster competitiveness at local & global level, the Ethiopian government has been noticed to take less attention to the issue. Therefore, it is high time to take some necessary steps in all aspects for initiating upstream SCI in a systematic manner. Based on the previous section conclusions essential specific recommendations are proposed to address the upstream supply chain integration of the case company, BGI Ethiopia.

**Policy and procedure** : Initiative has to be started on the formulation of upstream supply chain integration (SCI) policy and procedure by BGI Ethiopia. This has to be carried out in consultation with responsible stakeholder like upstream SC partners, etc. this situation leads to revision of the existing sourcing policy & procurement procedure to integrate the upstream supply chain integration.

**Continuous learning and training** : The formulation of a policy and including upstream supply chain integration (SCI) program in the company sourcing documents is not enough. Continuous learning and training on upstream supply chain integration (SCI) is necessary in order to increase knowledge-based implementation of upstream SCI. All actors in the chain including: the suppliers & BGI Ethiopia supply chain team should be exposed to this program. Fortunately, the upstream partners of BGI Ethiopia has been observed as having good education qualification & long years of attachment. This fertile ground need to be utilized.

**Sourcing reform** : A wider sourcing reform will be required, by the BGI Ethiopia. By considering systematic implementation of upstream supply chain integration (SCI). This activity includes but not limited to : creation of awareness on the upstream supply chain integration(SCI), putting the upstream SCI as a standing strategic management issue in the agenda of top executives, inclusion of upstream SCI in the sourcing policy & procurement procedure, restructuring the existing SC team structure of BGI, development of inhouse software application (SCI application) for interaction of basic information, dedicating resource( finance, professionals, etc), the continuous upstream SCI performance review.

This might be done by starting with few basic input materials supply line. Furthermore, the reform activity should be led by top level managers so that proper support & guidance could be made. Upstream supply chain integration (SCI) should be determined as one of the strategic management issue at top management level.

**Support of resource:** BGI Ethiopia is one of the wings of Groupé Castel, a global brewer, operating internationally in more than 53 countries for over a decade. This company is resourceful in terms of technical expertise, finance, ICT, etc. One of the characteristics of supply chain integration is sharing of resources for a common goal achievement in a efficient manner. The focal firm, BGI Ethiopia, is expected to take a lead in driving the SCI, BGI should identify the major gap of its upstream suppliers and make ready to nurture for joint success. The experience of Toyota & Honda plants could be integrated here. As an example, a BGI vendor may have full preparation & manufacturing ability to deliver annual requirement of beer cork. But this vendor has got only one serious issue, finance, for importation of basic inks & metal sheet as a raw material. BGI-Ethiopia could create a situation for fund transfer in the form of advance payment of some percent so that the manufacturing task & cork delivery could be facilitated. Such practice is expected to be exercised during the supply chain integration (SCI) activities.

**Performance evaluation:** Performance evaluation is one of the tool to identify gaps, and a way of improvement. There should be a regular performance evaluation practice on a one to one bases. The key performance indicators (KPIs) should be developed jointly. The assessment should cover the supply performance and the level of upstream SC integration practice(SCI). The evaluation for supply performance could cover delivery time, frequency, quantity, quality issue, price viability, place of delivery, claim response, etc. While the KPIs for upstream SCI could be the four dimensions of SCI,i.e Information Integration(II), Coordination and Resource Sharing(CRS), Organizational Relationship Linkage(ORL), and last but not least Management Commitment(MC).

### **Priority on implementation**

Based on the regression model, it has been concluded that Organizational Relationship Linkage( $b$  coefficient=0.63) has been noted as a prior influencer of the upstream level of SCI. Which is followed by management commitment ( $b$  coefficient=0.48). This result indicates that the higher the influencer, the quick result on the upstream SCI. So. This study recommends that the priority should be given based on this order during the implementation of upstream SCI & resource allocation.

## 5.4 LIMITATION OF THE STUDY

The study focused on the basic factors that influence upper supply chain integration in the Ethiopian brewery sector specifically to BGI Ethiopia PLC. The major limitations observed are deficiency on availability of empirical literatures on upstream supply chain integration particularly in the Ethiopian brewery industry, and insufficient secondary data that are tailored to the topic at the case company, BGI.

## 5.5 SUGGESTION FOR FURTHER STUDY

This research study was carried out to assess the level & practice of upstream supply chain integration (SCI) of the BGI Ethiopia & its partners in the upstream. The study has identified the existence of gap, and the weak practice of SCI.

Hence, the researcher believes that, a lot of work will be required to develop the concept of upstream SCI in the local brewing & national industry level. So, the researcher recommended further research study to be carried out on wider scale by considering various sectors of the industry so that the picture of national upstream supply chain integration practice could be understood. This leads to ignite a light to get attention of the concerned state office so that the government could take as a strategic program to enhance the Ethiopian manufacturing industries.

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# ANNEX

ANNEX 1

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE GRADUATE STUDIES

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

QUESTIONNAIRE TO BE FILLED BY UPSTREAM SUPPLY CHAIN PARTNERS

Dear respondents:

The purpose of this questionnaire is to gather data for a research to be conducted on supply chain integration entitled : UPSTREAM SUPPLY CHAIN INTEGRATION IN ETHIOPIAN BREWERY SECTOR: A CASE FOR BGI ETHIOPIA PLC. The thesis is as a partial fulfillment of the requirements for the Master of Logistics and Supply Chain Management Degree.

Your truthful response is very respected and will contribute a lot to the accuracy of the research paper. The information collected from this questioner will only be used for academic purpose and will be treated with strict confidentiality.

Thank you in advance for your willingness to participate in the research & spending your valuable time.

**Instruction:** Please, put a tick (✓) mark in which you want to select

<b>SECTION-1: ORGANIZATION PROFILE</b>			
The following questions are about demographic profile of your organization. Kindly indicate the appropriate characteristics of your organization using (✓).			
<b>1.1 The numbers of employees:</b>	<b>1.2 Operating experience of this company with BGI Ethiopia :</b>		
< 100 <input type="checkbox"/>	101- 250 <input type="checkbox"/>	<input type="checkbox"/> < 5 years	<input type="checkbox"/> 5- 10 years
251- 500 <input type="checkbox"/>	>501 <input type="checkbox"/>	<input type="checkbox"/> 11 - 15 years	<input type="checkbox"/> 16 - 20 years
		<input type="checkbox"/> >21 years	

**SECTION-2 RESPONDENT’S PROFILE**

The following questions are about the respondent’s profile in the organization. Kindly indicate the appropriate characteristics of the respondent’s profile using (✓).

<p>2.1 Gender Male <input type="checkbox"/> Female <input type="checkbox"/></p> <p>2.2 Respondent’s current position in the company</p> <p style="padding-left: 20px;">Top Management <input type="checkbox"/></p> <p style="padding-left: 20px;">Middle management <input type="checkbox"/></p> <p style="padding-left: 20px;">Officer <input type="checkbox"/></p>	<p>2.3 Respondent’s qualification level: _____</p> <p>MA/MSc or above <input type="checkbox"/> BA/BSc <input type="checkbox"/></p> <p>Diploma <input type="checkbox"/> High school and less <input type="checkbox"/></p> <p>2.4 Respondent’s work experience</p> <p><input type="checkbox"/> &lt; 5 years      <input type="checkbox"/> 5-10 years</p> <p><input type="checkbox"/> 10-15 years      <input type="checkbox"/> &gt;15 years</p>
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The following questions are about how your organization has been practicing upstream supply chain integration with BGI Ethiopia. Please indicate the level of your agreement or disagreement using (✓) on the following statements based on your experience in your company on the following supply chain management practices. The rating is 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5=Strongly Agree as shown below.

<b>SECTION 3: Level and practice upstream supply chain information integration, collaboration &amp; resource sharing and organizational relation linkage, Management commitment between BGI &amp; upstream partners.</b>						
S.N	Description	1	2	3	4	5
<b>II</b>	<b>Information Integration</b>					
II1	There is accurate information exchanging among partners					
II2	There is collaborative planning & strategy in the upstream supply chain					
II3	There is joint replenishment system of materials to run partners operation					

S.N	Description	1	2	3	4	5
II4	There is modern Information & communication technology to access information among upstream supply chain partners					
<b>CRS</b>	<b>Coordination and Resource Sharing</b>					
CRS1	Every partner of the upstream supply chain members involves in key decision-making process					
CRS2	There is common use of logistical equipment/resource among members in the upstream supply chain					
CRS3	There is contract/commitment on delivery frequency, payment, quality, quantity, place, etc throughout the supply chain					
CRS4	There is process integration in upstream supply chain partners					
<b>ORL</b>	<b>Organizational Relationship Linkage</b>					
ORL1	There is regular & active communication channel with members of the supply chain					
ORL2	Key performance indicators(KPIs) have been established that aligned with agreed common objective					
ORL3	The incentive realignment has been set jointly					
ORL4	Integrated behavior has been established to promote joint business performance					
ORL5	There is a practice of sharing of skill, ideas, knowledge, and institutional best practices along the upstream supply chain					
ORL6	There is continuous effort among partners to improve trust & long-term relationship					

S.N	Description	1	2	3	4	5
ORL7	BGI has got a system to encourages team building for coordination and cooperation					
<b>MC</b>	<b>Management Commitment</b>					
MC1	The management of both partners are allocating required resources for collaboration work					
MC2	There is a regular performance reviews & control to enhance the collaboration					
MC3	Training & continuous improvement are maintained for concerned employees regarding collaboration					
MC4	There is a practice of informal & personal relationship to enhance the collaboration with upstream partners					

The following question is about the level or intensity of upstream supply chain integration your organization with BGI Ethiopia.

Please indicate the level of your agreement or disagreement using (✓) on the following statements based on your experience in your company. The rating is 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5=Strongly Agree as shown below.

	Description	1	2	3	4	5
LI	<b>SECTION 4: LEVEL OF UPSTREAM SUPPLY CHAIN INTEGRATION</b>					
LI1	There is strong level of upstream supply chain integration among partners					

THANK YOU

FOR YOUR VALUABLE INPUT, TIME AND UNLIMITED COOPERATION.

## ANNEX 2

### INTERVIEW QUESTIONS TO BGI ETHIOPIA

1. Does BGI Ethiopia has got a formal upstream supply chain integration system with partners? P|s elaborate.
2. What are the challenges(barriers) on the upstream supply chain integration?
3. Do you think that there is good understanding (knowledge & skill) of supply chain integration by top level management of BG? And did the management considered it as a strategic issue to be addressed ?
4. Do you believe that there is good information exchange among partners on the upstream line regarding ( on time, in full & accurate information sharing)? And is there a regular channel for information exchange?
5. What methods have you used to communicate to your suppliers on the issue of material supply and related issues? Do you think that the frequency of information sharing is enough?
6. Is there a practice to share idea, skill, knowledge among partners?
7. Is there informal & personal relationship between BGI & upstream partners?  
Does BGI benefited from this?

### ANNEX 3

Sample Size Determination Using Krejcie and Morgan Table

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

The Table is constructed using the following formula for determining sample size:

*Formula for determining sample size*

$$s = X^2 NP(1 - P) + d^2(N - 1) + X^2 P(1 - P)$$

$s$  = required sample size.

$X^2$  = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

$N$  = the population size.

$P$  = the population proportion (assumed to be .50 since this would provide the maximum sample size).

$d$  = the degree of accuracy expressed as a proportion (.05).

*Source: Krejcie & Morgan, 1970*

NOTE:

The researcher has not used the formula since the table for determining sample size has all the provisions required to reach the appropriate sample size.

ANNEX 4

Simplified Table of CVR<sub>critical</sub> Including the Number of Experts Required to Agree an Item Essential.

Panel Size	N <sub>critical</sub> (Minimum Number of Experts Required to Agree an Item Essential for Inclusion)	Proportion Agreeing Essential	CVR <sub>critical</sub>
5	5	1	1.00
6	6	1	1.00
7	7	1	1.00
8	7	.875	.750
9	8	.889	.778
10	9	.900	.800
11	9	.818	.636
12	10	.833	.667
13	10	.769	.538
14	11	.786	.571
15	12	.800	.600
16	12	.750	.500
17	13	.765	.529
18	13	.722	.444
19	14	.737	.474
20	15	.750	.500
21	15	.714	.429
22	16	.727	.455
23	16	.696	.391
24	17	.708	.417
25	18	.720	.440
26	18	.692	.385
27	19	.704	.407
28	19	.679	.357
29	20	.690	.379
30	20	.667	.333
31	21	.677	.355
32	22	.688	.375
33	22	.667	.333
34	23	.676	.353
35	23	.657	.314
36	24	.667	.333
37	24	.649	.297
38	25	.658	.316
39	26	.667	.333
40	26	.650	.300

SOURCE: (Ayre & Scally, 2014)

ANNEX 5

TEST OF NORMALITY & HOMOSCEDASTICITY

Figure 1 Graphical test of normality and homoscedasticity.

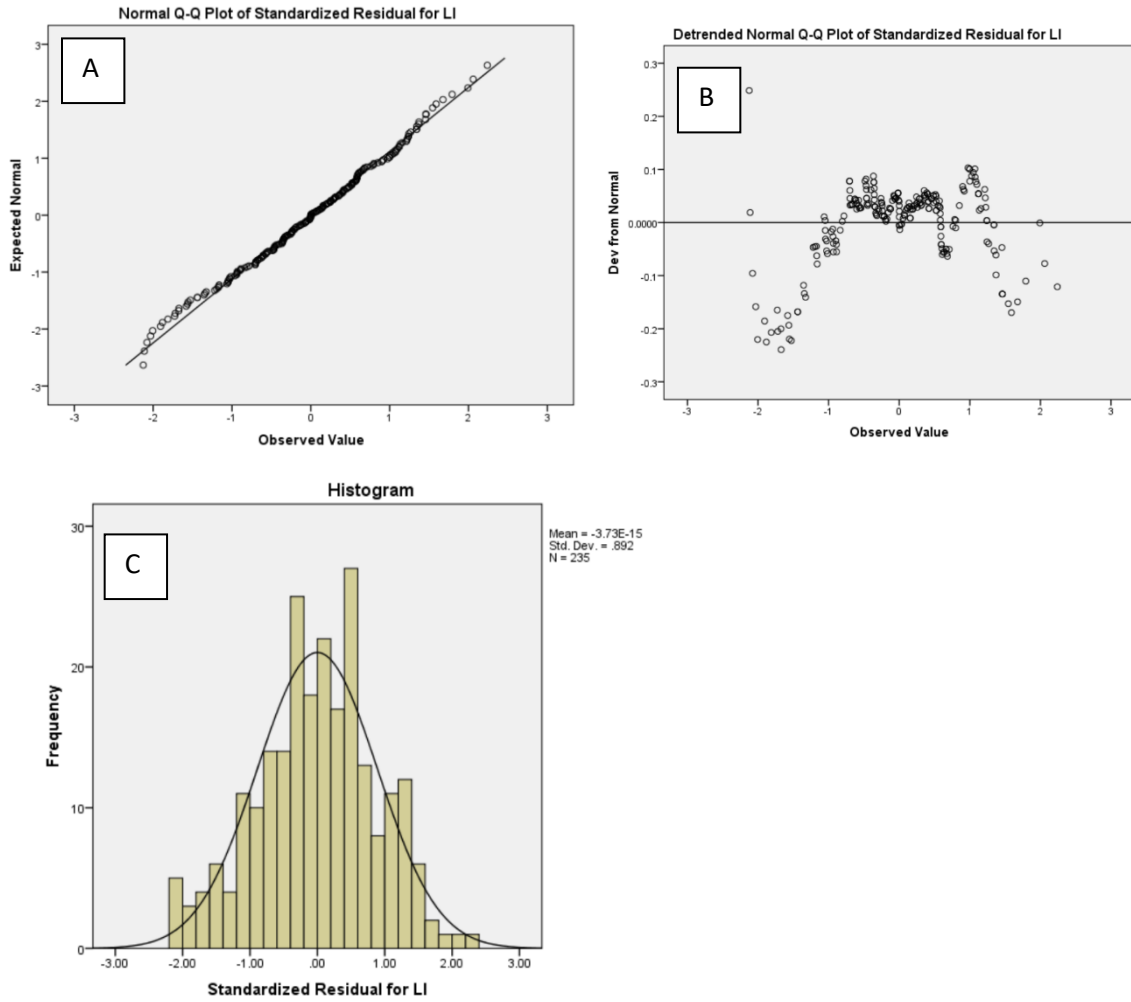


Table 1 The Kolmogorov-Smirnov Test and Shapiro-Wilk Test result for the standard error.

Tests of Normality						
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for LI	.034	235	.200 <sup>*</sup>	.992	235	.244

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Source: Field Survey, 2020

Table 2 Fisher Skewness Coefficient

S. No	Variable	Skewness	Standard Error of Skewness	Fisher Skewness Coefficient	Acceptance Range
1	Standard Error	(0.171)	0.1588	(1.079)	-1.96<=FSC<=1.96

Source: Field Survey, 2020

Table 3 Pearson Skewness Coefficient

S. No	Variables	$\bar{X}$ (Sample Mean)	MD (Median)	SD (Standard Deviation)	Pearson Skewness Coefficient	Acceptance Range
1	Standard Error	0	0	0.892	0	-0.5<=PSC<=0.5

Source: Field Survey, 2020

**Table 4 Fisher Coefficient of Kurtosis**

<b>S. No</b>	<b>Variables</b>	<b>Kurtosis</b>	<b>Standard Error of Kurtosis</b>	<b>Fisher Coefficient of Kurtosis</b>	<b>Acceptance Range</b>
1	Standard Error	(0.256)	0.316	(0.808)	-1.96<=FSC<=1.96

Source: Field Survey, 2020