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**DISTRIBUTION NETWORK PERFORMANCE MEASUREMENT
AND IMPROVEMENT
(CASE STUDY ON B.G.I ETHIOPIA)**

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**DISTRIBUTION NETWORK PERFORMANCE MEASUREMENT AND
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By: **Yared Darge**

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DECLARATION

I hereby declare that the work which is being presented in this thesis entitle “Distribution network Performance measurement and improvement (Case study on B.G.I Ethiopia)” is original work of my own, has not been presented for a degree of any other university and all the resources of materials used for the thesis have been duly acknowledged.

Yared Darge

Date

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Abstract

Over the past decade, there has been an increasing emphasis on Supply Chain Management as a vehicle through which firms can achieve competitive advantage in markets. In this research downstream part of a supply chain (distribution network) of the case company (BGI Ethiopia) has been discussed. BGI Ethiopia is one of the biggest beer producing companies in the country. Not so long ago the company has more than 50% of the market share when the annual beer producing capacity of the country was 5 million hectoliters, though back then there was no strong competition for the company. The market share began to shift in 2011, when global giants Heineken and Diageo joined the market, turning it into a show of force between global beer makers who have been taking chunks of the market. Even though BGI's producing capacity has also increased to 4.3 million hectoliters annually, the market share of the company has declined to 35.8%. While increased in production volume, the loss of the market share is linked to the downstream segment of the supply chain (the distribution network). In the research, BGI's distribution network under the scope of Addis Ababa's distribution network has been assessed. In Addis Ababa alone, there are six main disruption agents for the company. And the performance of these agents is determining the competitiveness of the company. The performance of the distribution network has been evaluated in accordance to SCOR model, setting five performance attributes and each having their own metrics. A questionnaire survey was distributed among the outlets of the case company and interviews were made to identify the KPI for the performance of the distribution network. The data collected from the questionnaires were analyzed using SPSS software. The research has revealed the KPI for each performance attribute based on the RII and a regression analysis was made to see the effect of this KPI on the other metrics., pointing out that this selected KPI has to be well managed for the better improvement of the distribution network which directly will improve the competitiveness of the case company and increase its market share once again. From the analysis, it has been concluded that perfect condition delivery has been identified as the KPI for reliability of the distribution network, sourcing time for responsiveness, distribution network adaptability with sub major distributors and outlets for the agility, distribution cost for the cost metrics and material handling efficiency for asset management efficiency. Finally, it is suggested that in order to enhance the performance of the distribution of the case company, the distribution network's performance has to improve by: increasing the number of vehicles doing the delivery to reach the reliability issue, adding more main distributing agents to address the responsiveness attribute, adjusting adaptability and creating coherent flexibility making the network more agile, reducing distribution cost, improving material handling efficiency.

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Acronyms

SC: Supply chain
SCM: Supply chain management
PMS: Performance Measurement System
SCPM: Supply chain performance measurement
SCOR: Supply chain operation reference
KPI: Key performances indicator
CSA: Central statistics agency
RII: Relative importance index
BGI: Brasseries Et Glaciers Internationals
HL: Hector Liter
SPSS: Statistical Package for Social Science
ABSC: Advanced Balanced Score Card

CHAPTER ONE

1.1 INTRODUCTION

The effect that manufacturing is facing due to globalization is critical. While the expansion the market place and increasing competitiveness, it drives customers to have much greater request and demand on the manufacturing companies to bring greater quality, adaptability and flexibility, along with better pricing. (Laosirihongthong, 2005).

Therefore, companies are now looking at reducing cost, better quality, advancement in technology and other competitive advantages as strategies to pursue in a globally competitive environment. Currently, one popular route to competitive advantage is to add value for customers by performing supply chain activities efficiently. As a result, many manufacturers are focusing on their supply chain management practices. (Pinaikul, 1988)

Supply chain management has become increasingly important to businesses which supply goods and services to the end customers. The focus on, and relationships with, different stakeholder groups are of great importance to all businesses, regardless of size or whether they supply products and services. However, supply chain management is perhaps most easily conceptualized in manufacturing, since there is a physical flow of goods. (Walker, 2003)

Over the past decade, there has been an increasing emphasis on Supply Chain Management as a vehicle through which firms can achieve competitive advantage in markets. A large number of examples in the 1990s show how companies have made large investments to streamline their supply chains in order to improve customer satisfaction and increase their internal productivity. As Christopher (2005) states, it is not actually individual companies that compete with each other nowadays; rather, the competition is between rival supply chains. The supply chains that add the most value for customers with the lowest cost in the chain make up the winning network of individual companies. (Christopher, 2005)

Supply chain management system is an integrated and collaborative network of suppliers, factories, warehouses, distribution centers, and retailers, through which the whole chain of logistic processes is managed for a fast and flexible coordination between a company, its

customers and suppliers within the chain. Among the members of supply chain, collaboration, which is based on “sharing” sense -like information sharing, resource sharing, risk sharing and activity sharing -plays a critical role to implement an effective SCM. So, an increasing number of companies subscribe to the idea that developing long-term collaboration, cooperation and partnership, can take significant wastes out of the supply chain and provide a route for securing the best commercial advantage.

Manufacturing firms worldwide have embraced the concept of supply chain management as important and sometimes critical to their business. For the last few years, a number of companies and organizations in Ethiopia have taken the lead to develop and improve their supply chain architecture, resulting in marked improvements in their performance. They have embraced new innovative technology and new management thinking to cope with the ever increasing competition from local and global players. The pressure is building up and the rest of the industries will need to catch up if they want to remain competitive. (Deshmukh, 2003)

Currently many brewery companies are running their production in Ethiopia. The competition in Ethiopia’s beverage industry is fierce, and undoubtedly getting fiercer every day. This means there is a tough battle ahead, but the company is looking forward to coming out as number one. In brewery production there are four raw materials are required for beer production: barley, hops, water and yeast. The quality of these raw materials has a decisive influence on the quality of the final product. Knowledge of the properties and the raw materials and their effects on the process and final product provides the basis for their handling and processing. With such knowledge it is possible to control the technological process rationally. Aside from the main four major raw materials required there are a number of supplies supplied to the companies before the product leaves the production. Including the raw materials required for the production of beer and the other supplies offered to the companies are presented by a number of suppliers. Once after the raw materials have been supplied the company the performance of the production of itself will be reflected upon the efficiency of the process and the quality of the beer being produced. Finally, but not least, after the production of the beer, the distribution of the beer thorough each possible Conner of market location will be critical for the profitability

and the competitiveness of the company. Generally, Supply chain management performance evaluation of all the three main bodies of the chain is always required in order for the company to reach to its targeted goal. The performance of the suppliers and the quality of the supplies that they provide will have a direct effect on the schedule, quality and competitiveness of the company on the market.

1.2 PROBLEM STATEMENT

From the marketing officer of BGI Ethiopia it was found out that there was not that much competition in the Ethiopian beer market because the number of consumers, unlike West African countries, was small. It was claimed that St George was in a far better position than its competitors, , because it has a 50.1pc share of the market, according to the company's research, and a higher annual production capacity of 2.7m hectoliters, with factories situated at different parts of the country. This was back then when the annual beer production volume of the nation was not far from 5 million hectoliters.(Fortune Magazine,2010) For years, BGI has been enjoying a dominant market position over the brewery market which could go as high as 70 percent at a certain time. However, this dominance has seen a decline in the past successive years. This decline in dominance is largely attributed to the coming of multinationals in the industry. Companies such as Heineken and Diageo entered the Ethiopian market back in 2011 following the acquisition of old and tittering state-owned breweries in the country.

The market share began to shift in 2011, when global giants Heineken and Diageo joined the market, turning it into a show of force between global beer makers who have been taking chunks of the market. The competition in Ethiopia's beverage industry is fierce, and undoubtedly getting fiercer every day. But as new breweries such as Heineken and Habesha enter the market, the annual beer production of the nation has been raised from less than five million hectoliters in 2011 to 12 million hectoliters presently.

Currently, there are around seven breweries operating in Ethiopia with an annual production capacity of nearly 12 million hectoliters .BGI, Heineken, Zebidar, Diageo, Dashen, Habesha, Raya. The biggest players in Ethiopia's brewery market, which has been

growing by 15pc over the past couple of years, and employs about 10,000 people, are Heineken Beer, BGI Ethiopia, and Diageo-Meta Abo Brewery. Heineken and BGI respectively produce 4 million and 4.3 million hectoliters annually. Zebidar has the lowest, standing at 350,000 hectoliters a year.

Nevertheless the market share of the company, BGI, seems to be the leading among its competitors stated by its own research, the market share is being scrambled by other main beer companies specially Heineken, who is addressing the market in so many strategy and marketing approaches. The active participation of all the brewery companies in the country, the market share of B.G.I is tending to descend and affect its competitiveness in its open market. The descent of the market share of B.G.I's is linked to the currently existing high competition of other similar companies. It is not actually individual companies that compete with each other nowadays; rather, the competition is between rival supply chains. The supply chains that add the most value for customers with the lowest cost in the chain make up the winning network of individual companies. This directly implies a better share in the market and winning in fulfilling customer satisfaction. (Christopher, 2005)

Previous researches had been done on identifying the different factors affecting the supply chain managements' of Brewery industries in Ethiopia (Daniel, 2016), (Eyob, 2019). However most researches have been evolving on identifying the key elements of the supply chain managements to the industries (Selam, 2012) and focusing on other brewery companies ((Bruktawit, 2019), (Robel, 2013). On the other hand researches on performance measurements of different manufacturing firms had been done (Hermela, 2016), also the performance measurements of supply chain management has been conducted (ASMAMAW, 2016) In the research's conducted earlier that performance measurement of the supply chain has been focused on the upper stream of the chain and not much about the distribution network of the companies. It is very clear here that the two main concepts, distribution network managements and performance measurements ought to be integrated for the proper evaluation of the industry's downstream supply chain management (Distribution network).

Therefore, this research paper tries to address this market share of the company in regard to its product distribution and evaluate the company's distribution network and identify key performance indicators for further improvement of the company's downstream supply chain management.

1.3 RESEARCH QUESTIONS

The general research questions of the study are focusing on two major areas: “Evaluating the existing Distribution network Management framework” and “Identifying key performance indicator for the company' distribution network” And the detailed questions are stated below.

- What is the current distribution network management system of BGI Ethiopia in Addis Ababa?
- What are the key performance indicators, KPI in distribution network (downstream supply chain) of the supply chain?
- What are the barriers in implementing performance measurement tool for distribution network (downstream Supply Chan) at BGI Ethiopia?
- What shall be implemented to improve and enhance the performance of distribution network (downstream supply chain) of the case company, BGI Ethiopia?

1.4 OBJECTIVES OF THE RESEARCH

The following are the intended objectives of the study:

General Objective

The main objective of the study focuses on performance measurement of the distribution network of downstream supply chain management of BGI Ethiopia, in Addis Ababa, and proposes an improvement and enhancement approach to their distribution network management system.

Specific objective

- 1 Analyze the existing distribution network system case company(B.G.I)
- 2 To evaluate the distribution network management system for the case company through SCOR model performance measuring matrices
- 3 To identify performance measurement metrics/indicators related to brewery industry
- 4 To develop conceptual improved distribution network management system for BGI

1.5 SIGNIFICANCE OF THE STUDY

A study on development of distribution network performance measurement framework is important for a number of reasons.

- This study on the case company will enable the company to see its distribution network management in different aspect will provide to the company away of evaluating its main distributors and its distribution network management system.
- Additionally, the study helps the manufacturers to identify performance measurement factors against distribution network management system.
- Enables companies to make enhanced downstream supply chain management decisions at strategic, tactical and operational levels and measures the performance of case study organizations against each performance measurement factor.

1.6 SCOPE OF THE RESEARCH

The scope of this research is limited to the supply chain performance measurement framework that applies to the Brewery Companies in Ethiopia (Specific to the case company, B.G.I Ethiopia). It has focused on the distribution network (downstream supply chain management) of the case company conducted in Addis Ababa city.

1.7 STRUCTURE (ORGANIZATION) OF THE THESIS

This thesis contains a total of five chapters and appendices. The report is structured so that the information presented to the reader is arranged in a logical sequence. Each chapter of the study illustrates different aspects of the research work.

The contents of the chapters are as follows:

Chapter One: - Introduction: This chapter begins with background and justification, problem statement, objectives, significance, and scope of the study.

Chapter Two: Literature Review: This chapter reviews on SCM, evolution of SCM, performance measurement and SCPM, factors affecting market share, distribution and distribution network, SCORE model. These key concepts and approaches help to establish and justify the study's theoretical basis and they assist in an understanding of the subsequent conceptual framework that was developed for the study

Chapter Three - Research methodology: This chapter describes different aspects of the methods used and situations that the researcher must consider during each phase of the study. Different ways of carrying out the study, ways of collecting information, and tools and methods of data analysis will be discussed.

Chapter Four: Result and Discussion: in this chapter the discussion of the assessment on the existing distribution network, challenges and barriers on the current SCM system, Descriptive and Inferential analysis has is resented.

Chapter Five: Conclusion and Recommendations: this chapter, drawn conclusions and given recommendations and proposed improvement model is presented.

CHAPTER TWO

LITERATURE REVIEW

The literature review section examines key concepts and approaches used in the study. This study studies Distribution network performance measurement framework, and also use of different methodology/approach to suggest an improvement on distribution network of brewery sector.

2.1 SUPPLY CHAIN AND SUPPLY CHAIN MANAGEMENT

It is mentioned by Christopher in 1991 and 1998 that variability of activities within a network of organization that add value to the product and services to the final users are termed as supply chain. He added that the network links upstream and downstream activities that a gives worth to the product or serviced offered. The different kind of activities within the SC are purchasing input materials from suppliers, transporting of those materials, production of goods, distribution of final products and product support for sustainment. (Christopher, 1992). (Christopher, 1998).

As defined by Global supply chain forum, Supply chain management is linkage of basic operations of business starting from original suppliers to final customers in producing services and products and along information flow with it, which gives value to the users and shareholders. (Cooper *et al.* 1997, Lambert *et al.* 1998):

Many more definitions is given to SCM from different scholars, among those scholars Ballou, Gilbert & Mukherjee, 2000 stated that SCM is handling the overall material flow, information flow and financial aspects of the chain till it reach to the end users.

Many articles published in various streams to try to define the SCM and discuss future directions and the corresponding empirical research methodology (Cooper, et al., 1997; Lambert & Cooper, 2000; Larson & Rogers, 1998 , Stank *et al.*2001, Ben Naylor *et al.* 1999, Simchi-levi *et al.* 2004 ,Aitken *et al.* 2005, Bowersox and Class, 1996, de Treville *et al.* 2004) , Krajewski *et al.* 2007, Bruce *et al.* 2004, . Theses published articles all tries to define SCM in different aspects of the business activities. Most agree that it is a coherent

and complete integration of all aspect of a firm beginning from sourcing raw material from the first supplier ahead of production going through managing inputs in production and distributing end products to the final customer, including all the material and information flow.

Supply Chain Operations Reference model (SCOR) which was defined in the Supply Chain Council (2005), defined a SC as follows (Supply Chain Council 2005):

“The supply chain encompasses every effort involved in producing and delivering a final product, from the supplier’s supplier to the customer’s customer. Five basic processes- plan, source, make, deliver and return broadly define these efforts, which include managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer.”

Supply Chain Council (2005) defined that there are four basic processes in the SC: plan, source, delivery and return. Plan refers to processes that balance aggregate demand and delivery requirements. Sources are processes that transform product to a finished state to meet planned or actual demand. Delivery is a process in which the finished goods are delivered to a customer. Return is defined as processes associated with returning or receiving returned products. (Iskanius 2006, Supply Chain Council 2005)

2.2 EVOLUTION OF SCM

The 1980’s marked the introduction of SCM in logistics, the due to intense competition globally tin the 1990’s the concept grasp attention. (Oliver, 1992) and (Handfield Robert B., 1998). Late 2005- 2010 was characterized by growth of different supply chain agile, lean and le-agile frameworks for cultivating the process and quality of the supply chain. The 2010 and afterward presents a way of setting linked architecture to measure the performance of supply chain using metrics. Xerox, Hewlett Packard, AlliedSignal, Wal-Mart, and Toyota are the leaders in exercising the concepts of SCM. (Frederick, 1992).

Category	Period	Characteristics	Nature/Contribution
Phase 1	Before 1980	Cost accounting orientation. Performance measurement dominated by transaction costs and profit Determination.	Manufacturers emphasized mass production to minimize unit production cost as the primary operations strategy, with little product or process Flexibility.
Phase 2	1980- 1990	Dominant theme was a discussion of problems of performance measurement systems, recognizing and discussing the weaknesses of Measurement systems and their organizational impact.	Globalization offered low cost, high quality and reliable products with greater design Flexibility.
Phase 3	1990- 2000	A mixed financial and Nonfinancial orientation. Measurement framework Were developed like BSC, SCOR model etc. to identify the problems of an Organizations.	Strategic alignment and Automation of business Process. Strategic suppliers and the logistics function in the value chain.
Phase 4	2000- 2010	Empirical and theoretical analysis of performance Measurement frameworks and methodologies.	E-commerce, e-supply chain, enterprise resource planning, MRP.
Phase 5	2010 onwards	Innovative performance Measurement systems. SCM and Six Sigma, Logistics and Six Sigma, JIT, TQM.	Agile supply chain, sustainability in supply chain and SMEs, vendor managed Inventory.

Table 2.1: Evolution of SCM

2.3 PERFORMANCE MEASUREMENT

A process of quantifying effectiveness: the degree of customer's satisfaction in their requests; and efficiency: measures how economically a firm's resources are utilized when providing a pre-specified level of customer satisfaction is defined as performance measuring. (Neely, 1995), (Gunasekaran, 2001)

“No measure, no improve” was introduced to measurements supply chain activities on the right time on the right things. (Kaplan, 1990)

Amlan et al., (2004) discussed that , for companies to asses through its SC to check its improvements or degraded was provided by performance measurements, which by doing so they can identify the gap the companies have with competitor, leading or lagging.

A study conducted by (Fassika, 2013)on the assessing of the Existing Performance Measures & Measurement Systems in Developing Countries with a case of Ethiopian, With the recent global integration and economic relevance of developing countries, the study investigated the level of performance measurement systems in Ethiopian. The finding results regarding the existing practices in performance measures, and measurement systems based on twelve companies and questionnaire survey on thirty two companies. The case study result shows that manufacturing industries still largely use financial and productivity performance measures.

According to (Alemu, 2013) indicates that companies which measure their performance using important financial and non-financial measures achieve better business performance. Even though certain companies are currently using non-financial measures, the researchers have learned that these non-financial measures were not integrated with each other, financial measures and strategic objectives. The business performance of most of the manufacturing companies surveyed is very low compared to international benchmarks. Moreover, the performance measurement practice of these organizations using non-financial performance measures or multi criteria performance measurement is low. But the extent of using financial based measures is relatively satisfactory.

(Hermela, 2016)) indicates that companies which measure their performance using important financial and non-financial measures in seven perspectives to achieve better business performance. Even though certain companies are currently using non-financial measures like productivity and production volume, the finding result shows that higher company's profitability does not mean their internal process performance is high, or its customer and market performance as it is expected. They can be profitable in unbalanced markets. Her study has identified and shown their relationship between financial and nonfinancial performance measures and integrated using equations of each indicator in every perspective with a multiple linear regression and mathematical equations to identify which metric to improve first. Finally this study ABSC holistic model performance measurement and improvement system with their framework. In the proposed model, developed hierarchy measures are verified in strategic, tactical and operational level. (Hermela, 2016)

In summary, performance measurement is an important aspect of a successful supply chain management. Even well-conceived competitive strategies cannot increase organizational success unless they are effectively implemented. Performance-measurement systems can play a key role in strategy implementation by helping to translate organizational strategy into desired behaviors and results, communicate expectations, monitor progress, provide feedback, and motivate employees through performance-based rewards ((Fleming et al., 2009)). Resources in any organization are limited and scarce. Performance measurement provides management with the opportunity to make the right allocation of resources and to set the right priorities for improvement.

2.4 SUPPLY CHAIN PERFORMANCE MEASUREMENT

One of the key areas that nowadays companies can gain competitive advantage is Supply chain performance measurement, it is a key strategic factor for increasing organizational effectiveness and for better realization of organizational goals such as enhanced competitiveness, better customer care and profitability. (Gunasekaran, 2001)

SCPM existed in two stages, one which was seen until 1980 and the later comes after that. (Gomes, 2004)

(Beamon, 1999) Discussed that, many metrics used in SCPM have been designed to measure operating performance, evaluate improved effectiveness, and examine strategic alignment of the whole supply chain management. He also focused on the major metrics such as time, resource utilization, output and flexibility to provide a context for developing more detailed performance measures and metrics in new enterprise environments.

Many authors such as (Neely, 1995); (Gunasekaran, 2001) (Angerhofer, 2006); (Gunter, 2006) explained separate measures of SCPM into four categories i.e. (i) quality, (ii) time, (iii) cost, and (iv) flexibility. Further, these metrics have been grouped into (i) quality and quantity, (ii) cost and non-cost, (iii) strategic/operational/tactical focus, and (iv) supply chain processes). The primary concerns were quantity, quality, cost, timeliness, performance and capacity utilization (Judge, 2001); (Qi, 2003)). The three performance measures discussed at different level, 1- Strategic level 2- Tactical level 3- Operational level by (Gunasekaran, 2001), can be used to make the right decisions so that they can help each other in achieving their goals and objectives. Strategic level helps in financial decisions and operational level in non-financial and tactical helps in both financial as well as nonfinancial.

2.5 FACTORS THAT AFFECT MARKET SHARE GROWTH

The need Market share gain originated from the assumption that by each point gained in the share will bring more earning as the market stretches. This is with the basics that the company can hold its relative market share currently having. (Michael, 2000) (Robel, 2013)

Market share growth relays on not few factors:

- Currently existing positive network
- Technological and related Success factors to be implemented
- Competitive structure of firms existing and in the future.
- Fragmentation of market due to expansion of the market

In addition to these possible changes in future market conditions, a firm's ability to hold its early gains in market share also depends on how it obtained them if a firm captures share through short-term promotions or price cuts that competitors can easily match and that may tarnish its image among customers it may be short-lived (Walker, 2003)

(Michael, 2000), also mention Problems Included within these are a loss of market share, possession of the wrong set of competencies, slower or slowing growth patterns, a loss of employee morale, poor product and process development, and the failure to recognize competitors' true capabilities. Companies are finding new business models to eat into the market shares of their competitors, which previously would not have been possible. Antitrust issues may arise if a firm dominates its market. In some cases it may be advantageous to decrease market share. For example, if a firm is able to identify certain customers that are unprofitable, it may drop those customers and lose market share while improving profitability

2.5.1 Ways to Increase Market Share

The basic that it is easier for a business to increase its share in a growing market is based on two arguments. First there may be many potential new users who have no established brand loyalties or supplier commitments and who may have different needs or preferences than earlier adopters thus there may be gaps or undeveloped segments in the market. It is easier, then for a new competitor to attract those potential new users than to convert customers in a mature market. Second, established competitors are less likely to react aggressively to market share erosion as long as their sales continue to grow at satisfactory rate (Walker, 2003)

In favor of this (Michael, 2000)) describe the way to increase market share with the following model:

Market share = Preference x Voice x Distribution.

According to this model, there are three drivers of market share:

- **Preference**- can be improved through product, pricing, and promotional changes.
- **Voice** - the firm's proportion of total promotional expenditures in the market. Thus, share of voice can be amplified by increasing advertising expenditures.
- **Distribution** - can be improved through more intensive distribution.

From these drivers we see that market share can be increased by changing the variables of the marketing mix.

- ✓ Product - by improving product quality.

- ✓ Price - a decrease in price will increase sales revenue. This tactic may not succeed if competitors are willing and able to meet any price cuts.
- ✓ Distribution - add new distribution channels or increase the intensity of distribution in each channel.
- ✓ Promotion - increasing advertising expenditures can increase market share, unless competitors respond with similar increases.

2.6 DISTRIBUTION AND DISTRIBUTION NETWORK

2.6.1 Distribution

Distribution is the process of making a product or service available for use or consumption by a consumer or business user, using direct means, or using indirect means with intermediaries. Or are the movement of goods and services from the source through a distribution channel, right up to the final customer, consumer or user, and the movement of payment in the opposite direction, right up to the original producer or supplier. An order or pattern formed by the tendency of a sufficiently large number of observations to group themselves around a central value (Wren, 2007).

2.6.2 Distribution channels

Distribution channels join the goods, producers and customers to each other.

The words of distributor cover a wide range of different means and refer to different people. There are basically two different types of distributors. Two types of Distributors exist; these are general distributors who can provide a variety of different goods in different geographic regions. On the other side, there are specialist distributors that offer information and technology services and applications of handful products. Public distributors' titles like Wholesaler, Distributors of general shopping, Association distributors and Storekeeper distributors (Philip Kotler, 2012)

Constituents of distribution networks include:

- Manufacturers and importers of goods to networks

- Wholesale that is intermediary between producers and final distributors.
- Exclusive agent
- Retailers that are final supplier of goods and services to consumers.

Indirect Distribution Channel

The indirect channel is used by companies who do not sell their goods directly to consumers. Suppliers and manufacturers typically use indirect channels because they exist early in the supply chain (Aaker, 2001) Depending on the industry and product, direct distribution channels have become more prevalent because of the Internet. Distributors, wholesalers and retailers are the primary indirect channels a company may use when selling its products in the marketplace. Companies choose the indirect channel best suited for their product to obtain the best market share; it also allows them to focus on producing their goods.

Direct Distribution Channel

A direct distribution channel is where a company sells its products direct to consumers. While direct channels were not popular many years ago, the Internet has greatly increased the use of direct channels. Additionally, companies needing to cut costs may use direct channels to avoid middlemen markups on their products. Selling agents and Internet sales are two types of direct distribution channels. Selling agents work for the company and market their products directly to consumers through mail order, storefronts or other means. The Internet is an easy distribution channel because of the global availability to consumers (Bakosi, 2006), (Anderson, 2006)

Wholesaling

Wholesaling includes all activities involved in selling goods or services to who buy for resale or business use. Manufactures use wholesalers because wholesalers can perform function better and more cost effectively than the manufacture can. These functions are not limited to selling and promoting, buying and building bulk barking, warehousing, and transporting financial risk bearing dissemination of marketing information and provision of management services consulting. Like retailers wholesaler must decide on target market,

product assortment and services promotion and place. The most successful wholesalers are those who adopt their services to meet and target customer's needs, recognizing that existing add value to the channel. (Berman, 1996)

Retailing

Retailing includes all the activities involved in selling goods or services directly to find consumer for their personal non-business use. A retailer or retail store is any enterprise which sales volume comes primarily from retailing. All marketer retailers must prepare marketing plans that includes decision on target market. So the marketing channels can be viewed as a set interdependent organization with high potential for conflict. Then why would any business chosen to become part of channel system (Berman, 1996)

Coverage

Channel selection depends on Coverage (Market Size). This refers to the intensity of distribution required by the manufacturer. The number of intermediaries required in a specific geographical area influences the market coverage or market exposure strategy. A manufacturer may opt to have intensive distribution, Selective distribution or exclusive distribution coverage for its products or services Intensive Coverage is adopted when many intermediaries are used at each level of the channel. This is typical of consumer convenience goods distribution where as many different outlets as possible are used. Exclusive Coverage refers to a highly selective pattern of distribution where only a single selected intermediary is involved in distributing the goods or services in a specific geographical area. In this situation customers are willing to search for the products or services extensively. Specifically goods are often distributed in this manner). Selective Coverage in between intensive and exclusive Coverage lays Selective coverage which refers to a distribution strategy where a few selected intermediaries are used in this distribution channel. This is typical in the distribution of consumer convenience goods (Borden, 2004), (Berry, 2010)

2.6.3 MERITS OF DISTRIBUTORS

- ✓ The distributor can reach markets and customers not concentrated on by the producer's salaried sales force, e.g. small contractors, infrequent users, etc.

- ✓ The distributor can reach markets and customers not concentrated on by the producer's salaried sales force, e.g. small contractors, infrequent users, etc.
- ✓ The distributor provides an additional sales force.
- ✓ Additional advertising is provided if the distributor has a catalogue and the manufacturer's products are presented in it.
- ✓ Reduce the cost of dealing with small order is eliminated.
- ✓ A distributor network provides an opportunity for the producer to promote his name and image on a large scale.
- ✓ The distributor can reach markets and customers not concentrated on by the producer's salaried sales force, e.g. small contractors, infrequent users, etc.
- ✓ The local distributor is well placed to service end users through immediate availability of the end product, though such a service obviously depends on the distributor's stocking and physical distribution capability.
- ✓ Advertising and promotion are available through distributor mailing lists. (Payne, 1995)

2.6.4 DEMERITS OF DISTRIBUTORS

- The manufacturer's field sales force may be reluctant to process orders through distributors as this lessens the commission enjoyed by the sales force.
- The manufacturer must put out time and effort to monitor the activities of distributors.
- Assistance and education of distributor personnel may be mandatory.
- A reorientation of the manufacturer's sales and marketing personnel to distributor thinking must be achieved.
- The manufacturer's own local sales force must spend time servicing the distributor.
- There is always the possibility of conflicting sales efforts.
- The producer must have distributor-oriented advertising and product literature available if required.
- Assistance and education of distributor personnel may be mandatory

2.7 FRAMEWORKS OF SCPM

Over the twenty years many SCPM frameworks has been formulated to address the requirements of measuring the performance if a supply chain with respect to some standards in literature. (Balfaqih, 2016). Supply chain performance is one of the most critical issues in various industries. It is argued that SCPM is fundamental to efficient SCM.

This study reviews the literature in the field of SCPM and assembles an overview of those systems, approaches, techniques and criteria. Findings disclose that performance measurement in supply chain contexts is still a fruitful area of research. The study also provides an overview of the performance measures employed in supply chain systems. These findings present a solid basis for future academic and practitioner work in the field of SCPM.

Author(s) (Year).	Framework	Measurement area	Strength	Weakness	Finding
Beamon(1999)	Supply chain processes	Resource Output Flexibility	Identify three types of performance measures and propose flexibility quantitative measurement approach for supply chains	Lack of system thinking of measuring supply chain widely Across the whole	Presents a framework for the selection of performance measurement systems for manufacturing Supply chains.
Gunasekaran et al.(2001)	A framework for supply chain performance measurement.	Strategy Tactical Operational	Combined decision making levels with financial and nonfinancial Criteria	Too many numbers of metrics and measures	-Measurement and metrics classification. Involves survey. Assessing Importance for each performance Measure.
Chan and Qi (2003)	Supply chain processes	Supplying inbound logistics core manufacturing outbound logistics market and sales	Identify five core processes as holistic complex supply chain measurement and introduce fuzzy set theory for judgment and evaluation processes	Overlook on the decision making ability and lack of applying with case study	Build an effective model to measure the holistic performance of complex supply chains
Otto and Kotza (2003)	Supply chain perspectives	System dynamics Operations research or information technology Logistics Marketing Organization Strategy	Design six unique sets of supply chain metrics to measure the effectiveness of supply chain management	All the metrics are not used in business practice to measure supply chain performance	Propose suitable metrics to measure the effectiveness of supply chain management
Gunasekaran et al.(2004)	Decision making levels	Strategy Tactical Operational	Consider supply chain processes with respect to decision making Levels	Need collaboration from all stakeholders of supply chain system to evaluate the framework	Measurement and metrics classification. Involves survey. Assessing Importance for each performance Measure.

Huang et al. (2005)	Supply chain operations reference (SCOR) model	Delivery reliability Responsiveness Flexibility Cost Assets	Summarize SCOR model and describe a computer-assisted tool to configure supply chain	Limit to one manufacturing company for studying	It incorporate both SCOR model with case study approach.
Knowles et al. (2005)	Six Sigma process	comprehensive review of the literature on supply chain management	Developed supply chain conceptual improvement model, which takes care of variation in supply chains using Six Sigma methodology	Need to develop a variation-driven approach framework and empirically validated	It tries to build up effective Performance measurement systems for the supply chain using literature review
Singh et al. (2006)	Performance measures	Improving on -time delivery, reducing inventory costs, to secure supply of raw materials and components, lowest possible product cost, reducing order to delivery cycle time, integrating suppliers	Deals with the benchmarking and performance measurement to investigate SCM practices at a number Indian manufacturing organizations by considering different metrics	Lack of empirical analysis	Utilized benchmarking and performance measurement to investigate SCM practices
Aramyan et al. (2007)	Financial versus non-financial	Efficiency Flexibility Responsiveness Food quality	Develop an integrated performance measurement system that contains financial as well as non-financial indicators	Investigate only single food company	Propose conceptual framework that founds to be useful for measuring performance
Bhagwat and Sharma (2007a)	Balanced score card perspective	Financial perspective Customer perspective Internal Business processes Perspective Learning and growth Perspective	Develop a balanced scorecard for supply chain management and apply in SMEs in India	Need to determine the proposed perspectives and measures	Useful guidance for the practical managers in evaluation and measuring of supply chain management in a balanced way and proposes a balanced performance measurement system to map and analyze supply chains

Bhagwat and Sharma (2007b)	Analytic hierarchy process	Financial perspective Customer perspective Internal Business processes Perspective Learning and growth Perspective	Proposed an analytical hierarchy process model for supply chain and best tool for prioritizing and choosing the best measure And metric for day-to-day business operations.	Does not stable in its theoretical foundation.	Useful guidance for the practical managers in evaluation and measuring of supply chain management in a balanced way and proposes a balanced performance measurement system to map and analyze supply chains performance using AHP tools
Hwang et al. (2008)	SCOR model	Sourcing process	Aim to find out important SCOR sourcing performance metrics by using the stepwise regression model	Concentrate on SCOR model version 7 only	Investigated the sourcing processes and their accompanied performance metrics in the supply chain operations reference model
Kaynak and Hartley (2008)	Quality management practices	Quality-related performance	Proposed model showing the relationships between quality management practices and upstream and downstream entities in the supply chain.	Concentrate on quality management practices only	Developed a structural equation model showing the relationships between quality management practices and upstream and downstream entities in the supply chain
Cai et al. (2009)	Supply chain processes	Resource Output Flexibility Innovativeness Information	Propose a framework using a systematic approach to improving the key performance indicators in a supply chain context	Results from cost transformation matrix analysis can use as only supporting information for making decision, not as direct decision	The framework can provides an effective approach to managing supply chain performance in a dynamic environment
Thakkar et al. (2009)	Integrated balanced score card and SCOR model	Customer service Finance and marketing Internal business Innovation and learning	Develop an integrated performance measurement framework for supply chain evaluation and planning in SMEs	Do not consider in decision making levels	Deliver a more comprehensive performance measurement Framework for SMEs in Indian.

Chia <i>et al.</i> (2009)	Balanced scorecard (BSC) approach on the logistics industry for measuring supply chain performance	Financial perspective Customer perspective Business processes Perspective Learning and growth Perspective	Apply the balanced scorecard approach on the logistics industry to Measure performance of supply chain.	The sizes of respondent clusters are differently.	Detailed guideline for the implementation and use of the framework
Chan & Chan (2010)	Solving the supplier selection problem in the apparel industry by using the Analytical Hierarchy Process (AHP)	Delivery, quality, assurance of supply, flexibility, and cost of supplier.	Develop a decision support model by using AHP to solve the supplier selection problem in the apparel industry.	It only focus only in supplier selection and it is not well studied	The model presented in the study addressed the most relevant issues in sourcing suppliers in the apparel industry. With the use of the model, supplier selection will be much easier and effective for buyers.
Lin & Li (2010)	An integrated framework for supply chain performance Measurement using six sigma metrics	It adopts the six-sigma metrics and includes three components (i.e., team structure measurement, supply chain process measurement and output measurement) to provide a more complete coverage of performance requisites.	Basic advantage of this study provides a more complete coverage of performance matrix.	The measurement model uses the six-sigma metric as an improvement tool which is not widely practiced in the supply chain or by individual members.	Complying with the application of this framework, the whole chain or individual members in a supply chain can advance the performance in a more effective way.
Li et al. (2011)	Supply chain operations reference model	plan source make deliver return	Measures the supply chain quality assurance practices and internal and external performance based on SCOR metrics	Provided only some preliminary insight regarding supply chain quality commitment and its impact	Examined the relationship between supply chain quality assurance practices and internal and external performance by considering SCOR metrics

				on performance.	
Searcy (2011)	Sustainability performance measurement system	process of updating a corporate	It provides a conceptual framework to structure the process of updating a corporate sustainability performance measurement System	The conceptual framework needs an empirical validation	Reviewing and updating of corporate sustainable performance measurement system
Singh (2011)	Interpretive structural modeling	coordination and responsiveness in supply chain	Develop the structural relationship among different factors of Coordination and responsiveness in supply chain to take strategic decisions.	Findings of study needs statistically validated.	Recognized the role of SCM practices and developed a framework for co-ordination in supply chain
Qureshi et al. (2011)	Analytic hierarchy process	Service industry and examined the relative importance	Proposed an analytical hierarchy process model for TQM Practices and examine its relative importance and ranking with that in service industry.	Lack of validation of the criteria and sub criteria.	Investigated and categories the TQM practices
Agus and Hajinoor (2012)	Lean production practices	lean production, product quality performance and business performance	Proposed a model which addresses the drivers of lean production practices and level of performance of product quality and business performance	Concentrates on lean production perspective	proposed a model which addresses the drivers of lean production practices and level of performance
Yadav et al. (2013)	Performance measurement framework	Review based	An integrated framework of performance management area showcasing research trends in performance measurement and management frameworks developed	Development of framework needs empirical validation	Developed an integrated framework of performance management area

Schaltegger and Burritt (2014)	Analytical framework	Sustainability in supply chain performance	Developed an analytical framework for the assessment of approaches for the measurement and management of sustainability Performance of supply chain.	Framework was not supported with case study.	Developed a practical approach towards sustainability supply chain performance
Pranav G.& Charkha(2015)	Identification of Performance Measures for Textile Supply Chain: Case of Small & Medium Size Enterprise	Cyclic processes of supply chain Network (procurement, production, distribution), Measures under three decisions making levels & Considering balanced scorecard (BSC) perspectives.	Developed a framework for supply chain performance measurement and analyzed using analytical hierarchy Process.	It uses four perspectives BSC but it must incorporate other parameter.	They developed a framework for identifying critical performance measures having an impact on performance of three distinct cyclic Processes.

(Temesgen, 2017)

Table 2.2: Frameworks of Supply chain performance measurement

2.8 SUPPLY CHAIN OPERATIONS REFERENCE (SCOR)

The performance or metrics section of SCOR focuses on understanding the outcomes of the supply chain and consists of two types of elements: Performance Attributes (attributes) and Metrics.

2.8.1 PERFORMANCE ATTRIBUTE

A performance attribute is a grouping or categorization of metrics used to express a specific Strategy. An attribute itself cannot be measured; it is used to set strategic direction. For example:

"The LX product needs to be leading the competition in reliability" and "The xy-market requires us to be among the top 10 agile manufacturers". Metrics measure the ability to achieve these strategic directions. SCOR recognizes 5 performance attributes: (SCOR11.0, 2012)

Reliability

The Reliability attribute addresses the ability to perform tasks as required. Reliability focuses on the predictability of the outcome of a process. Typical metrics for the reliability attribute include: On-time, the right quantity, the right quality. The SCOR key performance indicator (level-1 metric) is Perfect Order Fulfillment. Reliability is a customer focused attribute. (SCOR11.0, 2012)

Responsiveness

The Responsiveness attribute describes the speed at which tasks are performed. Responsiveness addresses repeated speed of doing business. Example Responsiveness metrics are cycle time metrics. The SCOR key performance indicator for Responsiveness is Order Fulfillment Cycle Time. Responsiveness is a customer focused attribute. (SCOR11.0, 2012)

Agility

The Agility attribute describes the ability to respond to external influences; the ability to and speed of change. External influences include: Non-forecastable increases or decreases in demand, suppliers or partners going out of business, natural disasters, acts of (cyber)

terrorism, availability of financial resources (the economy), labor issues. The SCOR key performance indicators include Flexibility, Adaptability and Value-at-Risk. Agility is a customer focused attribute. (SCOR11.0, 2012)

Cost

The Cost attribute describes the cost of operating the process. Typical costs include labor cost, material cost, transportation cost. The SCOR key performance indicators for Cost are Total Cost to Serve. Cost is an internal focused attribute. (SCOR11.0, 2012)

Assets

The Asset Management Efficiency ('Assets') attribute describes the ability to efficiently utilize assets. Asset management strategies in supply chain include inventory reduction and in-source vs. outsource. Example metrics include: Inventory days of supply, capacity utilization. The SCOR key performance indicators include: Cash-to-Cash Cycle Time, Return on Fixed Assets. Asset Management Efficiency is an internal focused attribute. (SCOR11.0, 2012)

2.8.2 METRIC

A metric is a standard for measurement of the performance of a supply chain or process. SCOR metrics are diagnostic metrics (compare to how diagnosis is used in a medical office). SCOR recognizes three levels of pre-defined metrics:

- Level-1 metrics are diagnostics for the overall health of the supply chain. These metrics are also known as strategic metrics and key performance indicators (KPI). Benchmarking level-1 metrics helps establishing realistic targets to support the strategic directions.
- Level-2 metrics serve as diagnostics for the level-1 metrics. The diagnostic relationship helps to identify the root cause or causes of a performance gap for a level-1 metric.
- Level-3 metrics serve as diagnostics for level-2 metrics. (SCOR11.0, 2012)

The analysis of performance of metrics from level-1 through 3 is referred to as metrics decomposition, performance diagnosis or metrics root cause analysis. Metrics decomposition is a first step in identifying the processes that need further investigation. (Processes are linked to level-1, level-2 and level-3 metrics).

SCOR recognizes 10 strategic metrics (level-1 metrics):

Performance Attribute	Level-1 Strategic Metric
Reliability	<ul style="list-style-type: none"> • Perfect Order Fulfillment
Responsiveness	<ul style="list-style-type: none"> • Order Fulfillment Cycle Time
Agility	<ul style="list-style-type: none"> • Upside Supply Chain Flexibility • Upside Supply Chain Adaptability • Downside Supply Chain Adaptability • Overall Value At Risk
Cost	<ul style="list-style-type: none"> • Total Cost to Serve
Asset Management Efficiency	<ul style="list-style-type: none"> • Cash-to-Cash Cycle Time • Return on Supply Chain Fixed Assets • Return on Working Capital

Table 2.3: Performance attributes of SCOR

(SCOR11.0, 2012)

2.9 LITERATURE SUMMARY AND GAPS IDENTIFIED

Literature Summary

Publications	Discussion point
Christopher, 1992). (Christopher, 1998),	Theses published articles all tries to define SCM in different aspects of the business activities. Most agree that it is a coherent and complete integration of all aspect of a firm beginning from sourcing raw material from the first supplier ahead of production going through managing inputs in production and distributing end products to the final customer, including all the material and information flow.
Gilbert & Mukherjee, 2000	SCM is handling the overall material flow, information flow and financial aspects of the chain till it reach to the end users.
(Cooper, et al., 1997; Lambert & Cooper, 2000	Supply chain management is linkage of basic operations of business starting from original suppliers to final customers
(Neely, 1995); (Gunasekaran, 2001) (Angerhofer, 2006); (Gunter, 2006)	Explained separate measures of SCPM into four categories i.e. (i) quality, (ii) time, (iii) cost, and (iv) flexibility. Further, these metrics have been grouped into (i) quality and quantity, (ii) cost and non-cost, (iii) strategic/operational/tactical focus, and (iv) supply chain processes).
(Beamon, 1999)	Discussed that, many metrics used in SCPM have been designed to measure operating performance, evaluate improved effectiveness, and examine strategic alignment of the whole supply chain management
(Hermela, 2016)	indicates that companies which measure their performance using important financial and non-financial measures in seven perspectives to achieve better business performance
(Alemu, 2013)	the performance measurement practice of these organizations using non-financial performance measures or multi criteria performance measurement is low
(Fassika, 2013)	Manufacturing industries still largely use financial and productivity performance measures.
(Michael, 2000) (Robel, 2013)	firm's ability to hold its early gains in market share also depends on how it obtained them if a firm captures share through short-term promotions or price cuts that competitors can easily match and that may tarnish its image among customers it may be short-lived Market share = Preference x Voice x Distribution.
(Walker, 2003)	established competitors are less likely to react aggressively to market share erosion as long as their sales continue to grow at satisfactory rate

Table 2.4: Literature Summery

Literature gap

It is seen the above table that most researchers have tried to address the literature part of Supply chain and supply chain management system. The concept of SCM has been defined in different aspects trying to constitute all aspect it holds to the current times. As evident from the above literature studies, many authors have worked upon various frameworks for measuring SC performance, and proposed a typology of PMS that identifies the major trends in the field of SCPM. Many ways of measuring the performance of a supply chain has been briefly stated in the earlier litterers (Table 2.2). on the other hand, the researches done earlier has shown that the exercise of performance measuring in company's currently operating in Ethiopia is low and those who evaluate and measure their performance measurement of the existing supply chain uses only financial and productivity tools to measure the performance of the supply chain. (Alemu, 2013), (Fassika, 2013) (Hermela, 2016). Although distribution network is the downstream of any supply chain, performance measurement of this part of the chain has been neglected. All the above researches has tried to focus their scope on the performance measurements and evaluation of the upper tire of the supply chain, whereas there exist insufficient literature about distribution network performance measurements and using non-financial and production tools to do so.

Therefore, to fulfill these gaps, this study is intended to provide a more holistic approach to the performance measurements tools other than financial tool, such as the SCOR model, and assess through the distribution network performance measurement of the case company having of a goal of improving the market share improved.

CHAPTER THREE

RESEARCH METHODOLOGY

This part of the study presents research methodology. It contains methods of data collection, data source, sample and sampling techniques, data gathering tools, methods of data analyses.

3.1 Methods of Data collection

Conducting this research both primary and secondary data were collected. Primary data were collected the managers of supply chain department of the company, distributed questionnaires from the distributors and exclusive outlets. Secondary data were gathered from a review of different articles and literatures done earlier on related topics.

3.2 Research Context

This research aimed to measure the performance of the distribution channels of the company in a cope of Addis Ababa city. Addis Ababa can be looked at as a case study as the city by itself is considered a separate region for which six agents have signed contracts with BGI. These contracts are renewed annually incorporating daily and monthly reports from sales coordinators and promoters of BGI. In managing these channels, area managers at executive levels control the regions, coordinators operated at territory level, and promoters and sales managers at route and line levels. Agents are evaluated through this chain of command.

Agents need to have experience in the brewery sector; they must be socially active and resident in the areas they intend to cover. They are also required to have adequate manpower, storage and supervision systems. The agreement with agents includes factory price, market price, and quotas.

3.3 Population Size

This research addresses the downstream of BGI's product supply chain namely distribution agents and outlets (exclusive to BGI'S products) in Addis Ababa and

surrounding towns. In this supply chain, there are 6 agents, 148 exclusive outlets in Addis Ababa and surrounding towns. A total of 154 respondents are the entire population of this research.

Territory	Number of agents	Number of Exclusive outlets	Total
T1	1	38	39
T2	1	20	21
T3	1	22	23
T4	1	23	24
T5	1	37	38
T6	1	8	8
Total	6	148	154

Table 3.1: Number of agents and outlets in Addis Ababa and surroundings
Source: BGI Ethiopia's' sales dept. , (adapted for the research)

3.4 Sample size

The sample size is a significant feature of any empirical study in which the goal is to make inferences about a population from a sample. In order to generalize from a random sample and avoid sampling errors or biases, a random sample needs to be of adequate size. (Hamed Taherdoost, 2018) To put it bluntly, larger sample sizes reduce sampling error but at a decreasing rate. Several statistical formulas are available for determining sample size. There are numerous approaches, incorporating a number of different formulas, for calculating the sample size for categorical data

$$n = \frac{p(100-p)Z^2}{E^2}$$

n : is the required sample size

P : is the percentage occurrence of a state or condition

E: is the percentage maximum error required

Z : is the value corresponding to level of confidence required

	Variance of the population P=50%		
	<i>Confidence level=95%</i> <i>Margin of error</i>		
Population Size	5	3	1
50	44	48	50
75	63	70	74
100	79	91	99
150	108	132	148
200	132	168	196
250	151	203	244
300	168	234	291
400	196	291	384
500	217	340	475
600	234	384	565
700	248	423	652
800	260	457	738
1000	278	516	906
1500	306	624	1297
2000	322	696	1655
3000	341	787	2286
5000	357	879	3288
10000	370	964	4899

Table 3.2: Sample size based on Desired Accuracy with Confidence Level of 95%
Source: (Gill et al., 2010)

Based on the given formula and the table that follows it , a population size of 154, confidence level of 95%, margin error(confidence interval) of 5 and variance of population(percentage of occurrence) of 50% results in a **sample size of 110**.

3.5 Data Analysis

Here in this research descriptive as well as inferential data analysis is being implemented. The descriptive data is analyzed using descriptive statistics to compute the correlation among and regression metrics using a statistical tool known as SPSS V 16. The findings were presented in the form of tables. The inferential data collected from Agents and outlets explained for further detail awareness about the findings of the quantitative data in each

variable. The demographic background information of the respondent also presented using descriptive statistics.

3.6 Selection of Frameworks of performance measurements

It has been shown on the earlier table (Table 2.2) that there exist more than twenty frameworks that can be implemented to the performance measurement of a supply chain. All mentioned frameworks have their own advantage and key points to be used for. Even though then frameworks exist in large numbers it does not mean that all can be suitable for all kind of performance measurements. One has to choose wisely in selecting the best framework that can fit to its own sector and requirement.

Here, in this research **SCOR** model has been selected to evaluate and measure the performance of the distribution network of the case company because of the following reasons:

- ✓ Aim to find out important **SCOR** sourcing performance metrics by using the stepwise regression model
- ✓ The performance or metrics section of **SCOR** focuses on understanding the outcomes of the supply chain and consists of two types of elements: Performance Attributes (attributes) and Metrics.
- ✓ Performance measures along the *five main supply chain processes*: Plan, Source, Make, Deliver and Return. (i.e. in this case Delivery is given much focus and attention here in this research in the form of distribution network)
- ✓ **SCOR** measurements area focuses on Delivery reliability, Delivery Responsiveness, Delivery Flexibility, Delivery Cost and Asset management of Delivery.

CHAPTER FOUR

RESULT AND DISCUSSION

In this Chapter, results from the collected data i.e. from the questionnaires, literatures and interviews are presented and analyzed to address the research questions

The collected data from the questionnaires was analyzed using SPSS. The ideal sample size determined in the research methodology was 110 respondents. Based on the sample size a total of 119 questionnaires were distributed among the 6 main agents and 148 exclusive outlets of the company in Addis Ababa. From those distributed questionnaires 84 of them returned and 35 of the distributed questionnaires' was either defective or not recovered. This will make the return rate of distributed questionnaires' 76.36 %. According to Smith (2002) the return or success rate 50% is 'adequate'; 60% response rate is 'good' and 70% rate or higher is 'very good'. Therefore the data analysis is going to be conducted on the returned 84 questionnaires.

4.1 Existing Product Distribution map in Addis Ababa

The main actors of BGI Ethiopia products downstream supply chain who have parts in value addition are the company, the agents and outlets (exclusive and nonexclusive). The product distribution map is shown in the below diagram below. Here in Addis Ababa, there are six major agents who takes the whole responsibilities if distributing the product throughout the city, and has been designated as T1, T2, T3, T4, T5, AND T6 in an indication of that they do their distribution on their specified distribution territory within the city. And each territory addresses 148 exclusive outlets and a lot more nonexclusive outlets. The outlets have been designated as OL 1, OL2, OL 3, ... as shown below in the diagram.

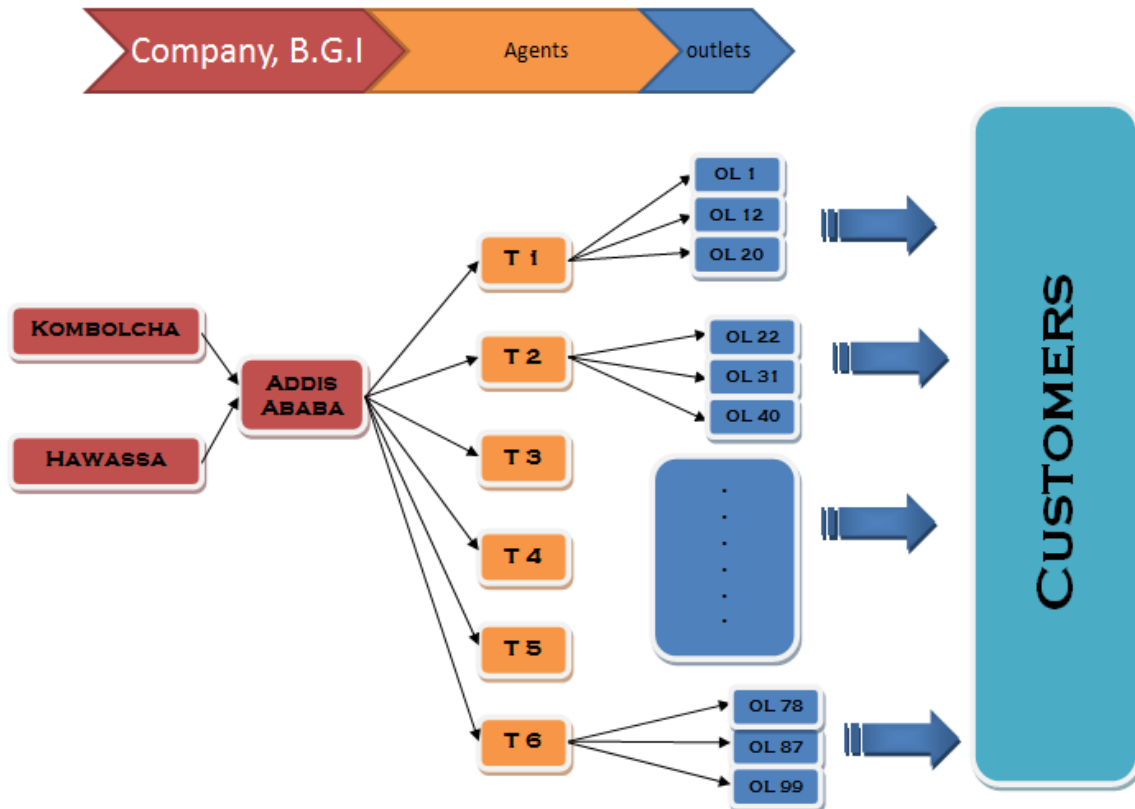


Figure 4.1: Existing product Distribution network in Addis Ababa

4.1.1 Challenge observed on the currently existing distribution network

The Major challenge observed on the distribution channel is the timely of delivery of the product. As per the focus group discussion; in some territories products may not be delivered at required place and time. In such case outlets are forced to buy products with additional cost or effort from other nearby territory or from agents' store. Such distribution problem occurs mostly due to location and **responsiveness** problem. The location of the outlet is coming the major challenge as it is remote from the distribution center which the sales truck may reach there at late hours. The **cost** of renting or purchasing a warehouse close to the outlets is that much expensive. Upon delivering the products, the demand of the outlets and the actual delivered shows a gap. The **gap between the demand the delivered** product may force (is forcing) the outlets to fulfill the demand gap with other substitute brand from other companies. The percentage of orders delivered may reflect on

the **reliability** of the agent distributor. In distributing the products, a poor collaborations among agents, individual workers, regional sales managers is observed, plus their exist no use of ICT technology to facilitate the distribution process in any way possible. That really arises doubt on the **agility** of the distributor agents. This affects the overall performance of the distribution channel. The road jamming is also a cause for late delivery of the goods to the final outlet.

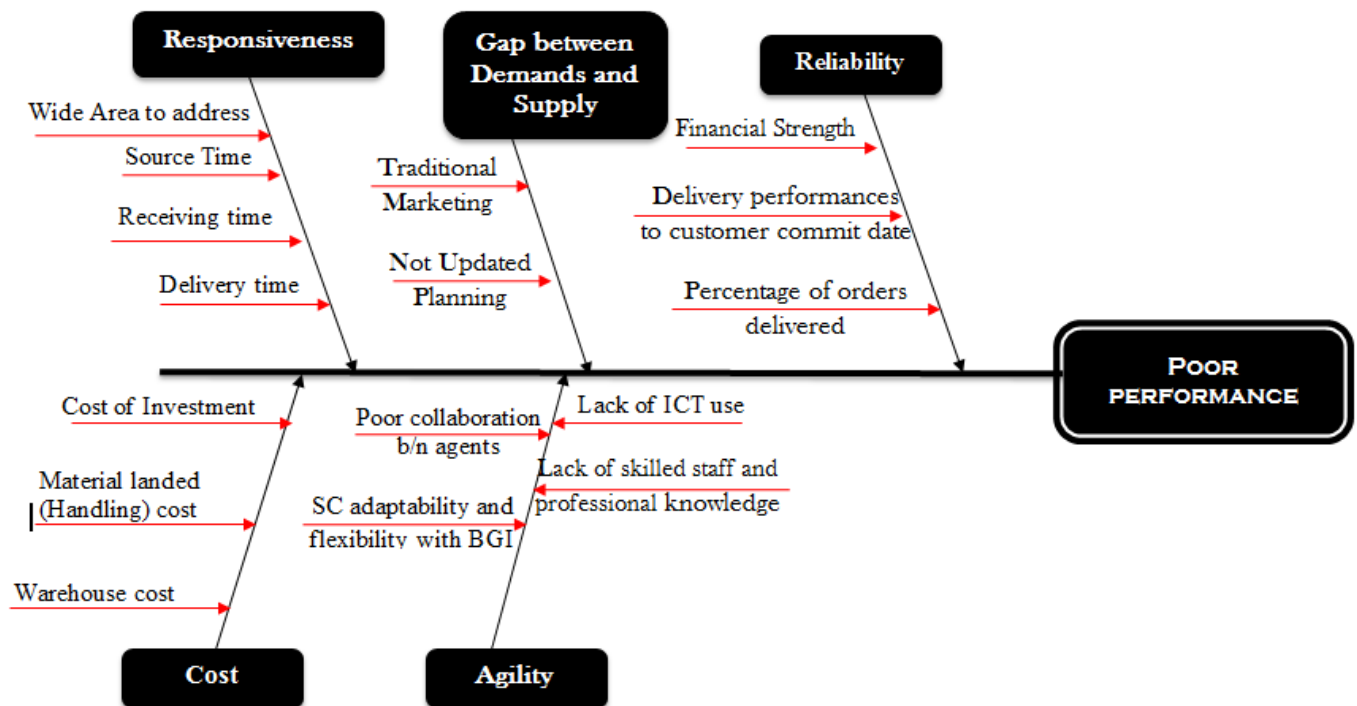


Figure 4.2: Cause and effect diagram for poor performance

4.2 Challenges and Barriers' of Supply Chain Management

The challenges or barriers of downstream supply chain integration was studied through semi structure interview with BGI Ethiopia sales and marketing department and supply chain department managers separately.

Poor Collaboration: The sales and marketing staffs visits the final outlets mainly to assess the sales performance and if there are technical problems on their sales equipment like refrigerator, draft cooling machine and accessories. Apart from this issue, the linkage of the company as well as distribution agent with the outlet is rated at low level. Each sales

promoter in every territory expected to reach to all outlets every fifteen days. However, practically the sales promoter is not covering the outlets within intended due time. This loose coordination among the downstream supply chain partners is one of the significant challenges on the downstream supply chain integration.

Lack of trust: In supply chain trust is the basic milestone for effective integration. However, the company does not trust agents for real time sharing specially price decision making process. Ideally, the company should consult the main agents as partner before making any price decision.

However, as the agents may affect the market due to mismanagement of inventory, the company is making decision by its own and let agents know for implementation of the new price in the market.

The demand is higher than supply: Currently in Ethiopia the demand of both bottle and draft beer is increasing while the capacity and number of breweries are radically evolving for the last few years. However, BGI Ethiopia is producing and selling its products with maximum capacity and holding the largest market share. Having such high market share, let the company focus only traditional way of doing the marketing and sales aspect rather than strengthen the supply chain integration.

High investment cost: the downstream supply chain integration has to characterize on level of resource sharing. However, due to high number of outlets in the country, the company is only focusing on exclusive outlets and some influential market areas to share resources to enhance the relationship with final outlets. In this aspect significant number of outlets St. George beer draft is selling with competitors branded glass cups. As the result the visibility of the company's product will be affected due to the company couldn't address enough material either affordable price or freely. This is also considered by members of the chain as partiality.

Low usage of Information Communication Technology: Information integration is one of the key indicator of the level and practice of supply chain integration. In this regard, as the practice of using information technology is low, the level of information integration rated at

low level. Therefore, practice of not using information technology with in the chain was one of the main challenges observed.

Lack of skilled staff and professional knowledge: for the implementation of high-tech information system requires high level of skilled staff and professional knowledge. In this situation most of the outlets and agents with in the chain has limited or no professional skill. Thus, lack of skilled staff in the chain affected the integration process.

Lack of Knowledge: All the partners should understand the benefits of integration among partners in the chain. However, there is clear lack of knowledge throughout the chain which the integration can bring from cost reduction up to creation of market competitiveness

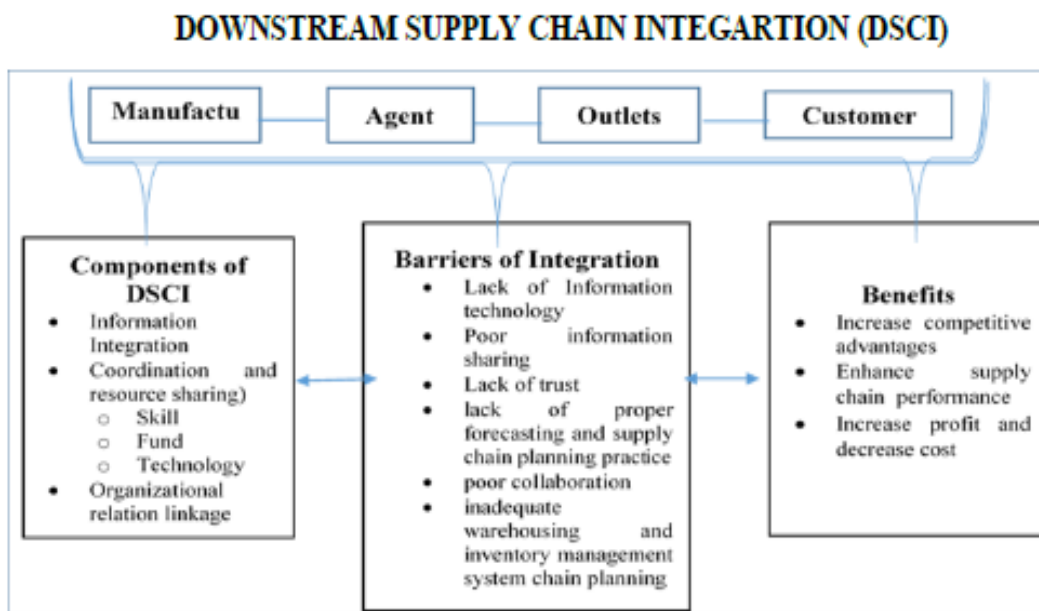


Figure 4.3: challenges and arrieriers in supply chain ananmnet at BGI
Source: Mulugeta, 2018

4.3 Reliability Test

Prior to testing the research questions, the survey measures used examined for the reliability. In view of the characteristics of the instrument used in this study, the inter-item reliability consistency (alpha) was used to measure its reliability. Reliability is known as to what extent the research findings can be replicated, if another study is undertaken using the same research methods (Ritchie and Lewis, 2003).

The internal consistency of a set of measurement items refers to the degree to which items in the set are homogeneous. Internal consistency can be estimated using a reliability coefficient such as Cronbach's alpha (Changiz & Azadeh, 2011), (Syum, 2010)(Hermela 2016). Therefore, the reliability of each questionnaire was calculated via Cronbach's alpha. According to George and Mallery (2003), Cronbach's alpha reliability coefficient normally ranges between 0 and 1. The results of Cronbach's alpha for the questionnaires based on each performance matrices are as shown below.

Performances Metrics	Reliability Statics	
	Cronbach's Alpha	No. of items
Conceptual Awareness of DNPM	0.705	9
Reliability	0.783	5
Responsiveness	0.735	4
Agility	0.777	5
Cost	0.829	10
Asset management efficiency	0.730	6

Table: 4.1 Cronbach's alpha result for each performance matrices

The closer Cronbach's alpha coefficient to 1.0 the greater the internal consistency of the items in the scale. George and Mallery (2003), (Syum, 2010), (Changiz & Azadeh, 2011) suggested that Cronbach's alpha coefficient greater than 0.7 is acceptable. Therefore here on above table the Cronbach's alpha values ranges from 0.705 to 0.829 which is acceptable value of reliability test.

4.4 Descriptive analysis

4.4.1 Awareness of Distribution network performance measurement

The first section of the body of the questionnaires distributed was to asses through the main six distributing agents and the company's reginal managers of their awareness and understanding of the performance measuring of their distribution network and use of tools

to measure the networks performance. This section has nine (9) questions to answers on scale of 1 to 5. (Scale of 1 = strongly disagree; 2= disagree 3=Neutral; 4=Agree; 5=strongly agree). A total 18 questionnaires was collected on this section, 6 from the mangers of the distributors and two from each reginal mangers.

Therefore, the result from the survey in terms of percentage of each responses are given on the below table.

Q		1	2	3	4	5
1.1	Managers have adequate understanding and knowledge on how the supply chain performances are measured for the company.	0	22.22%	61.11%	11.11%	5.55%
1.2	Your company believes competitiveness can be achieved through development of performance measurement in the supply chain.	0	11.11%	22.22%	50%	16.66%
1.3	Availability of Trainings about performance measurement is sufficient in your company.	0	61.11%	11.11%	16.66%	11.11%
1.4	Management's concern on company's strategy and measurable criteria for strategic success.	0	0	83.33	16.66%	0
1.5	There are sufficient indicators used in the company to measure the performance in the supply chain.	0	50%	33.33%	16.66%	0
1.6	Your company uses financial and non-financial indicators to measures the performance in the supply chain.	0	0	11.11%	88.88%	0
1.7	Performance measurement is important in the Supply Chain of your company.	0	0	27.77%	72.22%	0
1.8	The importance of performance measurement/evaluation for decision making in your company.	0	0	44.44%	27.77%	22.22%
1.9	Your company use performance evaluation reports to identify areas that need strategic focus.	0	22.22%	27.77%	44.44%	5.55%
	Average	0	18.52%	32.46%	38.26%	6.79%

Table 4.2: Section one respondent result by percentage

In the above table is clearly seen that more than fifty percent (54.32%) of the respondent answered “ disagree” and “Neutral” this shows that the management at the distributors and yet gain at the reginal level of the company are either not aware about the performance

measurements of distribution network or implement sufficient indicators to measure the performance of the network. The table also shows there exist no training about distribution network performance measurements. Yet gain the management's concern on attaining strategic success based by setting and implementing measurable performance measuring criteria's other than financial indicators is ambiguously unknown by most (83.33%) of the respondent so they answered "Neutral".

4.4.2 Correlation Analysis

In correlation analysis, we estimate a sample correlation coefficient, more specifically the Pearson Product Moment correlation coefficient. The sample correlation coefficient, denoted r , ranges between -1 and +1 and quantifies the direction and strength of the linear association between the two variables. The correlation between two variables can be positive (i.e., higher levels of one variable are associated with higher levels of the other) or negative (i.e., higher levels of one variable are associated with lower levels of the other). The sign of the correlation coefficient indicates the direction of the association. The magnitude of the correlation coefficient indicates the strength of the association. (scincediroctrate.com)

Bivariate Correlation

Correlations measure how the variables are related to each other. Using SPSS software tool has three types of menus for the correlation analysis,

1. Bivariate,
2. Partial Correlations, and
3. Distances correlations.

Bivariate Correlations measure how variables in each perspective are related. Before calculating a correlation coefficient, the bivariate Correlations procedure computes the pair

wise associations for a set of variables and displays the results in a matrix. It is useful for determining the strength and direction of the association between two scale or ordinal variables. The Partial Correlations procedure computes partial correlation coefficients that describe the linear relationship between two variables while controlling for the effects of one or more additional variables. Distances procedure calculates any of a wide variety of statistics measuring either similarities or dissimilarities (distances), either between pairs of variables or between pairs of cases. These similarity or distance measures can then be used with other procedures, such as factor analysis, cluster analysis, or multidimensional scaling, to help analyze complex datasets. (Hermela, 2016)

For this analysis the study use bivariate correlations procedure because the available information is expresses with weight. So that all the scores which have been registered by the respondents, have been feed to SPSS data entry module.

In the SPSS data entry module the analysis will show as Pearson Correlation (r) and significance (p) value of the two variables therefore, it will be vital to remind the properties and interpretation of r value (or Pearson Correlation), based on (Jay Devore & Nicholas Farnum , 1999).

The variables of Pearson Correlation (r) does not depend on the unit of measurement for either variables, which the correlation coefficient measures the inherent strength of relationships between two variables.

The value of Pearson Correlation (r) is between -1 and +1. A value near the upper limit, +1, is indicative of a substantial positive relationship, whereas an r close to the lower limit -1, suggests a prominent negative relationship.

$r=1$ only when all the points is in a scatter plot of the data lie exactly on a straight line that slopes upward, and -1 the reverse.

The effect size measure varies between 0 (no relationship) and 1 (perfect positive relationship). Therefore the closer to 1 the stronger the relationship. As a general rule of thumb, the following cut-off points are sometimes proposed:

$r < 0.1$ weak,

r <0.3 modest,
r <0.5 moderate,
r <0.8 strong,
r ≥0.8 very strong.

4.4.2.1 Analysis of Reliability Performance Attribute

According to SCORE model 11.0 Reliability is the ability to perform tasks as expected. Reliability focuses on the predictability of the outcome of a process. Typical metrics for the reliability attribute include: On-time, the right quantity, the right quality. A metric is a standard for measurement of the performance of a supply chain. Level-1 metrics are diagnostics for the overall health of the supply chain. These metrics are also known as strategic metrics and key performance indicators (KPI). Level I metric for the Reliability attributes is Perfect Order Fulfillment. Level-2 metrics serve as diagnostics for the level-1 metrics. The diagnostic relationship helps to identify the root cause or causes of a performance gap for a level-1 metric. Here the Level II metrics for Reliability are Percentage of orders delivered (RV1), Delivery performance to customer commit date (RV2), Documentation accuracy (RV3), Perfect condition (RV4), financial strength (RV5). On the following table below the correlation analysis is shown among those Level II metrics for the Reliability performance attribute.

		Percentage of orders delivered (RV1)	Delivery performance to customer committed date (RV2)	Documentation accuracy (RV3)	Perfect condition (RV4)	Financial strength (RV5)
Percentage of orders delivered (RV1)	Pearson Correlation	1	.656**	.877**	0.097	0.02
	Sig. (2-tailed)		0	0	0.378	0.859
	N	84	84	84	84	84
Delivery performance to customer committed date (RV2)	Pearson Correlation	.656**	1	.875**	.357**	.275*
	Sig. (2-tailed)	0		0	0.001	0.011
	N	84	84	84	84	84
Documentation accuracy (RV3)	Pearson Correlation	.877**	.875**	1	0.152	0.131
	Sig. (2-tailed)	0	0		0.169	0.236
	N	84	84	84	84	84
Perfect condition (RV4)	Pearson Correlation	0.097	.357**	0.152	1	.741**
	Sig. (2-tailed)	0.378	0.001	0.169		0
	N	84	84	84	84	84
Financial strength (RV5)	Pearson Correlation	0.02	.275*	0.131	.741**	1
	Sig. (2-tailed)	0.859	0.011	0.236	0	
	N	84	84	84	84	84

Table 4.3: Bivariate Correlation of Reliability metrics

In the above table we can see that none of the metrics have negative relation to one another, rather it is seen a strong correlation among the metrics, such a relation is seen among RV1 (Percentage of orders delivered) Vs RV3 (Documentation accuracy). That tells, whenever the accuracy of the documentation (packing slips, bills of lading, invoices,

Quality certification, Government or Customs documentation / forms, etc) are improved that is being on time and even a ahead of time, the percentage of the orders to be delivered will be increased. Here again on the above table, its seen that RV2 (Delivery performance to customer committed date) Vs RV3 (Documentation accuracy) shows a strong correlation. This means the performance on delivering on customer committed date is increased with the accuracy of proper documentation improving. RV4 (Perfect condition) Vs RV5 (Finical strength) also shows a strong correlation; meaning that Perfect condition (Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable) and accepted by the customer) is strongly related to the Financial strength of the distributor in a way that with Financial strength can provide all necessary precaution so that the product can reach to the customer in perfect condition. . RV1 (Percentage of orders delivered) Vs RV4 (Perfect condition) shows a weak correlation. Also RV1 (Percentage of orders delivered) Vs RV5 (Finical strength) shows similar correlation. We can conclude all the matrices of the responsiveness attribute are linearly related because the correlation value is all positive.

4.4.2.2 Analysis of Responsiveness Performance Attribute

The Responsiveness attribute describes the speed at which tasks are performed. Responsiveness addresses repeated speed of doing business. Example of Responsiveness metrics are cycle time metrics. The SCOR key performance indicator for Responsiveness (Level I metric) is Order Fulfillment Cycle Time. Here the Level II metrics for Responsiveness are Source cycle time (RV6): the average time associated with source processes, Make cycle time (RV7): average time associated with make processes, Deliver cycle time (RV8): average time associated with delivering processes, Deliver retail cycle time (RV9): the average cycle time of the process used to acquire, merchandise, and sell finished goods at a retail store. Upon collecting data on this part of the survey, three drivers from each of the six distributors have participated because they are the actual persons that cover the cycle in distributing the products.

On the following table below the correlation analysis is shown among those Level II metrics for the Responsiveness performance attribute.

		Source time (RV6)	Receiving Time (RV7)	Delivery time to sub major localized distributors (RV8)	Deliver time to retail shop (RV9)
Source time (RV6)	Pearson Correlation	1	0.444	0.439	0.388
	Sig. (2-tailed)		0.065	0.069	0.111
	N	18	18	18	18
Receiving time (RV7)	Pearson Correlation	0.444	1	0.395	.500
	Sig. (2-tailed)	0.065		0.104	0.035
	N	18	18	18	18
Delivery time to sub major localized distributors (RV8)	Pearson Correlation	0.439	0.395	1	0.316
	Sig. (2-tailed)	0.069	0.104		0.201
	N	18	18	18	18
Deliver time to retail shop (RV9)	Pearson Correlation	0.388	.500	0.316	1
	Sig. (2-tailed)	0.111	0.035	0.201	
	N	18	18	18	18

Table 4.4: Bivariate Correlation of Responsiveness metrics

In the above table it is clearly seen that nearly all the metrics have below “moderate” positive correlation among each other, except RV7(Receiving time) Vs RV9(Delivery time to retail shops) which have a correlation value of 0.500 which is taken as “moderate”. This implies that the increase (improvement) on the receiving time of the product will bring about an increase (improvement) on delivery time to the retail shops moderately. Any increase (improvement) on any of the metrics her have a weak correlation on the other remaining matrices. We can conclude all the matrices of the responsiveness attribute are linearly related because the correlation value is all positive.

4.4.2.3 Analysis of Agility Performance Attribute

The ability to respond to external influences, the ability to respond to marketplace changes to gain or maintain competitive advantage. SCOR Agility metrics include Flexibility and Adaptability. The SCOR key performance indicator for Agility (Level I metric) are **Upside supply chain flexibility (AV1)**: The number of days required to achieve an unplanned sustainable 20% increase in quantities delivered, **Upside supply chain adaptability (AV2)**: The maximum sustainable percentage increase in quantity delivered that can be achieved in 30 days, **Downside supply chain adaptability (AV3)**: The reduction in quantities ordered sustainable at 30 days prior to delivery with no inventory or cost penalties, **Overall value at risk (AV4)**: the sum of the probability of risk events times the monetary impact of the events which can impact any core supply chain functions, **Transport flexibility (AV5)**: flexibilities in using different transportation vehicles to transport products to dealers (sub major distributors) and to/from the company enforced by the company, BGI.

On the following table 4.5 below the correlation analysis is shown among that Level I metrics for the Agility performance attribute.

		Supply chain flexibility with BGI (AV1)	Supply chain adaptability with BGI (AV2)	Supply chain adaptability with sub major Distributors (AV3)	Overall value at risk (AV4)	Transport flexibility (AV5)
Supply chain flexibility with BGI (AV1)	Pearson Correlation	1.000	-0.089	-0.080	0.112	0.112
	Sig. (2-tailed)		0.724	0.752	0.66	0.658
	N	18	18	18	18	18
Supply chain adaptability with BGI (AV2)	Pearson Correlation	-0.089	1.000	0.280	0.230	0.228
	Sig. (2-tailed)	0.724		0.261	0.36	0.363
	N	18	18	18	18	18
Supply chain adaptability with sub major Distributors (AV3)	Pearson Correlation	-0.080	0.280	1.000	0.20	0.204
	Sig. (2-tailed)	0.752	0.261		0.42	0.417
	N	18	18	18	18	18
Overall value at risk (AV4)	Pearson Correlation	0.112	0.228	0.204	1.00	0.777
	Sig. (2-tailed)	0.658	0.363	0.417		0.000
	N	18	18	18	18	18
Transport flexibility (AV5)	Pearson Correlation	0.112	0.228	0.204	0.777	1.000
	Sig. (2-tailed)	0.658	0.363	0.417	0.00	
	N	18	18	18	18	18

Table 4.5: Bivariate Correlation of Agility metrics

Here on the above table it is shown that AV1(**Upside supply chain flexibility with BGI:**

The number of days required to achieve an unplanned sustainable 20% increase in quantities delivered) has negative correlation with two of the other metrics, AV2 (**Upside supply chain adaptability:**

The maximum sustainable percentage increase in quantity delivered that can be achieved in 30 days) and AV3(**Downside supply chain adaptability:**

The reduction in quantities ordered sustainable at 30 days prior to delivery with no

inventory or cost penalties) it means that the flexibility of the distribution network with the BGI tends to decrease as both adaptability on the distribution network with BGI and adaptability of the distribution with sub major distributors increases. In general it implies that the flexibility of the network to handle unplanned but sustainable increase (up to 20%) will decrease whenever the network's adaptability to accommodate an increase in product quantity in 30 days and whenever the decrease of ordered by sub major distributor's. other than that, the others metrics tend to have a positive but yet weak relation with one another.

4.4.2.4 Analysis of Cost Performance Attribute

The Cost attribute describes the cost of the distribution process. Typical costs include labor cost, material cost, transportation cost. The SCOR key performance indicators for Cost are Total Cost to Serve. The sum of the distributions' network cost to deliver products and services to customers. Total cost to serve include the cost to plan (CV1: total cost of personnel, automation, assets and overheads associated with planning the supply chain the distribution , cost to source materials (CV2): cost associated with managing the orders, receiving, inspecting and warehouse, products, merchandise and services, material landed cost (CV3): cost of purchased materials, transport cost, material customs duties taxes and tariff costs, compliance costs, distribution cost(CV4): the total cost associated with managing and performing distribution process, scheduling distribution activities, picking products, direct labor cost , order management cost (CV5): : cost of personnel,, automation, and asset associated with responding to inquiries and quotes, order tracking and tracing and maintenance, scheduling transportation, order entry, delivery, installation invoicing, Fulfillment cost (CV6): cost of physically handling of products, such as storage, picking, packaging and distribution to the requested spot, fulfillment of custom duties, return cost (CV7): cost of disposition of product returned due to planning error, product quality, and order management delivery error, discount and refund costs, cost of goods sold (CV8): : cost of direct material such as cost to purchase the initial number of caters to qualify as major distributors , transport cost (CV9): cost of fuel consumption in transportation of distributing of products , warehouse cost(CV10): cost of rental warehouse or purchase cost of warehouse if it is owed by the distributor.

		CV1	CV2	CV3	CV4	CV5	CV6	CV7	CV8	CV9	CV10
CV1	Pearson Correlation	1	.378	.500	.108	.161	.221	.081	.354	.707	.756
	Sig. (2-tailed)		.122	.035	.671	.523	.378	.751	.150	.001	.000
	N	18	18	18	18	18	18	18	18	18	18
CV2	Pearson Correlation	.378	1	.189	.528	.152	.584	.426	.802	.802	.286
	Sig. (2-tailed)	.122		.453	.024	.546	.011	.078	.000	.000	.250
	N	18	18	18	18	18	18	18	18	18	18
CV3	Pearson Correlation	-.500	-.189	1	-.376	-.081	.110	.282	.000	-.530	-.661
	Sig. (2-tailed)	.035	.453		.124	.751	.663	.257	1.000	.024	.003
	N	18	18	18	18	18	18	18	18	18	18
CV4	Pearson Correlation	.108	.528	-.376	1	.147	.522	.009	.000	.570	.386
	Sig. (2-tailed)	.671	.024	.124		.560	.026	.973	1.000	.013	.114
	N	18	18	18	18	18	18	18	18	18	18
CV5	Pearson Correlation	.161	.152	-.081	.147	1	.570	.532	.171	.000	-.152
	Sig. (2-tailed)	.523	.546	.751	.560		.014	.023	.498	1.000	.546
	N	18	18	18	18	18	18	18	18	18	18
CV6	Pearson Correlation	.221	.584	-.110	.522	.570	1	.730	.469	.469	.167
	Sig. (2-tailed)	.378	.011	.663	.026	.014		.001	.050	.050	.508
	N	18	18	18	18	18	18	18	18	18	18
CV7	Pearson Correlation	-.081	.426	.282	-.009	.532	.730	1	.684	.000	-.426
	Sig. (2-tailed)	.751	.078	.257	.973	.023	.001		.002	1.000	.078
	N	18	18	18	18	18	18	18	18	18	18
CV8	Pearson Correlation	.354	.802	.000	.000	.171	.469	.684	1	.500	.000
	Sig. (2-tailed)	.150	.000	1.000	1.000	.498	.050	.002		.035	1.000
	N	18	18	18	18	18	18	18	18	18	18
CV9	Pearson Correlation	.707	.802	-.530	.570	.000	.469	.000	.500	1	.802
	Sig. (2-tailed)	.001	.000	.024	.013	1.000	.050	1.000	.035		.000
	N	18	18	18	18	18	18	18	18	18	18
CV10	Pearson Correlation	.756	.286	-.661	.386	-.152	.167	-.426	.000	.802	1
	Sig. (2-tailed)	.000	.250	.003	.114	.546	.508	.078	1.000	.000	
	N	18	18	18	18	18	18	18	18	18	18

Table 4.6: Bivariate Correlation of Cost metrics

The above table shows that CV1 (planning cost) depicts negative correlation with CV3(Material landed cost) and CV7 (return cost). That tells us that an increment in either of CV3 or CV7 will result in decrement of the planning cost. Here again CV1 shows a strong positive correlation with CV9 (transport cost) and CV10 (warehouse cost) which means that any sort of increment or decrement of the either of CV9 or CV10 will have similar effect on planning cost. CV1 tends to have a moderate correlation with the remaining metrics (variables). There exist a strong correlation between CV2 (sourcing cost) and cost of goods sold (CV8) and also CV9 (transport cost). CV3 shows a negative weak correlation with CV2. CV10 has a negative correlation with most of the metrics like CV4 (distribution cost), CV 5 (order management cost), CV6 (fulfillment cost), CV9 and 10. CV4 (distribution cost) shows that it is in moderately strong correlation with CV5, CV6, and CV9, which means whenever the order management cost, fulfillment cost and transport cost are affected so does the distribution cost like wise. CV5 (order management cost) has yet gain a positive moderate correlation with CV6 and CV7 (return cost), meaning that an increment or decrement of the fulfillment cost and return cost will result similarly on order management cost. CV6 and CV7 are correlated strongly; whenever return cost arises so does fulfillment cost. Fulfillment cost (CV7) has negative correlation with CV10 (warehouse cost), that's to say that a decrement in the warehouse cost will have an increment on the fulfillment cost, and vice versa. CV8 (cost of goods sold) is in weak positive correlation with all metrics (variables) except CV9. The weak correlation of cost of goods sold with most is as result that cost is fixed by the company, BG1, but it exhibits a moderate correlation with CV9. Transport cost (CV9) shows that to be in strong positive correlation with CV10 (warehouse cost). The cheaper the warehouse cost the cheaper the transport cost and as the warehouse cost increases so does the transport cost.

In general, from the above table we can see that the cost associated here are interrelated with one another. They tends to affect each other mostly with positive strong correlation which means whenever one independent cost arises so will the remaining metrics, and decrement of that individual metric will have similar decrement to the others.

4.4.2.5 Analysis of Asset management efficiency Performance Attribute

The Asset Management Efficiency ('Assets') attribute describes the ability to efficiently utilize assets. Asset management strategies in distribution network include inventory reduction and in-source vs. outsource. Example metrics include: Inventory days of supply, capacity utilization.

SCOR key performance indicators include: Cash-to-Cash Cycle Time (AM1): cost of direct material such as cost to purchase the initial number of caters to qualify as major distributors. Return on Fixed Assets (AM2): Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in distribution network fixed assets. Return on working capital (AM3): Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position versus the revenue generated from a distribution, Facility utilization (AM4): utilization of all the resource and materials that exist in the best outcome of the performance of the company, Material handling efficiency (AM5): efficiency of distributors to handle and care for products starting from receiving the products up to delivering to retail and sub major distributors. , Warehouse management stems (AM6): efficiency of the systems used in the warehouse for the best delivering of the product to be distributed. Asset Management Efficiency is an internal focused attribute.

		Cash to cash cycle time (AMV1)	Return on fixed asset (AMV2)	Return on working capital (AMV3)	Facility utilization (AMV4)	Material handling efficiency (AMV5)	Warehouse management system (AMV6)
Cash to cash cycle time (AMV1)	Pearson Correlation	1	.392**	.234 ⁺	.323**	-.262 ⁺	.335**
	Sig. (2-tailed)		.000	.033	.003	.016	.002
	N	84	84	84	84	84	84
Return on fixed asset (AMV2)	Pearson Correlation	.392**	1	.517**	.725**	-.275 ⁺	.734**
	Sig. (2-tailed)	.000		.000	.000	.011	.000
	N	84	84	84	84	84	84
Return on working capital (AMV3)	Pearson Correlation	.234 ⁺	.517**	1	.591**	-.132	.384**
	Sig. (2-tailed)	.033	.000		.000	.230	.000
	N	84	84	84	84	84	84
Facility utilization (AMV4)	Pearson Correlation	.323**	.725**	.591**	1	-.144	.630**
	Sig. (2-tailed)	.003	.000	.000		.190	.000
	N	84	84	84	84	84	84
Material handling efficiency (AMV5)	Pearson Correlation	-.262 ⁺	-.275 ⁺	-.132	-.144	1	-.318**
	Sig. (2-tailed)	.016	.011	.230	.190		.003
	N	84	84	84	84	84	84
Warehouse management system (AMV6)	Pearson Correlation	.335**	.734**	.384**	.630**	-.318**	1
	Sig. (2-tailed)	.002	.000	.000	.000	.003	
	N	84	84	84	84	84	84

Table 4.7: Bivariate Correlation of Asset management efficiency metrics

In the above table it is seen that, AMV1 (cash to cash cycle time) having a negative correlation with AMV5 (material handling efficiency). Other than that AMV1 has a weak positive relation with the remaining metrics. AMV2 (return on fixed asset) shows a positive and moderate correlation with AMV4 (facility utilization and AMV3 (return on working capital), that is to mean that the improvement in facility utilization and increment in return

of working capital, will have a positive effect on the return of fixed asset(AMV2) and vice versa. AMV3 shows a moderate positive correlation with AMV4; meaning that as the facility utilization tends to improve so does the rate of return of working capital. Moreover AMV4 (facility utilization) has above moderate positive correlation with AMV6 (warehouse management system). As the warehouse management system improve so will the facility utilization. Here on the above table it is seen that AMV5 (material handling efficiency) having a negative correlation with all the metrics, telling that any sort of change in this individual metric will have a considerable effect on the remaining.

4.4.3 Selection of Key Performance Indicators

Organizations must select metrics that will align business performance to its strategic objectives and vision. Different researchers suggested that companies must keep these metrics very simple and that a reasonable number will about 5-6 metrics under each KPI (David, 2010). The standard KPI are not exhaustive and companies can therefore add or vary this KPI to reflect their unique situation or circumstance (Hermela 2016).

The data were analyzed using various statistical methods. The relative importance of KPIs were identified using the relative importance index (RII) using the following equation.

$$RII = \frac{\sum_{i=1}^5 W_i X_i}{A \times n} \dots \dots \dots \text{Equation 4.1: Relative importance index}$$

Where:

- W_i = the weight given to the i th response=1,2,3,4,5,
- X_i = frequency of the i th response,
- A = the highest weight (5 in this study), and
- n = the number of respondents.

Based on the above formula, the KPI for each performance attribute among the listed metrics is computed and selected. The following table shows that.

Performance attribute	Performance metrics	Likert's scale					sum	RII	Rank
		1	2	3	4	5			
Reliability	Percentage of orders delivered	0	11	39	34	0	275	0.65	3
	Delivery performance to customer commit date	0	22	29	33	0	263	0.63	4
	Documentation accuracy	0	0	51	33	0	285	0.68	2
	Perfect condition	0	0	39	45	0	297	0.71	1
	Financial strength	0	0	62	22	0	274	0.65	2
Responsiveness	Source Time	0	0	13	5	0	59	0.66	1
	Receiving time	0	10	8	0	0	44	0.49	3
	Delivery time to sub major distributors	0	6	12	0	0	48	0.53	2
	Delivery time to retail shops	0	12	3	0	0	33	0.37	4
Agility	supply chain flexibility with BGI	0	3	11	4	0	55	0.61	5
	supply chain adaptability with BGI	0	2	2	14	0	66	0.73	2
	supply chain adaptability with sub major Distributors	0	0	5	13	0	67	0.74	1
	Overall value at risk	0	0	11	7	0	61	0.68	3
	Transport flexibility	0	0	14	4	0	58	0.64	4
Cost	Planning cost	0	0	6	12	0	66	0.73	3
	Sourcing cost	0	0	14	0	4	62	0.69	4
	Material landed cost	0	0	16	2	0	56	0.62	7
	Distribution cost	0	0	3	7	8	77	0.86	1
	Order management cost	0	6	12	0	0	48	0.53	9
	Fulfillment cost	0	3	8	7	0	58	0.64	6
	Return cost	0	7	11	0	0	47	0.52	10
	Cost of Goods sold	0	4	10	4	0	54	0.6	8
	Transport cost	0	0	4	10	4	72	0.8	2
	Warehouse cost	0	0	3		10	59	0.66	5
Asset management efficiency	Cash to cash cycle time	0	0	59	25	0	277	0.66	3
	Return on supply chain fixed asset	0	20	47	17	0	249	0.59	5
	Return on working capital	0	30	29	25	0	247	0.59	6
	Facility utilization	0	19	40	25	0	258	0.61	4
	Material handling efficiency	0	0	20	64	0	316	0.75	1
	Warehouse management system	0	19	20	45	0	278	0.66	2

Table 4.8: Relative importance index for performance measurement attributes.

Based on the RII calculation one KPI with the highest value of RII is selected from each performance measuring attributes. These KPI metrics will be considered as dependent variables in their respective performance attributes. The KPI for each performance attribute is shown below:

	Performance attribute	KPI	RII Value
1	Reliability	Perfect condition	0.71
2	Responsiveness	Source Time	0.66
3	Agility	supply chain adaptability with sub major Distributors	0.74
4	Cost	Distribution cost	0.86
5	Asset management efficiency	Material handling efficiency	0.75

Table 4.9: KPI for performance measuring attributes

4.4.4 Regression analysis

Multivariate analysis

Bivariate correlation shows only their strength of relations whether strong or weak, further in order to show quantitatively how much is the effect of one variable over other variable regression analysis is required. The results of correlation analysis in this section tested the statistical significance of the association and their directional relationships between the performance measuring metrics. In addition to the correlation analysis the study further examined the effect of the independent variables on the dependent variables. Therefore, additional analysis that allows us to make better inferences was conducted.

The regression analysis result depicts the effect of the dependent variables (metrics) from each performance attributes which were calculated as KPI in the above section (Table 4.9) with the independent variables.

Regression equation of business performance is:

$$Y_i = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 + \beta_6x_6 + \beta_7x_7 + C \dots \dots \dots$$

Equation 4.1: Regression of business performance

Where: Y_i = dependent variables;
 α = intercept;
 $\beta_1 \dots \beta_3$ = coefficients
 $x_1 \dots x_3$ = independent Variables
 ϵ = error term

(Antony & Sanghamitra, 2010), (Syum, 2010), (Fentahun & Alemu, 2013)(, Hermela 2016)

4.4.4.1 Reliability Regression analysis

Dependent Variable: Perfect Condition (RV 4)

Independent Variables: Percentage of orders delivered (RV1), Delivery performance to Customer commit date (RV2), Documentation accuracy (RV3), Financial strength (RV5)

Equation of Regression:

$$RV4 = 1.871 + 0.473 RV1 + 0.732 RV2 - 0.990 RV3 + 0.659 RV5 +$$

Model		Coefficients				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
1	(Constant)	1.871	.428		4.368	.000
	Percentage of Orders delivered	.336	.113	.473	2.966	.004
	Delivery performance to customer committed date	.447	.101	.732	4.435	.000
	Documentation accuracy	-.990	.250	-.990	-3.957	.000
	Financial strength	.732	.080	.659	9.175	.000
a. Dependent Variable: Perfect condition						

Table 4.10: Regression Coefficients of Reliability

$$RV4 = 1.871 + 0.473 RV1 + 0.732 RV2 - 0.990 RV3 + 0.659 RV5$$

..... Equation 4.2: Regression Equation of Reliability

The above formula has revealed that the KPI for Reliability performance attribute, AV4 (Perfect condition: Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable) and accepted by the customer), depends on those four metrics.

Interpretation of the equation:

RV4 (Perfect condition) can be improved by one scale per unit of:

- ✓ RV1 (Percentage of Orders delivered): if the delivery percentage is increased by **0.473**
- ✓ RV2 (Delivery performance to customer committed date): if performance is improved by **0.732**
- ✓ RV3 (Documentation accuracy): if the requirement for documentation accuracy is decreased by **0.990**
- ✓ RV5 (Financial strength) : if the financial strength of the distributors is increased by **0.659**

4.4.4.2 Responsiveness Regression analysis

Dependent Variable: Source time (**RV 6**)

Independent Variables: Receiving time (**RV7**), Delivery time to sub major localized Distributors (**RV8**), Deliver time to retail shop (**RV9**)

Equation of Regression:

$$RV6 = 1.558 + 0.242RV7 + 0.287RV8 + 0.176RV9 +$$

Model		coefficients			t	Sig.
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta		
1	(Constant)	1.558	.725		2.150	.050
	Receiving time	.218	.243	.242	.899	.384
	Delivery time to sub major localized distributors	.273	.234	.287	1.167	.263
	Deliver time to retail shop	.212	.313	.176	.677	.510
a. Dependent Variable: Source time						

Table 4.11 Regression Coefficients of Responsiveness

$$RV6 = 1.558 + 0.242 RV7 + 0.287 RV8 + 0.176RV9$$

..... Equation 4.3: Regression Equation of Responsiveness

Interpretation of the equation:

RV6 (source time) can be improved by one scale per unit of:

- ✓ RV7(receiving time) if it improved by **0.242**
- ✓ RV8 (Delivery time to sub major localized distributors) is improved by **0.287**
- ✓ RV9 (Deliver time to retail shop) if is improved by **0.176**
- ✓ Deliver time to retail shop) if is improved by **0.176**

4.4.4.3 Agility Regression analysis

Dependent Variable: **AV3** (Distribution adaptability with sub major Distributors)

Independent variables: **AV1** (Distribution flexibility with BGI), **AV2** (Distribution Adaptability with BGI), **AV4** (Overall value at risk), **AV5** (Transport Flexibility)

Equation of Regression:

$$AV3 = 2.512 + 1AV1 + 2AV2 + 4AV4 + 5AV5$$

coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.512	1.280		1.962	.071
	Distribution flexibility with BGI	-.044	.233	-.054	-.187	.855
	Distribution adaptability with BGI	.173	.203	.233	.855	.408
	Overall value at risk	.210	.378	.206	.555	.589
	Transport flexibility	-.087	.466	-.073	-.187	.855
a. Dependent Variable: Supply chain adaptability with sub major Distributors						

Table 4.12 Regression Coefficients of Agility

$$AV3 = 2.512 - 0.054AV1 + 0.233AV2 + 0.206 AV4 - 0.073AV5$$

..... Equation 4.4: Regression Equation of Agility

Interpretation of the equation:

AV3 (Distribution adaptability with sub major Distributors) can be improved by one scale per unit of:

- ✓ AV1 (Distribution flexibility with BGI): if the flexibility regulations are eased by **0.054**
- ✓ AV2 (Distribution adaptability with BGI): if it is increased by **0.233**
- ✓ AV4(Overall value at risk): if it is increased by **0.206**
- ✓ AV5(Transport flexibility) if it is eased by **0.073**

4.4.4.4 Cost Regression analysis

Dependent variable: Distribution cost (CV4)

Independent variables: Planning cost (CV1), Sourcing cost (CV2), Material landed Cost (CV3), Order management cost (CV5), Fulfillment cost (CV6), Return Cost (CV7), Cost of Goods sold (CV8), Transport cost (CV9), Warehouse cost (CV10)

Equation of Regression:

$$CV4 = + 1CV1 + 2CV2 + 3CV3 + 5CV5 + 6CV6 + 7CV7 + 8CV8 + 9CV9 + 10CV10 +$$

Model		coefficients				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.500	1.845		2.981	.015
	Planning cost	-.545	.320	-0.164	.000	1.000
	Sourcing cost	1.365	.218	1.328	5.354	.000
	Material landed cost	-.500	.360	-.215	-1.389	.198
	Order management cost	1.365	.295	1.314	.000	1.000
	Fulfillment cost	.333	.227	.325	1.472	.175
	Cost of Goods sold	-1.333	.298	-1.216	-4.473	.002
	Transport cost	-1.43200	.214	-1.325	.000	1.000
	Warehouse cost	-.167	.261	-.190	-.637	.540
a. Dependent Variable: Distribution cost						

Table 4.13 Regression Coefficients of cost

Excluded Variables						
Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	Return cost	. ^a000
b. Dependent Variable: Distribution cost						

Table 4.14 Excluded variables of Cost regression analysis.

$$CV4 = 5.5 - 0.164CV1 + 1.328CV2 - 0.215CV3 + 1.314CV5 + 0.325CV6 - 1.216CV8 - 1.325CV9 - 1.90 CV10$$

..... Equation 4.5 Regression Equation of cost

Interpretation of the equation:

CV4 (Distribution cost) can be improved by one scale per unit of:

- ✓ CV1 (planning cost): if it is decreased by 0.164
- ✓ CV2 (sourcing cost): if it is increased by 1.328
- ✓ CV3 (Material landed cost): if it is decreased by 0.215
- ✓ CV5 (Order management cost): if it is increased by 1.314
- ✓ CV6 (Fulfillment cost): if it is increased by 0.325
- ✓ CV8 (Cost of goods sold): if it is decreased by 1.216
- ✓ CV9 (Transport cost): if it is decreased by 1.325
- ✓ CV10 (Warehouse cost): if it is decreased by 1.90

Here it is seen that the cost of return (CV7) has been excluded from computation of the regression formula for cost, because that cost comes after the completion of the distribution process, which the return cost will have no coefficient in the formal.

4.4.4.5 Asset management efficiency Regression analysis

Dependent variable: Material handling efficiency (AM5)

Independent variables: Cash to cash cycle time (AM1), Return on distribution fixed asset (AM2), Return on working capital (AM3), Facility utilization (AM4), Warehouse management system (AM6)

Equation of Regression:

$$AM5 = 4.724 + 1AM1 + 2AM2 + 3AM3 + 4AM4 + 5AM5 +$$

Model		coefficients				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
1	(Constant)	4.724	.360		13.126	.000
	Cash to cash cycle time	-.172	.113	-.174	-1.526	.131
	Return on distribution fixed asset	0.089	.153	0.132	.722	.472
	Return on working capital	.021	.074	.038	-.289	.774
	Facility utilization	.126	.104	0.205	1.220	.226
	Warehouse management system	.148	.085	0.276	1.745	.085
a. Dependent Variable: Material handling cost						

Table 4.15 Regression Coefficients of Asset management efficiency

$$AM5 = 4.724 - 0.174AM1 + 0.132AM2 + 0.038AM3 + 0.205AM4 + 0.276AM6$$

..... Equation 4.6 Regression Equation of Asset management efficiency

Interpretation of the equation:

AM5 (Material handling efficiency) can be improved by one scale per unit of:

- ✓ AM1 (Cash to cash cycle time): if decreased by 0.174
- ✓ AM2 (Return on distribution fixed asset): if it is increased by 0.132
- ✓ AM3 (Return on working capital): if it is increased by 0.038
- ✓ AM4 (Facility utilization): if it is increased by 0.205
- ✓ AM6 (Warehouse management system): if it is improved by 0.276

4.5 Inferential Analysis

From the semi-structure interviews with the supply chain department and regional sales managers of the company and managers of the agents, the researcher has understood that the performance measurement of the distribution network has been and is based on financial parameters (sales). This may help to understand the financial path the case company and the agents are going through financially, but its limitation is undermining the increases and widening of the market here in A.A and the ignoring the increased number of the competitors within the city. As Christopher (2000) states, it is not actually individual companies that compete with each other nowadays; rather, the competition is between rival supply chains. The companies nowadays compete to address their products to the end customers before the competitors do. This actually left for the distributing agents in the case company. While the company is increasing its annual production volume, the distribution of its products to the end users should have been increased. As Michael and McGrath (2000) describes, one of the three determinants to increase market share is to have a better distribution network. Measuring the performance of the distribution network should not only be determined by the financial parameters. According SCOR the performance measuring attributes for the downstream supply chain (Distribution network) are Reliability, Responsiveness, Agility, Cost, and Asset management efficiency. It is understood from the semi-structure interview that those performance measurement attributes has not been applied in the case company in a way to measure the performance of the distribution network. While not measuring the performance of the distribution network, the case company could not fully be competitive and improve its means of distribution. One of the basic objects of performance measurement is to improve the existing one.

On the earlier section of this research it has been attempted to show the correlation relationship of performance metrics in each attributes. Based on the correlation result the degree of relation has been determined. Based on RII the KPI metrics among each attribute has been selected to define it's the others on the regression formula. The KPI selected for each performance measurement attribute can defines the attribute and further

defines the performance of the distribution network itself. The performance of the distribution network later on defines the market share of the company.

Reliability of the distribution network lies on those five metrics (SCOR). These are percentage of orders delivered, delivery performance of to customer committed date, documentation accuracy, perfect condition and financial strength. Each is correlated to on another. There exist a strong correlation between Percentage of orders delivered and documentation accuracy. This tells us that for an attempt to improve the accuracy of documentation accuracy will bring a better and positive result in improving the percentage of orders delivered. Again documentation accuracy improvement will improve delivery performance to customer committed date. Delivering products to the customer on committed date will give competitive advantage to the case company over the others. Here in this performance attribute(Reliability) the KPI is perfect condition delivery; meaning that a product is assumed to be delivered perfect when the requirement documentation are fully fulfilled, when the agent di addressing or distributing the products to the outlets and end users on committed date and right quantity. From data collected and direct observation to in the outlets and retail shops within the territory of the agents it is understood that Reliability of the agents are moderate. Delivering on committed date and delivering the right amount of products ordered by the outlets are the basic problems of the agents, and this can be caused from the financial strength of the agents to purchase products from the case company and delivering it to the outlets and customers.

The Responsiveness of the agents is determined by the time it takes them to source products from the company, deploy it to their warehouse, and distribute to the sub major localized distributors and outlets. Here “Time” plays a great role. From the semi- structure interview from the regional sales managers, the researcher has understood that the timely efficiency of the agents in distributing the products to the outlets is the competitive parameter of their company with the other competitors.

On descriptive analysis the results supports that by making four type of : time based parameters” to fully understand where the time delay could arise and can be improved. The KPI here in responsiveness is source time. As the source time is improved the other deployment time and distribution time could be improved. The prolonged source time problem arises not from production inadequacy, but from the loading of products to vehicles and the narrow area of the loading docks with in the case company’s compound. Nevertheless, it is understood from the interviews with the distribution agent mangers that distribution time has been and is being hard to manage and improve with the widening of the city, crowded roads and newly deployed regulation restricting the hours of the movement of the distributing vehicles with in the city. Addressing each corner of the city with only the existing number of agents takes more time nowadays that few years back because the city has stretched and not all the outlets and end users can be addressed on daily basis. An outlet may not be reached on daily bases due to running out of time on daily basis in accordance to the newly deployed regulation.

The Agility of each distribution agents brings the agents to be in middle off the company and the outlets and end users. The healthy relation that each of the six main agents has with the case company and downward to the outlets and end users define the agility of the agents further will define the agility of BGI Ethiopia. The researcher has understood from an interview with the supply chain manger that the case company is flexible and adaptable to any form of request made by the agents is willing to address any changes made to orders, and distribution area accommodation. However, the agents have not been adaptable to the outlets and sub-major distributors. This is characterized by adjusting to the request of the agents to address more/less number of products to the outlets. It is clearly pointed out from the descriptive analysis of this research that the KPI of agility performance measurement attribute is “Adaptability with sub-major distributors and outlets”

Distribution network's adaptability) This is again seen as the maximum sustainable percentage increase/ decrease in quantity delivered that can be achieved in 30 days by the agents. Whenever the outlets are decreasing the orders due to many reasons, the agent's shows not addressing those outlets going and delivering to the better ordering outlets, which lead the first outlets shift to the competitor's product. The distribution network is said to be agile when it addresses all the outlets (even more) whether the orders are small or large.

Cost in general has been and is basic in distribution of products. The cost associated metrics set by SCOR has shown the cost related to the distribution of products. For the "cost" performance measurement attribute the KPI is distribution cost. From the interviews with the distribution managers of the agents the researcher has understood that the cost of distribution takes the lion's share of all the costs that they have to face, cost of personnel, and assets associated with responding to inquiries and quotes, order tracking and tracing and maintenance, scheduling transportation, order entry, delivery, installation invoicing are the costs associated with distribution cost. The distribution agents are expending these costs without any consideration from the case company. The price of the products sold are set by the company so the agents have to address these costs by distributing large volume of products to the end users, and so far the distribution cost has been the main cost that they have to deal with.

Last but not least of the performance measurement attribute is "Asset management efficiency". All the six distribution agents' managers were asked to evaluate their asset management system based on the evaluating metrics set by SCOR. The efficiency of the asset management system within the agents will reflect on the performance of the agents, and yet again on reflect on the distribution network preface of the company. All the managers have agreed that the efficiency can be improved by improving by improving the material (product) handling efficiency within their warehouse and deployment compound. The products are first deployed to the warehouse after receiving from the company. While unloading most uses human labor (except one), which that consumes time. And again upon loading it to each distributing vehicles human labor is used. From descriptive analysis it is

clearly understood that the **KPI** for this performance measurement attribute is Material handling efficiency, which stand in supports of the argument made by the mangers.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

As performance measurements are conducted to measure and improve the performance, no decision should not be made without one. Here in this research it has been attempted to evaluate the performance of the distribution network for the case company in addressing the market share gap between what it was few years ago and how it stands currently. The performance of the distributing agents reflects on the performance of BGI Ethiopia in distributing and hold its share in the market.

From the semi-structure interviews and distributed questionnaires, it was tried to figure out the main causes of the performance setback which has led the case company to lose its market share. The conclusions are listed below:

- ✓ Only financial parameter has been and yet still in use to measure and analyze the performance of the distribution network of the case company and agents.
- ✓ Most of the respondents (54.32%) are not aware of any other performance measurement tools other than financial parameters. Also 83.33% of the respondents are not aware of the aware of attaining strategic success by implanting measureable performance measurement criteria's other than financial indicators.
- ✓ The KPI selected for each performance attribute are the defining metrics for each attribute. They show positive and strong correlation with the other metrics in their respective attributes. Any improvement to be made on these KPI will improve the performance of the distributing network.
- ✓ The **reliability** of the distribution network is highly defined by its KPI, which is the perfect condition metric, which includes delivering of products to the customer on committed date and right orders with accuracy of documentation.

- ✓ It's agreed among all the managers of the distributing agents and regional sales managers of the case company that there exist a timely delivery of products problem being observed nowadays. In such cases outlets are forced to buy and source other products and shift to other competitor. Such distribution problem occurs mostly due to location and **responsiveness** problem.
- ✓ Distribution network adaptability with the outlets and sub major distributors is basic characteristics of the **agility** of the distribution network and yet its shows a setback in being adaptable to the request made by the outlets and sub-major distributors.
- ✓ Distribution cost on the distributing agents is being bottleneck for the agents that in takes most of their financial capabilities.
- ✓ Agreed by all (except one) the efficiency of material (product) management system within the compounds of the agents is being setback for the efficient distribution of products.
- ✓ From the interviews conducted with managers of the distribution agents, it was understood that BGI is in market share competition with others by only single brand, which is St, George beer, while the other competitors have provided a variety of products. That has made BGI to be only per freed for its single brand while the others are offering wide range of variety.

5.2 Recommendations

Based on the above conclusions drawn, some recommendations are proposed to address the problems mentioned in this research and improve the performance of the distribution network, which later will improve the market share of the case company.

- Other than financial parameters, performance measuring tools such as SCOR are recommended implemented to measure, analyze and improve the performance of the distribution network.
- ✓ There shall be adequate training available to managers and other related personnel's on attaining strategic success by implanting measureable performance measurement criteria's other than financial indicators.

- The responsiveness of the distribution network can be addressed by adding more distributing agents other than the existing six. As the city had stretched, more distributors should be given the responsibility of distributing the products. Not only that but also, the number of vehicles to distribute products owned by the agents shall be increased in order to beat the time curfew regulation and beat the competitors. More number of vehicles means addressing the outlets and each corner of the city on or ahead of time.
- In addressing the cost of distribution being very high for the distributing agent, a system by the case company needs to be implemented to assist them in financial means which can be returned as long time loan.
- Agents must be adaptable to the outlets and sub major distributors' request in adjusting to fluctuation orders and be able to work with and address all either high small amount order or large order request.
- In reference to the regression analysis made on each performance attributes, based on the set formula for each KPI, each KPI can be improved to bring about improvement of the performance of distributing network, which later will improve the market share of the case company.
- Even though it's beyond the concept of performance measurement of distribution network, the case company should have a variety of products that are consistently produced. This will widen the preferences of BGI products in comparison with the competitors.

5.3 Proposed Improvement Model

Based on the drawn conclusion and offered recommendation the performance of the distribution network of the case company need to be improved. To improve the performance and raise the market share the following improvement framework has is suggested by the researcher

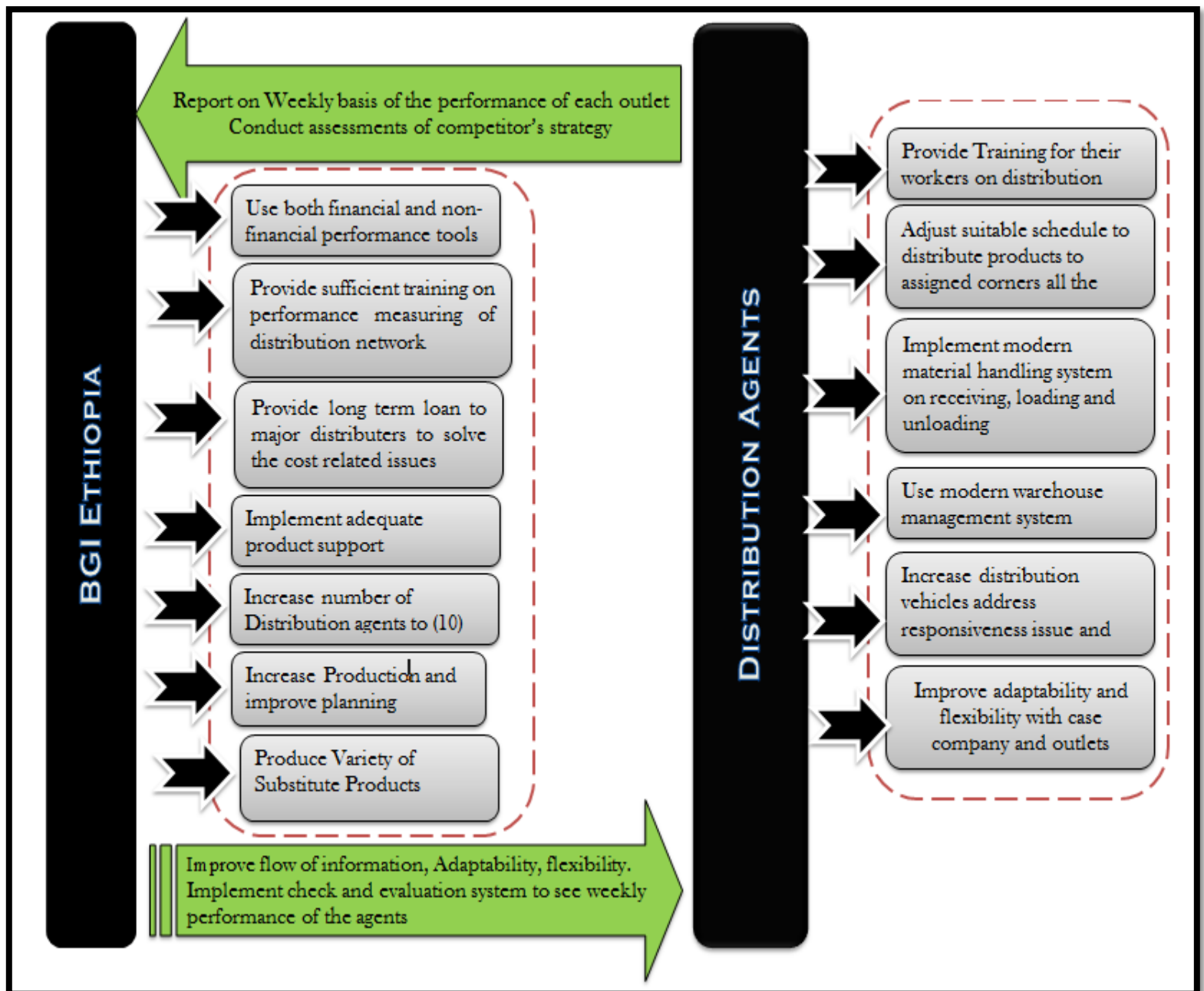


Figure 5.1: Proposed improved product Distribution network in Addis Ababa

The above diagram shows the improvement model that ought to be implemented by the case company to improve the performance of the distribution which later bring an improvement in its market share. The improvement of flow of information aided by information technology will bring the adaptability of the distribution network to improve and the collaboration between the case company and the distribution agents to a better stage. The increased number of distribution agents will itself will bring an improvement in the performance if the distribution network.

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Annex



ADDIS ABABA UNIVERSITY
ADDIS ABABA INSTITUTE OF TECHNOLOGY
SCHOOL OF MECHANICAL AND INDUSTRIAL ENGINEERING
POST GRADUATE PROGRAMME IN INDUSTRIAL ENGINEERING

TITLE: **DISTRIBUTION NETWORK PERFORMANCE MEASUREMENT AND
IMPROVEMENT
(CASE STUDY ON B.G.I ETHIOPIA)**

Acknowledgement to the respondent

We are very much proud to express my gratitude for your dedicated cooperation by company and the staff for the willingness and cooperation in undertaking this valuable research. We ask your kind cooperation in answering the questions as truthfully as possible. Had it not been your genuine cooperation of filling this questionnaire, it would have not been possible to conduct this thesis.

This questionnaire is developed to conduct a scientific research on Performance measurement and Improvement of distribution network performance measurements (Case study on B.G.I Ethiopia). The main purpose of the study is to measure and evaluate the existing distribution network Framework, identify strong and weak points of the existing Supply chain framework and indicate improvement measures. By identifying performance measurement indicators (metrics) in the supply chain that companies should know the exact gap what and how to measure their performances. Hence companies should improve their competitiveness.

The information gained from the survey will definitely useful for the success of study as well as for the sub sector. We would also like to assure you that all responses given will be treated as **STRICTLY CONFIDENTIAL!!** And used for academic purposes only. If you need further clarification, please feel free to contact through the address Yours Sincerely,

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I. Preliminary Information

A. Respondent profile

1. Your current position in the company.....
2. Qualification level: College diploma B.A/Bsc MA/Msc & Above
3. Your work experience in this company: Below 2 years 2-5 years
5-10 years above 10 years

Section I: Concept and Interpretations of Supply Chain Performance measurement in the Company.

Please rate on the scale 1 to 5 with the following questions which are related to awareness of Supply Chain performance measurement systems. Please tick 'X' or '✓' mark in the corresponding cell.

(Score of 1 = strongly disagree; 2= disagree 3=Neutral; 4=Agree; 5=strongly agree).

Q		1	2	3	4	5
1.1	Managers have adequate understanding and knowledge on how the distribution network performances are measured for the company.					
1.2	Your company believes competitiveness can be achieved through development of performance measurement in the supply chain.					
1.3	Availability of Trainings about distribution performance measurement is sufficient in your company.					
1.4	Management's concern on company's strategy and measurable criteria for strategic success.					
1.5	There are sufficient indicators used in the company to measure the performance in the distribution network.					
1.6	Your company uses financial and non-financial indicators to measures the performance in the supply chain.					
1.7	Performance measurement is important in the distribution network of your company.					
1.8	The importance of performance measurement/evaluation for decision making in your company.					
1.9	Your company use performance evaluation reports to identify areas that need strategic focus.					

Section II: A. to what extent do you evaluate your organization on the following major performance attributes and performance measures indicator, please tick (X) mark on space given in a table. (Score of 5 = perfectly fulfilled, 4 = Very Good, 3 = moderately fulfilled, 2 = fairly fulfilled, & 1= Not fulfilled).

Performance metrics (Metrics decomposition)						
1. Reliability						
1.1	Perfect order fulfillment	1	2	3	4	5
1.1.1	Percentage of orders delivered					
1.1.2	Delivery performance to customer commit date					
1.1.3	Documentation accuracy					
1.1.4	Perfect condition					
1.2	Financial strength					

2. Responsiveness

I. How much time is needed to **source** the product from the company (BGI)?

Less than a 1 day

1 to 2 days

2 to 3 days

3 to 5 days

5 to 7 days

II. How much time is needed after receiving the product till distributing ?

Less than a 1 hr.

1 to 2 hrs.

2 to 3 hrs.

3 to 4 hrs.

4 to 5 hrs.

III. How much is needed to **deliver** requested volume of products to sub major localized distributors?

Less than a 1 hr.

1 to 2 hrs.

2 to 3 hrs.

3 to 4 hrs.

4 to 5 hrs.

IV. How much time is needed by the localized sub major distributors to **deliver to retail** shop?

Less than a 1 hr.

1 to 2 hrs.

2 to 3 hrs.

3 to 4 hrs.

4 to 5 hrs.

Section II: B. to what extent do you evaluate your organization on the following major **performance attributes and performance measures indicator**, please tick (X) mark on space given in a table. (Score of 5 = Extremely flexible/ adaptable, 4 = Very Good, 3 = moderately flexible/ adaptable, 2 = fairly flexible/ adaptable, & 1= poorly flexible/adaptable).

		Performance metrics (Metrics decomposition)				
3. Agility		1	2	3	4	5
3.1	supply chain flexibility with BGI					
3.2	supply chain adaptability with BGI					
3.3	supply chain adaptability with sub major Distributors					
3.4	Overall value at risk					
3.5	Transport flexibility					

Section II: C. to what extent do you evaluate your organization on the following major **performance attributes and performance measures indicator**, please tick (X) mark on space given in a table. (Score of 5 = extremely expensive/ adaptable, 4 = fairly expensive, 3 = moderately costs, 2 = fairly cheap, & 1 extremely cheap).

		4. Cost				
4.1	Total cost to serve	1	2	3	4	5
4.1.1	Planning cost					
4.1.2	Sourcing cost					
4.1.3	Material landed cost					
4.1.4	Distribution cost					
4.1.5	Order management cost					
4.1.6	Fulfillment cost					

4.1.7	Return cost					
4.1.8	Cost of Goods sold					
4.1.9	Transport cost					
4.1.10	Warehouse cost					

Section II: D. to what extent do you evaluate your organization on the following major performance attributes and performance measures indicator, please tick (X) mark on space given in a table. (Score of 5 = highly efficient, 4 = fairly efficient, 3 = moderately efficient, 2 = fairly inefficient, & 1= poorly inefficient.

5. Assets management efficiency						
		1	2	3	4	5
5.1	Cash to cash cycle time					
5.2	Return on supply chain fixed asset					
5.3	Return on working capital					
5.4	Facility utilization					
5.5	Material handling efficiency					
5.6	Warehouse management system					

If you have any other suggestion and recommendation to how the performance of the distributors can be measured and enhanced, please feel free to discuss it here under:

Thank you.

Key words

N.B: In order to understand the questionnaires easily some common terms are defined;

Supply chain management is the movement of materials as they flow from their source to the end customer. It includes purchasing, manufacturing, warehousing, transportation, customer service; demand planning, supply planning and supply chain management.

Performance measurement: The process of quantifying the efficiency and effectiveness of action.

Supply chain performance measurement The process of quantifying the efficiency and effectiveness of the supply chain.

Performance measurement indicator: Is a set of metrics used to quantify both the efficiency and effectiveness of actions.

- **Perfect Order Fulfillment:** The percentage of orders meeting delivery performance with complete and accurate documentation and no delivery damage.
- **%of orders delivered:** Percentage of orders which all of the items are received by customer in the quantities committed.
- **Delivery performance to customer commit date:** The percentage of orders that are fulfilled on the customer's originally committed date.
- **Documentation accuracy :** Percentage of orders with on time and accurate documentation supporting the order, including packing slips, bills of lading, invoices, Quality certification, Government or Customs documentation / forms, etc.

Perfect condition: Percentage of orders delivered in an undamaged state that meet specification, have the correct configuration, are faultlessly installed (as applicable) and accepted by the customer

Order fulfillment cycle time: the average actual cycle time consistently achieved to fulfill customer orders. For each individual order this cycle time starts from the order receipt and ends with customer acceptance on the order.

- **Source cycle time:** the average time associated with source processes.
- **Make cycle time:** average time associated with make processes.
- **Deliver cycle time:** average time associated with delivering processes
- **Deliver retail cycle time:** the average cycle time of the process used to acquire, merchandise, and sell finished goods at a retail store.

- **Distribution flexibility:** The number of days required to achieve an unplanned sustainable 20% increase in quantities delivered
- **Distribution adaptability:** The maximum sustainable percentage increase in quantity delivered that can be achieved in 30 days
- **Distribution adaptability:** The reduction in quantities ordered sustainable at 30 days prior to delivery with no inventory or cost penalties
- **Overall value at risk:** the sum of the probability of risk events times the monetary impact of the events which can impact any core supply chain functions
- **Transport flexibility:** flexibilities in using different transportation vehicles to transport products to dealers (sub major distributors) and to/from the company enforced by the company, BGI.
- **Planning cost:** total cost of personnel, automation, assets and overheads associated with planning the supply chain.
- **Sourcing cost:** cost associated with managing the orders, receiving, inspecting and warehouse, products, merchandise and services
- **Material landed efficiency :** cost of purchased materials, transport cost, material customs duties taxes and tariff costs, compliance costs
- **Distribution cost:** the total cost associated with managing and performing distribution process, scheduling distribution activities, picking products, direct labor cost
- **Order management cost:** cost of personnel,, automation, and asset associated with responding to inquiries and quotes, order tracking and tracing and maintenance, scheduling transportation, order entry, delivery, installation invoicing
- **Fulfillment cost:** cost of physically handling of products, such as storage, picking, packaging and distribution to the requested spot, fulfillment of custom duties.
- **Return cost:** cost of disposition of product returned due to planning error, product quality, and order management delivery error, discount and refund costs.
- **Cost of Goods sold:** cost of direct material such as cost to purchase the initial number of caters to qualify as major distributors.

- **Transport cost:** cost of fuel consumption in transportation of distributing of products.
- **Warehouse cost:** cost of rental warehouse or purchase cost of warehouse if it is owed by the distributor.
- **Cash to cash cycle time:** The time it takes for an investment made to flow back into a company after it has been spent for purchase of products to distribute
- **Return on Distribution fixed asset:** Return on Supply Chain Fixed Assets measures the return an organization receives on its invested capital in supply chain fixed assets.
- **Return on working capital:** Return on working capital is a measurement which assesses the magnitude of investment relative to a company's working capital position versus the revenue generated from a supply chain.
- **Facility utilization:** utilization of all the resource and materials that exist in the best outcome of the performance of the company
- **Warehouse management system:** efficiency of the systems used in the warehouse for the best delivering of the product to be distributed.