



ADDIS ABABA UNIVERSITY  
SCHOOL OF BUSINESS AND ECONOMICS  
DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

MEASURING SUPPLY CHAIN PERFORMANCE USING BSC MODEL:  
THE CASE OF CADILA PHARMACEUTICAL PLC

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By

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in Partial Fulfillment of the Requirements for the Degree of Masters of Art in  
Logistics and Supply Chain Management

Advisor

Matiwos Ensermu (PhD)

Addis Ababa, Ethiopia

JUNE, 2018

## **Declaration**

I, the under signed, declare that this thesis entitled “*Measuring Supply chain Performance Using BSC Model in the Case of Cadila Pharmaceuticals*”, is my original work and to the best of my knowledge has not been presented for a degree by any other person, and that all the sources of material used for the thesis have been duly acknowledged.

Declared by:

**Yenesew Shambel**

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Date & Signature

## **Statement of Certification**

This is to certify that the thesis carried out by **Yenesew Shambel** on the topic entitled “*Measuring Supply chain Performance Using BSC Model in the Case of Cadila Pharmaceuticals*”, is his original work and is suitable for submission for the award of Masters of Art Degree in Logistics and Supply Chain Management.

**Advisor**

**Matiwos Ensermu (PhD)**

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Date & Signature

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DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

This is to certify that the thesis carried out by **Yenesew Shambel** on the topic entitled “*Measuring Supply chain Performance Using BSC Model in the Case of Cadila Pharmaceuticals*”, and submitted in partial fulfillment of the requirements of the Degree of Master of Art in Logistics and Supply Chain Management complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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## **Acronyms:**

API	Active pharmaceutical ingredients
BSC	Balanced score card
DRP:	Distribution Requirements Planning
EDI:	Electronically Data Interchange
ERP:	Enterprise Resource Planning
EU	European Union
GM	General Manager
GMP	Good manufacturing practice
PFSA	Pharmaceuticals fund and supply agency
PLC	Private limited company
SCPM:	Supply chain performance measurement
SC:	Supply Chain
SCM	Supply chain management
WHO	World health organization

## Abstract

*The study sought to determine the Balanced Scorecard measures on supply chain performance at Cadilla Pharmaceutical PLC. The objectives of the study were to establish the extent to which the BSC measures have been used at Cadilla Pharmaceutical in measuring their supply chain performance and to validate the result using customer/distributors survey. The research design involved were descriptive and inferential explanatory design, supported by thematic analysis. Data were collected from 125 Cadilla employees using a questionnaire and interview guide that were administered to employees and conducted by researcher. Tables were used to present data. Descriptive statistics like mean and standard deviation were used to analyze demographic and each constructs under investigation, whereas inferential statistics like regression analysis were used to measure the relationship between independent (BSC measures) and dependent (supply chain performance). The result of the study established that the BSC measures are greatly used to establish the supply chain performance at Cadilla Pharmaceuticals. Customer measures ( $b=0.371$ ) has the most positive influential effect on supply chain performance, followed by , innovation, learning and growth, financial measures and internal business measures ( $b = 0.325$ ,  $b = 0.292$ , and  $b = 0.245$ ) respectively at  $p$  value  $<0.001$ . It was also found that there is a significant relationship between BSC measures and supply chain performance represented by  $R^2$  value of 0.811 which translates to 81.1% variance explained by the four independent variables of financial measures, customer satisfaction, internal business processes, learning and growth. The overall supply chain performance of Cadilla pharmaceutical from distributors perspective is moderate performance. But, in contrast to this there are problems related to product availability, on time delivery, communication systems, flexibility, after sale service and customer satisfaction survey from customer perspective. Therefore from the result it can be concluded that BSC measures at Cadilla pharmaceuticals is strongly affecting their supply chain performance. It was also recommended that the company should keep using BSC as performance measurements as holistic performance perspective in such a way that they can solve problems raised by distributors. Finally, based on the limitation of this study, further research can be done on a wider group of companies to establish whether the BSC measures are better in measuring Supply chain performance in pharmaceutical industry*

**Key words: balances score card, supply chain performance**



# Chapter One: Introduction

## 1.1. Background of the Study

SCM is generally considered to involve integration, coordination and collaboration across organizations and throughout the supply chain (Stank, M., Moonen, H., Popova, V. & Krauth, E., (2001). Naylor (1999) defines supply chain as following (Naylor, 1999): A supply chain is a system whose constituent parts include material suppliers, production facilities, distribution services and customers linked together via a feed forward flow of materials and feedback flow of information. As noted by Vander Vorst (2006), it is imperative to analyze supply chain within the context of the full complexity of their network structure & product type.

The pharmaceutical industry can be defined as a complex of processes, operations and organizations involved in the discovery, development and manufacture of drugs and medications. The World Health Organization (WHO) defines a drug or pharmaceutical preparation as: any substance or mixture of substances manufactured, sold, offered for sale or represented for use in the diagnosis, treatment, mitigation or prevention of disease, (Shah , 2004).

Pharmaceutical production occurs at three levels, primary, secondary and tertiary. The primary level includes the manufacture of active pharmaceutical ingredients and intermediates from basic chemical and biological substances. Secondary production includes the production of finished dosage forms from raw materials and excipients. The tertiary level is limited to packaging and labeling of finished products or repackaging of bulk finished products (WHO, 2005). The company under study produces the Secondary pharmaceutical products by sourcing the primary raw materials (API and Excipients) mostly from China and India. Therefore the performance of the company throughout the whole supply chain is very imperative to study.

The fundamental success of supply chain management involves the effective coordination and integration of all the entities among the various supply chain partners for example, suppliers, distributors, inbound and outbound transportation, third-party logistics companies, and information systems providers (Lenin , 2014).

Due to the rapid advancement in medical technology and life sciences market, health care supply chain is under severe pressure. Healthcare supply chain management differs from other

application in term of key elements as it tends to be misalignment, high costs for healthcare providers and heavy dependence on third party. There are multitudes of factors to be considered so as to ensure on-time delivery, protection and product integrity from origin to destination. (Lenin, 2014).

As one of these factors, supply chain performance creates value for companies, customers and stakeholders whom interacting throughout the supply chain (Estampea D., Lamouri S., Paris J. and Brahim S., 2013). In today's complex and changing business environment, enterprises must carefully develop their business strategies to gain a competitive advantage over the long term. Therefore, how to plan and formulate strategies for enterprises plays a decisive role (Chih C., Li-Chung, Chih , and Shi, (2016). One of these ways to plan and formulate strategies for enterprises is balanced scorecard (BSC) approach.

BSC concept reflects intent to keep score of a set of items that maintain a balance “between short term and long term objectives, between financial and non-financial measures, between lagging and leading indicators, and between internal and external performance perspectives (Kaplan and Norton et al 2000). These indicators are very important for the competitiveness of a company; in fact, they allow managers to consider all measures of performance and to assess whether it is possible to achieve improvement in a specific area, without affecting the performance of other areas (Wu and Chang, 2012, Paddeu,. 2016).

The importance of the balanced scorecard approach for SCPM is beyond discussion. Yan H., and Yang , (2013) stated that Balanced Scorecard not only helps organizations in faster and wider progress monitoring of their operations but can also help them in improving their internal and external functions of business such as engineering and design applications, production, quality improvement, materials management, quick response, gaining lost market shares, proper implementation of business strategies. Therefore, it is clear that for effective supply chain management, measurement goals must consider the overall scenario and the metrics to be used.

## **1.2. Background Of The Organization**

Cadila Pharmaceuticals (Ethiopia) PLC is a Joint Venture Company between Cadila Pharmaceutical Limited, India and Almeta Impex PLC, Ethiopia, established to Manufacture Tablets, Capsules & Liquids with a state of the art facilities at Gelan town, near Addis Ababa. The aforesaid Plant is one of the best manufacturing facilities in Ethiopia and the first Pharmaceutical Formulation Manufacturing Plant of the country recognized as per EU guide lines, to comply with the WHO led regulatory requirements of Good Manufacturing Practice (GMP).

From the start of its Commercial Production in March 2008, the Company has already sold more than ETB 1 Billion worth of Medicines. Cadila-Ethiopia mainly aims to focus on therapeutic areas such as Cardiovascular, Diabetology (Anti Diabetics), Gastroenterology (Antacids, Anti-ulcerative), Infectious Diseases (Anti Infective/Antibiotics), Psychiatry (Anti-Depressants) Nutritional (Haematinic, Vitamins), Pain Management (Anti Pyretic/Analgesic/ Anti Inflammatory), Respiratory, Malaria, Tuberculosis etc.

After 7 years of operation, the company also decided for Expansion of Pharmaceutical Manufacturing for which it took 17,390 square meters of land, with this, the production capacity will increase to above ETB 1 Billion per annum within 2016.

The company supplies all of its finished Products to the local market using both private; Baker pharmaceuticals, Pharma birbir, bonafed, and state- owned intermediaries (Pharmaceutical Fund and Supply Agency, PFSA).

## **1.3. Statement of the Problem**

Supply chain Performance measurements are becoming more and more important when SCM is coming into focus. Measuring supply chain performance helps an organization to Identify success, to identify whether the organization understand its processes, to Identify whether the company is meeting customer requirements, to Identify bottlenecks and where improvements are necessary, to ensure decisions are based on facts, to show if planned improvements actually happened. Lacking a general understanding of supply chain performance and the associated causal factors limits organizations ability to identify the best opportunities for improving supply

chain performance (Susarla & Karimi, 2012). When it comes to pharmaceutical products, one challenge in managing fresh produce and perishable pharmaceutical products is that product value deteriorates with time in supply chain at rates that are highly temperature and humidity dependent (Vander . 2006).

The pharmaceutical supply chain is complex, and involves many organizations that play differing roles. In Supply chain performance measurement the main purpose is to get information for top management's needs, but also several kinds of Supply Chain measures are needed at every management and operational level. SC should be measured because of management interest in measuring how efficient SC is. Gunasekaran *et al.* (2004) introduce six metrics for measuring SCM capability and performance. Metrics are based on the following SCM processes: plan, source, make/assemble and delivery/customer (Gunasekaran *et al.* 2004).

Shepherd and Günter (2006) categorize SC performance measures into five SC processes: plan, source, make, deliver and return or customer satisfaction, whether they measure cost, time, quality, flexibility and innovativeness and whether they are quantitative or qualitative measures. Measures can be categorized according to business processes or into strategic, operational and tactical management levels (Shepherd & Gunter 2006).

Measuring supply chain performance is not as such simple as traditionally known sets of performance measurement only focuses on financial measures (Sutton and kellow, 2010). The BSC model developed by (Kaplan and Norton, 1992) is designed to complement these financial measures of past performance with their measures of drivers of future performance, which put performance in comprehensive balanced view.

The BSC has been applied successfully in different organizations and many thriving applications have been documented. A range of benefits have been attributed to the BSC in supply chain management, including reduced costs, increased market share and sales, and solid customer relations (Fergueson, 2000). Nevertheless, many companies have not succeeded in maximizing their supply chain's potential because they have often failed to develop the performance measures needed to fully integrate their supply chain to maximize effectiveness and efficiency (Gunasekaran, McGaughey, Patel & Ronald, 2004). Cadila pharmaceutical is one of these companies that are yet to maximize its supply chain performance.

Chia,., Goh,. & Hum. (2009) tested the perception of senior supply chain managers on measurement using a balanced scorecard (BSC) model. These findings clearly indicate that despite the increased awareness of the need for a balanced approach as an alternative measure of performance, firms are still dependent on existing traditional financial tools.

Chia et al. (2009) found that the measurement of supply chain performance could be improved by using a more balanced approach as provided for by the BSC framework. The integration of the measures allows management to assess the overall competitiveness of the entire supply chain and determine internal variables that need improvement.

The pharmaceutical industry is not renowned for its supply chain management capabilities, unlike many other highly publicized industries that have profitably exploited their supply chains. Almost all local manufacturing of medicine in Ethiopia is limited to secondary manufacturing that involves combining various active ingredients and processing bulk medicines into dosage forms. This exposes the firms to a high level of foreign exchange risk and long lead-times for raw materials. Most pharmaceutical manufacturers have a low level of capacity compared with their foreign counterparts that leads to the company not to achieving economies of scale. This lead to low level production capacity and high production costs (Sutton and Kellow, 2010). Thus to overcome this problem measuring the pharmaceutical company's' whole chain effectiveness is needed.

Effective supply chain performance can be improved by having a blend of financial and non-financial measures (Gautreau & Kleiner, 2001) and the BSC framework measures up to those requirements. Therefore, measuring supply chain performance of Cadila Pharmaceutical from the balanced view of customers, financial, internal business, and learning and growth can reduce costs, increase market share and sales, and create solid customers relations.

There has been literature on the balanced scorecard in various service industries such as telecommunications where the BSC is used in performance measurement (Nyaega, 2006), BSC in healthcare organizations (Gurd & Gao, 2007) and hospitality industries (Denton & White, 2000), in manufacturing industries (Yan . and Hua . 2013; Ashioya 2013; Sillanpa I .2010) and etc. But, the literature did not cover the BSC in processing industries and specifically the pharmaceutical industry.

This study will address this gap by applying a BSC model for measuring supply chain performance based on empirical data integrating several statistical approaches. This study will also identify several opportunities for additional research on pharmaceutical supply chain performance measurement.

## **1.4. Objective/Aim of the Study**

### **1.4.1. General Objective**

The main objective of this study was to measure the supply chain performance of Cadilla pharmaceutical Limited from BSC approach and to validate the result using distributors/customer survey.

### **1.4.2. Specific Objectives**

The specific objectives of the study were:

- ✓ To measure the performance the company's Supply chain from financial perspective
- ✓ To measure the performance the company's Supply chain from customer perspective
- ✓ To measure the performance the company's Supply chain from internal business growth perspective
- ✓ To measure the performance the company's Supply chain from Innovation, learning and growth perspective
- ✓ To validate the result of supply chain BSC measures using external customer survey

### **1.4.2. Hypothesis of the Study**

In order to achieve the above specific research questions the following hypothesis has been hypothesized for literature review:

**H<sub>1</sub>:** The Firm commitment for strong financial capability will have strong supply chain performance.

**H<sub>2</sub>:** The Firm commitment for strong customer management will have strong supply chain performance.

**H<sub>3</sub>:** The Firm commitment for strong internal process will have strong supply chain performance.

**H<sub>4</sub>:** The Firm commitment for strong ability to innovate, improve and learn will have strong supply chain performance.

### **1.5. Significance of the Study**

The intention of the study is to measure the performance of the SCM in the pharmaceutical manufacturing companies of Ethiopia in general and Cadilla pharmaceutical company in particular. The effective implementation of the SCM by such companies produces core competencies so that they can compete with the importing companies. Therefore, the study has practical significance to assess the practice of the SCM as well as the challenges faced in it. Moreover the study can help the company to make some changes based on the result of this study and to understand how those performance indicators affects supply chain performance and it can also help to provide for researchers, academics and students reliable data about supply chain performance measurement of pharmaceutical industry.

### **1.6. Scope of the Study**

The objective of this study was to empirically measure the supply chain performance of Cadilla Pharmaceutical limited from BSC approach to addresses the performance from customer, financial perspectives, and internal business process and, learning and growth perspective. To this end, the scope of this study was delimited to the theoretical explanations of the phenomenon of BSC in measuring SCP of pharmaceutical company. Methodologically, this study was delimited to mixed design (descriptive and regression analysis) for quantitative and thematic analysis for qualitative. Empirically, the study was delimited to both qualitative and quantitative data collected from interview and the distributed questionnaires. The study also included the view of end customers (distributors). And geographically this study was delimited to Cadilla pharmaceutical limited, Addis Ababa, Ethiopia.

## 1.7. Operational Definitions

- **Financial:** profit Margin, Cash Flow, Revenue growth, and return on investment. (Brewer & Speh, 2000).
- **Innovation, Learning and Growth:** These measures focus on the inter-organizational innovation and learning. (Brewer & Speh, 2000).
- **Internal Business Process:** Waste reduction, Time compression, Flexible response, and Unit cost reduction. (Brewer & Speh, 2000).
- **Customer Satisfaction:** measure and monitor improvement of customer service of a supply chain over a certain time period. (Brewer & Speh, 2000).

## 1.8. Organization of the study

This study is organized in to five chapters. Chapter one presents the introductory part of the study, which comprises the back ground of the study, statement of the problem along with the research questions and objectives of the proposed study.

Chapter two deals with the review of the literature related to the topics; and, Chapter three gives detail account of the design and methodological aspects.

The analysis of the study data, presentation of the results and corresponding discussions are comprised under chapter four.

Chapter five finalizes the thesis by providing brief conclusions and relevant suggestions on the basis of the findings of the study.

## Chapter Two: Literature Review

### 2.1. Theoretical Literature Review

#### 2.1.1. Supply Chain Concept

With the rapid development of economic globalization, knowledge-based, information technology, the competition between enterprises is not a single enterprise in a certain time, a certain space, the competition for certain end markets, customer one-on-one competition, but become a kind of competition based on product development, design, manufacturing, distribution, distribution, sales and service competition across time and space, has been developed into a competition between the supply chain management (Yan , and Yang , 2013).

Hasan , Zulkifli , Malak , Nizaroyani , (2016), views supply chain management as a process of associating several business entities consisting of suppliers, manufacturers, distributors, retailers and customers. These integrated entities are important in managing the flow of resources such as material flows (products, servicing, recycling), information flows (order transmission, tracking, and coordination of physical flows), and financial flows (credit terms, payment schedules, and consignment arrangements). As supply chains compete against supply chains, it is vital that they are managed effectively so as to enhance their performance.

Supporting this Machado , (2013) defined that; supply chain management is the model being used increasingly in the business world, leading organizations necessities in rethinking their strategies. He continued to add that, improvement on the proceedings involved in the network links of supplies has the synergetic effect on global network performance.

Moreover, supply chain management creates value for companies, customers and stakeholders whom interacting throughout the supply chain (Estampea D., et al 2013). In today's complex and changing business environment, enterprises must carefully develop their business strategies to gain a competitive advantage over the long term. Therefore, how to plan and formulate strategies for enterprises plays a decisive role (Chih C., et al (2016).

Pharmaceutical supply chain is a network of supplier, manufacturing, distribution and logistics facilities of various pharmaceutical products. The pharmaceutical industry can be defined as a complex of processes, operations and organizations involved in the discovery, development and

manufacture of drugs and medications. The World Health Organization (WHO) defines a drug or pharmaceutical preparation as: any substance or mixture of substances manufactured, sold, offered for sale or represented for use in the diagnosis, treatment, mitigation or prevention of disease.

### **2.1.2. *Balanced Scorecard (BSC)***

Kaplan and Norton (1992) have proposed the Balanced Scorecard, with the purpose to evaluate organization's performance. The organization's mission and strategy are interpreted by the BSC, into a comprehensive set of performance measures which provide the framework for a strategic measurement and management system based on four balanced different perspectives, customer perspective, financial perspective, internal process improvement, and organizational learning perspective (Kaplan & Norton, 1996).

Their Balanced Scorecard is designed to complement "financial measures of past performance with their measures of the drivers of future performance". The name of their concept reflects an intention to keep score of a set of items that maintain a balance "between short and long term objectives, between financial and non-financial measures, between lagging and leading indicators, and between internal and external performance perspectives (Yan H., and Yang Z., 2013). These indicators are very important for the competitiveness of a company; in fact, they allow managers to consider all measures of performance and to assess whether it is possible to achieve improvement in a specific area, without affecting the performance of other areas (Wu and Chang, 2012, Paddeu, .2016).

Moreover, the BSC is used in order to support businesses into new strategies, decrease the cost and employ growth opportunities based on more customized, value-adding products and services (Bhagwat & Sharma, 2007)

Yan , and Yang, (2013) stated that Balanced Scorecard not only helps organizations in faster and wider progress monitoring of their operations but can also help them in improving their internal and external functions of business such as engineering and design applications, production, quality improvement, materials management, quick response, gaining lost market shares, proper implementation of business strategies. Therefore, it is clear that for effective supply chain management, measurement goals must consider the overall scenario and the metrics to be used.

These should represent a balanced approach and should be classified at strategic, tactical, and operational levels, and be financial and non-financial measures, as well.

Brewer and Speh (2000) state that the companies which will be competitive in the future are distinguished by the ability to effectively coordinate their processes, focus on delivering customer value, eliminate unnecessary costs of key functional areas and create a performance measurement system that provides data on whether the supply chain is meeting the expectations or not. The actual danger is that companies talk about the importance of supply chain concepts but continue to evaluate their performance with performance measurement systems that are either only slightly affecting or completely not affecting supply chain improvements.

## **2.2. Empirical Review on BSC and supply chain management**

### **2.2.1. Financial Perspective and Supply Chain Management**

The financial performance measures specify whether the company's strategy, implementation and execution plan are effectively contributing to the bottom line improvement of a firm. Financial goals take into account how to achieve “profitability, maintain liquidity and solvency both in short and long term, growth in sales turnover and maximize wealth of shareholders. The financial goals have as a purpose the survival, success and prosperity of the company. Survival is measured by cash flow, success by growth in sales and operating income and prosperity by increased market share and return on equity and capital employed” (Bhagwat & Sharma, 2007).

From the financial side, the Balanced Scorecard not only assess the traditional enterprise financial ratios, return on investment, cash flow, profit and other indicators, but also concerned about the financial condition of the entire supply chain indicators. Financial performance measurement method to reveal the overall strategy of the alliance and its implementation and enforcement are to contribute to the improvement of the supply chain (Yan , and Yang , 2013). Supporting this, the study by Ashioya , (2013) shows that fulfilling customers’ needs and supply chain partners ensures financial success as the overall aim is improving the financial capability of the whole supply chain entities.

A study conducted by Brewer & Speh, (2000) that aim to validate the correlation between supply chain integration and business success shows best practice SCM companies have a 45% total

supply chain cost advantage over their competitors. They revealed that better services leads to increased revenue growth and companies participating in information technology's for Integrated Supply Chain Management program reported a 17% revenue increase due to better SCM initiatives.

According Alazab et al., 2010, profit-ability is the key to a firm's ability to remain a viable entity and satisfy its shareholders. It is therefore important to inform consumers of how the firm is doing year after year and actions taken as a way of reflecting financial performance of organizations.

For most businesses, it is nothing more than the pursuit of revenue growth, increasing productivity, cost reduction, financial risk management, and other issues Tseng, M.; Lim, M.; Wong, W.P. (2015).

Cost structure can be measured through cash to cash cycle to know how long it takes to transform cash in assets such as equipments and inventories to cash collected from a customer. Return on investment measures the performance that the top management can achieve on the total capital invested in business. Measuring return on investment enables an organization to have insights about the financial health of the supply chain (Bhagwat & Shamar, 2007).

From the above discussion it can be hypothesized that:

***H<sub>1</sub>: The Firm commitment for strong financial capability will have strong supply chain performance.***

### **2.2.2. Customer and Supply Chain Performance**

In the customer perspective performance measures are aimed to create tangible results for its customers. One of the changes in business practices dictated by the transition from the industrial age to the information age is the shift of enterprises from being production- and product-focused to being customer-focused (Arik, 2006).

The customer performance measures should answer the question of how do customers see the business. The management must translate the general mission statement on customer service into specific measures that reflect the factors that really matter the customers. The customers are

concerned for the lead-time, the quality of products and services, the company's performance service and the cost effectiveness (Bhagwat & Sharma, 2007)

The customer perspective can be categorized into market share, customer acquisition, customer retention, customer satisfaction, and customer profitability. Companies must amend the target based on the customers who will generate the most expected profit and the greatest potential for revenue growth (Chih., et al 2016; Fabio, et al., 2015).

Supply chain Balanced Scorecard is more concerned about the performance of the supply chain in the level of customers and market segments, and clarify how to meet customer needs in order to effectively achieve the financial goals of the entire dynamic alliance. Customer value based on customer perception and therefore requires an assessment of the origin on the customer, including the level of service and customer satisfaction Yan , and Yang , (2013).

On the other hand, one of the main objectives of supply chain management is to meet customer needs. Low performance under this category is a significant indicator of decline in future, even though the present financial situation might appear good (Hasan B., et al 2016)

As studied by Brewer & Speh, (2000), product leadership objective can be achieved through measures such as good product quality and flexibility of products by providing a range of products that the customer wants. The different demands, desires and idiosyncrasies of customers all along the supply chain must be understood and managed effectively for companies to score better supply chain performance.

A study by Gunasekaran et al., (2001), stated that good customer relationship can be achieved through measures such as timely delivery of products, customer response time and order lead time. And a reduction in the order lead time leads to a reduction in the customer response time hence an efficient supply chain.

From the above discussion it can be hypothesized that:

***H<sub>2</sub>: The Firm commitment for strong customer management will have strong supply chain performance.***

### **2.2.3. Internal Business Process and Supply Chain Management**

The objective of this perspective is to satisfy shareholders and customers through excelling in internal processes. Metrics under this perspective assist managers to be aware of the performance of business, and whether its products/services satisfy customer needs (Hasan B., et al 2016)

The internal measures for the BSC represent what the business must excel at. It comes from the business process that have the greatest impact on customer's satisfaction aspects, since the cycle time, the quality, the skills of employees, and productivity are affected. When the organizations decide the processes and competencies that they must excel at, then they should specify measures for each of them (Bhagwat & Sharma, 2007).

Yan, and Yang., (2013) conduct research on supply chain dynamic performance measurement Based on BSC and focused on internal business process measures which have the greatest impact on customer satisfaction and achieve organizational financial goals. Balanced Scorecard method introduced innovative processes to internal business processes, from the point of view of the supply chain considerations, it require companies to create new products and services to meet the current and future target customers demand. These processes can create value in the future to promote the future of corporate financial performance

As studied by (Chih , et al 2016; Fabio, et al., 2015), the beginning of the value chain of the internal business process perspective is the innovation process, which clarifies the current and future customer needs. New products are developed to meet and create customer needs. Next, the operation process focuses on providing products and services to existing customers. Finally, the post-sales service process, which includes defective products and returns, is accounted for. For example, the BSC can overcome the challenge of high processing costs through the internal business perspective by having measures such as reduced order cycle time and efficient capacity utilization.

Supporting this (Brewer & Speh, 2000 and East African Breweries, 2010) stated that, improving inventory management can be achieved through measures such as inventory costs incurred in the supply chain including purchasing, holding, shortage and ordering costs. Flexibility can be achieved through measures that include how the supply chain responds to urgent orders, forecasting demand by understanding customers and their ordering patterns.

The manufacturing objective can be measured through manufacturing lead time and capacity utilization ensuring better customer response and flexibility. Improved delivery involves measures such as supply chain cycle time ensuring there is no non-value time hindering the supply chain process. Time compression ensures information and products flow smoothly and quickly (Brewer & Speh, 2000).

From the above discussion it can be hypothesized that:

**H<sub>3</sub>: *The Firm commitment for strong internal process will have strong supply chain performance.***

#### **2.2.4. Innovation/ Learning Perspective and Supply Chain Management**

This perspective aims to develop a long-term growth of the business. It contains manpower training and corporate cultural behaviors to both individual and corporate self enhancement (Hasan B., et al 2016).

The ability to innovate, improve and learn leads directly the company to create value. The processes that are related with innovation and continuous learning (learning and growth) can affect the efficiency of the businesses' operation. Furthermore, it can guarantee the cost reduction and product differentiation in order to meet customized requirements. Thus, the financial ability of the organization is boosted through gaining higher profitability and greater degree of profit (Bhagwat & Sharma, 2007).

Balanced Scorecard goal is revealed in the aspects of existing capacity of the system, and the gap between the high performance required capacities. To close capacity gaps, companies must invest to enable employees to acquire new skills, and straighten out the program and the day-to-day work of the organization Yan , and Yang., (2013).

In the learning and growth perspective companies continuously grow and innovate to be the best in class in supply chain practices. Firms improve their capability thereby reducing wastes and ensuring flexibility through various ways. The information capital objective has measures that include information sharing which is a key driver for improving supply chain performance and enhancing competitive advantage (Li & Zhang, 2006).

Li and Zhang (2006) continue to state that information sharing is being embraced in organizations through exploring advancements in technology such as use of the internet, intranet, databases, Electronic Data Interchange (EDI), Enterprise Resource Planning (ERP) and Distribution Requirements Planning (DRP) systems to exchange data, information and knowledge along the supply chain and in collaboration with its partners and the government, because accurate and timely information ensures better decision making. Product innovations and redesign also adds value to customers.

The human capital aspect involves talents and skills of the organizations employees and collaboration with its partners too. A company is as good as the people it keeps. Collaborations between the employees, performance management, compensation systems, training and development programs, should be implemented to improve the supply chain (Park et al., 2005). Good relationships with suppliers and partners should also be achieved for better results.

**H<sub>4</sub>: *The Firm commitment for strong ability to innovate, improve and learn will have strong supply chain performance.***

### **2.3. Supply Chain Performance Measurement**

Supply Chain Management is a key strategic factor for increasing organizational effectiveness and efficiency (Gunasekaran, et al., 2001). Performance measurement is defined as the procedure of quantifying the efficiency and effectiveness of an activity, while a performance indicator is a measure employed to quantify the efficiency and effectiveness of an action (Galankashi, M., Memari, A., Anjomshoae, A., Ma'aram, A., & Helmi, S., 2014). Whilst there are numerous indicators of performance which could be used in a company, there is a related few number of crucial dimensions that contribute to success or failure in the industry, that are called key performance indicators. Measurement of the whole SC performance is significant because measuring SC performance affects decision making through the evaluation of previous behavior and via benchmarking Galankashi, M. et al (2014)

KPIs can be defined as a set of indicators used to measure the success of a company through the measurement of the performance of a particular activity or process. They are not predetermined, but may change depending on the evaluation criteria or priorities that the company associates with each area Paddeu, D. (2016)

The KPIs are used to understand the extent to which an area or process is working against the objectives that the company is responsible to achieve. Based on the values of the indicators, the manager can decide which action has to be taken to improve the performance of a specific area. They can therefore be considered as a real decision support tool Paddeu, D. (2016)

In today's evolving world, Supply Chain Performance (SCP) is one of the key factors for enhancing organizational effectiveness and competitiveness, especially in the current era of global competition, customer awareness, technology advancement and outsourcing hence the need for accurate supply chain performance measurement tools (Park et al., 2005).

In the midst of fundamental revolution and the nature of business, for an enterprise to thrive, it has to understand how the supply chain networks work and how to make them work better (Githinji, 2010).

A key feature of present day business is the idea that it is the supply chain that competes, not the companies and the success or failure of the supply chain is largely determined in the market place by the customer (Stock, 2001).

Supply chain performance can be measured both in terms of customers' level of satisfaction and the costs incurred (Estampea, et al., 2013). Customer's satisfaction level is a sign of the required standard service level of a company, which is closely related to the whole performance of its supply chain (Chan, 2003). Evaluating supply chain performance is a complex mission, because it is a transversal process involving several actors cooperating to achieve given logistical and strategic objectives (Estampea, et al., 2013) Improving supply chain performance has become one of the critical issues for gaining competitive advantages for companies (Cai, et al., 2009).

Gunasekaran and Kobu (2007) asserted that business and environmental performance measures can be categorized in terms of quality, time, cost, flexibility and innovation. As indicated by Sezen (2008), supply chains should be evaluated based on their ability to respond to changes in products, delivery times, volume and mix; hence flexibility. According to Petterson, (2009) the three types of performance measures identified as the necessary components of a supply chain performance measurement system are: flexibility, resource and output.

## **2.4. Summary of the Literature Review**

Chang et al., (2013) conducted research entitled “Using the balanced scorecard on supply chain integration performance a case study of service businesses”. The study found that the four dimensions of Balanced Scorecard reinforced each other and were reinforced by the company strategies. On the other hand, the researcher found that companies at different levels in the supply chain will assign different levels of importance to different types of supply chain integration.

Supporting this, study by (Cheng et al., 2008 and Lubna I. 2014) entitled “Evaluating the Effectiveness of a Balanced Scorecard System Implemented in a Functional Organization”. it has been found that the firm level performance measures were directly assigned to a single department or to a small number of departments without considering the requirement for cross-departmental support and this resulted in some members of the firm questioning the value of the entire Balanced Scorecard system and resisting its operation.

In this connection, because the Balanced Scorecard is an open system, when the interests of all stakeholders and institutions succeed as part of an integral strategy, these interests can be integrated into it (Wang, Y. 2011). Therefore, this study is based on the original structure of the Balanced Scorecard and integrates the four dimension (customer perspective, financial perspective, internal process perspective and growth and learning) in supply chain performance to support businesses into new strategies, decrease the cost and employ growth opportunities based on more customized, value-adding products and services in pharmaceutical industries.

## **2.5. Conceptual Framework of the Study**

From the above literature, it is evident that supply chain performance is influenced directly by the BSC perspectives. The financial, customer, internal business, learning and growth perspectives directly influence efficiency and effectiveness of the supply chain.

Chia et al. (2009) found that the measurement of supply chain performance could be improved by using a more balanced approach as provided for by the BSC framework. The integration of the measures allows management to assess the overall competitiveness of the entire supply chain and determine internal variables that need improvement. Effective supply chain performance can

be improved by having a blend of financial and non-financial measures (Gautreau & Kleiner, 2001) and the BSC framework measures up to those requirements. Therefore, applying the BSC can improve the supply chain performance of Cadila pharmaceutical thereby increasing the customer satisfaction, minimize costs, employ growth opportunities, and adding value to products and service of pharmaceutical industries.

Independent variables

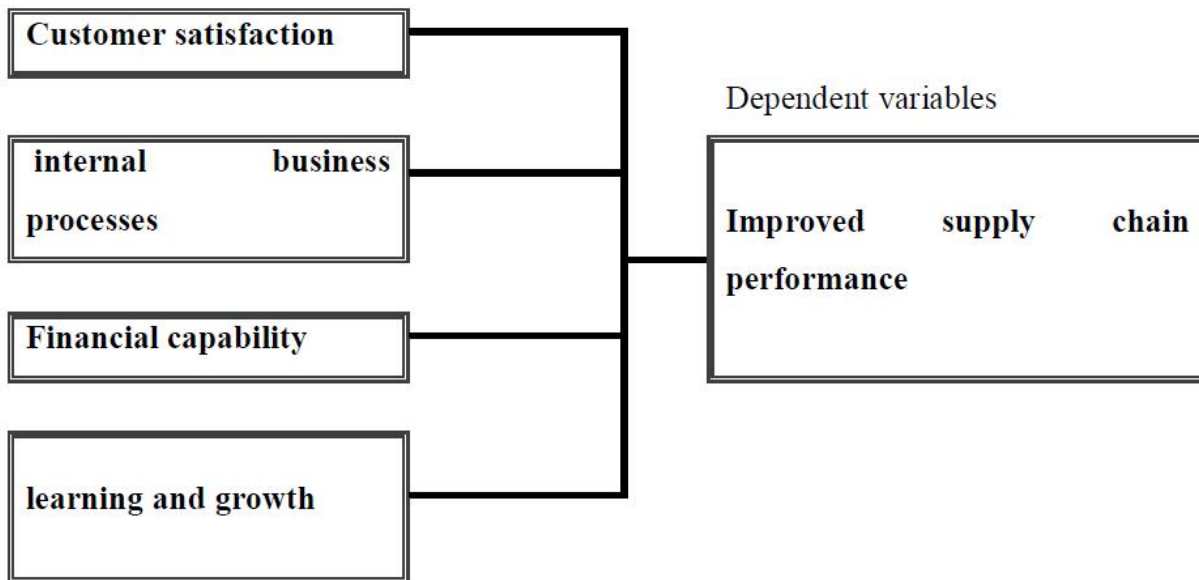


Figure 1: Research frame work; adopted form (Ashioya 2013)

## 2.6. Literature gap identificationon

SCM practices, performance and challenges in different industry of Ethiopia were studied in different dissertations. The results of different researches in the practices of SCM in different commercial sectors of Ethiopia are poor. Wondmineh (2013) studied the practice of SCM in Ethiopian pharmaceutical companies. It was found that, SCM practices in Ethiopian pharmaceutical firms are weak and not considering SCM as a strategic tool for competition.

Chang et al., (2013) conducted research entitled “Using the balanced scorecard on supply chain integration performance a case study of service businesses”. The study found that the four dimensions of Balanced Scorecard reinforced each other and were reinforced by the company strategies. On the other hand, the researcher found that companies at different levels in the

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## **Chapter Three: Research Design and Methodology**

### **3.1. Research Design**

The purpose of this study was to measure performance of Cadilla limited supply chain management using BSC model and identify the performance and come up with the finding and recommendation on the best practices.

Research design is the blueprint for fulfilling research objectives and answering research questions (John et al., 2007:20-84). In other words, it is a master plan specifying the methods and procedures for collecting and analyzing the needed information. It ensures that the study will be relevant to the problem and it uses economical procedures. Zikmund, (2003) stated that, based on their function or purpose, business research studies can be classified as exploratory, descriptive, or causal.

An exploratory study is defined as ‘an initial research conducted to clarify and define the nature of a problem’, whereas a descriptive study is a ‘research that is designed to describe the characteristics of a population or phenomena’. The third type of study is causal or explanatory research which is undertaken to identify cause-and-effect relationships between variables. Zikmund, (2003).

For the purposes of this study, the researcher used a mixed research, which involves the combination of descriptive and explanatory. Because, the objective of this study is to measure supply chain performance using BSC model, this study is explanatory/causal in nature which explains the cause-and-effect relationship among determinants of BSC and supply chain performance. In addition, to describe the demographic characteristics of respondent’s and survey distributors view on the performance of the company, descriptive design was used. Finally, to explore the qualitative results explanatory design was used. Therefore, this research was supported by the combination of descriptive and explanatory research design.

## **3.2. Source of Data**

In research study there are two types of data i.e. primary and secondary data. In order to meet the objectives of this study both primary and secondary source of data were used. The primary data were collected using interview and questionnaire.

### **3.2.1. Data Collection Instruments/Tools**

Data collection relies on instruments as it provides answers to the questions under the study. Data Collection is an important and crucial aspect of any type of research study. It is the “precise, systematic gathering of information relevant to the research purpose” (Burns & Grove, 2003, p. 48). Data collection instruments include: questionnaires, interview schedules, and document reviews. Researchers need to choose the most effective data collection instruments if they are to collect sufficient and usable data in their respective studies. In view of the above fact, the tools designed to collect the required data for this study were questionnaire and interview.

- **Questionnaire:**

A questionnaire is the most frequently used data collection instrument in educational research (Radhakrishna, 2007). It is a list of carefully designed questions or a set of questions usually in a highly structured written form to be answered by selected group of research participants or respondents (Gay, Mills and Airasian, 2009). The aim of a questionnaire is to find out what a selected group of participants do, think, or feel (Meyer, Becker, & Vandenberghe, 2004). So in this study questionnaire was used to collect data from Cadilla employees of different departments like pharmacists, logistics and supply chain, purchasing and others. All the question items used a five point Likert Scale where participants are required to put tick mark in the box that best represented their best opinions. At the end of each category, an open ended question was included to provide respondents free responses.

- **Interview:**

Interviews are methods of gathering information through oral questioning. It is the process of selecting the required information from interviewees. The purpose of interviewing is to find out what is in or on someone else’s mind. Interviewing helps the researcher to access the perspective of the person being interviewed (Patton, 2002). For this study, semi-structured interview questions was prepared to conduct one-on-one interviews with Cadilla procurement manager, marketing and sales Manager and commercial General Manager. Procurement manager was interviewed to get data

regarding suppliers' relations and response in availing raw materials. The researcher preferred one-on-one interview to focus group discussions as he found it difficult to bring participants from multiple locations to one location. In other words, time, distance, and other factors made it unlikely for a focus group panel to work together in the same physical location.

### **3.3. Population, Sampling and Sample size**

The research is about measuring supply chain performance from BSC perspective in Cadilla Pharmaceutical. Thus, the population in the current study is defined as the employees of Cadilla pharmaceutical limited found in supply chain distribution, pharmacist, chemist and sales and promotion departments from company perspective and external distributors of the company from customer perspective. In Cadilla pharmaceutical currently there are 331 permanent employees, out of whom 170 are male and 161 are female, but the focus of the study more relates with supply chain pharmacist, chemist, quality assurance, quality management, production, finance, management, & marketing departments of the company. Since the employees in these departments are assumed to have better understanding about the area of this study, the sample of the study was taken from these departments. The total target populations of these departments are 132. For selecting the respondents from the total population, census-sampling technique was used. Since the entire target population of the study was sufficiently small and respondents from these departments are assumed to be representative the researcher included the entire target population into the study.

According to Sekaran (2003), sample statistics need to be reliable and represent the population parameters as close as possible within a narrow margin of error.

For multiple regression analysis, Garson (2006) recommends that the sample size should be at least equal to the number of independent variables plus 104 for testing regression coefficients, and at least 8 times the number of independent variables plus 50 for testing the R-square respectively. Therefore, the 4 independent variables in this study will require at least 108 completed questionnaires in order to test the regression coefficients and the R-square.

The table below shows the number of employees in each of these departments.

**Table 3.1 Census Survey Population**

Division	Department	Number of Population
Pharmacist	Marketing	19
	Production	20
	Quality Control	6
	Quality Assurance	8
Chemist	Production	9
	Quality Control	16
	Quality Assurance	7
Supply Chain	Distribution	9
Operation And Management	Managers	4
	Sales And Promotion	10
	Purchasing	7
	Finance	9
	Human Resource	8
<b>Total</b>		<b>132</b>

As indicated in the above table the total numbers of populations in these departments are included in the study since they are small in number for regression analysis. Therefore, the student researcher used a censuses sampling technique for selecting respondents from company population.

For external customer survey, the company has 16 agents (distributors) and 150 wholesalers. Out of this 4 distributors and 71 wholesalers were randomly selected in this study.

### **3.4. Validity and Reliability**

Validity and reliability are important concepts in research. Validity refers to the degree that an instrument actually measures what it is supposed or intended to measure (Amin, 2005). The reliability of an instrument, on the other hand, is the consistency, dependability and replicability of the measuring instrument over time, and with the same respondents (Cohen, Manion, & Morrison, 2007). It is the extent to which an instrument yields consistent and stable results across

time and also across the various items in the scale (Sekaran & Bougie, 2010; Leedy & Ormrod, 2001).

### 3.4.1. Reliability Test Result (Internal Consistency)

There are various types of reliability tests; and the common method used by researchers is the internal consistency reliability test. The most commonly used measure of internal consistency is Cronbach's alpha coefficient (Sekaran and Bougie, 2010). Cronbach's Alpha is of the internal consistency of the questionnaire. According to Bryman and Bell (2007), reliability analysis is concerned with the internal consistency of the research instrument. As multiple items in all constructs were used, the internal consistency of BSC constructs that affects supply chain performance were assessed with Cronbach's Alpha and the reliability values for all constructs are confirmed as greater than 0.7, which are considered acceptable (Nunnally, 1978). The following table shows the summary of reliabilities of all constructs and items related to each constructs.

**Table 3.2: Reliability of Constructs**

<b>Item-Total Statistics</b>					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Financial Measures	14.3104	.687	.579	.442	.847
Customer Measures	14.4104	.670	.600	.528	.842
Internal Measures	14.3208	.603	.638	.513	.838
learning and growth	14.3184	.698	.669	.521	.828
Supply Chain Performance	14.3136	.565	.901	.817	.760

### 3.4.2. Validity Test Result

Validity refers to the degree that an instrument actually measures what it is supposed or intended to measure (Amin, 2005). Content and face validities are the validity issues most frequently reported in the literature. Content validity refers to the appropriateness of the content of an

instrument. A content validity test checks whether there are enough and relevant questions covering all aspects being studied and that irrelevant questions are not asked (Parahoo, 2006). Face validity, in contrast, refers to the extent to which an instrument appears to measure what it is intended to measure.

In this study, the content validity was concerned with the degree to which the designed questionnaire items fairly and accurately represent the main variables articulated in this study. On the other hand, the face validity basically checks that the questionnaire seems to measure the concept being tested. For this study Pearson product moment correlation and Corrected Item-Total Correlation stipulated in the above table were to test validity.

To evaluate the Discriminant and Convergent validity of the measurement scales, the item-total correlations for the latent constructs were examined. The results of the analysis of item-total correlations are presented in table 3.3. The results of the correlation pattern for the analysis shown in table 3.4 indicate that an item posited to reflect a particular construct has a stronger correlation with that particular construct than with any of the other constructs. This result provides evidence of Discriminant and convergent validity of the measures.

**Table 3.3: Validity Result**

Inter-Item Correlation Matrix						
Correlation		FM	CM	IBM	ILG	SCP
	FM	1.000	0.000	0.000	0.000	0.000
	CM	.419	1.000	0.000	0.000	0.000
	IM	.435	.395	1.000	0.000	0.000
	ILG	.411	.472	.576	1.000	0.000
	SCP	.656	.710	.693	.708	1.000

### 3.5. Methods of Data Analysis

After the data were collected, it was edited (checking completeness), classified, tabulated, coded, and reviewed in order to ensure the required quality, accuracy, consistency, and completeness. Thereafter, the quantitative data were coded, i.e., the edited raw data were converted into numbers and then tabulated to count the number of samples falling into various categories and

then they were transformed into Statistical Packages for Social Sciences ( SPSS), version 20.0 and were analyzed. Data analysis is the systematic organization of data and testing of the research hypothesis or finding answers to the research questions using the data. It involves classifying of questions, coding and categorizing of themes according to the most frequently used phrases or generative themes that would later be tabulated into frequencies and percentages for easy interpretation of the findings. As stated in the foregoing discussions, both quantitative and qualitative data were collected. In analyzing the quantitative data, both descriptive and inferential statistics were used whenever appropriate. Frequencies and percentages were used to describe the respondents' demographic information and professional characteristics. The other parts also used statistical tools such as multiple regressions, and correlations. A p-value of 0.05 or less was considered statistically significant.

The qualitative data obtained through interview schedules was analyzed using narration or descriptions. In short, the qualitative data was narrat-ly analyzed while the quantitative data was analyzed using different statistical tools.

## **Chapter Four: Data Analysis, Results and Discussions**

### ***4.1. Introduction***

As indicated in the previous chapter, the main attempt of this study was to measure the performance of pharmaceutical supply chain of Cadilla Pharmaceuticals using BSC model and to assess the view of customers about the supply chain performance of the firm. After the primary and secondary data were collected using questionnaire and interview, in this chapter the analysis and discussions for research findings obtained from the data collection instrument were presented. The analysis and discussion begins with the questionnaires' response rate followed by the descriptive statistics of the respondent's demographic information and descriptive statistics of BSC independent constructs along with distributors view of company's performance. The results of the reliability analysis, correlation coefficient and the regression assumption test were also reported which is supported by customers view and finally the results of hypothesis testing and interview results are presented.

### ***4.2. Demographic characteristics***

This section provides data on the general characteristics of the respondents who participated in the study. The purpose of this analysis is to establish the response rate and to present demographic information position, and experience of the respondents. The findings have been presented and explained below.

#### **Response Rate**

The respondents of this study come from the employees of Cadilla pharmaceutical found in marketing, production, quality control, finance, purchasing , HR, sales and promotion and distribution departments. Among the 132 questionnaire survey forms distributed, 5 were not returned and/or declined to participate. Two of the returned questionnaires were deemed invalid, and the final number of valid questionnaires was 125 usable questionnaires available for analysis. The respondents were given two weeks to respond, however, some respondents required longer time to finalize their responses.

**Table 4.1: Response Rate**

Number of Replies	125
Not Returned and/or Declined to Participate	7
Total Number of Forms Distributed	132
<b>Response Rate (%)</b>	96.21% (overall response rate)
	94.7% (effective response rate)

The overall response rate of 96.21% (127 responses/132 questionnaires) and a 94.7% effective rate of response (125 valid responses/132 questionnaires), which is comparable to similar studies in the field. So we can say that the response rate of the study is high enough to analyze the collected information.

**Table 4.2: Demographic Characteristics of Respondents**

<b>Age of the Respondents</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<25	30	24.0	24.0	24.0
	26-34	71	56.8	56.8	80.8
	35-44	14	11.2	11.2	92.0
	45-54	9	7.2	7.2	99.2
	>=50	1	.8	.8	100.0
	Total	125	100.0	100.0	
<b>Educational Background of the Respondents</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	15	12.0	12.0	12.0
	BA/BSc Degree	101	80.8	80.8	92.8
	MA/MSc	9	7.2	7.2	100.0
	Total	125	100.0	100.0	
<b>Respondents Position in the Company</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Pharmacist	49	39.2	39.2	39.2
	Chemist	30	24.0	24.0	63.2
	logistics and supply chain	9	7.2	7.2	70.4
	management and operation	37	29.6	29.6	100.0
	Total	125	100.0	100.0	
<b>Respondents Work Experience</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 years	23	18.4	18.4	18.4
	6-10 years	102	81.6	81.6	100.0
	Total	125	100.0	100.0	

**Table 4.2:** above presents the demographic statistics of the respondents. Among the 125 respondents, most of them 71 (56.8%) were between 26 and 34 years old, followed by 30 (24%) who are less than 25 years old. In terms of educational background the majority 101 (80.8%) have BA/BSc degree and the rest 15, (12%) and 9 (7.2%) were educated to the Diploma and Masters degree respectively. This is an indication that the employees of Cadilla Pharmaceuticals are matured and educated enough to serve the company from customer perspective, company's financial perspective, internal growth and learning and growth.

In the organization 49 (39.2%) of employees are pharmacists followed by 37 (29.6%) and 30 (24%) of operations management and chemist respectively. From logistics and supply chain management there are only 9 (7.2%) of employees in the company. As the information we get from production management shows those pharmacists and chemist in the organization, work as marketer, producer, quality controller and quality assurance in the company. This shows that the company recruits large percent of pharmacists and chemist and provide training for them, rather than recruiting business professional. This will result in weak supply cooperation across the supply chain and low profit for the company unless the company recruits respective professions for any position in the company.

The data also shows that the majority of respondents 102, (82.6%) had worked for 6 -10 years in the organization followed by 23 (18.6%) who worked for less than 5 years. This shows that since the commencement of the company in 2008 G.C., most of the respondents have been working there; hence they have fully information about the company. From this we can understand that the information provided by Cadilla's employees can represent the company's overall profile.

Therefore, it can be concluded that even if workers are matured enough, educated enough, and have enough work experience to work in the company, their unrelated position in the company may affect the overall performance of the company, especially from supply chain performance perspective.

#### ***4.3. Extent of the BSC measures in Supply Chain Performance at Cadilla pharmaceutical***

The study sought to find out the extent to which the Cadilla pharmaceutical has measured BSC measures to evaluate its supply chain performance or to what extent does the BSC

measures have been implemented in the supply chain at Cadilla Pharmaceutical. The respondents gave their responses on a scale of 1-5 where 1 represents to a very small extent and 5 to a very large extent.

For each of the BSC approach measures that affect Supply chain performance of Cadilla pharmaceutical, the mean score for each item under each variable along with average mean score were calculated to measure the company’s overall supply chain performance.

The result of mean score of BSC measures in each perspective from respondents view point suggest that the company is using BSC model to a moderate extent in evaluating its supply chain performance. This is also moderately affecting its supply chain. The mean score result with its standard deviation for each constructs are organized and analyzed as follows.

#### **4.3.1. Financial Perspective**

The First Research Question is: to what extent does the company measures the following financial measures to evaluate its supply chain performance in the last five years?

**Table 4.3: Financial Perspective**

<b>Descriptive Statistics</b>			
Code	Items	Mean	Std. Deviation
F1	Revenue growth	3.66	.649
F2	Rate of Return on investment	3.67	.727
F3	Cost saving initiative	3.62	.488
F4	Cash flow	3.65	.675
F5	Overall cost of the company	3.62	.726
F6	Suitable pricing policy	3.77	.460
F7	Sales	3.59	.597
F8	Profit margins	3.64	.588
F9	Clear financial goals	3.37	.724
F10	Working capital management	3.50	.703
<b>Average mean Score</b>		<b>3.609</b>	<b>0.6337</b>
Valid N (list wise)	125		

*Source: field survey 2018.*

From the table 4.3 above, it was agreed by the respondents that suitable pricing policy with mean of (3.77) is the most important measures followed by rate of return on investment, revenue

growth, cash flow, profit margin, cost saving initiatives, and overall cost of the company with mean score of (3.67, 3.66, 3.65, 3.64, 3.62, and 3.62) respectively in measuring supply chain performance. In addition sales, working capital management and clear financial goal are other import measures considered by company with mean score of (3.59, 3.50, and 3.37) respectively in measuring supply chain performance.

It is thus evident that measuring the suitable pricing policy and rate of return on investment are measures that are extensively used in the Cadilla’s supply chain which helps in knowing the financial capability of the company followed by revenue growth, cash flow, profit margin and lastly overall cost of the company.

Generally, as the average mean score (3.609) of all financial measure items shows in the last five years the company is moderately considering financial measures for evaluating its supply chain performance.

#### **4.3.2. Customer Perspective**

The 2nd research question is: how do you rate the following customer perspective measures to measure the supply chain performance of the company in the last five years?

**Table 4.4: Customer Perspective**

<b>Descriptive Statistics</b>			
<b>Code</b>	<b>Items</b>	<b>Mean</b>	<b>Std. Deviation</b>
C1	Concern to customer	3.49	.768
C2	customer order fulfillment	3.50	.604
C3	assessment of customers satisfaction	3.38	.693
C4	providing after sales support to customers	3.52	.703
C5	using promotion to gain customers	3.55	.546
C6	providing better service than competitors	3.54	.629
C7	Delivering on time to customers	3.54	.575
C8	overall relationship with customers	3.54	.576
<b>Average mean score</b>		<b>3.5075</b>	<b>0.63675</b>
Valid N (listwise)	125		

*Source: field survey 2018.*

From the table 4.4 above, it was agreed by the respondents that using promotion to gain customers, providing better service than competitors, Delivering on time to customers, and overall relationship with customers with mean value of (3.55, 3.54, 3.54, and 3.54) are the very important factors to be considered in improving supply chain performance of the company. This is followed by after sale service and customer order fulfillment with mean value of (3.52 and 3.50).

The average mean score (3.5075) of all customer measures shows that in the last five years the company was moderately considering customer measures as influential measures in evaluating their supply chain. This supports the findings of (Arik, 2006) who asserted that one of the changes in business practices dictated by the transition from the industrial age to the information age is the shift of enterprises from being production- and product-focused to being customer-focused

### ***4.3.3. Internal business Perspective***

The 3rd research question is: How do you rate the following internal business measures to measure the supply chain performance of the company in the last five years?

**Table 4.5: Internal business perspective Measures**

<b>Descriptive Statistics</b>			
Code	items	Mean	Std. Deviation
IB1	supply chain systems development	3.68	.655
IB2	setting clear strategic goals	3.68	.655
IB3	competent employees	3.58	.612
IB4	production strategies implementation	3.64	.559
IB5	introducing new products in suitable time	3.65	.557
IB6	internal processes that aim to reduce logistics, inventory, warehouse and transportation	3.48	.714
IB7	resources used to receive and supply goods	3.56	.665
IB8	company concern about experience sharing with suppliers	3.62	.520
IB9	strategic alliances with supply chain actors	3.54	.616
IB10	Total supply chain cycle time	3.54	.546
<b>Average mean score</b>		<b>3.597</b>	<b>0.6099</b>
Valid N (listwise)	125		

*Source: field survey 2018.*

From the above table 4.5 one can infer that setting clear strategic goals followed by supply chain system development with mean value of (3.68 and 3.68) respectively was considered by company as basic internal process measures for the whole supply chain. This was followed by new product introduction at suitable time and implementation of production strategies with mean value of (3.65 and 3.64) respectively.

Being supported by average mean value of (3.597) the above results shows that, the company was measuring internal business process measures moderately in measuring its supply chain performance.

#### ***4.3.4. Innovation, Learning and growth Perspective***

The researcher sought the view of the respondents on the extent to which the learning and growth measures below are implemented and measured in determining the supply chain performance, which hold on the 4<sup>th</sup> research question: How do you rate the following learning and growth measures to measure the supply chain performance of the company in the last five years?

**Table 4.6: Learning and growth measures**

<b>Descriptive Statistics</b>			
code	items	Mean	Std. Deviation
ILG1	Suitable training programs	3.47	.562
ILG2	Developing innovation capabilities	3.52	.576
ILG3	Creative ideas to develop supply chain performance	3.57	.614
ILG4	Company concern about adding value to employees	3.63	.654
ILG5	Partnership with suppliers in knowledge transfer	3.60	.539
ILG6	Company concern about experience sharing with suppliers	3.52	.679
ILG7	Clear company culture	3.57	.639
ILG8	Using latest technology for R&D	3.67	.471
ILG9	Attracting best ideas to support company	3.71	.536
IGL10	Supplier involvement in solving problems	3.74	.526
<b>Average mean score</b>		<b>3.6</b>	<b>0.5796</b>
Valid N (listwise)	125		

*Source: field survey 2018.*

As stipulated in the above table 4.6, Supplier involvement in solving company’s problem, attracting best ideas to support company and using latest technology and company concern about adding value to employees, with mean value of (3.74, 3.71, 3.67 and 3.63) respectively were considered as the basic measures that have been used by Cadilla pharmaceutical company in measuring its supply chain performance. With the support of average mean value of (3.6), this is an indication that Cadilla pharmaceutical embraces technology advancements and good relationships with its employees and suppliers thereby providing a conducive supply chain environment for the smooth flow of operations.

#### **4.3.5. Supply Chain Performance**

The respondents were also requested to confirm the overall performance of the company’s supply chain in using BSC measures. The respondents gave their responses on a scale of 1-5 where 1 represents significantly decreased and 5 represents significantly increased. The findings as seen in table 4.7 below shows that the overall supply chain performance of the company has moderately increased within the last five years.

**Table 4.7: supply chain performance**

<b>Descriptive Statistics</b>			
code	Items	Mean	Std. Deviation
SP1	The company clearly communicates its goals and strategies to employees	3.54	.576
SP2	Efficiency of the company in utilizing its resources (human, financial and material)	3.64	.559
SP3	Position among competitors in terms of supply	3.56	.700
SP4	Relationship with other supply chain actors	3.62	.821
SP5	Information exchange within the supply chain	3.60	.582
SP6	Profit compared to competitors	3.52	.799
SP7	Reduction in total supply chain cost of the company	3.62	.716
SP8	The quality of Cadilla products	3.70	.492
SP9	Company responsiveness to customer requirement	3.59	.623
SP10	Overall company successes	3.66	.581
<b>Average Mean Score</b>		<b>3.605</b>	<b>0.6449</b>
Valid N (listwise)		125	

*Source: field survey 2018.*

As shown in the above table 4.7, the quality of Cadilla products, overall company successes, and Efficiency of the company in utilizing its resources (human, financial and material), with mean value of (3.7, 3.66, and 3.64) respectively shows moderate increment in the overall company's supply chain performance. This is followed by relationship with other supply chain actors and reduction in total supply chain cost of the company, (with the same mean of 3.62), and Information exchange within the supply chain, and Company responsiveness to customer requirement (with mean value of 3.6 and 3.59).

Therefore, from the above result it can be concluded that the four BSC measures implemented by the company has resulted in moderate increment of company's' supply chain performance

In addition to the above analyzation, to validate and balance the findings of the research, a survey was made to evaluate the current performance of the company from customer's point of view. Table below shows the result of the survey.

#### ***4.3.6. External Survey for Distributors***

Performance measurement should not only consider suppliers and capacity of manufacturing but also consider customers' satisfaction. Measuring customer service and fulfillment are one of the core mechanisms to implement supply chain strategy, Gunasekaran et al., 2001). Based on this concept the researcher tried to conduct external survey with 4 distributors (Baker Pharmaceutical, Pharma Birbir, Bonafied and PFSA) and 67 wholesalers), which was analyzed and discussed as follows:

The 6<sup>th</sup> research question guiding the above idea is: what is your view on the following points to evaluate the supply chain performance of Cadilla pharmaceutical?

**Table 4.8: external survey for distributors**

<b>Descriptive Statistics</b>			
No	measures	Mean	Std. Deviation
1	All products produced by the company are available all the time in market	2.99	.886
2	The products manufactured by Cadilla fulfills your need in terms of quality	3.35	.699
3	All products produced by the company are requested by retailers	3.21	.844
4	The prices of the products produced by Cadilla is reasonable	3.01	.765
5	The prices of the products produced by Cadilla are not volatile	3.00	.894
6	The company delivers request products on time	2.61	.870
7	The company has good system of communication	2.90	.973
8	The company responds quickly to your order	2.97	.941
9	After sale service by the company	2.83	.956
10	The company delivers defect free products	3.13	.827
11	The company collects poor quality products from your store	2.99	.933
12	The company conducts survey to measure the level of satisfaction	2.72	.974
13	The company's overall supply chain performance is good	3.00	.894
<b>Average mean score</b>		<b>2.93</b>	<b>0.888</b>
Valid N (listwise)		<b>71</b>	

*Source: field survey 2018*

**Statement 1:** A product produced by the company is available all the time in market.

The mean value of this statement was 2.99 with standard deviation of 0.886. This implies that customers were not satisfied in terms of availability of Cadilla products in the market. This may result in the shift of customers from Cadilla to their competitors.

**Statement 2:** The products manufactured by Cadilla fulfill your need in terms of quality.

With regard to this measure's the mean value of the item was 3.35 with standard deviation of 0.699. This implies that even if there is a problem with availability of the product, the customers were satisfied by the quality of Cadilla products compared to other competitors.

**Statement 3:** All products produced by the company are requested by retailers.

With regard to customers/retailers request of products the mean value of 3.21 with its standard deviation of 0.844 was recorded. This is an implication that customers are requesting the product even though there is low availability of the product in the market. This may be due to the quality of the product.

**Statement 4:** The price of the products produced by Cadilla pharmaceutical is reasonable.

From the analysis of customers/distributors response the mean value of 3.01 with standard deviation 0.765 was found. This implies that price of products produced and distributed by Cadilla pharmaceutical is reasonable from distributors and wholesalers perspective.

**Statement 5:** The prices of the products produced by Cadilla are not volatile.

The mean score of 3.00 with standard deviation of 0.894 were found when customers were asked to judge the price volatility of Cadilla products. This is an implication that the price set by Cadilla pharmaceutical is stable in the past five years. But customers told us that recently up on the rose in currency exchange of the country the price of the product also rose by 20%. This is because the company imports raw materials from abroad (Hindi) that results in raw materials price rise.

**Statement 6:** The Company delivers requested products on time.

Towards this measure the mean value 2.61 with standard deviation .870 was evaluated by customers. Which means on time delivery of products by company is not up to the expectation of customers. This result supports the problem of product availability discussed on statement 1 of this discussion. In connection to the above measures, the empirical literature has been quite consistent in identifying price/cost, quality, delivery, and flexibility as important competitive capabilities for companies across the supply chain (Tracey M., 1999).

**Statement 7:** The Company has good system of communication.

For this statement the mean value of 2.90 with standard deviation of 0.973 were found. This implies that the company does not have good communication system to streamline its operation across supply chain partners. This result is against the supply chain system development

measure (with mean of 3.68 & Standard deviation of 0.655) analyzed under internal business perspective on table 4.7 above by company employees. Several previous studies are available. Tompkins and Ang., (1999) consider the effective use of relevant and timely information by all functional elements within the supply chain as a key competitive and distinguishing factor. This requires information and communication system to be developed by a company. So, organizations need to view their information as a strategic asset and ensure that it flows with minimum delay and distortion.

**Statement 8:** The Company responds quickly to your orders.

From the analysis, the mean value 2.97 with a standard deviation of .941 was found. This implies that the company does not respond quickly to customers' orders. This result supports the results on availability of products & on time delivery of products discussed earlier.

**Statement 9:** After sale service by the company.

With regard to this measure a mean value of 2.83 and standard deviation 0.956 were found by analysis. From customers point of view this is an implication that the serviceability or after sale service by the company is not as expected by customers.

**Statement 10:** The Company delivers defect free products.

Regarding to this measure, the mean value 3.13 and standard deviation 0.827 were found. This implies that, on average the company delivers defect free products to its distributors.

**Statement 11:** the company collects poor quality products from your store.

Regarding to this statement, the mean value 2.99 and standard deviation of 0.933 were found. This implies the company do not collects poor quality products form distributors store. This result supports the problem of after sale service by company, which was discussed on statement 9 above.

**Statement 12:** Company conducts survey to measure the level of satisfaction.

Regarding to this statement, the mean value 2.72 and standard deviation of 0.974 was found. This implies that the company didn't conduct customer satisfaction survey in the last 5 years to measure the level of customer satisfaction.

**Statement 13:** The company's overall supply chain performance is good.

With regards to this measure, the mean value 3.00 with standard deviation of 0.894 was found by analysis. This implies that company's overall supply chain performance is good from customers perspective.

Based on the above analysis of Cadilla's supply chain performance from distributors perspective we can say that the company is better in producing quality products, setting reasonable and stable price, delivering defect free products, and their products are being demanded by retailers. But, in contrast to this there are problems related to product availability, on time delivery, developing communication systems, flexibility (order response rate), providing after sale service and conducting customer satisfaction survey.

From the above discussion on the overall supply chain performance (with a mean value of 3.00 & 0.894 standard deviation) result and average mean score of (2.93 with 0.888 standard deviation from the mean) we can say that the overall supply chain performance of Cadilla pharmaceutical from distributors perspective is moderate performance. But this is not the result expected of the company. There should be a strong supply chain performance by companies to achieve their objectives. Supporting this idea (Li et al., 2004) suggested that, Effective supply chain management (SCM) has become a potentially valuable way of securing competitive advantage and improving organizational performance since competition is no longer between organizations, but among supply chains.

#### ***4.4. Statistical Test of Hypotheses: Regression Analysis***

Regression analysis is a statistical analysis that allows a researcher to test for statistical relationship between dependent variable and a set of independent variables and estimate the independent effect of each independent variable on the dependent variable. Four hypotheses were raised for this study. They were tested at 0.05 significant levels and confidence level of

95%. The researcher conducted a regression analysis to test the research hypotheses that illustrate the relationship between supply chain performance (dependent variable) and four other independent variables from BSC perspectives, namely Financial perspective (FM), customer perspective (CM), internal business process perspective (IB), and Innovation, learning and growth perspective (ILG). The aim of the regression analysis was to come up with a suitable regression equation that can be used to explain the BSC variables that affect supply chain performance (SCP) in Cadilla pharmaceutical. The researcher proposed the following multivariate regression equation:

**Table 4.9: model summary**

*Source: field survey 2018*

Model Summary									
Mode	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.904 <sup>a</sup>	.817	.811	.11026	.817	133.629	4	120	.000

a. Predictors: (Constant), ILG, FM, CM, IBM

The first measure in the model summary table is called ‘**R**’. This is a measure of how well our predictors predict the outcome. The model summary shows that there is a strong linear relationship between supply chain performance and the four independent variables (R= .904).

The model summary result shows that a regression model with R square **.817** implies that the percentage of variation in supply chain performance explained by the four BSC variables accounts for **81.7%**, and other unexplored variables may explain the variation in supply chain performance for **19.3%**.

In addition, the adjusted coefficient of determination (adjusted R-square) indicates the model fit. The adjusted R<sup>2</sup> revealed that **81.1%** of the variance in supply chain Performance was explained by the regression model. This is, as the name implies, a correction to R square, which takes into account that we are looking at a sample rather than at the population. The **R<sup>2</sup>** value is adjusted for the degrees of freedom and thus referred to as the adjusted R<sup>2</sup>. This is provided because the actual value of R<sup>2</sup> obtained with a given sample often overestimates the population value for R<sup>2</sup>. The adjusted R<sup>2</sup>, however, has been adjusted downwards to closely approximate the population value.

For this reason the value to adjusted  $R^2$  is normally smaller than the value of  $R^2$  (Hatcher & Stepanski, 2001). The p-values of the t-tests were at the 1% level of significance for all variables.

**Table 4.10: Analysis of variance (ANOVA)**

ANOVA <sup>a</sup>						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6.498	4	1.625	133.629	.000 <sup>b</sup>
	Residual	1.459	120	.012		
	Total	7.957	124			
a. Dependent Variable: Supply Chain Performance						
b. Predictors: (Constant), learning and growth, Financial Measures, Customer Measures, Internal Measures						

*Source: survey 2018*

The Analysis of Variance (ANOVA) table 4.10 shows that F-ratio is 133.629 at 4 and 120 degrees of freedom is statistically significant at 95% confidence level. It is significant at  $p < .001$  (because the value in the column labeled *Sig.* is less than .001). This result tells us that there is less than a 0.1% chance that an *F*-ratio this large would happen if the null hypothesis were true. Therefore, we can conclude that our regression model results in significantly better prediction of supply chain performance than if we used the mean value of SCP. In short, the regression model overall predicts SCP significantly well (the model is good fit).

**Table 4.11: regression coefficients**

Model		Coefficients <sup>a</sup>							
		Un-standardized Coefficients		Standardized Coefficients	t	Sig.	Hypothesis	Collinearity Statistics	
		B	Std. Error	Beta				Tolerance	VIF
1	(Constant)	-.801	.199		-4.036	.000			
	FM	.292	.049	.275	5.980	.000	<i>supported</i>	.725	1.380
	CM	.371	.048	.360	7.748	.000	<i>supported</i>	.708	1.411
	IBM	.245	.044	.279	5.599	.000	<i>supported</i>	.615	1.627
	ILGM	.325	.063	.265	5.193	.000	<i>supported</i>	.587	1.704
a. Dependent Variable: Supply Chain Performance									

In the Regression Model, the un-standardized coefficients (b) of customer measures, innovation, learning and growth, financial measures and internal business measures show the relative

influence on Supply chain performance. Customer measures ( $b=0.371$ ) has the most positive influential effect on supply chain performance, followed by , innovation, learning and growth, financial measures and internal business measures ( $b = 0.325$ ,  $b = 0.292$ , and  $b = 0.245$ ) respectively.

Each of these beta values has an associated standard error indicating to what extent these values would vary across different samples, and these standard errors are used to determine whether or not the b-value differs significantly from zero. As we saw in the above table, a t-statistic can be derived that tests whether a b-value is significantly different from 0. Well, in multiple regressions it is easiest to conceptualize the t-tests as measures of whether the predictor is making a significant contribution to the model. Therefore, if the t-test associated with a b-value is significant (if the value in the column labeled Sig. is less than .05) then the predictor is making a significant contribution to the model. The smaller the value of *Sig*, and the larger the value of *t*, the greater the contribution of that predictor. For this model, the customer measure ( $t(124) = 7.748$ ,  $p < .001$ ), innovation, learning and growth ( $t(124) = 5.193$ ,  $p < .001$ ), financial measures ( $t(124) = 5.980$ ,  $p < .001$ ) and internal business process ( $t(124) = 5.599$ ,  $p < .001$ ) are all significant predictors of supply chain performance. From the magnitude of the t-statistics we can see that the customer measures had a higher impact, whereas the rest three has relatively had similar medium impact.

#### **4.5. Discussion of the Finding**

The discussions of the above result findings in relation with the objectives and hypothesis of the study are presented as follows:

The basic objective of this study is to measure the supply chain performance of pharmaceutical company from BSC model perspectives, which is followed by four specific objectives depending on four BSC model perspectives. From the regression analysis it was found that these four perspectives of BSC model (i.e., Financial, customer, internal process and innovation, learning and growth measures) strongly affects and contributes to supply chain performance of Cadilla pharmaceutical. The relationship and effects that these factors have on Cadilla's supply chain performance are discussed under the following hypothesized hypotheses.

***H<sub>1</sub>: The Firm commitment for strong financial capability will have strong supply chain performance***

The first specific objective of the study was to measure to what extent does financial capability of a firm affects its supply chain performance. To attain at this object a regression beta coefficient was computed and the result of the regression analysis of the above model as stipulated in table 4.11, shows that financial measure of BSC model has a positive and statistical significant effect on Cadilla pharmaceutical's supply chain Performance ( $b= 0.292$  with  $p<0.001$ ). This means that the better the company measure the financial measures like revenue growth, return on investment, cost saving initiatives, profit margins and suitable pricing policy to evaluate it SCP the better the company's overall supply chain performance will be

This finding was supported by a study carried by (Yan H., and Yang Z., 2013) which revealed that, financial performance measurement method to reveal the overall strategy of the alliance and its implementation and enforcement are to contribute to the improvement of the supply chain. Supporting this, the study by Ashioya I., (2013) shows that fulfilling customers' needs and supply chain partners ensures financial success as the overall aim is improving the financial capability of the whole supply chain entities. Hence, **hypothesis 1 is accepted.**

***H<sub>2</sub>: The Firm commitment for strong customer management will have strong supply chain performance.***

The second specific objective of the study was to measure the extent to which firm's customer perspective affects its supply chain performance. To this end, it was found that the firm's concern for customer has a great statistically significant positive impact on its overall supply chain performance with ( $b = .371$ , with  $p < 0.001$ ). This means the more the company give emphasis to customer service the better their entire supply chain performance will be. Previous studies conducted in the past shows that, customers are concerned for the lead-time, the quality of products and services, the company's performance service and the cost effectiveness (Bhagwat & Sharma, 2007).

As studied by (Hasan B., et al 2016) one of the main objectives of supply chain management is to meet customer needs. Low performance under this category is a significant indicator of decline in future, even though the present financial situation might appear good.

Supporting this, the study by Brewer & Speh, (2000), shows that product leadership objective can be achieved through measures such as good product quality and flexibility of products by providing a range of products that the customer wants. The different demands, desires and idiosyncrasies of customers all along the supply chain must be understood and managed effectively for companies to score better supply chain performance.

Based on the above discussion and result of the regression analysis we can say that concerns for customers by companies will result in positive effect on supply chain performance of the company. Hence, **hypothesis 2 is accepted.**

***H<sub>3</sub>: The Firm commitment for strong internal process will have strong supply chain performance.***

The third specific objective of the study was to evaluate the effects that internal business process have on supply chain performance of pharmaceutical firm. Based on the result of the regression analysis of the above model stipulated on table 4.10, internal business process has positive and significant effect on supply chain Performance (b= **0.245** with p<0.001). This result is supported by past studies. As studied by (Chih C., et al 2016; Fabio D., et al., 2015), the beginning of the value chain of the internal business process perspective is the innovation process, which clarifies the current and future customer needs. New products are developed to meet and create customer needs. Next, the operation process focuses on providing products and services to existing customers. Finally, the post-sales service process, which includes defective products and returns, is accounted for. For example, the BSC can overcome the challenge of high processing costs through the internal business perspective by having measures such as reduced order cycle time and efficient capacity utilization throughout the supply chain.

Supporting this (Brewer & Speh, 2000 and East African Breweries, 2010) stated that, improving inventory management can be achieved through measures such as inventory costs incurred in the supply chain including purchasing, holding, shortage and ordering costs. Flexibility can be achieved through measures that include how the supply chain responds to urgent orders,

forecasting demand by understanding customers and their ordering patterns. Hence, **hypothesis 3 is also accepted.**

*H<sub>4</sub>: The Firm commitment for strong ability to innovate, improve and learn will have strong supply chain performance.*

The fourth specific objective of the study was to examine the effect of innovation, learning and growth on supply chain performance of Cadilla pharmaceutical. Based on the result of the regression analysis of the above model stipulated on table 4.10, innovation, learning and growth has positive and significant effect on supply chain Performance (b= **0.325** with  $p < 0.001$ ). This means the company's ability to innovate, improve and learn leads directly the company to create supply chain value.

Bhagwat & Sharma, (2007), stated that, the processes that are related with innovation and continuous learning (learning and growth) can affect the overall efficiency of the businesses' operation.

Moreover, in the learning and growth perspective companies continuously grow and innovate to be the best in class in supply chain practices. Firms improve their capability thereby reducing wastes and ensuring flexibility through various ways. The information capital objective has measures that include information sharing which is a key driver for improving supply chain performance and enhancing competitive advantage (Li & Zhang, 2006). Hence, **hypothesis 4 is also accepted.**

Above all, The data findings analyzed shows that taking all other independent variables at constant, a unit increase in customer satisfaction leads to a 0.371 improvement in supply chain performance of Cadilla company's supply chain. A unit increase in innovation, learning and growth will lead to a 0.325 increase in company's supply chain performance. A unit increase in financial strength will lead to a 0.292 increase in company's supply chain performance. And lastly keeping other variables remain constant; a unit increase in internal business process will lead to a 0.245 increment in Cadilla's supply chain performance. It is therefore evident that the BSC measures affect the supply chain performance at Cadilla pharmaceutical.

## 4.6. Interview Result

In addition to the above analysis of descriptive and inferential statistics from company employees and distributors perspective, interview guide was prepared and conducted with production manager of Cadilla pharmaceuticals. The result of the interview analysis was organized as follows:

### 1) How do you define Supply chain management?

Answer by production manager:

- In our organization we define supply chain as inter relationship between all parties involved in our medicine production system. We divide these parties as three parts, which includes our supplier (from china and India) who supplies raw materials for us, our Company (Cadila Pharmaceutical at Gelan town near Addis Ababa) and our customers (like Baker Pharmaceutical, Pharma Birbir, Bonafied and PFSA among others). But when it comes to supply chain management each of these parties manages their own respective facilities and there is no strong chain management by separate managers or leaders.

### 2) Do you measure the performance of your Supply chain?

Answer by production manager:

- Yes we measure our supply chain performance. Per annual all of the parties involved in the medicine production system prepare its own plans basing the financial capacity, raw material availability, workforce capacity, next stage customers, demand by these customers, technological capability and etc. So at the end of the year, to measure our performance we use our plan and compare what we have planned and what we have achieved, as all these parties do.

### **3) How do you link BSC metrics with Supply chain performance?**

Answer by production manager:

- As I tried to tell you earlier, when we plan at the beginning of the year we include all valuable things that we think would enhance our overall performance. As a core components of these values external customers like distributors and internal customers like workers are the first thing we consider. Second as the company is producing medicine in three facilities (1 in Ethiopia, and 2 others in India), research and development are the core components at the company for the innovation or development of new medicines. In addition to this, suppliers are our core party as they supplies basic ingredients. All of these components are developed from change philosophies adopted by our company like, BPR, BSC, Kaizen TQM and etc. at the end of the year by basing what we have considered at the beginning we measure our performance.
- Therefore I can say that we strongly link BSC with our supply chain. But not BSC alone we use different combination of these philosophies and performance measures.

### **3) What other performance management tools do you use?**

In addition to BSC and TQM we use Gantt chart and volume of work over certain period of time.

Answer by production manager:

- We use Gantt chart as a visual aid for loading and scheduling and executing the medicine production plan from Monday through Sunday. Gantt Load chart show us the loading and idle times of departments and machines. So use Gantt chart especially to measure machine performance.

### **5) How do you evaluate the relationship with suppliers and customers?**

Answer by production manager:

- Frankly speaking we have excellent relationship with our suppliers and customers. Our suppliers are basically from India and china. In India as there are two states of art Cadilla facilities they also serve as suppliers for us. In addition to this, we also supply

some ingredients from china and we have excellent relationships with them as we share accurate information whenever needed. From customer perspective we connect with them through distributors. Until 2016 we had 4 major distributors, but from 2017 till now our distributors have increased to 16. And we have excellent relationship with our customers including newly established distributors.

**6) How do you evaluate the overall Asset Utilization of your company?**

Answer by production manager:

- In terms of asset utilization it is more or less fair. There are different internal and external factors that affect our utilization like, geographic location, knowledge gap, economic factor (currency exchange), financial policy, loan availability and etc. due to these factors we take care of our overall assets, and raw material ingredients to be dynamic with these factors. Moreover as the company has strong foothold in the African continent through our formulation facility at Addis Ababa, efficiently utilizing the scarce resource that we have is must for us to meet unmet medicine demand of the continent.

**7) Is the room for innovation open? Yes**

As the production manager of the company told us “The Company strongly focused on innovation and research”.

- “our company is present in more than 45 therapeutic areas spread across 12 specialties, including cardiovascular, gastrointestinal, analgesics, haematinics, anti-infectives and antibiotics, respiratory agents, antidiabetics and immunological.” And this standard across three facilities one in Ethiopia and 2 in india”
- He also added that: At our company research and development is the core of all our initiatives, be it Biotechnology, APIs, Formulations, Plant Tissue Culture or Photochemistry. Due to these more than 300 scientists in its various Research and development setups reinforce the competitiveness of research in the therapeutic areas which have high unmet medical needs.

Due to this, the facility meets most of the stringent quality standards across the country and continent to produce tablets, capsules, soft and hard gelatin capsules, liquids and orals.

**8) Do you have dedicated meeting time with all stakeholders of your company?**

Answer by production manager:

- Yes we have plan for discussing with our stakeholders at least once in a year. But there are different constraints like government bureaucracy and distance from suppliers. We have to inform the local government to call for meeting as there is political instability in the country.

**9) How do you evaluate the overall value maximization of your company?**

Answer by production manager:

- It is very good. In the past 5 three years our company's turnover has increased, we gained goodwill in the country's pharmaceutical industry, our product image has changed, product range has increased (as we are producing more than 45 different types of products), and employee satisfaction has increased (as we consider them as our basic asset).

## **Chapter Five: Summary of Findings, Conclusions and Recommendations**

### **5.1. Introduction**

This chapter presents the summary of the findings from chapter four, and it also gives the summary of major finding, conclusions and recommendations of the study based on the objectives of the study. The objectives of this study was to measure the extent to which the BSC is used on the supply chain performance and to validate the results of supply chain performance using survey from customer point of view at Cadilla pharmaceutical.

### **5.2. Summary of Findings**

The study established that most employees have worked at Cadilla pharmaceutical for more than 5 years. Therefore they have more insights on the use of the BSC in the organization. This shows that the company has used the BSC measures for a long time.

From financial perspective, the study confirmed that Cadilla has implemented measures such as suitable pricing policy, rate of return on investment and revenue growth for measuring their supply chain performance. This has enabled Cadilla pharmaceutical to ensure financial success of the company through improved profits and revenue. This result is supported by regression analysis, that financial measures have significant positive effect ( $b= 0.292$ ,  $p<0.001$ ) on supply chain performance of the company.

From customer perspective, it was evident from the study that using promotion to gain customers, providing better service than competitors, Delivering on time to customers, and the overall relationship that the company has with customers is used to determine the supply chain performance of the company. This finding is also supported by regression analysis. There is a significant positive relationship ( $b= 0.371$ ,  $p<0.001$ ) between customer measures and supply chain performance of Cadilla pharmaceutical. This prove the argument by Brewer & Speh (2000) who assert that the different demands, desires and idiosyncrasies of customers all along the supply chain must be understood and managed effectively.

From internal business perspective, the study also established that measuring the internal business process like setting clear strategic goals, developing supply chain system, introduction

of new product at suitable times and implementing production strategies by the company has enabled performance increment in company's supply chain. With this regard the study confirmed that measuring supply chain cycle time enabled efficiency in the supply chain of the company. This implies that delivery of products from the factory to the respective distributor's stores is done in a timely manner. This result is supported by regression analysis which revealed that there is positive and statistically significant ( $b= 0.245$ ,  $p<0.001$ ) relationship between internal business process and supply chain performance.

From innovation, learning and growth, it was also confirmed by the study that Cadilla pharmaceutical has moderately measured innovation, learning and growth measures for improving its supply chain performance. The study shows that considering measures like supplier involvement in solving problems, attracting best ideas to support company and using latest technology in research development of the company enabled performance increment in company's supply chain. This result is also supported by regression analysis. It was found that there is positive and statistically significant relationship ( $b= 0.325$ ,  $p<0.001$ ) between innovation, learning and growth with supply chain performance.

The study reveals that from independent variable measures model, the customer measure ( $t(124) = 7.748$ ,  $p < .001$ ), innovation, learning and growth ( $t(124) = 5.193$ ,  $p < .001$ ), financial measures ( $t(124) = 5.980$ ,  $p < .001$ ) and internal business process ( $t(124) = 5.599$ ,  $p < .001$ ) are all significant predictors of supply chain performance. From the magnitude of the t-statistics we can see that the customer measures had a higher impact, whereas the rest three has relatively had similar medium impact.

The result of customer/distributors survey shows that company is better in producing quality products, setting reasonable and stable price, delivering defect free products, and their products are being demand by retailers. But, in contrast to this the result shows that there are problems related to product availability, on time delivery, developing communication systems, flexibility (order response rate), providing after sale service and conducting customer satisfaction survey by the company.

The result of interview with production manger shows that, the overall value maximization by the company in the last five years is very good. The company's turnover, goodwill, product image, product range and employee satisfaction has increased in the past 5 years.

### **5.3. Conclusions**

The study concludes that Cadilla pharmaceutical has implemented and embraced the BSC measures in its supply chain.

Above all the study concludes that, using promotion to gain customers, providing better service than competitors, delivering on time to customers, and the overall relationship that the company has with customers (from customer perspective), supplier involvement in solving problems, attracting best ideas to support company, and the use of latest technology in research development of the company (from innovation, learning and growth), suitable pricing policy, rate of return on investment, and revenue growth (from financial perspective), setting clear strategic goals, developing supply chain system, introduction of new product at suitable times and implementing production strategies (from internal business perspective) are the main measures that are used in establishing performance of the supply chain at Cadilla pharmaceutical.

This shows that the objectives of product quality, overall company success, efficiency of the company in utilizing it resources (human, financial & material), reduction in total supply chain cost, relationship with other supply chain actors, and company's responsiveness to customer requirement has been moderately achieved at Cadilla pharmaceutical.

Customers/distributors confirmed that, even though there are problems with availability, on-time delivery, communication system, flexibility and after sale service, the company is better in terms of quality, price, defect free product, demand of their product and overall supply chain.

Lastly, as it can be understood from interview result that the company has been using BSC to measure it overall performance, even if they are not fully measuring the performance across the chain.

#### **5.4. Recommendations**

The study has measured and confirmed that the BSC measures are significant in enhancing supply chain performance of Cadilla pharmaceutical. As discovered from the findings of the study, levels of supply chain performance of the Cadilla pharmaceutical company is approximately moderate

Hence Cadilla pharmaceutical should give special emphasis to the improvement of the overall supply chain performance in line with its corporate and functional strategies in order to operate according to international best practices and consistently offering defect free quality products at reasonable and stable price to its customers.

The BSC perspectives and their related performance indicators are considered as a template rather than as an integral part of the overall performance measurement system in the company. This is evidenced by lower result in internal business process perspective which has resulted in lower communication system, lower response rate/in-flexibility in order response and low provision of after sales services. Therefore to overcome this problem, the proposed framework can be used to detect and evaluate specific operations and general supply chain performance enhancement efforts. In addition to this the company needs to have strong ICT infrastructure to improve their poor communication system to create better internal and external integration across supply chain partners in such a way that problems related to on time delivery and availability can be solved. The measure of order lead time should be also implemented since it measures the time it takes to respond to customers orders ensuring efficiency in the supply chain. A reduction in the order lead time leads to a reduction in the customer response time hence an efficient supply chain (Gunasekaran et al., 2001).

Even though the company is doing well in customer perspective and learning and growth, a quantifiable indicators system to evaluate the performance of dynamic supply chain is needed as it plays a central role in the day-to day operations and management of the supply chain.

It is accepted in the literature (van Veen-Dirks and Wyn, 2002; Angerhofer and Angelides, 2006 Chavan, 2009) that SCs are increasingly customer driven, that is managers pay more attention to their immediate customers and the performance measures demanded by their customers. Customer satisfaction is the only indicator that presents a high percentage of usage in all SC

roles. The results presented shows that the company is not paying attention to customer satisfaction survey to understand better customer needs. Therefore this should be the issue that company should consider.

From financial perspective the company achieved moderate performance, but they are considering only from their company perspective which will result in low overall supply chain finance. Therefore, Cadilla pharmaceutical should also embrace measures such as return on supply chain assets and cost per operation hour so as to know total capital invested in the supply chain assets such as logistical equipment and the return in terms of cash from the customers.

From internal business and innovation perspective, Cadilla pharmaceutical should also put more emphasis on product development system, since with the technology advancements and changing customer tastes and preferences; there is need for continuous product innovations and improvement

Finally, as companies that have adopted BSC appear to exhibit more effectiveness in strategic planning, improved control and increased employee motivation, and customer satisfaction, Cadilla should continue using BSC as performance measuring system in order to have a balanced outcome in all perspectives.

### ***5.5. Limitations of the Study and Suggestions for Further Research***

The findings of this study were limited to only Cadilla pharmaceutical company which will affect the generalizability of the study to other organization in pharmaceutical industries. Therefore, a comparative study can be carried out to establish the BSC measures that enhance supply chain performance in other companies in Ethiopian pharmaceutical industry. The survey method of data collection can be used. This will enable a comparison of the BSC between various companies and provide findings on which conclusions can be made. It would be beneficial to know whether a more highly developed performance measurement system leads to better performance. It would also be beneficial to know if some attributes are more important than others with respect to organizational performance.

## Reference:

- Adane Alemu (2016). Measuring Supply Chain Performance in Ethiopian Pharmaceutical Industry Using BSC Model: The Case of Addis Pharmaceutical Factory. Addis Ababa University.
- Alhyari, S., Alazab, M., Venkatraman S., & Alazab A., (2010). "Performance Evaluation of E-Government Services Using Balanced Scorecard: An Empirical Study in Jordan Applications, *International Journal of Production Research*, Vol. 45 No. 12
- Amin, E. M. (2005). Social science research: Conception, Methodology and Analysis. Kampala: Makerere University Press.
- Arik A.G., (2006). "A Balanced Scorecard Model for the Performance Measurement of Enterprise Planning Implementation". *Graduate Thesis, Middle East Technical University*.
- Aronovich, Dana, Marie Tien, Ethan Collins, Adriano Sommerlatte, and Linda Allain. (2010). "Measuring Supply Chain Performance: Guide to Key Performance Indicators for Public Health Managers". Arlington, Va.: USAID.
- Ashioya I., (2013). "The Balanced Scorecard and Supply Chain Performance: A Case of Kenya Nut Company". Master's Thesis University of Nairobi.
- Bhagwat, R. and Sharma, M. K. (2007). "Performance Measurement of Supply Chain Management: A Balanced Scorecard approach". *Journal of Computers and Industrial Engineering* Vol. 53, No. 1: pp. 43–62.
- Brewer, P.C., and Speh, T.W., (2000). "Using the Balanced Scorecard to Measure Supply Chain Performance". *Journal of Business Logistics*, Vol. 21, No. 1, 2000, pp. 87-104.
- Brewer, P.C; Speh, T.W. (2000). Using the Balanced Scorecard to Measure Supply Chain Performance". *Journal of Business Logistics*, Vol. 21, n.1, 2000
- Burns and Grove (2003). The Practice of Nursing Research. (5th ed). London: Elsevier
- Cai, J., Liu, X., Xiao, Z. and Liu, J. (2009), "Improving Supply Chain Performance Management: A Systematic Approach To Analyzing Iterative KPI Accomplishment", *Decision Support Systems*, Vol. 46, No. 2, pp. 512-521.
- Chan, F. (2003). "Performance Measurement in a Supply Chain". *The International Journal of Advanced Manufacturing Technology*, Vol. 21, No. 7, pp. 534-548.

- Chia, A., Goh, M. & Hum, S.H. (2009). “Performance Measurement in Supply Chain: Balanced Scorecard Perspective”. *Benchmarking: An International Journal*, 16(5), 605.
- Chih C., Li-Chung, Chih H., and Shi-Jer L., (2016). “A Balanced Scorecard of Sustainable Management in the Taiwanese Bicycle Industry: Development of Performance Indicators and Importance Analysis”. MDPI, Basel, Switzerland.
- Cohen, L., Manion, L. & Morrison, K. (2007). “Research Methods in Education (6<sup>th</sup> ed.)”. London: Taylor & Francis Group.
- Croome, S., P. Romano, et al., (2000). “Supply Chain Management: An Analytical Framework For Criticl Literature Review”, *European Journal of Purchasing & Supply Management*, Vol. 6, No. 1, pp. 67-83
- De Koster, M.B.M., Balk, B.M. (2008). “Benchmarking and Monitoring International Warehouse Operations in Europe”. *Production and Operations Management* 17(2), 1-10.
- Estampea, D., Lamouri, S., Paris, J. L. and Brahim-Djell, S. (2013). “A Framework for Analyzing Supply Chain Performance Evaluation Models”. *International Journal of Production Economics*, Vol. 142, No. 2, pp. 247-258.
- Fabio D., Antonella P., and Claudio A., (2015). “Development of a Framework for Sustainable Outsourcing: Analytic Balanced Scorecard Method (A-BSC)”. *Open access. Sustainability* 2015, 7, 8399-8419; doi: 10.3390/su7078399 ISSN 2071-1050. [www.mdpi.com/journal/sustainability](http://www.mdpi.com/journal/sustainability).
- Galankashi, M. R., Memari, A., Anjomshoae, A., Ma’aram, A., & Helmi, S. A., (2014). “Selection of Supply Chain Performance Measurement Frameworks in Electrical Supply Chains”. *International Journal of Industrial Engineering and Management*, 5(3), 131–137.
- Garson,E(2006). Hand book of research methods in public administration
- Gay, R., Mills, G. & Airasian, P. (2009). “Educational Research: Competencies for Analysis and Application (9th ed.)”. Upper Saddle, NJ: Prentice Hall.
- Githinji S. (2010). “Logistics outsourcing and supply chain performance: A survey of universities in Nairobi County”. *Unpublished MBA Project*, University of Nairobi.
- Guansekaran, A., Patel, C. and Tirtiroglu, E., (2001). “Performance Measures and Metrics in a Supply Chain Environment”. *International Journal of Operations and Production Management*, 21, 71–87.

- Gunasekaran et al. / *Int. J. Production Economics* 87 (2004) 333–347.
- Gunasekaran, A., & Kobu, B. (2007). “Performance Measures and Metrics in Logistics and Supply Chain Management: A Review of Recent Literature (1995–2004) For Research and Applications”. *International Journal of Production Research*, 45(12), 2819-2840.
- Gunasekaran, A., Patel, C. and Tirtiroglu, E. (2001), "Performance Measures and Metrics in A Supply Chain Environment", *International Journal of Operations & Production Management*, Vol. 21, No. 1/2, pp. 71-87.
- Hasan B., Zulkifli M., Malak T., Nizaroyani S., (2016). “Performance Measurement of Water Desalination Supply Chain Using Balanced Scorecard Model”. *International Journal of Engineering and Technology (IJET)* Vol. 8 No 1 Feb-Mar 2016.
- Kaplan, R. S. and Norton, D. P. (1992), "The Balanced Scorecard – Measures That Drive Performance". *Harvard Business Review*, January-February, pp. 71-99.
- Kaplan, R. S. and Norton, D. P. (1996), "Strategic Learning and the Balanced Scorecard: Strategy and Leadership", Vol. 24, No. 5, pp. 18 - 24.
- Karthikeyan Lenin. (2014). Measuring Supply Chain Performance in the Healthcare Industry. *Science Journal of Business and Management*. Vol. 2, No. 5, 2014, pp. 136-142.
- Leedy, PD. & Ormrod, JE. (2001). *Practical Research: Planning and Design*. (7<sup>th</sup> ed.). New Jersey: Prentice-Hall.
- Lubna Ibrahim Al-Ghazi (2014). The Effect of Knowledge Management on Organizational Performance Using the Balanced Scorecard Perspectives (*Jordanian Private Hospitals in the City of Amman: A Case Study*). Middle East University.
- Machado R., (2013). Supply Chain Management: “Survey in the Brazilian Pharmaceutical Industry”. *International Conference on Industrial Engineering and Operations Management*. Valladolid, Spain.
- Meenakshi Srivastava et al (2013). *Global Journal of Management and Business Studies*. ISSN 2248-9878 Volume 3, Number 9 (2013), pp. 999-1006.
- Meyer, J.P., Becker, T.E., & Vandenberghe, C. (2004). Employee Commitment and Motivation: A Conceptual Analysis and Integrative Model. *Journal of Applied Psychology*, Vol.89, 991–1007.
- Shah N., (2004). *Computers and Chemical Engineering* 28 (2004) 929–941

- Neely, A., Gregory, M. and Platts, K., (1995). “Performance Measurement Systems Design: A Literature Review and Research Agenda”. *International Journal of Operations & Production Management*, 15: 4, 80-116.
- Paddeu, D. (2016). How Do You Evaluate Logistics and Supply Chain Performance? A Review of the Main Methods and Indicators. *European Transport/Trasporti europei*, 61 (4). pp. 1-16. ISSN 1825-3997 Available from: <http://eprints.uwe.ac.uk/335>.
- Parahoo K. (2006). “Nursing Research: Principles, Process and Issues (2nd ed.)”. Palgrave Macmillan, Houndmills Basingstoke.
- Park, J.H., Lee, J.K., & Yoo, Y.S. (2005). “A Framework for Designing the Balanced Supply Chain Scorecard”. *European Journal of Information Systems*, Vol. 14 No. 4
- Patton, M. Q. (2002). “Qualitative Research and Evaluation Methods”. Thousand Oaks, CA: SAGE Publications, Inc.
- Petterson, J. (2009). “Defining Lean Production: Some Conceptual and Practical Issues”. *TQM Journal*, 21(2), 127-142.
- R. S. Kaplan and D. P. Norton, (1992). “The balanced scorecard-measures that drive performance,” *Harvard Business Review*., Vol. 70, 1992, No. 1, pp. 71-79.
- Radhakrishna, R.B. (2007). “Tips for Developing and Testing Questionnaires/Instruments” *.Journal of Extension*, 45 (1), Available @www.joe.org.
- Sekaran, U. & Bougie, R. (2010). “Research Methods for Business: A Skill Building Approach (5<sup>th</sup> ed.)”. *Chichester: John Willey & Sons Ltd.*
- Sekeran ,(2003) Research methods for business p.70
- Sezen, B. (2008). “Relative Effects of Design, Integration and Information Sharing on Supply Chain Performance”. *Supply Chain Management: An International Journal*, 13(3), 233-240.
- Shepherd, C. and Günter, H.( 2006). “Measuring Supply Chain Performance: Current Research and Future Directions”. *International Journal of Productivity and Performance Management*. 55(3/4), 242 - 258.
- Sillanpaa, Ilkka, (2010). “Supply Chain Performance Measurement in The Manufacturing Industry. A Single Case Study Research to Develop a Supply Chain Performance Measurement Framework”. *University of Oulu, Faculty of Technology, Department of*

*Industrial Engineering and Management, P.O.Box 4610, FI-90014 University of Oulu, Finland Acta Univ. Oul. C 374, 2010 Oulu, Finland.*

- Stank, M., Moonen, H., Popova, V. & Krauth, E., (2001). “Performance Indicators in Logistics Service Provision and Warehouse Management –a Literature Review and Framework
- Starmass,(2007) Research on market readiness for fashion brand entry
- Susarla, N., & Karimi, I. (2012). “Integrated Supply Chain Planning for Multinational Pharmaceutical Enterprises”. *Computers & Chemical Engineering*, 42, 168-177
- Tompkins J, Ang D. (1999). “What Are Your Greatest Challenges Related To Supply Chain Performance Measurement?” *IIE Solutions* 1999; 31(6):66.
- TraceyM, Vonderembse MA, Lim JS. (1999). “Manufacturing Technology and Strategy Formulation: Keys to Enhancing Competitiveness and Improving Performance”. *Journal of Operations Management* Vol.17 (4):411–28.
- Tseng, M.; Lim, M.; Wong, W.P., (2015). “Sustainable Supply Chain Management: A Closed-Loop Network Hierarchical Approach”. *Ind. Manag. Data Syst.* **2015**, 115, 436–461.
- Van Der Vorst, J. et al. (2006). “Logistics Orchestration in the Ornamental Plant Supply”. *Wegeningen University Position Paper FloriLog-regle WP-II, [online] (accessed 25 February 2018) available from: <http://library.wur.nl/WebQuery/clc/1888451>.*
- Wang, Y. (2011). “Research on Performance Evaluation of Supply Chain Based on Improved BSC”. *In Proceedings of the International Conference on Transportation, Mechanical, and Electrical Engineering*, TMEE, Changchun, China, 16–18 December 2011; pp. 212–215.
- Wondimienh Sewuye (2013). “Supply chain management practices of Pharmaceuticals Manufacturing Companies of Ethiopia: The Case of Ethiopian pharmaceuticals manufacturing Share Company”. Addis Ababa University.
- Yan H., and Yang Z., (2013). Supply Chain Dynamic Performance Measurement Based on BSC and SVM. *IJCSI International Journal of Computer Science Issues*, Vol. 10, Issue 1, No 2, January 2013 ISSN (Print): 1694-0784 | ISSN (Online): 1694-0814 [www.IJCSI.org](http://www.IJCSI.org).

## **Appendix**

### Appendix 1- Consent form

***ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE***

***DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMEN***

Greetings!

My name is Yenesew Shambel. I am conducting a study on “*Measuring Supply Chain Performance using BSC model: the case of Cadilla Pharmaceuticals*” for the partial fulfillment of master’s degree in logistics and supply chain management at Addis Ababa University, School of commerce. The information that will be collected from this research project will be kept confidential. Taking part in this study you will contribute towards alleviating the problem of poor Measuring system of supply of medicines.

If you are willing to participate in our project, you need to understand and sign the Consent form. Then, you will be asked to give your response to the data collector. If you have any question you can contact following individual and you may ask at any time you want.

Yenesew Shambel: Addis Ababa University

Tel: +251 912 065547

E-mail: yenesew72@yahoo.com

**PART I: General Information and Demographic Background of Respondents in the Selected Samples of Facilities.** Please choose one oval that best describes you.

1. Gender

1.1 Male

1.2 Female

2. Age

2.1 Less than 25 Years

2.4 45-54 Years

2.2 26-34 Years

2.5 Over 54Years

2.3 35-44 Year

3. Educational Background

3.1 Certificate

3.4 MSc/ MA

3.2 Diploma

3.5 Other Specify \_\_\_\_\_

3.3 BA/BSC Degree

4. Profession of in-charge/coordinator/

4.1 Pharmacist

4.3 Logistics and supply chain

4.2 Chemist

4.4 Other Specify \_\_\_\_\_

5. How many years have you been employed in the pharmaceutical sector?

5.1 1-5 Years

5.3 11-15 Year

5.2 6-10 Years

5.4 Over 15 Year

**Part III. Questionnaire for Cadilla Employees regarding SCP from BSC Perspective**

1) To what extent does your company measure the following financial measures to evaluate its supply chain performance in the last five years?

No	Financial measures	To very lower extent (1)	To lower extent (2)	neutral (3)	To higher extent (4)	To very high extent (5)
1	Revenue growth					
2	Rate of Return on investment					
3	Cost saving initiative					
4	Cash flow					
5	Working capital management					
6	Clear Financial goals					
7	Suitable pricing policy					
8	Sales					
9	Profit margins					
10	Overall cost the company					

If there are other measures please specify: \_\_\_\_\_

2) To what extent does your company measure the following customer satisfaction measures to evaluate its supply chain performance for the last five years?

No	Customer perspective	To very lower extent (1)	To lower extent (2)	neutral (3)	To higher extent (4)	To very high extent (5)
1	Concern to customer					
2	customer order fulfillment					
3	assessment of customers satisfaction					
4	providing after sales support to customers					
5	providing better service than competitors					
6	using promotion to gain customers					
7	Delivering on time to customers					
8	overall relationship with customers					

If there are other measure please specify:  
\_\_\_\_\_

3) How do you measure the following internal business measures to measure the supply chain performance of the company for the last years?

No	<b>Internal business measures</b>	To very lower extent (1)	To lower extent (2)	neutral (3)	To higher extent (4)	To very high extent (5)
1	supply chain systems development					
2	setting clear strategic goals					
3	competent employees					
4	production strategies implementation					
5	introducing new products in suitable time					
6	internal processes that aim to reduce logistics, inventory, warehouse and transportation					
7	resources used to receive and supply goods					
8	company concern about experience sharing with suppliers					
9	strategic alliances with supply chain actors					
10	Total supply chain cycle time					

If there are other measures please specify: \_\_\_\_\_

4) How do you measure the learning and growth measures to measure the supply chain performance of the company for the last years?

No	<b>Innovation, learning and growth measures</b>	To very lower extent (1)	To lower extent (2)	neutral (3)	To higher extent (4)	To very high extent (5)
1	suitable training programs					
2	developing innovation capabilities					
3	creative ideas to develop supply chain performance					
4	company concern about adding value to employees					
5	partnership with suppliers in knowledge transfer					
6	company concern about experience sharing with suppliers					
7	clear company culture					
8	using latest technology for R&D					

9	attracting best ideas to support company					
10	supplier involvement in solving problems					

If there are other measures please specify:

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**Part IV: Questionnaire for distributors**

1) To what extent does your company evaluates the supply chain performance of Cadilla pharmaceuticals?

N o	External customer satisfaction survey	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
		1	All products produced by the company are available all the time in market			
2	The products manufactured by Cadilla fulfills your need in terms of quality					
3	All products produced by the company are requested by retailers					
4	the prices of the products produced by Cadilla is reasonable					
5	the prices of the products produced by Cadilla are not volatile					
6	the company delivers request products on time					
7	The company has good system of communication					
8	the company responds quickly to your order					
9	the company informs any product defect after sales					
10	The company provide after sale services					
11	the company collects poor quality products from your store					
12	the company conducts survey to measure the level of satisfaction					
13	the company's overall supply chain performance is good					

If there are other measures please specify:

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5) What is your view for the following supply chain performance measures?

No	Measures	Significantly decreased (1)	Decreased(2)	The same as before(3)	Increased(4)	Significantly increased (5)
1	The company clearly communicates its goals and strategies to employees					
2	Efficiency of the company in utilizing its resources (human, financial and material)					
3	Position among competitors in terms of supply					
4	Relationship with other supply chain actors					
5	Information exchange within the supply chain					
6	Profit compared to competitors					
7	Reduction in total supply chain cost of the company					
8	The quality of Cadilla products					
9	Company responsiveness to customer requirement					
10	Overall company successes					

Source: Adapted from Adane Alemu (2016)

## **Part II: Questions for Top Management of Cadilla pharmaceuticals**

- 1) How do you define Supply chain management?
- 2) Do you measure the performance of your Supply chain?
- 3) How do you link BSC metrics with Supply chain performance?
- 4) What other performance management tools do you use?
- 5) How do you evaluate the relationship with suppliers and customers?
- 6) How do you evaluate the overall Asset Utilization?
- 7) Is the room for innovation open?
- 8) Do you have dedicated meeting time with all stakeholders of your company?
- 9) How do you evaluate the overall value maximization of your company?