



ADDIS ABABA UNIVERSITY

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

MEASURING SUPPLY CHAIN PERFORMANCE IN ETHIOPIAN
PHARMACEUTICAL INDUSTRY USING BSC MODEL: THE CASE OF ADDIS
PHARMACEUTICAL FACTORY

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By
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A Thesis Submitted to Addis Ababa University School of Business and Economics in Partial
Fulfillment of the Requirements for the Degree of Masters of Art in Logistics and Supply Chain
Management

Advisor
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May, 2017

Declaration

I, the under signed, declare that this thesis entitled “*Measuring Supply chain Performance in Ethiopian Pharmaceutical Industry Using Balanced Scorecard Model: The Case of Addis Pharmaceutical Factory*”, 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:

Adane Alemu Gebru

Date & Signature

Statement of Certification

This is to certify that the thesis carried out by **Adane Alemu** on the topic entitled: “*Measuring Supply chain Performance in Ethiopian Pharmaceutical Industry Using Balanced Scorecard Model: The Case of Addis Pharmaceutical Factory*” 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)

Date & Signature

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This is to certify that the thesis carried out by **Adane Alemu Gebru**, entitled: “*Measuring Supply chain Performance in Ethiopian Pharmaceutical Industry Using Balanced Scorecard Model: The Case of Addis Pharmaceutical Factory*” 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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List of Acronyms

APF-Addis Pharmaceutical Factory

BSC-Balanced Score Card

FMOH-Federal Ministry of Health

PFSA-Pharmaceuticals Fund and Supply Agency

R&D- Research and Development

SCM-Supply Chain Management

SCPM-Supply Chain Performance Measurement

SC-Supply Chain

WHO-World Health Organization

ABSTRACT

The objective of this research is to measure the supply chain performance of pharmaceuticals manufacturing companies of Ethiopia by studying the supply chain performance of Addis pharmaceutical factory as a unit of analysis. Descriptive and quantitative methods of research were used and data were collected by interview questions, document review and questionnaires. Document review was conducted to study especially the financial performance as factual data was needed. The performance of the supply chain was measured using balanced score card model. Based on questionnaires data were collected from employees of Addis pharmaceutical factory and distributors to measure the supply performance of APF.

The findings of the study suggested that financial, learning and growth and customer perspectives have statistically significant result. Generally, the study findings have suggested that the levels of supply chain performance is approximately moderate in the case of Addis pharmaceutical factory in terms of the four dimensions. It has also discovered that, among the four performance measurement dimensions financial perspective is comparatively in a better position in the company. From the survey conducted and filled by customers, It was found also that the company did not respond to customer orders, have no good communication system and the company does not conduct customer survey to evaluate customer satisfaction level. The study advocated that a lot of emphasis need to be directed to customer perspective and learning and growth perspective in order to achieve customer satisfaction and employee learning and growth through efficiency or productivity, consequently improving the organizational performance as a whole.

Key words: supply chain performance, Balanced score card

Chapter One: Introduction

This topic begins with a brief background to the study, which leads to an introduction of the case company, Addis Pharmaceutical, statement of the problem of the study, question and objective of the study will then be presented.

1.1 Background of the Study

The supply chain is the network created among different companies that produce, handle, and distribute a specific product (Susarla & Karimi, 2012); in the current study, the product being investigated is pharmaceutical medicine.

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 labelling of finished products or repackaging of bulk finished products. (WHO AFRO, SADC, 2005).

The company under study produces the Secondary pharmaceutical products by sourcing the primary raw materials (API and Excipients) mostly from China and India.

1.2 Background of the organization

Addis pharmaceutical factory was established in 1996 as a company by Endowment Fund For Rehabilitation of Tigray. In 2016 the company reorganized as a joint venture company of EFFORT and England Origin Company called 54 company. Currently the company has been manufacturing more than 91 high quality pharmaceutical products of different therapeutic categories including Antibiotics, Gastro-intestinal drugs, Central Nervous system drugs, Cardiovascular drugs, antidiabetic agents, Antihistamines & Anti allergic, Anthelmintics, analgesics, Antiprotozoals, Respiratory drugs, dermatologicals and Minerals & Vitamins and Large volume Parenterals; in various dosage forms.

The company has more than nine production lines and fully equipped laboratories as well as utilities capable of producing tablets, capsules, syrups/suspensions, dry powders for reconstitution, injectable vials, liquid injectable ampoules, creams and ointments which can generally be

categorized as Non--Lactam products [Tablets, Capsules (General), Syrups/Suspensions, Ampoules (Sterile), Ointment (sterile)] and -Lactam products [Vials (Sterile), Capsules and dry powders for reconstitution]. The -Lactam products are manufactured in dedicated lines, whereas other non- -Lactam products are manufactured on a campaign basis in other manufacturing lines.

The company supplies all of its finished Products to the local market using both private and state-owned intermediaries (Pharmaceutical Fund and Supply Agency, PFSA). The latter accounts for 70% of total demand, and distribute the products to government hospitals and health centers (Sutton and Kellow, 2010).

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. This study addresses this gap by describing a methodology 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.

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 that only focuses on financial measures. Supply chain activities like sourcing, producing, inventory and distribution and the associated factors that affect the ability of supply chain performance and meet the maximum service level provided by the company. 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).

It is thus critical to measure the performance of the current supply chain in the pharmaceutical manufacturing industry of Ethiopia , the study focused on measuring the performance of each activities of the supply chain that influence supply chain performance of pharmaceutical factory, because the company now follows the traditional aspect of performance measures.

1.4 Research Questions.

- 1) To what extent is the company's supply chain performance measured?
- 2) What is the level of SC performance of Addis Pharmaceutical Factory?

1.5 Objective/Aim of the Study

1.5.1 General Objective

The main objective of this study was to measure the performance of supply chain of pharmaceutical Industry.

1.5.2 Specific Objective

- ✓ 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 learning and growth perspective

1.6 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 Addis 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 have 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.

1.7 Scope of the study

The scope of the research is APF and only addresses the Performance from BSC perspective.

The study did not include the supplier's supplier and the ultimate customer of the product due to time and budgetary constraints. This study did not include the view of end customers (patients) and employees who have no knowledge of BSC

1.8 Organization of the study

The study is organized in to five chapters. Chapter-one presents the introductory part of the study that comprises, among others, the background 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 extant literature related to the topic of inquiry; whereas chapter-three gives detail account of the design and methodological aspects employed.

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

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

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Chapter Two: Review of the Related Literature

2.1 Introduction

This chapter reviews relevant literature on the key areas that the study covers. This chapter presents the theoretical underpinnings of the study. With a focus on the objectives and theoretical thresholds of this study, the chapter reviews related and contemporary literature on the concept of supply chain performance using Balanced score card model. The chapter examines various research studies and reports done locally (Ethiopia), regionally (Africa) and globally.

2.2 Theoretical Review

2.2.1. Supply Chain Management Defined

SCM business concept has been a famous topic for many researchers. Each researcher has several ways to define SCM. SC is described as a chain linking each element from customer and supplier through manufacturing and services so that the flow of material, money and information can be effectively managed to meet the business requirement. (Stevens 1989) Aitiken (2005) defines SCM as following (Aitken *et al.* 2005): *The supply chain is defined as the network of connected and interdependent organizations that work together to enable the flow of products into markets, whereas a "pipeline" is defined as the specific operational mechanisms and procedures that are employed to service specific product/market contexts.*

SCM emphasizes both the overall and long-term benefit for all parties in the SC through cooperation and information sharing. Simchi-Levi *et al.* (2004) define SCM as (Simchi-levi *et al.* 2004):

A set of approaches used to efficiently integrate suppliers, manufacturers warehouses and stores so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time in order to minimize system-wide costs while satisfying service-level requirements.

SCM is generally considered to involve integration, coordination and collaboration across organizations and throughout the supply chain (Stank *et al.* 2001). Naylor (1999) defines supply chain as following (Ben Naylor *et al.* 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.*

2.2.2. Pharmaceutical supply chain

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.

Pharmaceutical supply chain is a network of supplier, manufacturing, distribution and logistics facilities of various pharmaceutical products.

2.3. Empirical Review

2.3.1. Supply chain practices in Ethiopia

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. In another sector Biruk (2014) tried to measure the performance of SCM in metal and engineering industries. The result of the study shows that the implementation of measuring the SCM in this industry is weak. Also the SCM practices don't have any relationship with organizational performances except internal lean practices. In addition, Belay, (2011) studied the practices of SCM in cement industries. The result of the thesis shows similar to other industries in the country i.e. the practice of SCM in cement industry is almost poor.

Mesfin (2007) also studied the SCM and model development study as a case study of Mesfin Industrial Engineering plc. The result of this study shows that most of the employees of the company don't have awareness of SCM. The company also don't use supply chain cost analysis rather than using the traditional accounting system.

Based on the assessment of FMOH for monitoring and evaluation of national drug policy, there was only one local pharmaceutical manufacturing plant in 1993 G.C that is owned by the government. Currently, drug production activity is being under taken by 13 local pharmaceutical manufacturing plants: One government owned, eleven private (unaffiliated with multinationals)

and one private (affiliated with multinationals). Three of the factories are engaged in medical supplies production, one on empty gelatin capsule production and nine on finished product formulation using imported raw materials (FMOH, 2003).

According to Sutton and Kellow (2010), and different experts the pharmaceutical supply chain of Ethiopia have two wings. The first is addressing those of the public health facilities through PFSA. The second is addressing the private health facilities through different importers, wholesalers and also PFSA to some extent. PFSA was established in 2007 based on pharmaceutical logistics master plans implementations designed by FMOH. The mandate of PFSA is; it is a sole provider of forecasting, procurement, storage, inventory management and distribution of pharmaceuticals to the public health sector in Ethiopia. PFSA's current supply chain starts with the import of most drugs via the port of Djibouti and purchasing from local manufactures. These products are then trucked into central PFSA based in Addis Ababa, before being distributed to the various distribution centers (Hubs) and on to the hospitals and health centers. Recently PFSA has established pull system known as integrated pharmaceutical logistics system primarily using the essential data items reported from health facilities regularly every other month. Using its 11 distribution centers (Hubs), PFSA will distribute drugs and supplies to public health facilities throughout the country (PFSA, 2012).

2.3.2. Supply Chain Performance

According to Chan (2003) performance measurement describes the feedback or information on activities with respect to meeting customer expectations and strategic objectives. The purpose of a performance measurement system is to ensure that standards and objectives are set clearly, performance is regularly and objectively assessed for accomplishments, and that actions are taken to improve and enhance performance potential in the future (Ababneh, 2008). The basis of competition for winning companies in today's economy is supply chain superiority (O'Marah, 2000). With organizations seeking benefits of shorter lead times, responsiveness, flexibility and shorter product development cycles, excellence in supply chain performance is inevitable.

Alazab A., Alhyari, Alazab M. and Venkatraman, (2010) found that a good performance measurement system should be able to provide to all stockholders where they are, how the organization is doing and where the organization is going. Measuring supply chain performance can therefore facilitate a better understanding of the supply chain, positively influencing supply

chain partners and improving its overall performance (Chen & Paulraj, 2004). Supply chain performance measurement systems are essential for better decision making by management and good communication across the entire supply chain including supply chain partners and employees. Performance measures enable a more open and transparent communication between people leading to a co-operative work environment hence improved organizational performance (Gunasekaran & Kobu, 2007).

Performance measurement systems are also necessary tools required to support decision making (Berrah & Cliville, 2007). Moreover, supply chain measurement systems ensure timely feedback of information enabling the organization to correct or improve processes in the supply chain. Performance measurement provides information for management feedback for decision makers thereby assisting in directing management attention revising company goals and re-engineering business processes (Thakar, Marwah & Gupta, 2012).

2.3.3. Balanced Scorecard

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. However, if a company takes action by linking their performance measurement system to their supply chain practices, they will be in a better position to achieve their supply chain initiatives (Brewer & Speh, 2000). In order to achieve such competitive advantages for a company, Brewer and Speh (2000) developed a 'modified balanced scorecard' which aims for being competitive in the future. The key of the model is the linkage between supply chain management and the balanced scorecard (see figure 2.4). Brewer and Speh (2000) found four essential supply chain management areas: Supply chain management goals: The essence of supply chain management goals is that waste reduction and enhanced supply chain performance come only when there is high integration, sharing and cooperation between internal and external supply chain processes. Therefore companies must foster a high coordination and integration of internal functions and the external participants of a

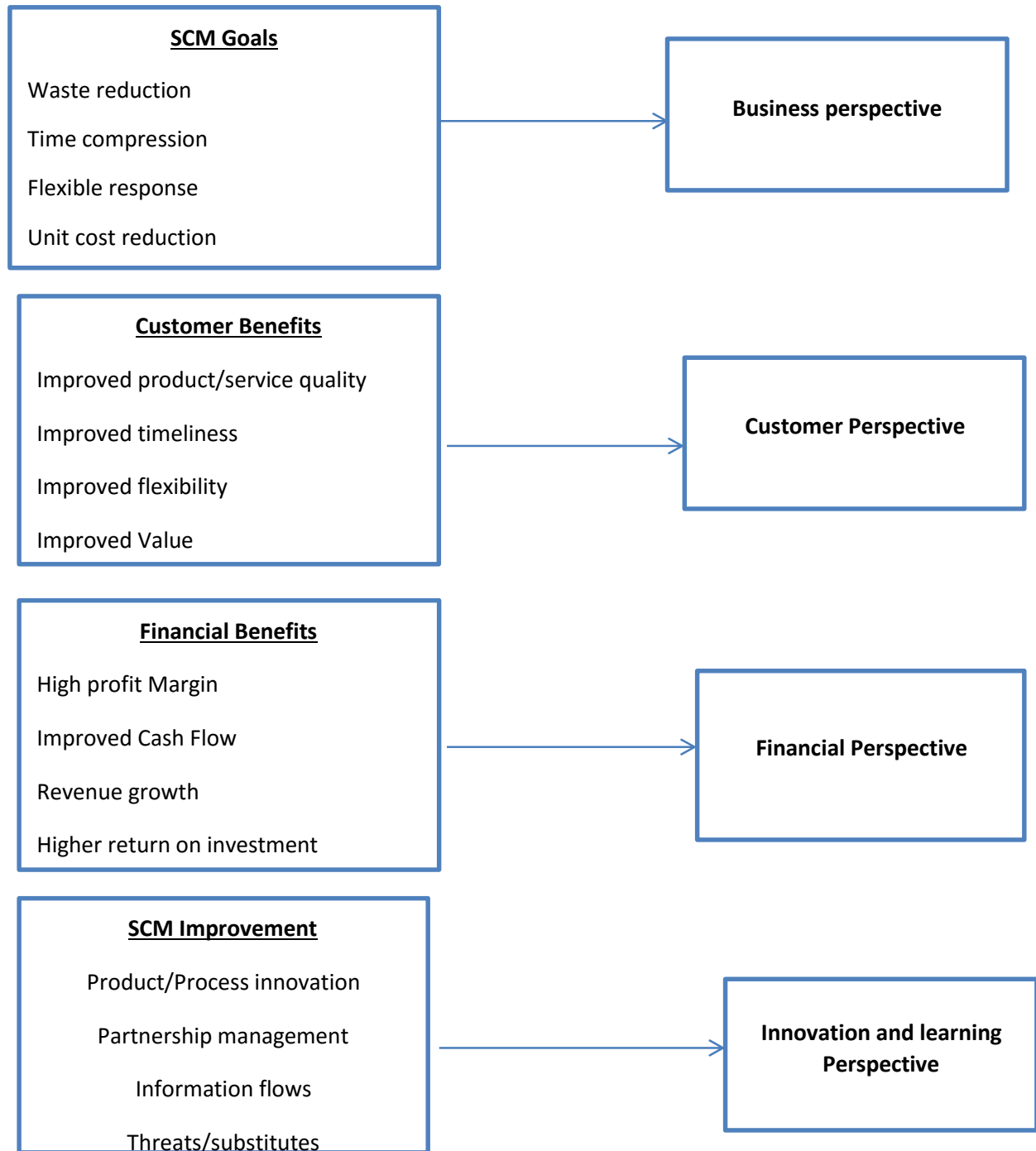
supply chain. These goals of supply chain management include waste reduction, time compression, flexible response and unit cost reduction. Waste reduction is achieved, for example, through minimizing duplication, harmonizing operations and systems, and enhancing quality. Time compression is focusing on reducing order-to-cycle time through accomplishing production and logistics in shorter times to save costs. The next objective, flexible response, stresses the point of flexible actions towards order handling or demand variation. The final objective, unit cost reduction, aims at reducing the costs per unit for the customer, for example, by reducing the logistics costs of a product (Brewer & Speh, 2000). Customer benefits:

If the supply chain achieves its goals which have been discussed previously, it will eventually create benefits for the customer. Generally these achievements should be passed on to the customer, but it needs to be known to which extent the customer realizes these benefits and what factors force that realization. Thus it is an objective to know the different demands and desires of customers all along the supply chain and effectively manage those (Brewer & Speh, 2000).

2.3.4. Linking Supply Chain Management to Balanced Score card

Supply chain Management

Balanced Score Card



Source: Brewer and Speh (2000, p.85)

2.3.5. Financial benefits:

If supply chain management goals are achieved and the benefits flow down to the customer, financial success should be experienced. The best-known financial benefits are lower costs, leading to higher profit margins, enhanced cash-flow, revenue growth and higher rate of return on assets. Therefore the financial benefits are closely dependent on the previous two areas (Brewer & Speh, 2000).

2.3.6. Supply chain management improvements:

This area adds a dynamic element to the framework by accounting the fact that companies need to continuously learn and innovate for their future. Companies thereby need to continuously improve their processes by redesigning processes and products, by sharing knowledge between the supply chain partners, by continuously improving the information flows, and by exploring new threats or substitutes affecting the value delivered to the customer (Brewer & Speh, 2000). Taking these areas of supply chain management into account, the areas were then adapted to the balanced scorecard approach with the following perspectives of measurement:

2.3.7. Business Processes:

There are many examples for business performance measures. The measures for this modified approach vary depending on the company. Alternatives could be supply chain cost of ownership measuring purchasing costs, inventory costs, poor quality or delivery failure. Other suggested measures are supply chain efficiency, number of choices, average response time or percentage of supply chain target costs achieved. It is important to recognize that all these measures intend to measure the performance of the whole supply chain (Brewer & Speh, 2000).

2.3.8. Customer measures:

Under the same setting as previously described, measures for customers might be number of contact points, relative customer order response time, customer perception of flexible response and customer value ratio. The intent of these measures is to measure and monitor improvement of customer service of a supply chain over a certain time period (Brewer & Speh, 2000).

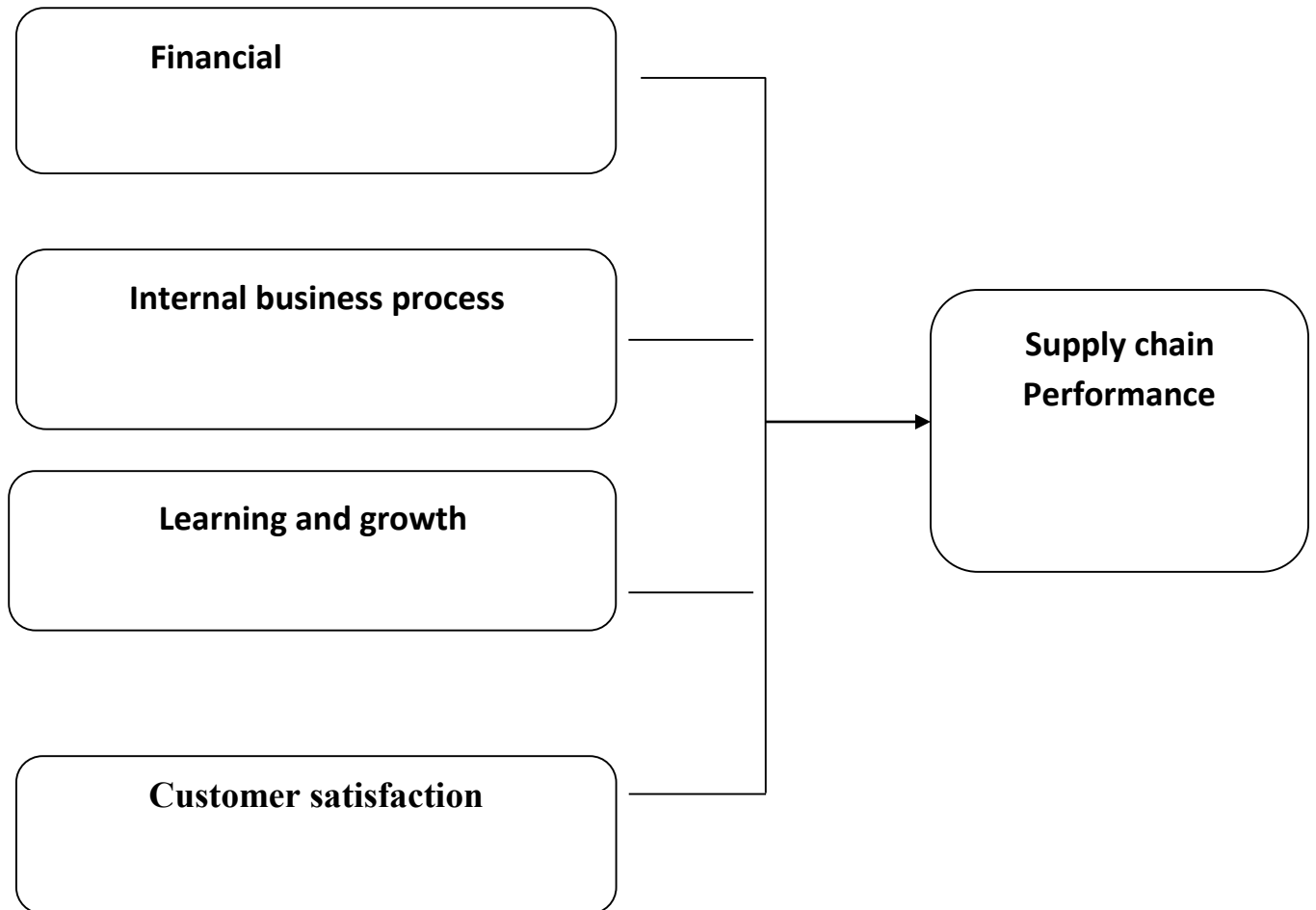
2.3.9. Innovation and Learning:

These measures focus on the inter-organizational innovation and learning. The measures could be product finalization, product category commitment ratio, number of shared data sets per total data

sets or performance trajectories of competing technologies (Brewer & Speh, 2000). Considering these perspectives Brewer and Speh created their modified balanced scorecard model.

As the system is implemented, dialogues evolve among the participants of the supply chains to further develop new measures when using this supply chain performance measurement system. Applying this model can thereby achieve measurement of the objectives of supply chain management from a holistic point of view, while gaining competitive advantage through a better control and the possibility of constant improvements (Brewer & Speh, 2000).

2.4. Conceptual framework



Source: adopted by researcher from Brewer and Speh

Chapter Three: Research Methods

3.1 Introduction

The purpose of this study is to measure performance of supply chain management of pharmaceutical industry using Key Performance indicators of BSC and identify the performance and come up with the finding and recommendation on the best practices and.

3.2 Research design

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. The research design employed under this study is a mix of quantitative and qualitative. It describes the result of performance measurement and customer satisfaction.

According to Mark et al. (2009:101) mixing qualitative and quantitative approaches gives the potential to cover each method's weaknesses with strengths from the other method. In this study, a combination of qualitative and quantitative approaches of doing research will be employed, which has been practiced, as recommended by Creswell (2009:203-216).

The finding and conclusion of the study depends on the fully utilization of statistical data collection and analysis.

3.2.1 Sample size and Sampling method

3.2.1.1 ADDIS PHARMACEUTICAL FACTORY

Data was collected both from primary and secondary sources. Primary data collected by conducting interviews with the procurement manager and top management about performance of suppliers and purchasing policy of the company. Structured questionnaires were used to measure the supply chain performance and employees from different department's selected using purposive sampling were asked to collect the data.

3.2.1.2 Distributors

PFSA is the main distributor of APF's for public health facilities and different wholesalers for private health facilities. The study area is in Addis Ababa since most of the distributors are found in Addis Ababa. Since majority of the firm's products are procured by PFSA, PFSA was selected for the study by purposive sampling. Regarding private distributors (wholesalers) 50 active customers were selected.

3.3 Sources and tools for data collection

There are two types of data i.e. primary and secondary data that were used in the study. The primary data that was collected are by using interviews and questionnaires. Using interview questions the data were collected from APF procurement manager, marketing and sales Manager and commercial DGM. Procurement manager was interviewed to get data regarding suppliers' relations and response in availing raw materials. Questionnaires were used to collect primary data from 60 employees of different departments and 50 wholesalers and 10 PFSA employees.

Moreover In order to improve my study and strength my findings, articles, academic journals, and useful texts were used from different sources, such as library, journals, academic books and relevant documents from the factory and concerned government bodies of the industry.

3.4 Procedure of data collection

The procedure for the data that was collected using questionnaires was first the respondents are communicated to get their consent. Once their consent was known, the prepared questionnaires are distributed to each participant by appreciating their participation and devoting their precious time for the research. The questionnaires were collected by checking the completeness of the data. Finally the activities were accomplished by appreciating the respondents.

The data that was collected using structured interview; first the interviewees were communicated and appointment was arranged to take the interview. The interviews were started by appreciating the interviewee for giving their precious time. When the respondents are ready, questions were forwarded accordingly.

3.5 Test Reliability

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

et al., (2012), the aim of reliability analysis is to find the extent to which a measurement procedure produced the same result if the process is repeated over and over again under the same conditions. The most common technique used in the literature to assess the scales reliability and stability is use of the Chronbach Alpha Statistics. Chronbach Alpha should be above 0.70 to produce a reliable scale and any scale with Chronbach Alpha less than this standard should be eliminated Sekaran (2005).

Table 3.1 Cronbach's alpha

	Variables	Cronbach's alpha	No of items
1	Financial measures	.833	11
2	Customer perspective measures	.910	14
3	Internal business measures	.944	15
4	Learning and growth measures	.915	16
5	Supply chain performance measures	.778	10

Source: own survey result 2017

Chapter Four: Data Analysis, Result and Discussion

4.1 Results/Findings of the Study

4.1.1 Introduction

In this part the data that were collected using interview, questionnaires and document review are presented. The data were important to measure the SCM performance of APF using the BCS model and view of customers about the supply chain performance of the focal firm. The findings and results are helpful to forward recommendations. Interviews were used to collect data from procurement manager, commercial manager and marketing and sales Manager of APF. Questionnaires were used to collect the data from different employees of the company in the supply chain and active customers or distributors of APF's products. In addition, documents were reviewed to measure the SC performance of the company. The results are organized as follows.

4.1.2 Demographic characteristics

Observing the demographic trend or characteristics of our sample population before starting the data analysis is useful to make the analysis more meaningful for the reader. This part of the questionnaire requested limited amount of information related to personal and demographic status of respondents.

The importance of demographic examination in this research is to describe the characteristics of the sample, like proportion of male and female, profession and educational background and experience of respondents in the pharmaceutical sector. Accordingly these variables are summarized and described in tables shown below.

Table 4.1 Respondents Demographic Information

Item	Category	Frequency	Valid percent
Sex	Male	90	75%
	Female	30	25%
	Total	120	100
Age	<25 years	25	20.84

	26-34 years	61	50.84
	35-44 years	31	25.84
	45-54 years	3	2.50
	Total	120	100
Educational background	Diploma	45	37.5
	BA/BSC	70	58.34
	MSC/MA	5	4.17
	Total	120	100
Profession	Pharmacist	50	41.67
	Chemist	10	8.34
	Logistic and supply chain	22	16.7
	Others	38	31.67
	Total	120	
Work experience in pharmaceutical sector	1-5 years	30	15.0
	6-10 years	67	70.0
	11 years and above	23	15.0
	Total	120	100

Source: own survey result 2017

From the above table the first item of demographic characteristics is gender. The gender distribution of respondents of APF covers 83.3% male while 16.7% of the respondents covers female. This shows the gender distribution of sample is dominated by male.

Respondents were also asked the range of their age and 41(68.3%) of the respondents were in the age category of 26-34 years while 11(18.3%) of the respondents were in the age category of 35-44 years.

Regarding educational background, 47(78.3%) of the respondents were at educational level of BA/BSC degree while 8(13.3%) of the respondents were at educational level of diplomas, 5(8.3%) were also MA/MBA/MSc holders. This shows the sample comprises professionals and sub-professionals.

The fourth item was profession of respondents, regarding to this 22(36.7%) of the respondents were others (economist, management, accountant, biologist and engineering) while 15(25) of them were pharmacists, 13(21.67%) were logistics and supply chain and 10(16.67%) were chemists.

The last item was work experience in pharmaceutical sector, regarding to this 42(70.0%) of them have 6-10 years while 9(15.0) of them have work experience of 1-5 years and 9(5.5%) have work experience of 11 years and above. From the above information the majority of respondents had served the company above five years and this helped the researcher to measure the performance of past five years using the response of respondents with broad knowledge of the company system and overall culture.

4.1.3 Descriptive Analysis

The mean is measure of central tendency which provides general picture of the data and the result of mean of respondents in each perspective of the measures suggest that the increment or not of the supply chain performance. In this case, the mean of each item together with their respective dimension overall was calculated in order to conclude the overall supply chain performance.

4.1.4 Financial Perspective

The First Research Question: What is the level of performance of the following financial measures in determining the supply chain performance in the last five years?

Table 4.2. Financial Perspective

Financial Measures	Minimum	Maximum	Mean	Std. Deviation
Profit Margin	3.00	4.00	3.6667	.47559
Revenue growth	3.00	4.00	3.8070	.39815
Rate of Return on investment	3.00	5.00	3.9474	.51482

Cost saving initiative	3.00	5.00	3.6842	.57190
Controlling variation against budget	3.00	4.00	3.7018	.46155
Cash flow	3.00	5.00	4.0000	.33646
Working capital management	3.00	5.00	3.8519	.49172
shareholders satisfaction	2.00	5.00	3.8421	.67585
clear financial goals	2.00	4.00	3.4561	.59971
Suitable pricing policy	2.00	4.00	3.4035	.67770
Sales	2.00	5.00	3.5965	.75261
Mean Average			3.723382	

Source: research survey 2017

From the above table of the financial measures, the mean values of all measures are in the higher end of the scale. Therefore one can infer that all financial measures have increased in the last five years.

4.1.5 Customer Perspective

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

Table 4.3. Customer Perspective

Customer Perspective measures	Minimum	Maximum	Mean	Std. Deviation
Concern to customers	1.00	5.00	3.2632	.79116
Customer order fulfillment	1.00	4.00	3.0833	.69603

Integration with customers	2.00	4.00	3.1833	.59636
Responds to customers complains	2.00	5.00	3.1833	.81286
Assessment of Customers satisfaction	1.00	4.00	3.0667	.60693
Customer satisfaction level	2.00	4.00	3.2167	.61318
Overall relationship with customers	1.00	5.00	3.3167	.79173
Prices are suitable to customers	1.00	5.00	3.1667	.80605
Providing after sales support to customers	1.00	4.00	2.9833	.70089
Full customer data base	1.00	4.00	3.2167	.76117
Providing better service than competitors	1.00	4.00	3.1167	.78312
Supplying defect free products to customers	1.00	5.00	3.3667	.86292
Delivering on time to customers	2.00	4.00	3.4667	.59565
Using promotion to gain customer	1.00	4.00	3.1333	.85304
Mean Average			3.197379	

Source: researcher survey 2017

From the above table of customer perspective measures, providing after sales support to customers (with mean value of 2.983 and Std. deviation 0.69603) has decreased within the last five years. On the other hand customer order fulfillment with mean value of 3.0833 and Sd. 0.69603, assessment of customer satisfaction with mean value of 3.0667 and Sd.0.60693 are almost the same as before or showed slight increment. On the other hand integration with customers with mean value 3.1833 and Sd.0.59636 and response to customer complaints has also 3.1833 mean and 0.81286 std.

deviation. Moreover the price suitability to customers (Mean 3.1667 and std. deviation 0.80605) showed moderate increment.

Though the increment is small other customer perspective measures like concern to customers (Mean 3.2632), customer satisfaction level (Mean 3.2167 & Std. deviation 0.61318) have increased with in the last five years.

Customer perspective measures like Overall relationship with customers (Mean 3.3167 Std. deviation 0.79173), Full customer data base (Mean 3.2167 std. deviation 0.76117), Supplying defect free products to customers (Mean 3.3667 std. deviation 0.86292), delivering on time to customers (Mean 3.4667, Std. deviation 0.59565) showed better performance within the last five years.

4.1.6 Internal business Perspective

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

Table 4.4. Internal business perspective Measures

Internal business perspective Measures	Minimum	Maximum	Mean	Std. Deviation
Supply chain systems development	1.00	4.00	3.2105	.77314
Setting clear strategic goals	3.00	4.00	3.6140	.49115
Competent employees	2.00	4.00	3.2982	.56584
Accuracy of forecasting techniques	1.00	4.00	3.1228	.73364
Production strategies implementation	1.00	4.00	3.2807	.79629
Introducing new products in suitable time	1.00	4.00	3.2037	.91897
Reduction in Supplier lead time against industry norms	1.00	4.00	3.4444	.83929

Internal processes aim to reduce logistics cost (inventor, warehouse and transportation)	1.00	4.00	3.5263	.82603
Production processes development	1.00	4.00	3.4386	.82413
Resources used to receive and supply goods	1.00	4.00	3.3860	.75010
Following quality guidelines	2.00	4.00	3.3684	.58650
Reducing total supply chain cost	2.00	4.00	3.3333	.57735
Strategic alliances with supply chain actors	1.00	4.00	3.1053	.85949
Level of forward and backward integration	2.00	4.00	3.2632	.55183
Total supply chain cycle time	2.00	4.00	3.4444	.60397
Mean Average			3.335987	

Source: researcher survey

From the above table one can infer that accuracy of forecasting techniques (Mean, 3.1228 & Std. deviation 0.73364), strategic alliance with supply chain actors (Mean, 3.1053 & Std. deviation 0.85949) showed small increment. But other internal business perspective measures like setting strategic goals (Mean, 3.6140, Std. deviation 0.49115), internal processes that aim to reduce logistics costs (Mean 3.5263, Std. deviation 0.83929) have shown better increment followed by Reductions in Supplier lead time against industry norms (Mean 3.4444 & std. deviation.83929), Production processes development (Mean 3.4386 Std. deviation 0.82413), resources used to receive and supply goods (Mean 3.3860, Std. deviation 0.75010), Following quality guidelines (Mean 3.3684 & Std. deviation 0.58650), reducing total supply chain cost (Mean3.3333 & Std. deviation 0.57735).

4.1.7 Learning and growth Perspective

4th Research questions: 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 4.5. Learning and growth measures

Learning and growth measures	Minimum	Maximum	Mean	Std. Deviation
Suitable training programs	1.00	4.00	3.1053	.72418
Training programs aim to improve quality	2.00	4.00	3.2982	.65370
Developing innovation capabilities	2.00	4.00	3.2807	.64792
Applying Innovative problem solutions	2.00	4.00	3.3509	.66792
Supplier involvement in cost saving initiatives	1.00	4.00	3.1579	.67585
Creative ideas to develop supply chain performance	2.00	4.00	3.2105	.52566
Company concern about adding value to employees	2.00	4.00	3.1930	.61058
Reduction in Employees turnover rate	2.00	4.00	3.1404	.66651
Partnership with suppliers in knowledge transfer	2.00	4.00	3.2632	.55183
Employees with suitable experience	3.00	4.00	3.2632	.44426
Company concern about experience sharing with suppliers	2.00	4.00	3.3509	.58221
Company care about experienced employees	2.00	4.00	3.2105	.61924

Clear company culture	3.00	4.00	3.3509	.48149
Using latest technology for R&D	1.00	4.00	3.2281	.84552
Attracting the best ideas to support company	2.00	4.00	3.5185	.60628
Supplier involvement in solving problems	2.00	5.00	3.4444	.76889
over all supply chain performance measure	2.00	4.00	3.3684	.67166
Mean average			3.278529	

Source: researcher survey 2017

The same with other perspectives suitable training programs (Mean 3.1053 & Std. deviation of 0.72418), supplier involvement in cost saving initiatives (Mean 3.1579 and Std. deviation of 0.67585), reduction in Employees turnover rate (Mean 3.1404, Std. deviation 0.66651) have shown slight performance increment.

On the other hand metrics like, attracting the best ideas to support company (Mean 3.5185 & Std. deviation 0.60628), supplier involvement in solving problems (Mean 3.4444 and Std. deviation of 0.76889) have shown better improvement in performance followed by measures like, clear company culture (Mean 3.3509 & Std. deviation 0.48149), Company concern about experience sharing with suppliers (Mean 3.3509 Std. deviation 0.58221).

4.1.8 Supply chain performance

What is your view for the following supply chain performance?

Table 4.6. Supply chain performance Measures

Supply chain performance Measures	Minimum	Maximum	Mean	Std. deviation
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Communicating company goals and strategies to employees	2.00	4.00	3.4035	.67770
Efficiency of the company in utilizing its resources (human, financial and material)	3.00	4.00	3.7018	.46155
Position among competitors in terms of supply	3.00	4.00	3.7407	.44234
Relationship with other supply chain actors	3.00	4.00	3.5185	.50435
Information exchange within the supply chain	2.00	4.00	3.5741	.60194
Profit compared to competitors	3.00	4.00	3.7250	.45220
Reduction in total supply chain cost of the company	2.00	4.00	3.4444	.69798
The quality of APF's product	3.00	4.00	3.5000	.51075
Company responsiveness to customer requirement	3.00	4.00	3.5000	.51075
Overall company success	3.00	5.00	4.0000	.54772

Source: researcher survey 2017

The overall supply chain performance of the company as shown in table_ has increased with in the five years. Overall company success with mean value 4.000 and deviation from the mean 0.54772, the profit compared to competitors with mean value of 0.37250 and deviation from the mean is 0.4522, position among competitors in terms of supply with mean value of 0.37407 and Std. deviation 0.44234, efficiency of the company in utilizing its resources whose mean value 3.7018 and deviation from the mean 0.46155 have better performance.

On the other hand, communicating company goals and strategies to employees mean value of 3.4035 and standard deviation of 0.67770, relationship with other supply chain actors with mean value 3.5185 and standard deviation 0.50435, Information exchange within the supply chain with a mean of 3.5741 and deviation from the mean 0.60194, Information exchange within the supply chain 3.5741 deviation from the mean 0.60194, Reduction in total supply chain cost of the company with a mean of 3.4444 and deviation from the mean 0.69798, the quality of APF's product with a mean value of 3.5000 and standard deviation of 0.51075, company responsiveness to customer requirement with a mean value of 3.5000 and standard deviation of 0.51075 were moderately increased their performance.

To 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.

4.1.9 External survey for distributors

6th Research question: what is your view on the following points to evaluate the supply chain performance of APF?

Table 4.7.External customer satisfaction survey

Measures	Minimum	Maximum	Mean	Std. deviation
1.All products produced by the company are available all the time in market	1.00	4.00	2.600	.78246
2.The products manufactured by APF fulfills your need in terms of quality	2.00	5.00	3.300	.86307
3.All products produced by the company are requested by retailers	2.00	5.00	3.300	.93131

4. the prices of the products produced by APF is reasonable	2.00	4.00	3.080	.89989
5. the prices of the products produced by APF are not volatile	2.00	5.00	3.240	.95959
6.the company delivers requested products on time	2.00	4.00	2.880	.87225
7.The company has good system of communication	2.00	4.00	2.600	.75593
8.the company responds quickly to your order	2.00	4.00	2.680	.76772
9.the company informs any product defect after sales	2.00	4.00	2.960	.80711
10. the company delivers defect free products	2.00	5.00	3.300	.88641
11. the company collects poor quality products from your store	2.00	4.00	2.940	.81841
12.the company conducts survey to measure the level of satisfaction	2.00	4.00	2.600	.60609
13.the company's overall supply chain performance is good	2.00	4.00	3.180	.80026

Source: researcher survey 2017

Statement 1: A product produced by the company is available all the time in market. The mean value of this statement was 2.600 and standard deviation of .78246.This implies customers were not satisfied in terms of availability.

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

Regarding to this statement, the mean value was 3.300 and deviation from the mean was .86307. This implies that customers were satisfied by the quality of the products.

Statement 3: all products produced by the company are requested by retailers. Regarding to this statement the mean value 3.300 and standard deviation of .93131 were recorded and this implies products are requested by retailers.

Statement 4: The price of the products produced by APF is reasonable. The mean value 3.0800 and standard deviation .89989. This implies that price of products produced by APF was reasonable.

Statement 5: the prices of the products produced by APF are not volatile. Against this statement the mean value 3.2400 and standard deviation .95959 were found. This implies the prices are not volatile.

Statement 6: the company delivers requested products on time. The mean value 2.880 and standard deviation .87227. Which means on time delivery of products was not up to the expectation of customers.

Statement 7: the company has good system of communication. The mean value 2.6000 and standard deviation of .75593 were found. This implies that the company has no good system of communication.

Statement 8: The Company responds quickly to your orders. The mean value 2.680 and standard deviation of .76772. This implies that the company does not respond quickly to customers' orders.

Statement 9: The Company informs any product defect after sales. Regarding to this statement mean value of 2.960 and standard deviation .80711 were found. This implies moderate result.

Statement 10: The Company delivers defect free products. Regarding to this statement, the mean value 3.300 and standard deviation .88641 were found. This implies the company delivers defect free products in average.

Statement 11: the company collects poor quality products from your store. Regarding to this statement, the mean value 2.940 and standard deviation of .81841 were found. This implies the company collects poor quality products in average.

Statement 12: company conducts survey to measure the level of satisfaction. Regarding to this statement, the mean value 2.600 and standard deviation of .60609. This implies that the company did not conduct survey to measure the level of satisfaction.

Statement 13: The company's overall supply chain performance is good. Regarding to this statement, the mean value 3.1800 and standard deviation of .80026 were found. This implies that company's overall supply chain performance is good.

4.2 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.

Table 4.8 Test of Model for Dimensions of BSC and supply chain performance.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.570 ^a	.325	.276	.56928
a. Predictors: (Constant), Learning and Growth Perspective, customers perspective , Internal business perspective , Financial perspective				

The R= .570 indicates a relationship between overall supply chain performance on BSC perspectives which are learning and growth perspective, customer perspective, internal business perspective and financial perspective.

The R² was .325 which means that 32.5% of the variation in overall supply chain performance to BSC dimensions could be attributed to change the dimensions learning and growth, customer, internal business and financial perspectives and 68.5% of variation in overall supply chain performance of the dimensions learning and growth perspective, customer perspectives internal business perspective and financial perspective is explained by other factors that are not within the control of the research.

Table 4.9 significance of the regression coefficient

Coefficients^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.512	1.206		2.912	.005
	Financial perspective	.0511	.178	.0383	2.865	.006
	customers perspective	.010	.101	.012	.096	.044
	Internal business perspective	.277	.170	.206	1.630	.109
	Learning and Growth Perspective	.231	.139	.250	1.661	.037
a. Dependent Variable: supply chain performance						

In the above table internal business perspective is seen not to have a substantial impact on supply chain performance (B= .277, t= 1.630, P= .109).

Hence internal business perspective is a not significant predictor of supply chain performance. Learning and growth, financial and customer perspective records influence the supply chain performance.

(B= .231, t= 1.661, P= .037) then customer perspective makes the least influence (B= .010, t= .096, P= .044). And financial perspective (B=.0511 t= 2.865, P= .006) Therefore, the regression equation become.

$$Y = a + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \beta_4 * X_4 + e$$

Which is $Y + 3.512 .0511x_1 + .010x_2 + .277x_3 + .231x_4$

Supply chain performance = 3.512 + .0511 (financial perspective) + .010 (customer perspective) + .277(internal business perspective) + .231(learning and growth perspective). Thus, internal business perspective, leaning and growth perspective, financial and customer perspective found to be statistically significant in influencing supply chain performance.

Table 4.10 ANNOVA Result

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.575	4	2.144	6.615	.000 ^b
	Residual	17.825	55	.324		
	Total	26.400	59			
a. Dependent Variable: over all supply chain performance measure						
b. Predictors: (Constant), Learning and Growth Perspective, customers perspective , Internal business perspective , Financial perspective						

Source: researcher survey 2017

Table 12 shows the output of the ANOVA analysis and it is used to test if there is a significant difference to the overall supply chain performance. It is evident that the significant value is $F(4,55) = 6.615$, $P = .000$ is less than 0.05. Therefore, there is statistical substantial difference in the supply chain performance.

4.3 Multi Colinearity

Under research investigation we are expected to understand concepts beyond the means and standard deviations of the dependent and independent variables so we need to know how one variable is related to another which comes with the concept of correlation. Correlation is the relationship between two variables. So, we would like see the nature, direction, and significance of the bivariate relationship of the variables used in the study.

Table 4.11 Multi- Correlation

Control Variables			Financial perspective	customer perspective	Internal business perspective	Learning and Growth Perspective
over all supply chain performance	Financial perspective	Correlation	1.000	.050	.033	.0366
		Significance (2-tailed)	.	.709	.805	.004
		df	0	57	57	57
	customers perspective	Correlation	.050	1.000	.150	.270
		Significance (2-tailed)	.709	.	.258	.038
		df	57	0	57	57
	Internal business perspective	Correlation	.033	.150	1.000	.0389
		Significance (2-tailed)	.805	.258	.	.002
		df	57	57	0	57
	Learning and Growth Perspective	Correlation	.0366	.270	.0389	1.000
		Significance (2-tailed)	.004	.038	.002	.
		df	57	57	57	0

Based on Andy F. (2009) statement, the correlation among independent variables is below the limit of high correlation (by high mean correlation of above .80 or .90). The highest correlation is detected between Infrastructure and service reliability (0.573), transit time and service reliability (0.511) and safety/liability and transit time (0.532) and the lowest correlation is scored between transit cost and transit time (0.02) . Hence the correlations among independent variables are below 0.80.

4.4 Suppliers performance

Measuring performance of suppliers is difficult as almost all input materials are imported and collecting data regarding suppliers' performance is difficult. To measure the performance of suppliers, interview with the procurement manager was conducted. As per the outcome of the interview, the company has vendor qualification procedure prepared to select the suppliers of input materials (raw and packaging materials). The company has also a system which focuses on approving suppliers and suppliers are rated as A, B, C, D provided that all comply with minimum requirement.

The approval procedure is conducted by technical team from quality control, production and procurement departments. The approval procedure considers Good Manufacturing practices and other pharmaceutical international practices. The procurement committee also evaluate suppliers based on the company's purchase manual that considers delivery lead time, price, quality and the result of supplier approval criteria.

But as per the interview the company has no a procedure to select and conduct long term contract agreement or long term relationship with suppliers needs improvement.

As observed from the interview most suppliers have average performance regarding delivery and better performance regarding quality. On the other hand the communication system or e-procurement of the company can be said it is traditional or the ICT infrastructure needs great emphasis.

The company uses performance measurement tools that focuses on Financial, production capability, capacity building, synergy and development army but their alignment with the company strategy is questionable and needs emphasis.

4.5 Measuring supply chain performance using BSC

As stated in the literature the purpose of a performance measurement system is to ensure that standards and objectives are set clearly, performance is regularly and objectively assessed for accomplishments, and that actions are taken to improve and enhance performance potential in the future (Ababneh, 2008).

The result of supply chain performance using BSC the case of APF can be said moderate, financial measures the first average mean 3.723 followed by internal business measures (average Mean 3.3336), learning and growth with average (average mean 3.278) and the least performed was customer perspective with average mean 3.1973.

4.6 Measuring Supply chain Performance using external customer survey.

Measuring customer service and fulfillment are one of the core mechanisms to implement supply chain strategy. Performance measurement not only considers suppliers and capacity of manufacturing but also customers' satisfaction. To measure customers' satisfaction flexibility, the customer query time and post transaction measures of customers' services are used (Gunasekaran *et al.*, 2001).

The researcher have tried to conduct survey to evaluate the supply chain performance from customers or distributors point of view and the result of the survey showed the company's supply chain performance is not strong. The products produced by the company are not available all the time in market, most distributors are not satisfied with on time delivery of products. More over respondents complain that the company does not respond to customer orders, have no good communication system and the company does not conduct customer survey to evaluate customer satisfaction level.

On the other hand, product quality, demand of products by retailers, price volatility, delivering defect free products and the overall supply chain performance were performed better or averagely performed.

Chapter Five: Summary of Findings, Conclusions and Recommendations

5.1 Summary of findings

Based on presentation of the results, the findings of the study are summarized as follows. To measure the supply chain performance of the pharmaceutical factory the researcher looked for BSC metrics to measure the focal firm performance in a balanced approach and to enrich the measurement researcher have used external customer survey. The study also showed the relationship that exists between supply chain performance and balanced score card metrics.

In order to achieve these objectives, data were collected from the employees and active customers of APF. The data were processed in qualitative and quantitative approaches and regression analysis was also used.

From the demographic characteristics of respondents' the dominant percentage were male (75%) and the remaining (25%) were female respondents. The minimum educational background of respondents was college diploma and we can say that educated respondents were participated in the study. When we come to work experience of respondents' 85% of them have served more than 6years in the pharmaceutical sector and this had its advantages to the study as measurement needs enough knowledge and exposure of the sector. As a result the validity of the research will increase and the findings can describe the existing situation of the sector.

From the interview and physical observation the researcher observed that the company doesn't have a system that focuses long term relationship with suppliers and poor ICT infrastructure and poor communication system.

The findings of the analysis shows the average mean values of the BSC perspectives were from 3.1973 to 3.723 and this indicates the supply chain performance of APF has increased but the increment is very small.

On the other hand the analysis of the external survey filled by customers' shows that the supply chain performance of APF is moderate.

From the regression analysis, internal business, learning and growth and customer perspective found to be statistically significant in influencing the supply chain performance.

5.2 Conclusion

This research was conducted in an attempt to measure the supply chain Performance of Ethiopian pharmaceutical factories the case of APF by using BSC model.

The supply chain performance of APF has increased slightly with in the last five years when evaluated by employees but the external survey shows the supply chain performance of the company is poor.

Out of the four perspectives of BSC, customer and learning and growth were rated lower. Lower result in these to implies the company didn't satisfy customers and employees.

Out of the dimensions used for the external survey the most important points like communication system, availability of finished products, response to customer order and conducting customer satisfaction survey have shown poor performance.

Though the company imports most inputs of production from different countries of the world, it possesses poor ICT infrastructure that resulted poor backward integration. Moreover the company has different branches and plants upcountry which need high internal integration and at the same time the company has no strong integration with customers.

Though the performance of the company has increased from time to time customers are not still satisfied and they demand improvement in price, good communication system, high response to their order and availability of goods.

Compared to the existing opportunities that the company have with regard to government support and availability of huge market, APF's supply chain performance is not strong enough to exploit the opportunities.

Generally, the study findings have suggested that the levels of supply chain performance is moderate in the case of Addis Pharmaceutical Factory in terms of the four perspectives of balanced score card as the perceived evaluation of the respondents imply. The performance from time to time is comparatively in a better position.

5.3 Recommendations

As revealed from the findings of the study, levels of supply chain performance of the company is approximately moderate.

Hence Addis Pharmaceutical Factory shall give special emphasis in the improvement the supply chain performance in line with its corporate and functional strategies and objectives in order to operate according to international best practices and consistently offering quality products at affordable price to the society.

The study indicated that the company need to have strong ICT infrastructure to improve the poor communication system and create better internal and external integrated supply chain.

The company need to create alignment between existing performance measurement tools and the strategy of the company.

The study advocated that a lot of emphasis need to be directed to supply chain management and performance measurement based on balanced approach and the factory should maintain the effort made on customer perspective and learning and growth perspective to enhancing performance of their supply chain which are still need to be improved.

The Factory should also have performance measurement system that includes different stakeholders and supply chain actors to improve the communication gaps and enhance the backward and forward integration.

According to Kaplan and Norton, the balanced scorecard is not only a measurement tool, but also communication tool. Therefore, the company shall implement BSC as a measuring tool to solve the communication gaps and to communicate its strategy.

Lower results in customer perspective and learning growth implies company didn't satisfy the customers and employees. The management should emphasis to improve the performance otherwise it will be easy to customers shift to other competitors or new entrants in the industry. At the same time employees can also run out of the company and this may distort the tacit knowledge of employees.

As shown in the result of the study the financial measures are in a better position which means the company gives more focus to the financial performance and hence the management should give attention to all perspectives of BSC to bring a balanced supply chain performance.

Finally the researcher recommends the company to apply BSC as performance measuring system in order to have a balanced approach in measuring performance and to improve the poor performance related to customer perspective and learning and growth perspective.

5.4 Limitations of the Study

Like many research works, this particular study is also subjected to some limitations. First and for most, this study does not comprehensively capture all supply chain actors as applicable to supply chain management, rather it made emphasis in measuring supply chain performance of the company from employees and customers point of view. In order to benefit from comprehensive measurement future studies shall consider other supply chain actors like suppliers. In addition to the aforementioned limitation it need also to have more similar factories perspective in order to consider it as an industry.

Reference

- 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
- BREWER, P.C; SPEH, T.W. Using the balanced scorecard to measure supply chain performance. Journal of Business Logistics, Vol. 21, n.1, 2000.
- Dorota LEONCZUK. Categories of supply chain performance indicators: an overview of approaches (2015).
- EPA (Ethiopian Pharmaceutical Association), (2011). Ethiopian Pharmaceutical Association Annual Conference Proceeding Report, Addis Ababa, Ethiopia.
- FMOH (Federal Ministry of Health) and World Health Organization, (2003). Assessment of the pharmaceutical sector in Ethiopia, Addis Ababa, Ethiopia.
- Guansekeran, 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.
- Heizer J. and Render B. (2011). Operation Management, Global Edition, 10th ed. New Jersey, USA, Prentice Hall Inc
- National strategy and plan of action for pharmaceutical manufacturing development in Ethiopia (2015–2025) Federal Democratic Republic of Ethiopia Ministry of Health and Ministry of Industry (July 2015).
- 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.
- Kaplan, R.S. and Norton, D.P., 1992. The balanced scorecard: measures that drive performance, Harvard Business Review, 70: 1, 71-9.
- Kennerley, M. and Neely, A., 2002. A framework of the factors affecting the evolution of Performance measurement systems. International Journal of Operations & Production Management, 22: 11, 1222-45.

Kennerley, M. and Neely, A., 2003. Measuring performance in a changing business environment. *International Journal of Operations & Production Management*, 23:2, 21-27.

Supply chain management practices of Pharmaceuticals Manufacturing Companies of ETHIOPIA: The Case of ETHIOPIAN PHARMACEUTICALS MANUFACTURING SHARE COMPANY
By WONDIMIENEH SEWUYE (2013).

Shlomo Globerson and Gal Wolbrum (2014), Logistics management and supply chain management: A critical evaluation; *International Journal of Business and Economics Research* 2014; 3(2): 82

Simatupang T.M, Sridharan R, (2004), a collaboration index: a measure for supply chain collaboration, *International Journal of Physical distribution and Logistics Management*, Vol. 35, No. 1, pp. 44-62,

Solakivi T, (2014), the connection between supply chain practice and firm performance: evidence from multiple surveys and financial reporting data, *Turku School of Economics, Series A*,

Thakkar J, Kanda A, and Deshmukh S.G, (2009), Supply chain performance measurement framework for small and medium scale enterprises, *Benchmarking: An International Journal*, Vol. 16, No. 5, pp. 702-723,

UNCTAD (United Nations Conference on Trade and Development). (2011a). *Investment in Pharmaceutical Production in the Least Developed Countries, A Guide for Policymakers and Investment Promotion Agencies*. UN, Geneva

Appendix

Appendix 1- consent form

ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMEN

Greetings!

My name is Adane Alemu. I am conducting a study on Measuring Supply Chain Performance in Ethiopian Pharmaceutical industry for the partial fulfillment of master's degree in logistics and supply chain management in Addis Ababa University, School of commerce. The information that will be collect 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.

Adane Alemu: Addis Ababa University Tel:

+251 912 69 21 33

E-mail: gadanealemu@gmail.com

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Name	Signature	Date

Appendix 2 – Questionnaire on Measuring Supply chain Performance

Questionnaire No: _____ Date: _____

PART1. General Information and Demographic Background of Respondents in the Selected Samples of Health Facilities

1.1. Gender

1.2. ☐ Male

☐ Female

1.3. Age

- ☐ Less than 25 Years
- ☐ 26-34 Years
- ☐ 35-44 Year
- ☐ 45-54 Years
- ☐ Over 54Years

1.3. Educational Background

- ☐ Certificate
- ☐ Diploma
- ☐ BA/BSC Degree
- ☐ MSc/ MA
- ☐ Other Specify _____

1.4. Profession of in-charge/coordinator/

- ☐ Pharmacist
- ☐ Chemist
- ☐ Logistics and supply chain
- ☐ Other Specify _____

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

- ☐ 1-5 Years ☐ 6-10 Years ☐ 11-15 Years
- ☐ Over 15 Years

Part II: Questions for Top Management of APF

- 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) Do you have long term relationship with other supply chain actors?
- 8) Is the room for innovation open?
- 9) Do you have dedicated meeting time with all stakeholders of your company?
- 10) How do you evaluate the overall value maximization of your company?

Part III. Questionnaire for APF 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?

	Significantly Decreased	Decreased	The same as before	Increased	Significantly Increased
Financial Measures	1	2	3	4	5
1.Profit Margin					
2.Revenue growth					
3.Rate of Return on investment					
4. Cost saving initiative					
5. Variation against budget					
6.Cash flow					
7.Working capital management					
8.Overall cost the company					
9. Clear Financial goals					

10. Suitable pricing policy					
11.Sales					

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?

Customer perspective	Significantly decreased (1)	Decreased (2)	The same as before (3)	Increased (4)	Significantly increased (5)
1.concern to customers					
2.customer order fulfillment					
3.integration with customers					
4.assement of customers satisfaction					
6.customer satisfaction level					
7.overrall relationship with customers					
8.Prices are suitable to customers					
9.providing aftersales support to customers					
10.full customer data base					
11.providing better service than competitors					
12.supplying defect free products to customers					
13.delivering on time to customers					
14.using promotion to gain customers					

If there are other measures 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?

Internal business measures	Significantly decreased (1)	Decreased (2)	The same as before (3)	Increased (4)	Significantly Increased (5)
1.supply chain systems development					
2.setting clear strategic goals					
3.competent employees					
4. accuracy of forecasting techniques					
5. production strategies implementation					
6.introducing new products in suitable time					
7.reduction in supplier lead time against industry norms					
8.internal processes that aim to reduce logistics (inventory, warehouse and transportation					
9.production processes development					
10.resources used to receive and supply goods					
11.following quality guidelines					
12.Reducing supply chain cycle time					

13.strategic alliances with supply chain actors					
14.level of forward and backward integration					
15.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?

Innovation, learning and growth measures	Significantly decreased (1)	Decreased (2)	The same as before(3)	Increased (4)	Significantly (5)
1.suitable training programs					
2.training programs aim to improve quality					
3.developing innovation capabilities					
4.applying innovative problem solutions					
5.supplier involvement in cost saving initiatives					
6.creative ideas to develop supply chain performance					
7.company concern about adding value to employees					
8.reduction in employees turnover rate					
9.partnership with suppliers in knowledge transfer					

10. employees with suitable experience					
11. company concern about experience sharing with suppliers					
12. company care about experienced employees					
13. clear company culture					
14. using latest technology for R&D					
15. attracting best ideas to support company					
16. supplier involvement in solving problems					

If there are other measures please specify:

Part IV) Questionnaire for distributors

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

External customer satisfaction survey	Ratings				
Measures	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 APF 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 APF is reasonable					
5. the prices of the products produced by APF 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 delivers defect free products					
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					
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If there are other measures please specify: -----

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

	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					
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8	The quality of APF's product					
9	Company responsiveness to customer requirement					
10	Overall company successes					

