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COLLEGE OF BUSINESS AND ECONOMICS GRADUATE STUDIES
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ASSESSMENT OF SUPPLY CHAIN INTEGRATION IN DAIRY PROCESSING CENTER IN AND AROUND ADDIS ABABA

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS' OF ARTS IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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STATEMENT OF DECLARATION

This is to certify that **RegassaTesfayeTefera** has carried out his research work on the topic entitled, **Assessment of supply chain integration in dairy processing center in and around Addis Ababa.** The work is original in nature and is suitable for submission for the award of **Master Degree in Logistics & Supply Chain Management (M.A in LSCM).**

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LIST OF ABBREVIATIONS/ACRONYMS

DPC: Dairy processing center

GDP :Gross Domestic Product

SCI: Supply Chain Integration

SCM: Supply Chain Management

SPSS: Statistical Packages for Social Science

ABSTRACT

Supply chain integration has become a prominent issue during the last decade. Efficient supply chain integration enables upstream and downstream supply chain firms to compete better. The thesis research was conducted to assessing supply chain integration in nine dairy processing centers in and around Addis Ababa. The study focused on five supply chain internal integration items, eight supply chain integration items with suppliers and customers. The general objective of this study was to assess supply chain integration in dairy processing center in and around Addis Ababa. Nine processing centers were selected purposively based on their processing capacity and accessibility. The research strategy of this study was a multiple case study and the dairy processing companies were the unit of analysis. Moreover, the study included organization that work closely with these companies to ensure the reliability of the research output. The research design applied both qualitative and quantitative methods for data collection. The quantitative data was analyzed using SPSS for descriptive statistics and the qualitative data was used to further explain the findings of the quantitative data. The finding of the study indicated that most of representative processing centers were established before 10 years and are privately owned. Pasteurized milk, yogurt, and soft cheese are the most common dairy products which were produced by most of the processing companies. Almost all of the mean level of agreements for variables in internal integration score is above 4.0 which are considered as high level of integration.The internal supply chain integration is more reliable and flexible than external (supplier and customer) supply chain integration. The supply chain internal integration of the case dairy processing was perceived high. The study also found the gap on sharing on production plan, long term policies and strategies with their suppliers and customers. Poor quality raw milk, raw milk supply and dairy product demand fluctuations during dry seasons and fasting period respectively, considered as a challenge for dairy processing centers. Dairy processing centers focused on internal integration and intensification. Collaboration and sharing information on production plan and strategies with suppliers and customers was considered as average. Even though supply chain integration variables score is high in dairy processing centers, sharing information on production plan, collaboration development program, sharing medium-term and long-term policies and strategies with suppliers and customers needs attention to bring sustainable improvement in the sector.

Keywords: *Dairy supply chain**;** Customer Integration; Internal integration; Supply integration*

CHAPTER ONE
INTRODUCTION

1.1.Background of the study

Supply chain integration has become a prominent issue during the last decade. In recent years, there has been a great deal of empirical evidence to show that successful supply chain integration can improve a firm's performance and competitive advantage (Ou et al. 2010; Wiengarten et al. 2010). Supply chain management (SCM) seeks to enhance competitive performance by closely integrating the internal cross-functions within a company and effectively linking them with the external operations of suppliers, customers, and other channel members to be successful (Lambert, et al. 1998; Kim, 2006). This means that a firm that is pursuing SCM practices needs to pay attention to supply chain integration (SCI) and its implementation (Hussein &Nassar, 2010).

Supply chain integration can be viewed at two levels of analysis in operations management: (i) internal integration with other functional areas inside the organization; and (ii) external integration, especially with direct suppliers and customers (Pagell, 2004). Supply chain management literatures emphasize on the importance of supply chain integration among intra or inter-organization processes (Flynn, Huo and Zhao, 2010) and the cost-benefit analysis and performance metrics of supply chain(Zhou et al., 2011). According to the studies and findings of (Bakker et al., 2012), several barriers still exist to ensure inter-company and intra - company supply chain integrations and hence, businesses are struggling to adapt various supply chain integration models to suit their needs. Supply chain integration is being attempted to some extent with a goal to combine supply chain functions to improve efficiencies and effectiveness. A broader supply chain management cross-functional integration is required with a holistic approach and the problems in supply chain management integration need to be identified. Over the past decades, there has been an increasing emphasis on supply chain management as a vehicle through which firms can achieve competitive advantage and superior performance in competitive market environment (Cooper et al. 1997).

Supply chain management is the systemic and strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain for the purposes of improving the long-term performance of the individual companies and that of the member of a given Supply Chain as a whole (Mentzer et al., 2001).

Efficient supply chain integration enables upstream and downstream supply chain firms to compete better. A customer focused supply chain strategy requires a total systems view of the linkages in the chain that work together efficiently to create customer satisfaction at the end point of delivery to the consumer. Consequently, costs must be lowered throughout the chain by driving out unnecessary costs, processes, shorten the delivery lead times and focusing on value adding supply chain processes (Mentzer and Gundlach , 2009). As per the aforementioned literatures, one can understand that supply chain integration, system thinking and performance have a significant impact on the performance and competitiveness of companies.

Ethiopia has one of the largest livestock inventories in Africa with a national herd estimated at 52 million cattle, 46.8 million sheep and goats, and 9 million pack animals (CSA, 2017). The total volume of milk produced in Ethiopia increased over the last 15 years from less than 1 billion liters to 3.06 billion liters in 2015/16. The overall country milk production expected to surpass existing milk demand as per GTP II period (2015–2020) projection with about 2501 million liters that is 47% above (AGP-LMD, 2013). In milk shades like Addis and its surrounding there are small scale dairy semi-commercial farms that supply significant volume of milk to Addis Ababa and other nearby towns (AACCSA, 2016). There are 18 registered milk processors in the Addis milk shed. The capacities range from less than 1,000 liters per day to 60,000 liters per day. Current milk processed is estimated to be 150,000 liters per day (USAID, 2010). Most of the companies work under capacity for most of the product types. The daily processing capacity of the largest processor, Lame Dairy, is 60,000 liters per day, now it operates at a maximum of 40,000 liters. Eight companies have a processing capacity of over 10,000 liters per day. With the capacity assessment done for 17 companies that operate at different scale, even though few are operating with their full capacity most are functioning under capacity, on average the companies are working 18-43% on average for the different products (AACCSA, 2016).

Dairy processing operations in Ethiopia is tending to be quite vertically integrated. Some processors have their own dairy farms, collection centers, transport, and retail shops as well as out sourcing these services. The key expenses for the dairy processors are purchase of milk, labor, and transport. One processor of 33,000 liters per day and fully integrated from farm to retail has a total work force of 380 people. According to USAID (2010) most of the processors do some portion of milk collection and transport along without sourcing collection and distribution to "specialized" firms. There has been no detailed analysis by any of the surveyed firms into the cost effectiveness of collection and distribution systems (Land O'Lecks, 2010).

1.2. Statement of the Problem

Despite the contribution of dairy to Ethiopian economy, it seems the pivotal role of supply chain integration and its implementation in the industry is underestimated. This has resulted in decline and fluctuations in production of raw milk. The fluctuations experienced in production are because of several factors which include poor supply chain integration, inappropriate mode of transport along the milk supply chain, poor infrastructure for perishable nature of milk and seasonal fluctuation milk supply, milk price and demand.

Most of the research has been conducted on milk supply chain and identified determinate factors in milk supply coordination (Lemma,2015) and characterizing milk supply chain at smallholder farmers and cooperatives level (Amentae, 2015). No research was conducted on supply chain integration in dairy sector and or in processing center except limited research on supply chain integration in Garment industry (Selam, 2012) and supply chain management in Brewery factory (Sintayehu, 2016).

Most researches that have been conducted in dairy sector focused on milk supply chain and its coordination. However, supply chain integration is crucial in order to improve company performance (Carter, 2009). Moreover, most recent studies indicated that supply chain integration will directly lead to considerable improvement in firm's performance. Apart from previous studies engaged in the dairy sector, this research was assessed supply chain integration in dairy processing. This knowledge gap in newly emerged and competitive industry initiated the

researcher to conduct this study to generate baseline information on the scope of supply chain integration in dairy processing centers.

1.3. Research Question

The current research has answered following research questions:

- ✓ What is the level supply chain integration within dairy processing centers?
- ✓ What are the major supply chain integration challenges in dairy processing centers?
- ✓ How dairy processing centers integrated their supply chain?

1.4. Objective of the Research

1.4.1 General Objective

The general objective of this study was to assess supply chain integration in dairy processing center in and around Addis Ababa to generate baseline information on supply chain integration Furthermore, the research was targeted to achieve the following specific objectives:

1.4.2. Specific Objectives

1. To assess the scope of supply chain integration in dairy processing center centers.
2. To assess the major supply chain integration challenge in dairy processing center.
3. To identify how dairy processing centers integrated their supply chain

1.5. Significance of the Study

The dairy sector contributes considerably to the national Gross Domestic Product (GDP). It has a share of 40% in the agricultural GDP and 12–16% in the national GDP. The latter is about twice as high as it is in neighboring countries in Eastern Africa, mainly because of the significantly higher share of agriculture in the Ethiopian GDP.

The average annual demand in Ethiopia for dairy products in the next ten years (2013-2022) is expected to reach $1 billion. This is as a result of the current high population and future growth trends, a growing number of urban centers and urbanized lifestyles, and finally steadies economic growth rates registered by the country and visible increased income levels of the general population. The government of Ethiopia plans to almost double domestic milk production between 2015 and 2020. This increase will require investments and improvements in yields of fodder crops, feeding, genetics, health, and dairy processing. Ethiopia imports a significant amount of dairy products and decreasing this will reduce foreign currency spending on imports. Over the next five years the government is not only aiming at a decrease in dairy imports, but is also working on a dairy policy that will result in the export of dairy products (Zijlstra et al, 2015).

Supply chain integration helps to reduce costs, improve reaction to change, enhance customer service levels and facilitate decision making by suppliers and customers (Cheng et al., 2010). So that assessing supply chain integration in dairy processing center will have a paramount importance to improve the performance of the sector. The profitability of the center and product quality and affordability of dairy product will be improved by integrating all required facilities and services together with suppler and customers.

1.6. Scope of the Research

The scope of the study was limited to assess supply chain integration in milk processing centers in the study area. Supply chain integration includes internal and external which was further classified into supplier and customers. Only nine, 50 % of the total dairy processing centers that have a capacity to process 10,000 liters of milk per day and processed diversified dairy product was included in this study due to time due to time and budget limitation. Only experience individuals from different stakeholder offices were interviewedto further explain and get in-depth insight about the findings of the quantitative data. Therefore, the current study did not represent all of milk processing center found in and around Addis Ababa.

1.7. Limitation of the study

The current thesis research was done only on 50 % of dairy processing centers found in and around Addis Ababa while the focused of the study was only on limited supply chain integration i.e internal integration and external (supplier and customer) integration variables. The sample sizes included in this particular study was purposively determined and is relativelysmall as compared to the total size of processing centers in the study area. Therefore, it may not be a representative which is enough forgeneralization.

1.8. Organization of the study

The study is organized in five chapters. The first chapter deals with background of the study, statement of the problem, objective of the research, significance, scope and limitation of the study. Chapter two presents the review of literature and conceptual frame work. Chapter three research methodology; Chapter Four focused on presentations, analysis and interpretation of the data collected and chapter five presents the summary, conclusions and recommendations of the study.

CHAPTER TWO
LITERATURE REVIEW

2.1. Overview of dairy product processing in Ethiopia

The total volume of milk produced in Ethiopia increased over the last 15 years from less than 1 billion liters to 3.06 billion liters in 2015/16. The overall country milk production expected to surpass existing milk demand as per GTP II period (2015–2020) projection with about 2501 million liters that is 47% above (AGP-LMD, 2015). In milk shades like Addis and its surrounding there are small scale dairy semi-commercial farms that supply significant volume of milk to Addis Ababa and other nearby towns (AACCSA, 2016). There are 18 registered milk processors in the greater Addis milk shed. The capacities range from less than 1,000 liters per day to 60,000 liters per day. Current milk processed is estimated to be 150,000 liters per day. In very few cases are the milk plants operating at full capacity. With the exception of the former state owned enterprise, Lame/Shola Dairy, and Mama Dairy, all of the other dairy processing facilities are less than 10 years in operation and many of those competing for market share in Addis Ababa are less than 5 years old. This period of 2005 – 2010 has been a time of subtle transition for the Ethiopian dairy sector (Land O'Lakes, 2010). There has been an increase in processing capacity which has also been accompanied by an increase in dairy product lines. In 2000 the Ethiopian dairy product line consisted of pasteurized milk and butter. In 2010 consumers can find a wider variety of domestic dairy products including yogurt, fruit flavored yogurt, UHT milk, ice cream, cultured milk, and cheeses such as mozzarella, provolone, and gouda. MAMA Dairy offers 32 dairy products to its customers in 2010 compared to a product line of 12 products in 2006. This reflects a dairy sector that can and will adjust to consumer and market demands (AGP-LMD, 2013).

The dairy processors are quite competitive in their purchasing practices of raw milk. Prices generally range from ETB 8 to 10 per liter. The further the farm or collection center is located from the point of processing, the price decreases to account for additional transportation costs. Fasting periods are a challenge as processors report a decline in processing capacity of 25% during the August and March/April fasting periods. However, some processors are managing

around fasting periods by building inventories of UHT milk and cheese, although this can create cash flow problems (AGP-LMD, 2015).

One of the interesting characteristics of Ethiopian dairy processing is that the operations tend to be quite vertically integrated. Some processors have their own dairy farms, collection centers, transport, and retail shops as well as out sourcing these services. The key expenses for the dairy processors are purchase of milk, labor, and transport. One processor of 33,000 liters per day and fully integrated from farm to retail has a total work force of 380 people. In detailed surveys of six milk processors, five processors held their work force fixed regardless of the amount of milk being processed. During periods of milk shortages and fasting periods, this increases the price per liter rather dramatically when milk supplies decrease by 25%. All firms do some portion of milk collection and transport along without sourcing collection and distribution to "specialized" firms (Zelalem, Emmanuelle and Ameha, 2011; Land O'Lakes, 2010)

On the other hand the same Authors indicated that there are several factors that affect the production as well as distribution of milk and milk products. Among other factors, the unstable and low consumption levels of milk and milk products can be considered as one important factor to hamper dairy development in the country. The demand for milk and milk products declines substantially during the fasting period of the Ethiopian Orthodox Church as this population abstains from consuming animal products including milk and milk products. There is a missing link in the dairy value chain as it is difficult to justify the cause of the supply/demand mismatch. Most producers complain of the lack of market outlets for milk, especially during and shortly after the rainy season where milk production increases following the increased availability of animal feed and during fasting periods. Contrary to complains from the producers on milk surpluses, large milk processing enterprises are reported to be operating below their potential capacities mainly due to shortage of milk(Zelalem, Emmanuelle and Ameha, 2011).

As the buyer and seller of milk the dairy processor is the key relationship link in the dairy value chain. The relationships with sellers (farmers and cooperatives) and buyers (retailers and consumers) require trust. In order to build trust each party needs to know what is demanded of them and there has to be a transparent flow of information along the value chain; the processor needs quality raw milk and the retailer needs an adequate supply. The relationships also require

that each party has some level of power in price negotiation and volumes of milk collected reflected in contracts. Finally the relationships require that everyone has benefit in terms of getting paid on time with incentives to increase price. Currently there is no industry forum or association within which the processors can collectively discuss common interests, seek training, and conduct market or business assessments (AGP-LMD, 2015).

2.2. Dairy supply chain in Ethiopia

According to Otte (2010), about 150 million households around the globe are engaged in milk production and supplying to about 6 billion milk consuming people. The study noted that the link between production and consumption for milk involves various chain actors which vary from one context to the other. The study also indicated that there are numerous challenges that hinder the supposed value additions for minimum cost by dairy chains, particularly in the developing countries. Among the listed challenges include: challenges in establishing milk collection and transport system, which is further aggravated by the dispersed settlement of farmers and remoteness of the farming sites from roads and urban centers; seasonality of the milk supply, poor transport infrastructure and other logistics facilities such as cooling facilities, inadequate and/or lack of technology in milk collection and processing, and poor quality of raw milk.

Dairy industry is in close relations with dairy farming from which it obtains raw material. The industrialist or his agent meets with the farmer at least once a day, either in the morning or both in the morning and afternoon during milk buying. The farmer has no chance to market any other product everyday throughout the year, and in the same way, no other branch of production has a monthly income, either. This relationship carries a vital importance for both sides (DPT, 2000). Integration in dairy industry may occur as vertical and horizontal integration.

Horizontal integration occurs either when enterprises, dealing with dairy farming, or which process dairy products merge with other similar enterprises in order to make new investments to extend scales, or when enterprise groups in the same activity level gather under cooperative-like organizations in order to act together in that particular activity level. Vertical integration, however, joins and coordinates the enterprises which function in different fields such as production, process, and marketing under the same management, to obtain raw material for

backward integration and to market the products for the forward integration. The vertical integration between the farmer and the industrialist can be realized when farmer cooperatives form an establishment to process their own products, when there is a contractual production between the industrialist and the farmer or when the industrialist invests directly in dairy farming. Other examples of vertical integration are when the industrialist invests in retail sector to distribute and market his products or, as mostly observed in developed countries, when big retailers themselves produce their dairy products or have them produced under their brand (Demirbas, 2004). However, Dairy processing operations in Ethiopia is tends to be quite vertically integrated. Some processors have their own dairy farms, collection centers, transport, and retail shops as well as out sourcing these services (Land O'Lakes, 2010).

Dairy supply chain comprises on six core activities such as production, transportation, processing, packaging, storage and consumption. It is required to synchronize these activities of the various dairy supply chain partners. It is challenging phenomenon that Ethiopia dairy supply chain core activities has been segregated and there still no any mechanism introduced for integration. Particularly, it is complicated issue to design an efficient, hygienic and economic dairy supply chain for developing countries. There are quite important viable complications existed in the dairy supply chain, firstly it is difficult to establish a sound milk collection and transportation system. Small dairy holders produced little quantities of milk and that are situated in the remote areas (Lemma, 2015).

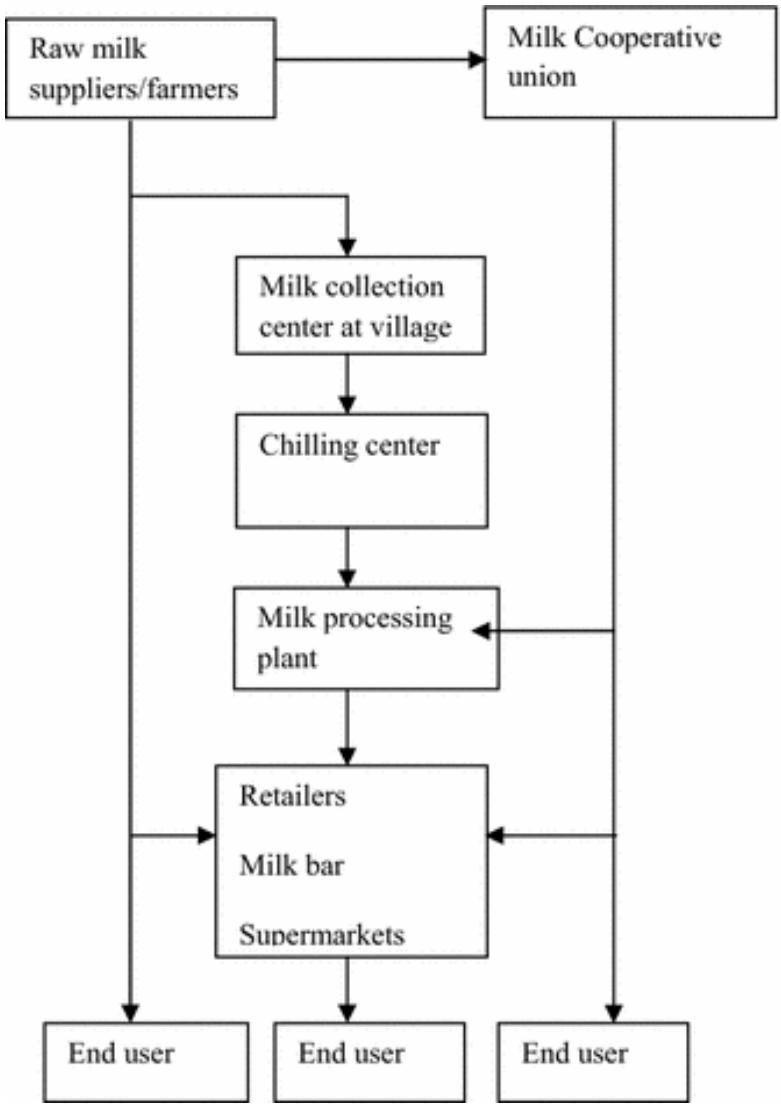

Figure 2.1.Dairy Supply chain process in and around Addis Ababa milk Shed (Adopted from Ruben et al., 2017).

According to Amentae*et al* (2015),the flow of dairy products in the supply and marketing chains (Figure 2.2), in Ethiopia involves a number of chain actors in complicated networks. The flows start from producers/farmers who have a number of alternative buyers for their products. Farmers may sell their dairy products directly to consumers who usually subscribe ahead of time. Farmers could also sell their dairy products to cooperatives/unions, wholesalers, processors, retailers, and catering institutions. Farmers' milk sells distribution by customer category was dominated by cooperatives/ unions buying of the milk sold by farmers. The same authors arestated that the

flow of dairy between processors and wholesalers as can be seen from Figure 2, is bidirectional where processors buy fresh milk from wholesalers and wholesalers buy processed milk from processors. FM and PM in the flow chart from wholesalers refer to fresh milk and processed milk, respectively.

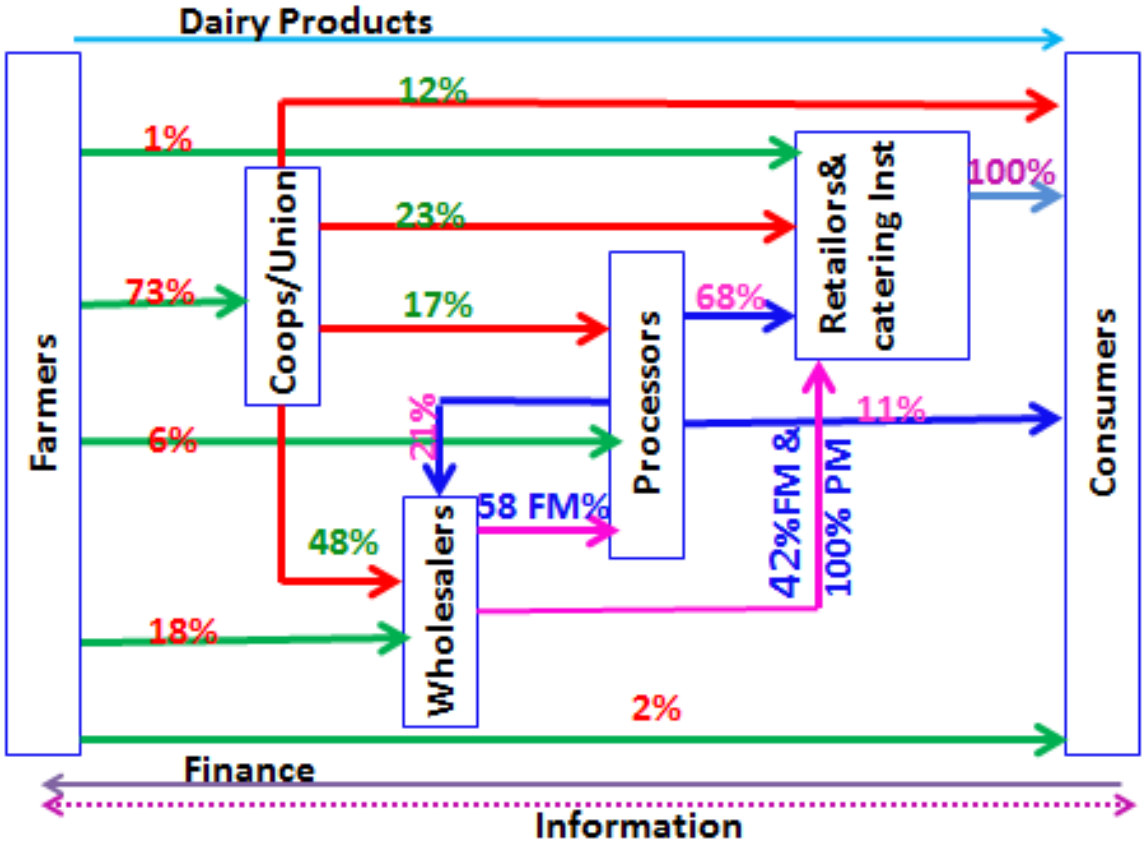

Figure 2.2. Dairy products flow in supply and marketing chains with selling distribution percentages from each stage (Adopted from Amentae et al., 2015).

2.3. Supply Chain Management (SCM)

Supply chain management (SCM) is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage. It represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective & efficient ways possible. Recently the paradigm of "supply chain management (SCM)" has gone through huge developments globally. SCM seeks to enhance competitive performance by closely integrating the internal cross-functions within a company and effectively linking them with the external operations of suppliers, customers, and other channel members to be successful (Otchere, Annan &Anin, 2013; Kim, 2006). Trends in supply chain relationships reveal the necessity to increase cooperation and trust amongsupply chain partners in order to enhance efficiency and effectiveness. Long-term relationships,based on a win-win attitude, are replacing the traditional adversarial relationships. A positive buyersupplierinteraction might yield favorable results not only for both parties, but for the supply chain asa whole (Junqueira, 2010). According to Ballou (2006), without a doubt, supply chain management will continue to grow inimportance as companies continue to pursue out-sourcing, expand their international operations anddo business in a global economic environment. It often is the basis for a firm's competitive strategy,so the increasing interest that the concept has gained in recent years is understandable.

The objective of supply chain management is to maximize the overall value generated rather than profit generation (Otchere et al, 2013). Although the importance of supply chain relations is widely acknowledged, seamless coordination is rarely achieved in practice coupled with several challenges (Hussain and Nassar, 2010; Otchere et al, 2013).Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination andcollaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies (CSCMP, 2010).

For a successful implementation of SCM, a crucial aspect is the quality of the relationship betweenmembers of the chain. Effective SCM is made up of a series of partnerships, thus, it requires partnersto build and maintain long-term relationships (Cooper et al., 1997; Power, 2005).Cooper et al. (1997) believe that the relationship time horizon extends beyond the life of the contract, perhaps indefinitely, and, at the same time, the number of partners should be small to facilitateincreased cooperation and information sharing.Since supply chain relationships are so important, they are typically long-term and requireconsiderable strategic coordination. Mentzer et al. (2001) examined the antecedents andconsequences of supply chain management at the strategic level, which can be analyzed in Figure2.3.

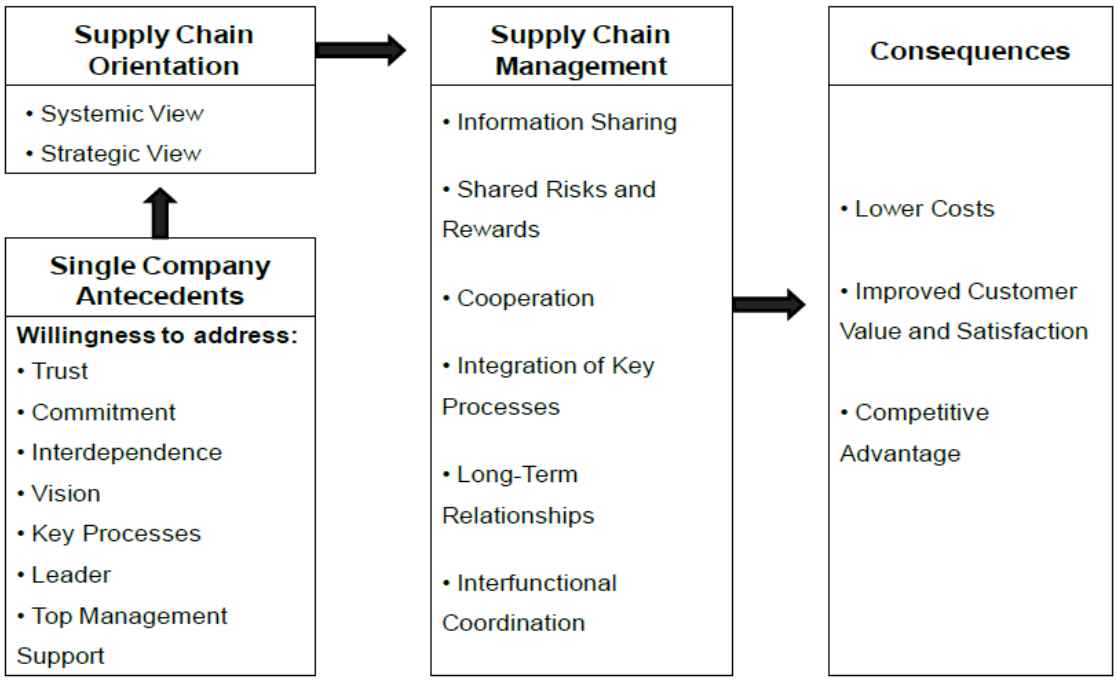

Figure 2.3. Supply chain management antecedents and consequences (Adapted fromMentzer et al., 2001).

Mentzer et al. (2001) classify as antecedents to SCM the factors that enhance or impede theimplementation of the concept. The authors revealed key issues that need to be taken into accountsuch as the organization stakeholders' vision, top management support and definition of keyprocesses to be integrated.

2.4. Supply Chain Integration

Supply chain integration is defined as "the extent to which all activities within an organization, and the activities of its suppliers, customers, and other supply chain members, are integrated together (Narasimhan, et al., 1998). The theoretical foundation for supply chain integration can be traced to the value chain model of Porter, and specifically, its notion of linkages.

One of the biggest challenges for business is to integrate supply chains for the benefit of customers and to make a profit (Sadler, 2007). All firms participate in a supply chain, from the raw materials to the ultimate consumer. How much of this supply chain needs to be managed and integrated depend on several factors including the complexity of the product, the number of available suppliers and the availability of raw materials. Furthermore, dimensions that need to be considered include the length of the supply chain and the number of suppliers and customers at each level(Junqueira, 2010).

Supply chain integration is a very important topic that needs to be considered so that positive resultsfrom the implementation of SCM can be achieved. It should be noted that the level of integration isdetermined at the strategic level, hence, strategic alignment between the chain's members isessential. Power (2005) suggests that integration of supply chain processes through investment incooperative arrangements and technologies is difficult to separate from, or consider independently of,the strategic positioning of organizations.

According to Baharanchi (2009), an integrated supply chain is linked organizationally and coordinated with information flow, from raw materials to the on-time delivery of finished products to customers.The entire supply chain is linked by information about anticipated and actual demand. There are two interrelated forms of integration that manufacturers regularly employ. The first type of integration involves integrating the forward physical flow of delivery

between suppliers, manufacturers and customers. The second type of integration involves the backward integration of information technologies and the flow of data from customers to suppliers.Supply chain integration is one of the prominent research streams in operationsand supply chain management literature and it manifestin terms of integration of internal operations within a firm as well asexternal integration with customers and suppliers (Ataseven and Nair, 2017).

Supply chain integration must comprise both information and material, and cannot restrict itself to only one. Higher levels of integration are characterized by increased logistics-related communication, greater coordination of the firm's logistics activities with those of its suppliers and customers, and more blurred organizational distinctions between the logistics activities of the firm and those of its suppliers and customers (Stock et al., 2000). Coordination, collaboration, and cooperation are often usedmore of less interchangeably for describing integrative efforts among partners to improve the overall efficiency of the supply chain (Singh and Power, 2009), such as collaborative planning, forecasting and replenishment (Danese, 2006).

According to Sweeny et.al (2011), most businesses certainly manufacturing based business can be described in terms of the five functions: buy, make, store, move and sell. This is what is referred to as the internal (or micro or intra-firm) supply chain. Traditionally these functions have often been measured, and therefore managed, in isolation, often working at cross purposes. This traditional approach is analogous to a relay race with responsibility being passed from one function to another. Supply chain integration means thinking beyond the established boundaries, strengthening the linkages between the functions, and finding ways for them to pull together. A recognition that the "whole is greater than the sum of the parts" calls for more effective integration between purchasing and procurement (buy), production planning and control (make), warehouse management (store), transport management (move) and customer relationship management.

Integration withupstream suppliers and downstream customers has been emphasizedto be a key competitive differentiator by several studies (Ragatz et al.,1997; Frohlich and Westbrook, 2001; Lee, 2004). The factors that arerequired to foster integration among supply chain partners

mainlyconcentrate on information sharing and collaboration in the design ofprocesses and products, joint decision-making, and coordination.These factors help in aligning the interests of all firms within the supply chain and aid in improving overall supply chain performance asagainst maximizing only internal efficiencies of individual firms (Lee,2004).

Internal integration and external integration play different roles in the context of supply chain integfration. While internal integration recognizes that the departments and functions within a manufacturer should function as part of an integrated process, external integration recognizes the importance of establishing close, interactive relationships with customers and suppliers. Both perspectives are important in allowing supply chain members to act in a concerted way, to maximize the value of the supply chain (Ataseven and Nair, 2017).

2.4.1. Internal Integration

Internal integration examines intervention across various parts of a single organization. Internal integration pertains to the extent to which logistics activities interact with other intra-firm functional area (Chen et al., 2009). At this stage internal integration deals with an easy access to key operational data from the integrated database, highly integrated information system linking to various internal departments in an organization, accessing to inventory information throughout the supply chain, retrieving inventory status in real time, utilizing a computer-based planning system between marketing and production and with high degree of information system integration for production processes (Baharanchi, 2009).

The phrase “internal supply chain” is to describe work aimed at breaking down the barriers between functions within organizations. Asif (2010) also discusses to support customer requirements at the lowest total system cost, internal integration represents the integration of all internal functions, from material management to production, sale and distribution. At this stage, the firm focuses on the internal flow of goods into the organization and on the way out to the customer. Moreover, internal integration is characterized by full system visibility from distribution to purchasing, and required integration across functions under the control of the firm to achieve customer satisfaction. In practice, it means that special attention must be given to the

interface between functional areas such as procurement, production, logistics, marketing, sales and distribution.In recent literature, internal integration practices combines different internal perspectives and refers to the degree to which companies aim for cross functional linkage, develop structures for interaction, and execute cross-functional operations in their everyday business (Schoenherr and Swink, 2012).

Information sharing serves as an essential approach for the survival of enterprises and enabler of supply chain integration.Nowadays, with the advancement in information and communication technology, information sharing has become moreconceivable. Furthermore, information sharing in supply chains has become more efficient by the global introduction of longtermcooperation and coordination which leads ultimately to the improvement of companies' competitive advantages (Lotifi et al, 2013). The same authors indicated that there is alack of information sharing within companies nowadays, which results in inefficiency of coordinating actions within the units inthe company or organization.

Internal integration‘s impact on performance depends on the functional areas that are being integrated and the level of external integration. It is generally believed that firms achieve a relatively high degree of internal integration before they attempt to develop a higher degree of external integration. Thus a research effort centered on internal integration seems to be an appropriate starting point (Chen et al., 2007). Therefore, the current studies is assessed the level of agreement in information sharing and internal integration within dairy processing centers.

2.4.2. External Integration

External integration examines integration that occurs between organizations. It crosses firm boundaries and extends to the supply chain. Externally logistics can serve in a boundary spanning capacity and interface with suppliers, carriers and customers (Chen et al., 2007).

External supply chain integration is a key to obtain competitive advantage in the current e-global environment. As stated by Rosenzweigh et al. (2003), firms can achieve two main competitive advantages. First, high integration among external partners in supply chains can turn into more responsive firms to face volatile demand due to increased information visibility and operational knowledge (Kim, 2006). Secondly, highly integrated external supply chain partners have the potential to decrease net costs of doing business and total delivered costs to customers (Quesada, 2008).External integration practices are dyadic and uni-dimensional in that it encompasses either supplier integration or customer integration (Flynn, Huo and Zhao, 2010). The practices recognize the importance of establishing close, interactive relationships with customers and suppliers. Integration with suppliers represents a change from adversarial to a cooperative attitude, commencing with product development, the supply of high quality products, the processing and incorporation of changes in specifications, technology exchange and design support. To achieve customer integration, there should be seamless links between the organization and its customers, both parties should be able to access accurate and real time information. There should be seamless links between them in terms of business processes as well as strong supplier- customer relationships (Frohlich and Westbrook, 2001).

External integration extends the scope of integration outside the company to embrace suppliers and customers. More specifically, this stage of integration represents more than a change of focus from product-oriented to customer-oriented in relation to mutual support and cooperation. A review of external supply chain integration literature reveals two major areas of emphasis. They are: (i) Customer integration and (ii) Supply integration. For supply integration, integration back down to the suppliers represents a change in attitude away from conflict to cooperation, starting from product development, the supply of high quality products, process and specification change information, technology exchange and design support (Baharanchi, 2009). Some researchers have investigated supply-side integration in different dimensions. Power (2005),

defines supply integration as obtaining frequent deliveries in small lots, using single or dual sources of supply, evaluating alternative sources on the basis of quality and delivery instead of price, and establishing long-term contracts with suppliers. In terms of logistics communication, this concept could view supply integration as effective alignment, information sharing and supplier participation between suppliers and manufacturers.

In terms of customer integration, the firm will penetrate deep into the customer organization to understand the product, culture, market and organization, so that it can respond rapidly to the customer's needs and requirements. The important concept of demand integration is based on the improvement of demand planning and visibility in supply chains. Without information, sharing from one end of the supply chain to the other, tremendous inefficiencies can occur in customer service (Kastro, 2006).

2.4.2.1.Upstream (supplier or supply) Integration

Upstream supply chain integration refers to integrating the firm with its suppliers (Ragatz et al., 1997). For supply integration, integration back up to the suppliers represents a change in attitude away from conflict to cooperation, starting from product development, the supply of high quality products, process and specification change information, technology exchange and design support. In terms of logistics communication, this concept could view supply integration as effective alignment, information sharing and supplier participation between suppliers and manufacturers (Baharanchi, 2009).

Reinforcing the above idea, Lee et al., (2007), discussed supplier integration as a strategic linkage deals with suppliers, involving suppliers in new products during the design stages in production planning and inventory management, developing a rapid response order processing system with suppliers, placing a supplier network that assures reliable delivery, and exchanging information with suppliers.

In an integrated supply chain, development of a strong strategic partnership with suppliers will facilitate their understanding and anticipation of the manufacturer’s needs, in order to better meet

its changing requirements. This mutual exchange of information about products, processes, schedules and capabilities helps manufacturers develop their production plans and produce goods on time, improving delivery performance. By developing a good understanding of the manufacturer's operations, suppliers achieve a high level of customer service, which, in turn, helps the manufacturers improve their customer service. Supplier integration has been found to be related to product development performance (Koufteros et al., 2007) and supplier communications performance (Cousinsand Menguc, 2006). Others, however, have found no relationshipbetween supplier integration and operational performance (Stanket al., 2001) or a negative relationship (Swink et al., 2007).

The integration process between suppliers and manufacturers is accomplished through extensive information system infrastructure that is shared between the supplier and manufacturers. More specifically, the manufacturers and the supplier will use enterprise infrastructure (i.e. enterprise software, inter-organization networks and trained employees) to integrate production scheduling, automatic inventory replenishment, product specification etc. This also entails establishing a cross company team that works on collaborated planning, scheduling and order fulfillment (Abebe, 2007).

2.4.2.2. Downstream (Demand or Customers) Integration

Downstream supply chain integration refers to integrating the firm with its customers. Customer integration is identified as the most critical competency for achieving competitive advantage. This competency is defined as building lasting relationships with customers that create value customer integration deals with the ability to communicate delivery of the right products and services to customers locally and globally in the right time right place and right quality with correct invoice. Customer integration is mainly sharing product information with customers accepting customer orders, interacting with customers to manage demand, having an order placing system sharing order status with customers during order scheduling, and product delivery phase. The important concept of demand integration is based on the improvement of demand planning and visibility in the supply chains. Without information sharing from one end of the

supply chain to the other, tremendous inefficiencies can occur in customer service (Baharanchi, 2009; Lee et al., 2007; Power, 2005)

According to Baharanchi (2009), demand integration is also significantly related to product quality like supplier integration, in terms of customers satisfaction and product customization, because firms that closely interacts with selected customers will better understand the detailed wants and needs of their customer. The same author stated that, there is a significant correlation between information sharing with customers through an understanding of customer need and product quality. Moreover, firms focusing on product innovation, the role of the customer should be emphasized, moving to further involvement in the new product development process. Being more integrated with customers also enables firms to more quickly respond to their product changing needs in the product innovation process (Baharanchi, 2009).

One way to effectively identify customer expectations and achieve customer integration is to collect, analyze and share information. The real-time sharing of information allows the manufacturers to anticipate changing expectations and quickly update the entire firm on the new demands. This construct reflects the firm‘s ability to use logistics information technology to identify and offer unique service capabilities to meet the requirements of individual customers or segments. The new technologies that enable closer relationships with customers include, Customer Relationship Management Internet and Electronic Data Interchange (Tollin, 2002; Savitskie and Closs, 2003).

2.5. Conceptual Framework

Supply chain integration includes strategic initiatives in the supply chain that tries to create an efficient and integrated system. In other words, it refers to the integration of communications, activities, tasks, processes and locations for continuous communication among customers, suppliers, producers and other members of the supply chain. There are three basic types of Supply Chain Integration (SCI), which include internal integration, customer integration and supplier integration (Lai *et al.*, 2012; Otchere*et al.*, 2013). Supply chain integration helps to reduce costs, improve reaction to change, enhance customer service levels and facilitate decision making by suppliers and customers (Cheng *et al.*, 2010).

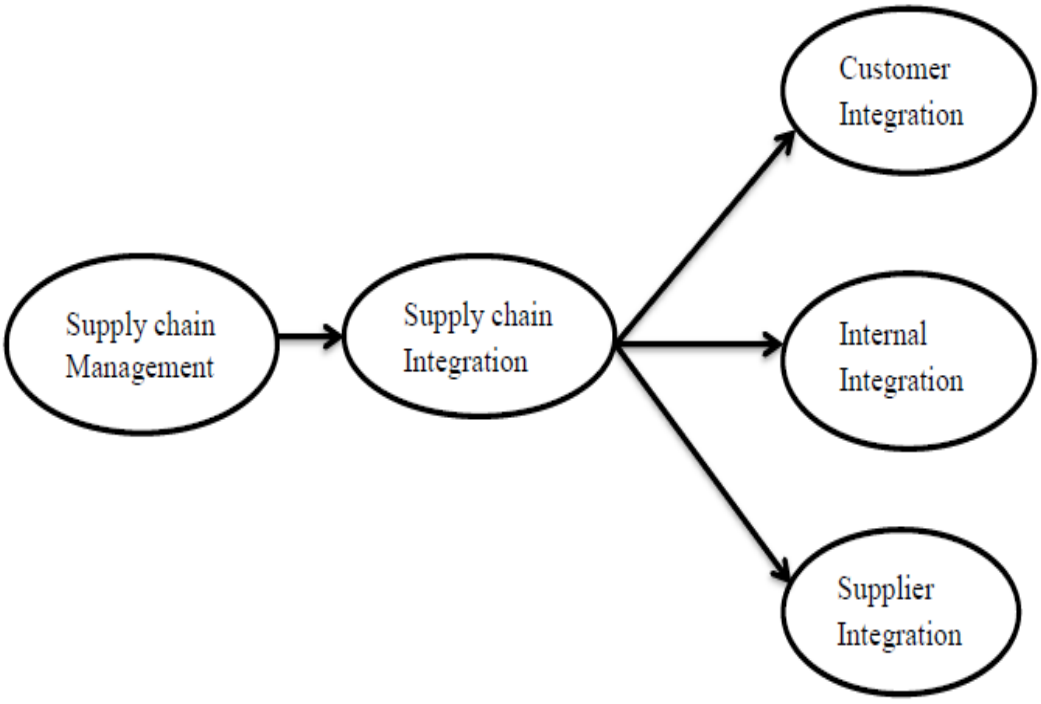

Figure 2.4. Conceptual framework of the research

Source :Otchere*et al.*, 2013 b(Modified)

Figure 2.4 explain the conceptual framework and theory of the study.Supply chain integration is moderated through supplier, internal and customer integration.

CHAPTER THREERESEARCH METHODOLOGY

3.1. Description of the Study Area

This study was conducted in dairy process center that found in and around Addis Ababa. The area of Addis Ababa is 530.14 square kilometers. Its current population is about 2.57 million, about 3.9 percent of the population of Ethiopia. It also represents about 26 percent of the urban population of Ethiopia. Addis Ababa has an aggregate population density of 4,847.8 persons per square kilometer (Yonas, 2014). There are 18 registered milk processors in the in and around Addis Ababa. The capacities range from less than 1,000 liters per day to 60,000 liters per day.

3.2. Research Approach

The current thesis research has followed two research approaches: qualitative and quantitative, Quantitative approach involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis using statistical tools and qualitative approach is concerned with subjective assessment of attitudes, perceptions, opinions and behavior (Sintayehu, 2016). Quantitative approach involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis using statistical tools and qualitative approach is concerned with subjective assessment of attitudes, perceptions, opinions and behavior (Sintayehu, 2016).

3.3. Research Design

The main objective of this research was to assess supply chain integration in dairy processing center in and around Addis Ababa. It was further assessed the scope supply chain integration within dairy processing centers, the major supply chain integration challenges in dairy processing centers and how dairy processing centers integrated their supply chain among supplier, internal, and customer. In order to gather adequate information which helps to measure the variables, both qualitative and quantitative methods of data collection were used. For the qualitative method of data collection personal interview were engaged with 10 persons who was expected to have sufficient knowledge and experience in the dairy supply chain integration; five experience general manager of selected processing and the rest five of them from different stakeholder organizations such as Ethiopian dairy processor association, Dairy

cooperatives/unions, Ministry of livestock and fisheries and Ministry of industry and investment and Ethiopian Meat and Dairy development Institute. For the quantitative method, two types questionnaires which were modified from (Selam, 2012 and Otchere et al. 2013). The first type of questionnaire was distributed to General managers to assess the level of agreement for internal supply chain integration in processing centers. The second type of questionnaires were distributed to production/purchasing, sales / Marketing and quality control mangers to assess the level of their agreement for external supply chain (supplier, and customer) integration in processing centers. This study involved five-point scale for three constructs of independent variables (internal, supplier, and customer integration).

3.4. Unit of Analysis

The unit of analysis for a survey was the entire set of units for which the survey data are to be used to make inferences. Thus, the unit of analysis defines those units for which the findings of the survey are meant to generalize. Unit of analysis must be specifically defined, as the definition determines whether sampled cases are eligible or ineligible for the survey (Experiment Resources, 2008). Therefore, the unit of analysis for this study is dairy processing center in and around Addis Ababa. According to (Land O'lecks, 2010) there are about 18 dairy processing centers are located in and around Addis Ababa. The current study was considered only 9 representative processing centers out of 18 centers located in and around Addis Ababa.

3.5. Sample and Sampling Technique of the Study

Sampling population were selected purposively based on the capacity of the processing centers and level of implementation of supply chain management such as Sourcing, Production, Transportation, Sales & Marketing, Distribution & Channel management, Warehouse & Inventory Management, accessibility and time limitation. Hence, 9 representative processing centers purposively were selected for the current study which was represented 50 % of the total processing centers available in the study area. Besides all the selected processors are those adopting modern technology with the majority of their output being pasteurized milk in packs of 500 ml and with some diversified dairy products.

3.6. Data Source and Collection Procedure

Both primary data and secondary sources were used for this study. Primary data were collected directly from the respondents for the specific purpose of addressing the research problem using semi-structure questionnaires and personal interview. Besides, secondary data were collected from profiles of processing centers, documents, books, articles and journals. The questionnaires were designed based on the conceptual framework and the research questions to assess supply chain integration in dairy processing center. The questionnaires were pre-tested before the commencement of actual survey to avoid any ambiguity for the respondent. The structured questionnaires were directed to Managers whose responsibilities are directly related to supply chain management practices from departments including Sourcing, Production, quality \Sales & Marketing, Distribution & Channel management. That is, 36 questionnaires were distributed to the 9 dairy processing centers managers; deputy mangers for production and sourcing, sales and marketing and quality control officers. But only 32 questionnaires were returned. Because one manager/officer was responsible for both production and quality control in some of the companies. Personal interview were held to get supplement information on the status of supply chain integration, dairy product quality and major challenges for dairy processing centers.

3.7. Variables and Measurement

Supply chain integration; internal, supplier and customer integration are variables of the current research. The respondents (General managers of processing centers) were asked to indicate their level of agreement and disagreement using a five-point Likert scale (1 = strongly disagree 2= disagree, 3= neutral 4=agree and 5 = strongly agree) about internal integration within dairy processing among their staffs in different departments. At the same time production mangers, Sales and Marketing and quality control managers were asked to indicate their level of agreement and disagreement using a five-point Likert scale (1 = strongly disagree 2= disagree, 3= neutral 4=agree and 5 = strongly agree) about supply chain integration with milk supplier and customers (retailers and whole sellers).

3.8. Methods of Data Presentation and Analysis

In this study the quantitative data analysis was done using descriptive statistics to compute mean and standard deviation using a statistical tool known as SPSS version 20. Frequency and percentage and chi square test were used to infer if there is a significant difference in level of

agreements among the respondents. The finding of each variable has been presented using tables. The qualitative data collected from general managers and other stakeholder (Ethiopian dairy processor association, Dairy cooperatives/unions, Ministry of livestock and fisheries and Ministry of industry and investment,and Ethiopian Meat and Dairy development Institute) were used to further explain and get in-depth insight about the findings of the quantitative data.

3.9. Ethical Considerations

Ethics is becoming an increasingly prominent issue for all researchers. Researchers are encouraged to employ knowledge of research ethics in practice. Ethical issues were prominent throughout this research process, including during the data collection, during the analysis and writing up of the final report. The student clarified to the respondents about the objectives of the study and explains that the information would be used only for research and academic purposes. During conducting data collection, both honesty and respect for the rights of the respondents were in place. Again, the student respected the rights to anonymity, confidentiality and informed consent of the respondents. The researcher also requested the consent of the respondents to conduct the research study with official letter and finally permission was given.

3.10. Reliability and validity

To make the instruments measure what was intended to measure therespondents were clearly communicated on the contents of the questioner aswell as the objectives of the research.To keep consistency of the tool, the research framework is constructed basedon acknowledged and published theories. Finally, the respondents selectedwere the top management groups of the company that are involved into the dayto day supply chain management planning, organizing and deciding activities.Accordingly, the researcher expects that the respondents have given credibleanswers that would probably be answered to another future independentresearcher.This means, internal validity is achieved. As this study is a multiple case study whose findings cannot be inferred for the total population. Therefore, external validity is the common gap in case studies.

CHAPTER FOURRESULTS AND DISCUSSIONS

4.1. General Information of selected dairy processing centers

4.1.1. Profiles of selected milk processing centers

The detailed profile, year of establishment location and ownership types of representative sample centers for the current study is shown in Table 1. Most of representative processing centers were established before 10 years and few of them were established in the recent year (Table 1). Most of dairy processing centers have been established since from 1991. This is because the Ethiopian government has made several macroeconomic policy changes and it also was considered as thephase of free market and market liberalization (Zelalem, Emmanuale and Ameha, 2011). According to Tsehay (2001), the formulation of the dairy development strategy focused on creating an environment for many smallholder dairy farmers to have access to markets in an attempt to stimulate producers to increase their production to meet market demands and satisfy the market.

Table 4.1. Profiles of selected milk processing companies

Processing centers	N	Year of establishment	Location	Ownership
Sebeta Agro Industry (Mama Dairy)	2	1998	Sebeta	PLC
MH Plc (Family Milk)	4	2003	Addis Ababa	PLC
Lame Dairy processing (Shola milk)	4	2008	Addis Ababa	PLC
M.E.H Agro industry(Zagol Milk)	4	2013	Sululta	PLC
Elemitu Integrated Milk Industry (Harme milk)	5	2004	Suluta	Share company
Berta & Family	4	2000	Addis Ababa	PLC
Loni Agro Industry	3		Sululta	PLC
Ada'a dairy cooperative	3	1998	Bushoftu	Cooperative
Holland dairy	3	2007	Bushoftu	PLC
Total	32			

N= no of respondents

Among the respondents, majority of the processing centers are private limited companies and the rest few of them are cooperatives and share companies. In terms of ownership, all the enterprises in the sample are privately owned. This is partly because of the current government followed a largely free

market economy and has undertaken a number of economic reforms among which privatization and creating a favorable environment for private investment are important ones (Bahiru, 2009).

More than 50 % the employee is ranged from 100 to 200 and followed by 33.3% of them ranged from 40 to 100. Employees of the center are both professional and non-professional depends on available position in the center. In case of supplier, 44.4% of there is ranged from 10 to 100 and followed 33.3% 250-500

Table 4.2. Summary of numbers of employee, suppliers and customers in the selected processing centers

Total numbers of employee	N	%	Total numbers of customer	N	%
40-100	3	33.3	20-50	3	33.3
101-200	5	55.6	51-200	4	44.4
more than 200	1	11.1	more than 200	2	22.2
Total numbers of supplier					
10-100	4	44.4			
100 -250	1	11.1			
250-500	3	33.3			
more than 500	1	11.1			

4.1.1. Products of the processing centers

According to the respondents, almost all of the respondents produce pasteurized milk, yogurt, and soft cheese. Some of respondents have produced specialized product such as flavored yogurt, different types of cheese and cream. Only Sebeta Agro industry has produced fruit juice besides dairy products. M.E.H Agro industry (Zagol Milk) Plc is also the only processing center which has its own dairy farm though the raw milk production is not fully support the processing centers. The rest 8 processing centers solely depend on farmers, cooperativesand other raw milk supplier. The current result is in line with the research report by (Land O'Lecks, 2010).) that indicated that dairy processing operations in Ethiopia is tends to be quite vertically integrated. Some processors have their own dairy farms, collection centers, transport, and retail shops as well as out sourcing these services

4.1.2. Respondents' demography

Most of the processing companies have different departments, sales/ marketing, production and quality assurance though four of them do not have independent department for quality assurance and the work will be done within production/ supply chain department. About 62.5 % of the respective mangers had work experience more than 10 years and the rest 21.9 % and 15.6% have 6 to 10 years 15.6% have 1 to 5 years of work experience respectively (Table 4.3).

About 56.3% of them the respondents have MSc/MA educational qualification and 34.4% of them have BSc/BA and the rest have Diploma in their respective fields of specialization (Table 4.3). The results showed that most of the respondents have better educational background and work experience which will be an opportunity to be effective in the supply chain integration.

Table 4.3.Respondents' demography in the case milk processing companies

Respondents' position	N	%
General manager	9	28.1
Sales/ Marketing Manager	9	28.1
Supply chain Manager	9	28.1
Quality Manager	5	21.1
Work experience		
1 to 5 years	5	15.6
6 to 10 years	7	21.9
More than 10 years	20	62.5
Educational background/qualifications		
MSc/MA	18	56.3
BA/BSc	11	34.4
Diploma	3	9.3

4.2. Supply chain integration in dairy processing centers

Considering the existing supply chain integration experiences, respondents were asked to indicate the level of their agreement about supply chain integration related to their respective companies from the alternative questions arranged in five point Likert scale method, where 1 stands for strong disagreement (the worst integration) and where 5 stands for strong agreement

(the best integration). For the purpose of the analysis three (average) was used as a cut-off point. Where, more than three is considered as better level of integration while less than three was considered as low level of integration which needs improvement and management concern. In addition, three (average level) was also considered by the researcher as an indication of the area where improvement action plan and attention is needed. Mean performance score 4.0 and above are considered by the researcher to be high level of performance.

4.2.1. Internal integration

Table 4.4 shows the result of internal integrations in dairy processing centers. The current result shows that almost all of the mean internal integration variables score was above 4.0 which wereconsidered as high level of integration. More than 85% percent of the respondents have high effective communication between departments in new product or process development and collaborates with their company's development program.More than 85 % of the companies also have better technical information and work plan sharing between departments. Only less than 15 %of companies have limited information sharing and collaboration between departments (Appendix Table 2).

Table 4.4. Summary result of internal integration in milk processing centers

Internal integration items	N	Mean	SD
Communications between different departments regarding a new product or process development project	9	4.33	1.00
Information sharing about inventory status between departments	9	4.11	0.93
Exchanging of plan between departments	9	4.22	0.67
Departments' collaboration with the company development program	9	4.33	0.71
Sharing technical information between departments	9	4.22	0.83

N= total numbers of respondents ; SD = standard deviation

Collaboration and open communication keep all links in the supply chain strong and functioning efficiently. Most of the processing companies agreed that there was exchanging of technical information, inventory status and work plan between departments. Even though, the level of agreement was slightly low in information sharing about inventory status between departments

there was no significant difference in level of agreements among processing companies in internal integration (Appendix Table 2). Almost all companies have better internal integration within their processing centers which might be due to their long experience in producing diversifying products and in managing the company. This result is in line with the report of Frohlich and Westbrook (2001) who stated that an organization is considered to have a high level of integration when the information systems used different functions are linked together with all functions able to access accurate and real time information from other functions and there are also effective means of communication across functions.

Finally production, marketing and sales, quality control department managers concerning the information exchanging practices about new product or process development projects were outlined that, departments in their weekly meeting have been discussing about any situation that they will anticipate in the future about new dairy product development based on customers need and the status supplier. Also they have discussed the problem that they are encountering and suggest solution.

Information sharing was serves as an essential approach for the survival of enterprises and enabler of supply chain integration. Information sharing might bring a significant amount of advantages to manufacturing sector such as inventory reduction and efficient inventory management, cost reduction, increasing visibility (significant reduction of uncertainties), significant reduction or complete elimination of bullwhip effect, improved resource utilization , increased productivity, organizational efficiency, improved services, building and strengthening social bonds, early problem detection, quick response , reduced cycle time from order capacity utilization. On the other hand, there are some barriers to sharing information as well (Lotif, et al, 2013).

Internal integration deals with an easy access to key operational data from the integrated database, highly integrated information system linking to various internal departments in an organization, accessing to inventory information throughout the supply chain, retrieving inventory status in real time, utilizing a computer based planning system between marketing and production and with high degree of information system integration for production process (Stevens, 1990; Lee et al., 2007; Kim, 2006; Baharanchi, 2009). Different software applications

are used to coordinate decision making in the internal supply chain through integrating the entire company‘s information system, process and store data that cut across various functional areas, business units and production lines. Internal information technologies include a firm‘s data base, transaction applications, Enterprise Resource Planning (ERP) etc influences the way manufactures manage their daily operations by facilitating the flow of information among all supply chain processes of a firm that accelerates internal process integration and enhances job performance (Sun and So, 2010; Closs and Savitskie, 2003).

4.2.2. Supply Integration

As indicated in Table 4.5, more than half the variables have mean integration score is above 4.0 which is considered as high level of integration and the remaining variables of the mean supply integration score is below 4.0 which is considered average level of internal integration (Table 4.5).

Table 4.5. Summary result of supply integration in dairy processing centers

Supply integration items	**N**	**Mean**	**SD**
Communications with your suppliers on research activities and new product development (R&D)	23	4.09	1.20
Transparent information about each other’s inventory status	23	4.22	0.67
Sharing information on production plan	23	3.52	1.16
Collaboration development program	23	3.96	1.07
Sharing medium-term and long-term policies and strategies	23	3.43	1.08
Sharing technical information	23	4.09	0.85
Long-term relationships with your suppliers	23	4.39	0.78
Rewarding suppliers	23	4.17	0.72

N= total numbers of respondents; SD = standard deviation

According to the data presented in the table, effective communications on research activities and new product development (R&D), transparent information about each other’s inventory status with suppliers, sharing technical information, long-term relationships with your suppliers, rewarding suppliers were considered high and their mean value is above 4.0. While the mean value for sharing information on production plan, policies, strategies and collaboration

development program with supplier is considered as average and below 4.0. There was a significant difference in level of agreements in supply integration among the selected company (appendix Table 3) which was also in line with in interview result.

Some of the companies follow the supplier performance and assist them in improving the management and on how to improve the quality of raw milk supply and continuous follow up. But some of the respondents were fail to communicate and collaborate with their suppliers. Majority of the respondents reward their suppliers based on their performance, some of the respondents do this practice sometimes, and significant number of the respondents do not reward their suppliers.

Even though supply chain integration score is high in dairy processing, sharing information on production plan, collaboration development program, sharing medium-term and long-term policies and strategies with supplier needs attention to bring sustainable improvement in the sector. According to Chen, (1999) inadequate and insufficient information sharing limits a firm's ability to leverage otherwise supportive relationships to accomplish.

Although most of the respondents agreed that they perform almost all of the supply integration practices, it does not prove that the sector have excellent supply integration. Talking about effective supply integration in Ethiopian dairy industry which is in its infancy stage, when it is a challenge even for the developed countries that have sophisticated supply chains, would be far from the truth. Moreover, for the question how many raw milk suppliers do the industry have, most of the sample centers replied that they do not have limited number of suppliers. Without having limited number of suppliers, it is not likely to sharing common vision, goals, purpose, and objectives across organization. It would also be difficult to communicate and share information. This indicates that there is a problem of alignment as well as linkage in the upward stream supply chain of Ethiopian dairy industry.

According to USAID(2013) report about Ethiopian dairy processing supply chain indicated that as the buyer and seller of milk the dairy processor is the key relationship link in the dairy value chain. The relationships with sellers (farmers and cooperatives) and buyers (retailers and consumers) require trust. In order to build trust each party needs to know what is demanded of

them and there has to be a transparent flow of information along the value chain; the processor needs quality raw milk and the retailer needs an adequate supply. The relationships also require that each party has some level of power in price negotiation and volumes of milk collected reflected in contracts. Finally the relationships require that everyone has benefit in terms of getting paid on time with incentives to increase price. Currently there is no industry forum or association within which the processors can collectively discuss common interests, seek training, and conduct market or business assessments (USAID, 2013).

Effective integration with suppliers is a key factor for achieving competitive advantage. In new product development the benefits from integrating with suppliers are extensive from reducing time to market, reducing costs, improving customer satisfaction and reducing quality problems, among others (Takeishi, 2001). Integrating with suppliers in terms of supplier participation, information sharing and technology sharing has been reported to yield specific benefits in terms of achieving higher product quality. Controlling product quality requires manufactures to work more closely with their suppliers (Baharanchi, 2009; Frohlich and West brook, 2001).

On the other hand, literatures indicated thatCorrect supply chain relationships based on strategic collaboration with supply chain partners (Yeung et al., 2009) as a result of SCI, leverage the flow of timely, accurate and quality information (Li and Lin, 2006) . However, although the definitions in the literature regarding supply chain integration encompass the complementarities between integration and information sharing, in the means that supply chain integration supports effective and efficient flow of information (Flynn, Huo and Zhao,2010).

4.2.3. Customer Integration

Table4.6.shows that only three variables have the mean customer integration score was above 4.0 which were considered high level but most of variables have them mean customer integration score is below 4.0 which is considered as average level and needs attentions(Table 5).Only transparent information about each other's inventory status, long-term relationships with customers and measure customers satisfaction were considered high and their mean value above 4.0.While the mean value for effective communications with your suppliers on research activities and new product development (R&D), sharing technical information,production plan, policies,

strategies and collaboration development program with supplier is considered as average and below 4.0 (Table 4.6).

There is a significant difference in levels of agreements in customer's integrations among respondents (Appendix Table 4).Some of the companies agreed to have better customer integration and or management and some of them is not. The mean value of information sharing on production plan and medium-term and long-term policies and strategies were average compared to others.

Table 4.6. Summary result of customer integration in milk processing centers

Customer integration items	**N**	**Mean**	**SD**
Communications with your suppliers on research activities and new product development (R&D)	23	3.78	1.00
Transparent information about each other's inventory status	23	4.00	0.80
Sharing information on production plan	23	3.17	1.30
Collaboration development program	23	3.78	1.00
Sharing medium-term and long-term policies and strategies	23	3.30	1.11
Sharing technical information	23	3.96	1.02
Long-term relationships with your customers	23	4.43	0.59
Measure customers satisfaction	23	4.00	0.95

N= total numbers of respondents; SD = standard deviation

According to different literatures, customer integration deals with the ability to communicate delivery of the right products and services to customers in the right time, right place and the right quality with correct invoice. Customer integration is mainly sharing product information with customers accepting customer order, interacting with customers to manage demand, having an order placing system sharing order status with customers during order scheduling and product delivery phase. Being more integrated with customers also enables firms to more quickly respond to their product changing needs in the product innovation process. Without information sharing from one end of the supply chain to the other, tremendous inefficiencies can occur in customer service. By having better information and better access to that information, customer

service can be substantially improved by being able to make more timely and accurate sales, replenishment and shipping decisions (Baharanchi, 2009; Lee et al., 2007; power 2005).

Quesada, et al., (2008), agree that transparency of products throughout the supply chain maximizes customer accessibility and increases customer service. Integrated information, systems allow customers total visibility to know where their products are and when exactly will be delivered. Information accessibility improves customer services. Reinforcing the above ideas, Savitskie and Closs (2003) point out that key dimension of performance is the firm‘s ability to broadly meet the customer specified requirements (i.e. customer service performance) includes order related concerns (e.g. fill rate and accuracy), delivery-related (e.g. on time) and responsiveness (e.g. to changing customer requirements‘).

The current result indicated that customer integration is in information sharing on production plan and policies and strategies is low and needs improvement. The same result indicated that there is a significant difference among processing centers in terms of customer management. According toMoberg, Cutler, Gross and Speh (2002) who stated that good relationships with supply chain members, including customers are needed for enhanced organization performance.Besides, Goldenberg (2000) believes that customer relation management is not merely technology applications for marketing, sales and services but rather when it is successfully implemented; it enables firms to have cross-functional, customer-driven, technology-integrated business process management strategy that maximizes relationships. Customer relation management helps companies improve customer retention and loyalty, cross sell and up-sell, reduce operating costs, and increase sales and revenue. Customer relation managementand marketing in general—are critical in setting up an efficient demand chain.

4.3. Supply chain integration challenge in dairy processing centers

Interview and document analysis were used to collect data about dairy processing supply chain integration and challenges faced. Interview was conducted with general managers of the center and experienced persons who work in Ethiopian dairy processor association, Dairy cooperatives/unions, Ministry of livestock and fisheries and ministry of industry and investment

and Ethiopian Meat and Dairy development Institute. The interview questions related to the supply chain integration in dairy processing centers.

- Do dairy processing centers have good supply chain integration (supplier and customer integration? Yes No
- If you say "No" for the above question, what is the reason for their weak supply chain integration?
- What are the challenges faced by the dairy processing centers currently?
- How do you communicate challenges with your suppliers, customers and stakeholders?

According to the respondents, there were two different ideas/answers about good supply chain integration in the processing centers; the first group were explained that yes there was good dairy supply chain integration with in supply chain activities such as production, transportation, processing, packaging, storage and consumption. The interviewee further indicated that they have good communication and information sharing among raw milk supplier and customers (retailers and whole seller) and feedback whenever it required. Milk transportation with cooling facility for both raw milk and milk product has been used which helps to maintain product quality. On the other hand, the second group was indicated that there was no good supply chain integration because there were no well-coordinated transportation, raw milk collection, and marketing of products. There do not have limited number of raw milk supplier and customer (retailer and whole seller) because of seasonal fluctuations of raw milk supply and numbers of fasting days throughout the year. The stated reasons were hindered them not to have effective communication and information sharing on production plan and strategies of the processing center.

Regarding challenge faced the processing centers; the interviewees were listed the major challenges from the supply and customer side. From the supply side, unreliable raw milk supply both in terms of quality and quantity was one of the major challenges faced the processing center which leads the center to process under its capacity. Adulteration, poor road infrastructure, transportation system and husbandry practice were among the responsible factors that affecting the raw milk quality which will lead poor product quality. Low milk productivity per individual

animal, small amount of milk per household, cost of feed, animal health and informal milk marketing system were also important factors for low milk supply.

The above mentioned challenges were also supported by literature review. According to Lemma et al. (2015) dairy supply chain required to synchronize activities of the various dairy supply chain partners. It is challenging phenomenon that Ethiopia dairy supply chain core activities has been segregated and there still no any mechanism introduced for integration. The same authors stated that designing an efficient, hygienic and economic dairy supply chain is difficult for developing countries like Ethiopia. There are quite important viable complications existed in the dairy supply chain, firstly it is difficult to establish a sound milk collection and transportation system. Small dairy holders produced little quantities of milk and that are situated in the remote areas (Zelalem, Emmanuelle and Ameha, 2011; Lemma et al., 2015).

From the customer side, low dairy product demand due to fasting period of Orthodox Christian followers in the area is a major challenge for most processing center faced. The perishable nature of milk together with long fasting periods was seriously affecting milk product market and which also a contradictory phenomenon for dairy industry unless a sustainable solution in place. However, there are some dairy processing like Family milk is working to introduce Ultra Heat Treated UTH, long shelf life) milk to alleviate such types of problem and to bridge the gap between raw milk supply and dairy product demand created during fasting period. According to the report of AGP-LMD (2013), fasting periods are a challenge as processors were reported a decline in processing capacity of 25% during the August and March/April fasting periods. However, some processors are managing around fasting periods by building inventories of UHT milk and cheese, although this can create cash flow problems(AGP-LMD ,2013).

Absence of clear policy to discourage informal milk marketing, adulteration of raw milk, incentive for bank loan, expansion investment, poor coordination among input supply for raw milk production were frequently also mentioned as challenge. Support from different sectorial offices of the governments and non-governments favorable policy and free markets were mentioned as positive encouragement available for the centers.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATION

5.1. Summary

According to the result most of representative processing centers were established before 10 years and are privately owned. Pasteurized milk, yogurt, and soft cheese are the most common dairy products which were produced by most of the processing companies. But, some of respondents have produced specialized product such as flavored yogurt, different types of cheese and cream. Only one processing center which has its own dairy farm though the raw milk production is not fully support the processing centers and the rest 8 processing centers solely depend on farmers, cooperatives and other raw milk supplier. Most of the respondent managers have experience more than ten years and Msc/ MA educational qualifications while others are having work experience less than ten years and BSc qualifications respectively.

Almost all of the mean level of agreements for variables in internal integration score is above 4.0 which are considered as high level of integration. More than 85% percent of the companies have effective communication in new product or process development and collaborates with their company's development program.They also have better technical information and work plan sharing between departments and their mean value is more than average, 4.0, value.Even though, the level of agreement was slightly low in information sharing about inventory status between departments there was no significant difference in level of agreements among processing companies in internal integration.

Regarding supply chain integration, more than half the variables have the mean integration score is above 4.0 which is considered as high level of integration.Effective communications on research activities and new product development (R&D), transparent information about each other's inventory status with suppliers, sharing technical information, long-term relationships with suppliers, rewarding suppliers were considered as high and the mean value of all are above 4.0. While the mean value for sharing information on production plan, policies, strategies and collaboration development program with supplier is considered as average and below 4.0.There was a significant difference in level of agreements in supply integration among the selected companies which was also in line with in interview result.

Some of the companies follow the supplier performance and assist them in improving the management and on how to improve the quality of raw milk supply and continuous follow up. But some of the companies were fail to communicate and collaborate with their suppliers. Majority of the companies reward their suppliers based on their performance, some of them do this practice sometimes, and significant number of the companiesdo not reward their suppliers.

Onlythree of the variables have the mean customer integration score was above 4.0 which were considered high level but most of the variables have mean customer integration score is below 4.0 which is considered as average level and needs attentions. Transparent information about each other's inventory status, long-term relationships with customers and measure customers satisfaction were considered high and their mean value is above 4.0.While the mean value for effective communications with your suppliers on research activities and new product development (R&D), sharing technical information, production plan, policies, strategies and collaboration development program with supplier is considered as average and below 4.0 which needs attention.Being more integrated with customers also enables firms to more quickly respond to their product changing needs in the product innovation process. Without information sharing from one end of the supply chain to the other, tremendous inefficiencies can occur in customer service.

Poor quality of raw milk and supply fluctuation is the major common challenges for all processing centers though there is a variation in degree of severity.Adulteration, poor road infrastructure, transportation system and husbandry practice were among the responsible factors affecting the raw milk quality which will lead poor product quality. Low milk productivity per individual animal, small amount of milk per household, cost of feed, animal health and informal milk marketing system were mentioned asimportant factors for low milk supply.

Absence of clear policy to discourage informal milk marketing, adulteration of raw milk, incentive for bank loan, expansion investment, poor coordination among input supply for raw milk production were frequently also mentioned as challenge. Support from different sectorial offices of the governments and non-governments favorable policy and free markets were mentioned as positive encouragement available for the centers.

5.2. Conclusion and Recommendation

Long term experience of most processing centers in producing different dairy products, mangers experience and their educational background could be an advantage to implement effective dairy supply chain integration in the sector.

High level of agreementsfor internal integration within the companies and high mean value for effective communication in new product or process development and collaborates within their company's development program will keep all links in the supply chain strong and functioning efficiently. Better internal integration within their processing centers might be due to their long experience in producing diversifying products and in managing the company.

More than half the variables have of mean level of agreement of for supply integration score is above 4.0 which is considered as high. Effective communications on research activities and new product development (R&D), transparent information about each other's inventory status with suppliers, sharing technical information, long-term relationships with suppliers, rewarding suppliers were considered high and the mean value of all are above 4.0. While the mean value for sharing information on production plan, policies, strategies and collaboration development program with supplier is considered as average and below 4.0 and which needs attention for sustainable development for the companies though there was a significant deference between the companies.

Onlythree of the variables have the mean customer integration score was above 4.0 which were considered high level.Transparent information about each other's inventory status, long-term relationships with customers and measure customers satisfaction were considered high and their mean value above 4.0.While the mean value for effective communications with your suppliers on research activities and new product development (R&D),sharing technical information, production plan, policies, strategies and collaboration development program with supplier is considered as average and below 4.0 and needs attention. Being more integrated with customers also enables firms to more quickly respond to their product changing needs in the product innovation process. Without information sharing from one end of the supply chain to the other, tremendous inefficiencies can occur in customer service.

Generally, the current finding of the study showed that the internal supply chain integration is more reliable and flexible than external (supplier and customer) supply chain integration. The supply chain internal integration of the case dairy processing was perceived high. However, there was gap on sharing on production plan, long term policies and strategies with their suppliers and customers. Dairy processing centers focused on only internal integration and intensification compared to supply chain integrations. Therefore, sharing information on production plan, collaboration development program, sharing medium-term and long-term policies and strategies with suppliers and customers needs attention to bring sustainable improvement in the sector.

Even though supply chain (supplier and customer) integrationvariables score was considered as high in dairy processing centers, sharing information on production plan, collaboration development program, sharing medium-term and long-term policies and strategies with suppliers and customers needs attention to bring sustainable improvement in the sector.

Poor quality raw milk, raw milk supply and dairy product demand fluctuations during dry seasons and fasting period respectively, considered as a challenge for dairy processing centers even though there is variation in level of severity

Though there is a difference in level of challenge faced by companies' poor quality of raw milk and supply fluctuation is the major common challenges for all of them.This might be due to lack of having fixed number of supplier and customer in which effective communication and information sharing is hinder in implementing external integration. This will further loosen the relation between supplier and customer.

Support from different sectorial offices of the governments and non-governments favorable policy and free markets were mentioned as positive encouragement available for the centers.Absence of clear policy to discourage informal milk marketing, adulteration of raw milk, incentive for bank loan, expansion investment, poor coordination among input supply for raw milk production will remain a challenge unless appropriate action in place.

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APPENDICES

I. Questionnaires

ADDIS ABABA UNIVERSITY

School of Commerce

Department of Logistics and supply chain management

A. Questionnaire distributed for General Manager of dairy processing centers

Dear Participants;

This questionnaire is developed for an academic effort planned for the collection of data to conduct a thesis paper on the title "Assessment of supply chain integration in dairy processing center in and around Addis Ababa", in order to fulfill the University's (Addis Ababa University) requirement set for awarding of a Master's degree in Logistics and Supply Chain Management. The information obtained from this questionnaire will be kept confidential and will not be used for any other purposes. Hence, I am kindly asking respondents to give your candid information.

Thank you for your cooperation!

NB:

- It is not necessary to write your name
- Try to address the entire question given below
- For the closed ended questions use (√)mark for your choice in the given box

1. General Information

This part of the questionnaire tries to gather some general information about the background of the respondent and the company.

1.1.Name of the company: _____

1.2.Positionof respondent:-_____

1.3. Educational background ofrespondent:-

PHD ☐ MBA/MSC ☐ BA/BSC ☐ Diploma ☐ Others ☐

1.4 Form of company:

Private Limited Company□Share Company □PartnershipPublic □Private Ownership □

1.5 Experience ofrespondent:-

1- 3 Years □4- 6Years □7- 10 Years □More than than Years □

1.7.Year of establishment: _____

1.8.Capital of the company:

 Startupcapital: _____

 Current capital _____

1.9.Total number of employees:_____

1.10.What is/are your company's product(s)?

_____

_____

_____

1.11.How many raw material and component suppliers do you have? _____

1.12.How many people work in your purchasing and supply management department? _____

1.13.How many customer/buyer companies do you have? _____

1.14. How many people work in your marketing and sales management department? _____

2. **Information on Internal Integration**

This part of the questionnaire relates to information on relationships among different departments of your company.

2.1.You have effective communications between different departments regarding a new product or process development project.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

2.2.Different but related production sections have transparent information about the inventory status of each other.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

2.3.Different departments in your company provide each other with their plan (s).

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

2.4.Different departments in your company collaborate with the company development program

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

2.5.Different departments in your company share technical information with each other quickly if required.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

B. Questionnaire to be distributed for the Sales/marketing, Supply chain Or Quality Manager of dairy processing centers

Dear Participants;

This questionnaire is developed for an academic effort planned for the collection of data to conduct a thesis paper on the title "Assessment of supply chain integration in dairy processing center in and around Addis Ababa", in order to fulfill the University's (Addis Ababa University) requirement set for awarding of a Master's degree in Logistics and Supply Chain Management. The information obtained from this questionnaire will be kept confidential and will not be used for any other purposes. Hence, I am kindly asking respondents to give your candid information.

Thank you for your cooperation!

NB:

- Itis not necessary to write your name
- Try to address the entire question given below
- For the closed ended questions use (√)mark for your choice in the given box

1. General Information

This part of the questionnaire tries to gather some general information about the background of the respondent and the company.

1.1.Name of the company: _____

1.2. Position of respondent:-

Sales manager □ Quality manager/Officer □ Supply manager/Officer □ others □

1.3. Educational background ofrespondent:-

PHD □ MBA/MSC □ BA/BSC □ Diploma □ Others □

3. Information on supplier integration/ supply chain management

This part of the questionnaire relates to information about suppliers, and relationships between your company and the suppliers. If your company has already worked out a supply chain management policy or is working on it currently, it would be great if you could attach theses documents to the completed questionnaire.

3.1.You have effective communications with your suppliers on research activities and new product development (R&D).

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

3.2.You and your supplier have transparent information about each other's inventory status.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

3.3.You and your suppliers provide each other with each other's production plan.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

3.4.You collaborate with your supplier's development program(s).

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

3.5.You and your suppliers are aware of each other medium-term and long-term policies and strategies.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

3.6.You and your suppliers share technical information with each other if required.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

3.7.You have long-term relationships with your suppliers.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

3.8.You reward your suppliers based on their performance.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

4. **Information on Customer Integration**

This part of the questionnaire relates to information on your customers, and relationships you have with them. If your centers has already worked out a customer relationship management policy or is working out on it currently, it would be great if you could attach these documents to the completed questionnaire.

4.1.You have effective communication with your customers on research activities and new product development (R&D).

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

4.2. You and your customers have transparent information about each other's inventory status.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

4.3. You and your customers provide each other with each other's production plan.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

4.4.You collaborate with your customer's development program(s).

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

4.5.You and your customers are aware of each other's medium-term and long-term policy and strategies.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

4.6.You and your customers share technical information with each other if required.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

4.7.You have long-term relationships with your customers.

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

4.8.Your company have a systematic way to constantly measure customer satisfaction

Strongly agree □Agree□Neutral□Disagree□Strongly disagree□

C. Personal Interview

1. How do you rate the product quality of dairy processing center when compared to the global market?

- High quality
- Medium quality
- Low quality

2. If their quality is low, what do you think the reason is for the poor product quality of the sector?

_____

_____

_____

_____

_____

3. Do dairy processing centers have a good supply chain integration in the domestic as well as foreign market?

Yes

No

4. If you say "No" for the above question, what is the reason for their weak supply chain integration?

_____

_____

_____

_____

_____

_____

5. What are the problems faced by the dairy processing centers currently?

_____

_____

II. Appendix Tables

Appendix Table 1. Illustrates respondent's position with different internal integration activities by their frequency and percentage

Variables		Strongly agree	Agree	Neutral	Dis agree	Strongly disagree	Total	Chi-square df
Effective communications between different departments regarding a new product or process development project	N	5	3	0	1	0	9	2.672
	%	55.6	33.3	0	11.1	0	100	
Information about inventory status between departments	N	3	5	0	1	0	9	2.672
	%	33.3	55.6	0	11.1	0	100	
Exchanging of plan between departments	N	3	5	1	0	0	9	2.672
	%	33.3	55.6	11	0	0	100	
Departments' collaboration with the company development program	N	4	4	1	0	0	9	2.002
	%	44.4	44.4	11.1	0	0	100	
Sharing technical information between departments	N	4	3	2	0	0	9	0.672
	%	44.4	33.3	22.2	0	0	100	

Appendix Table 2. Illustrates respondent's position with different supply integration activities by their frequency and percentage.

Variables		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Chi-square df
Effective communications with your suppliers on research activities and new product development (R&D)	N	11	7	3	0	2	23	8.823
	%	47.83	30.43	13.1	0	8.70	100	
Transparent information about each other's inventory status	N	7	15	0	0	1	23	12.82
	%	30.43	65.22	0	0	4.35	100	

Sharing information on production plan	N	5	8	5	4	1	23	5.484
	%	21.74	34.78	21.74	17.39	4.35	100	
Collaboration development program	N	7	12	1	2	1	23	20.34
	%	30.43	52.17	4.35	8.69	4.35	100	
Sharing medium-term and long-term policies and strategies	N	2	12	5	2	2	23	16.44
	%	8.7	52.17	21.74	8.7	8.7	100	
Sharing technical information	N	8	10	4	1	0	23	8.453
	%	34.78	43.48	17.39	4.35	0	100	
Long-term relationships with your suppliers	N	12	9	1	1	0	23	16.43
	%	52.17	39.13	4.35	4.35	0	23	
Rewarding suppliers	N	7	14	1	1	0	23	8.453
	%	30.43	60.87	4.35	4.35	0	100	

Appendix Table 3.Illustrates respondent's position with different customer integration activities by their frequency and percentage

Variables		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total	Chi-square df
Effective communications with your suppliers on research activities and new product development (R&D)	N	6	9	5	3	0	23	8.823
	%	26.09	39.13	21.74	13.04	0	100	
Transparent information about each other's inventory status	N	6	12	4	1		23	11.33
	%	26.09	52.17	17.39	4.35		100	
Sharing information on production plan	N	4	7	3	7	2	23	4.614
	%	17.39	30.43	13.04	30.43	8.7	100	
Collaboration development program	N	5	11	5	1	1	23	14.64
	%	21.74	47.83	21.74	4.35	4.35	100	
Sharing medium-term and long-term policies and strategies	N	2	11	3	6	1	23	14.24
	%	8.7	47.83	13.04	26.09	4.35	100	

Sharing technical information	N	7	11	3	1	1	23	16.34
	%	30.43	47.83	13.04	4.35	4.35	100	
Long-term relationships with your customers	N	11	11	1	0	0	23	8.712
	%	47.83	47.84	4.35	0	0	23	
Measures customers satisfaction	N	6	14	1	1	1	23	28.09
	%	26.09	60.87	4.35	4.35	4.35	100	