Determinants of Milk Supply Chain Integration in Oromia National Regional State: The Case of Sululta District

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

By

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This is to certify that the thesis prepared by **Gutu Tamasgen**, entitled **"Determinants of Milk Supply Chain Integration in Oromia National Regional State: The Case of Sululta District"**; which is submitted in partial fulfillment of the requirements for the Degree of Masters in Logistics and Supply Chain Management (LSCM), complies with the regulation of the university and meets the accepted standards with respect to originality and quality.

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Declaration

I **Gutu Tamasgen** hereby declare that the work which is presented in this thesis entitled **"Determinants of Milk Supply Chain Integration in Oromia Regional State: The Case of Sululta District"** is the original work of my own and has not been presented for a degree of any other university. All sources of material used for this thesis have been duly acknowledged.

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Confirmation

This thesis can be submitted for examination with my approval as university advisor.

Advisor; Shiferaw Mitiku (PhD)

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The Researcher

ACRONYMS AND ABBREVIATIONS

CRS: Coordination Resource sharing
CSA: Central Statistics Agency
EDI: Electronic Data Interchange
EEA: European Environment Agency
FAO: Food and Agriculture Organization
GDP: Growth Domestic Product
GIS: Geographic Information System
GSCM: Global Supply Chain Management
GTP: Growth and Transformation Plant
HHH: Household head
HRM: Human Resource Management
ICT: Information Communication Technology
II: Information integration
IT: Information Technology
LMD: Livestock Market Development
MoA: Ministry of Agriculture
MoFED: Ministry of Finance and Economic Development
NPC: National Planning Commission
ORL: Organization relationship linkage
SCI: Supply chain integration
SCM: Supply Chain Management
SDANRO: Sululta District Agriculture and Natural Resource Office
SDAO: Sululta District Agricultural Office
SDCPA: Sululta District Cooperative Promotion Agency
SDLFO: Sululta District Livestock and Fishery Office
SDTMDO: Sululta District Trade and Market Development Office
SNV: Netherlands Development Organization
SPSS: Statistical Package for Social Sciences
VMI: Vendor Managed Inventory

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ABSTRACT

The main objective of this paper was aimed to analyze the determinants of milk supply chain integration in Sululta District. Specifically, it tried to identify the most determinant factors that affect milk supply chain integration and tried to prioritize factors that affect milk supply chain integration across the supply chain actors based on information integration, coordination resource sharing and organizational relationship linkage. Data were gathered from 97 milk producing households and 20 milk traders through questionnaire survey and Likert scale-based factor evaluation were applied. Hence, data from the survey were analyzed and presented using descriptive statistics. The results showed that, in most cases regardless of the significant importance of information, integration for effective and efficient business performance, majority of respondents from producers and traders affirmed that lack of joint replenishment forecast, absence of real time information, and lack of sustainable and compatible information sharing system to improve collaborative market planning and decision making as the most important challenges for milk supply chain integration in study area. It also indicated that, the level of trust among supply chain partners is limited. This implies that, the organizational relationship linkage in the study area is very limited for cross-functional integration in milk supply chain initiatives. The result also showed that, there were great challenges of coordination of resource sharing and this lead to high cost of supply chain integration among supply chain partners. The three dimensions of milk supply chain integration were prioritized from the most to the least determinant factors in the study area. Information integration, organizational relationship linkage and coordination resource sharing were prioritized as first, second and third by their virtue of their mean of mean score of Likert scale of 4.84, 4.83 and 4.62 respectively. This implies that, information integration is an essential for the effective functioning of the whole supply chain integration. Which leads to sustainable relationship linkage and trust among supply chain partners and lastly, the integration of coordination resource sharing might be brought among supply chain partners due to high level of trust. In general, milk supply chain in the study area seemed to be un-integrated and separately performed. Thus, the study recommended that, the government should establish legal framework and written contract agreement platform to maintain trust, facilitate compatible information technology system and provide frequent training to supply chain partners on the best practices in the form of seminars and workshops. Moreover, the study also recommended that, supply chain partners should introduce coordination resource sharing in order to increase quality and minimize cost of milk supply chain integration. These all need to be due attention in-order to enhance dairy business development through increasing efficiency and effectiveness among milk supply chain partners.

Keywords: *Supply, integration, determinant, milk*

CHAPTER ONE

1. INTRODUCTION

This chapter tried to introduce the background of the study, problem statement, objectives of the study, research questions, scope of the study, delimitation of the study, definition of terms, and significance of the study.

1.1. Background of the Study

Because of 75 percent of the world's highly poor people inhabit in rural areas on agriculture (FAOSTAT, 2011), the advancement of agricultural sector, particularly in developing countries is an important factor for cutback of poverty. Studies indicated that about 60 percent of rural people of developing countries depend on livestock resources for their livelihood and hence, contribution of livestock to this group is important to improve economic growth and escaping poverty (FAO, 2010). According to FAO LMD (2010) about 12 percent to 14 percent of the world population, rely on milk subsector for their income and employment opportunities, and this is estimated to almost 150 million farm households, or more than 750-900 million people, the majority of them are in developing countries (Gezahegn and Rich, 2003), and are engaged in milk production and/or live on dairy farms or within dairy farming households and the production of one million liters of milk per year on smallholder dairy farms creates approximately 200 on-farm jobs (FAO LMD, 2010).

Ethiopia is endowed with large and diverse livestock resources but using its rich endowment to little advantage. The country is said to be the first in Africa and 10th in the world in its cattle population while the least in milk consumption with 19 liters per capita consumption per annum (SNV, 2008). Report by the National Planning Commission (NPC, 2016) issued at the end of the country first growth and transformation plant (GTP I) indicated that, Ethiopian economy is highly dependent on agriculture, which contributed about 38.5 percent of the country GDP, and provides an employment opportunity for about 80 percent of the population (Nagalla, 2016). The livestock subsector plays a vital role as source of food, income, services and foreign exchange to

the country economy, and contributes to 12-16 percent and 33 percent of the total and agricultural GDP, respectively (Staal *et al*., 2008). Livestock accounts for 12–15 percent of the total export earnings (SNV, 2008), about 60-70 percent of livelihoods of the population and 47 percent of agricultural GDP (Staal *et al.,* 2008), and more than 85 percent of agricultural cash income (Sonder *et al.,* 2006). As reflected in the Growth and Transformation Plan (GTP), the Ethiopian government has huge interest to develop the livestock sector through expansion of fattening and milk production via breed improvement as well as pasture development and animal health (MoFED, 2010).

With regard to altitude, Ethiopia is divided into two major agro-ecological zones, i.e., a highland (>1,500 meters above sea level) and a low land (<1,500 meters above sea level), which includes pastoral and agro-pastoral areas. The highland comprises 39 percent of the land areas of the country, 88 percent of human population, and 74 percent of the tropical livestock units, while the remainder is in the lowlands (Hussen *et al.,* 2008). According to the report of the Central Statistical Agency (CSA, 2016) the livestock population was estimated to 57.8 million cattle, 28.9 million sheep, 29.7 million goats, 2.1 million horses, 0.4 million mule, 7.9 million donkey, 1.2 million camel, 60.5 million poultry and 5.9 million beehives. Cattle, camel and goats are the main sources of dairy products in Ethiopia (CSA, 2016). According to MoA (2015), cattle produce 83 percent of the total milk and among which 97 percent of the cow milk comes from indigenous cattle breeds. Even though the productivity performance of these indigenous cows is reported to be low when compared with average productivity of other countries and world average, the dairy sub-sector is reported to be used as means of employment, income generation, and as source of food with better nutritive value such as minerals like calcium, proteins which are main source of important amino acids required for body buildings and tissue repairs, but are scarce in the food sources of cereals (Ali *et al.,* 2017). Hence, development of the dairy sub-sector can contribute more in the reduction of poverty and to improve nutritional status in the country.

Even though intensive dairy development through improving the productivity problem of local cattle is one of the top priority strategies of the Ethiopian government, the productivity of this sector is constrained by several factors, including poor genetics that result in low production and reproductive performance, poor quality and varying seasonal availability of feed, high disease

incidence and parasite challenges, low accessibility of services and inputs, and lack of a well-organized marketing system, which is dominated by informal marketing channel. (Duncan .J. *et al.,* 2013)

In order to improve the productivity and total production of key livestock value chains such as for milk, poultry, red meat, and crossbred dairy cows through improving genetics, feed, and livestock health services in its second Growth and Transformation Program by 2020, the Ethiopian government has developed a livestock master plan (Shapiro *et al.,* 2015).

1.2. Problem Statement

Dairy contributes an important livestock product and makes a significant contribution to the nutrition as well as income for the livestock owners. Ethiopia holds large potential for dairy development due to its large livestock population and the favorable climate for improved and high yielding animal breeds (Mohammed *et al.,* 2004). Despite the huge potential, however, dairy production has not been fully exploited and promoted in the country. The country earned about 3.06 billion liters of cow milk and 220 million liters of camel milk by the year 2015/2016, with a mean milk yield of 1.37 liter per cow per day or 247 liters per 6 months of lactation length (CSA, 2016). Compared to the world (104 liters) and Africa (49 liters) average milk consumption (World Dairy Submit, 2012), the milk consumption in Ethiopia is significantly low, i.e., only 19 liters per capita per year (SNV, 2008). With regard to market supply, about 98 percent of milk in Ethiopia is produced and managed by smallholder dairy farmers. Nevertheless, only 5 percent of the milk produced in the country is sold in markets whereas the rest 95 percent is used for consumption and processing at home (Ali *et al.,* 2017).

Milk production and marketing in Ethiopia has been studied by different authors (Berhanu, 2012; Meryem, 2013; Eyassu and Doluschitz, 2014; and Asnakech *et al.*, 2016). Some case studies were also undertaken regarding value chain analysis of dairy production (Betela, 2015), analysis of milk and feed value chain (Kitaw *et al.*, 2012), and milk value chain and quality analysis (Mustefa, 2012). Most of these studies mainly focused on production aspect of the dairy and some have considered the common dairy marketing related problems, ignoring to identify factors that determine the supply chain integration of milk. This shows the important determinants of milk supply chain integration among the producers and traders were not well identified and

documented. On the other hand, a good SCM needs to be working strategically at collaborates with its supply chain partners. In order to achieve effective and efficient flows of products and services, information and money to provide maximum value to the customer at low cost and high speed, however, there need to be strategically integration among the supply chain actors.

Therefore, this study was aimed at examining how milk supply chain is integrated and functioning among producers and traders in terms of information integration, coordination and resource sharing and organizational relationship linkage in the study district. Cognizant of these facts, this study was undertaken to seek possible answers to the following problems by conducting milk supply chain integration in the selected study area.

1.3. Research Questions

The study tried to answer the following questions:

- → What are the major challenges that hinder milk supply chain integration across the supply chain actors in Sululta district?
- → What are the determinants of milk supply chain integration of supply chain actors in Sululta district?
- → On what basis do factors that affect milk supply chain integration across the supply chain actors can be prioritized?

1.4. Objective of the Study

1.4.1. General Objective

The main objective of the study was to analyze the determinants of milk supply chain integration in Sululta District.

1.4.2. Specific objectives:

- → To identify the major challenges that hinders milk supply chain integration across the supply chain actors in Sululta district.
- → To identify the major determinants of milk supply chain integration across the supply chain actors in Sululta district.

→ To prioritize factors that affect milk supply chain integration across the supply chain actors.

1.5. Significance of the study

The study tried to provide information on the determinants of milk supply chain integration in the study areas. Therefore, it tried to shed light on required efforts to enhance the production and utilization of dairy at larger scale to bring about economic development in the area. The information that will generate from the study could also serve as a guideline to all stakeholders in the dairy value chain including policy makers and extension service providers in order to determine factors that hinder the implementation of supply chain integration options and to establish effective supply chain management practices in the sector. The result from the study also believed to benefit both governmental and non-governmental organizations that were engaged in the dairy development sub-sector.

The findings of the study could also serve as a stepping stone for future researchers on the same or similar research topics by suggesting areas that need further studies to be conducted. Ultimately, successful completion of the study enabled the researcher to partially fulfill the requirements for the award of a Master's degree in Logistics and Supply Chain Management offered by the Addis Ababa University School of Commerce.

1.6. Scope of the Study

The study mainly focused on the analysis of determinants of cow milk supply chain integration in Suluta District. The study was conducted in six *kebeles* of Sululta district. These areas coverage of the study were selected due to their higher number of dairy cows than the rest *kebeles* of the district. The study tried to cover the determinants of milk supply chain integration based on information integration (II), coordinated resource sharing (CRS) and organizational relationship linkage (ORL).

1.7. Delimitation of the Study

The initial plan was to analyze the determinants of both milk and milk products supply chain management of the proposed study area. However, due to the fact that both milk and all milk

products are believed to follow different routes of supply chain, and the associated huge financial requirement to accomplish the study in contrast to the very little or no research fund available, the researcher decided to conduct the research only on the determinants of cow milk supply chain integration of the proposed study area. The study tried to cover the analysis of determinants of milk supply chain integration between producers and traders and it also tried to focus only on external determinants of milk SCI among the chain.

1.8. Limitation of the Study

With regard to the limitation of the study, due to financial and time constraints the study only focused on the determinants of milk supply chain integration of one district. In addition to this, all milk supply chain actors in the study area were not included. However, the study focused on only major milk supply chain partners i.e. producers and traders. Hence, all generalizations of the finding are limited to the study district and areas with similar socioeconomic characteristics.

1.9. Organization of the Study

The study was consisted of five chapters. The first chapter contained: background, research problem, objectives, research questions, and scope of the study, delimitation of the study, definition of terms, and significance of the study. In the second chapter, review of different theoretical literatures, empirical works related to the subject-matter with identified literature gap and conceptual framework of the research were presented. Chapter three described the methodology that was used in conducting the study. Research findings and detail discussions of the result were presented in chapter four. Chapter five summarized the main findings of the study and provided research and policy recommendations thereof.

1.10. Definition of Terms

Supply chain: is a collection of viewpoints that search for integration and effective collaborations between materials, information, and financial flows throughout the supply chain. As a result of the integration, the product is delivered to the required location timely, properly and at the lowest cost and thus the customer's need is met (Estedler and Hilletofth, 2007)

Supply chain management (SCM): is defined as a set of approaches that efficiently integrate and coordinate the materials, information and financial flows across the supply chain so that merchandise is supplied, produced and distributed in the right quantities, to the right locations, and at the right time, in the most cost-efficient way, while satisfying customer requirements.

Determinants: were that of who sought to identify whether the formulation of environmental plans being influenced by pressure from clients, shareholders, society and governmental regulations (Henriques and Sadorsky, 1996).

Supply chain integration (SCI): It is the degree to which a producer strategically collaborates with its supply chain partners in order to achieve effective and efficient flows of products and services to provide maximum value to the customer.

Trust in supply chains: it can be attributed to relationships between people or organizations. Humans have a natural disposition to trust and to judge trustworthiness (Kosfeld *et al.,* 2005). Members in a supply chain institute trust through legal frameworks, commercial law, control system, agreements and contracts (Child and Mollering, 2003).

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

Under this chapter relevant theoretical literature has been discussed to explore the research problem and it presents empirical literature reviewed and a summary of the conceptual framework by the researcher. Theoretical literature reviews included different concepts and theories related to supply chain integration. Empirical literature review included review of various empirical studies conducted to supply chain integration while the conceptual framework describes various variables of the study.

2.1. Theoretical Literature Review

2.1.1. Supply Chain

Supply chain is a process which involves various parties i.e. manufacturers, suppliers, transporters, warehouse, retailers etc. One of the views on supply chain defines it as a trend that involves various process of the product such as production, processing, distribution, consumption and its disposal after final use. In a supply chain, the physical process may include the flow of products from suppliers to the end consumers, but the supply chain as a whole include the supply chain decisions, that involves product returns, payments, rebates, repair etc in the process (Ayers, 2006).

During the process of the supply chain, there is a continuous flow of the information, product and Money. The products flow from manufacturer to the customer while the money flows from customers to the manufacturers, while the information keeps flowing between all the parties during the supply chain. The supply chain involves various stages which include customers, retailers, wholesalers/distributors, manufacturers; component/raw material suppliers and all of these stages are interconnected to each other through the flow of products, information and funds (Chopra and Meindl, 2007).

2.1.2. Supply Chain Management

Definitions of SCM vary across many scholars of supply chain management. A deep synthesis of these definitions depicts that SCM can be defined from three perspectives; a management philosophy, implementation of a management philosophy and finally a set of management processes (Mentzer *et al.,* 2001). The various definitions advanced and their categorizations point that the term "supply chain management" remains a knowledge area of great contestation and confusion for researchers and practitioners alike (Mentzer *et al.,* 2001).

When SCM is viewed as a philosophy, a systems approach is used to view the supply chain. Thus, a supply chain becomes a single entity rather than a set of fragmented parts each performing its own function (Tyndall *et al.,* 1998). It follows that the philosophy of supply chain extends the concept of partnerships and collaborative endeavors into an intra firm and inter-firm effort to manage the total flow of goods from the supplier to the ultimate customer (Jones and Riley, 1985). In supporting Jones and Riley, Cooper *et al.,* (1997) argue that SCM is a set of beliefs that each firm in the supply chain directly and indirectly affects the performance of all the other supply chain members, and ultimately the overall supply chain performance.

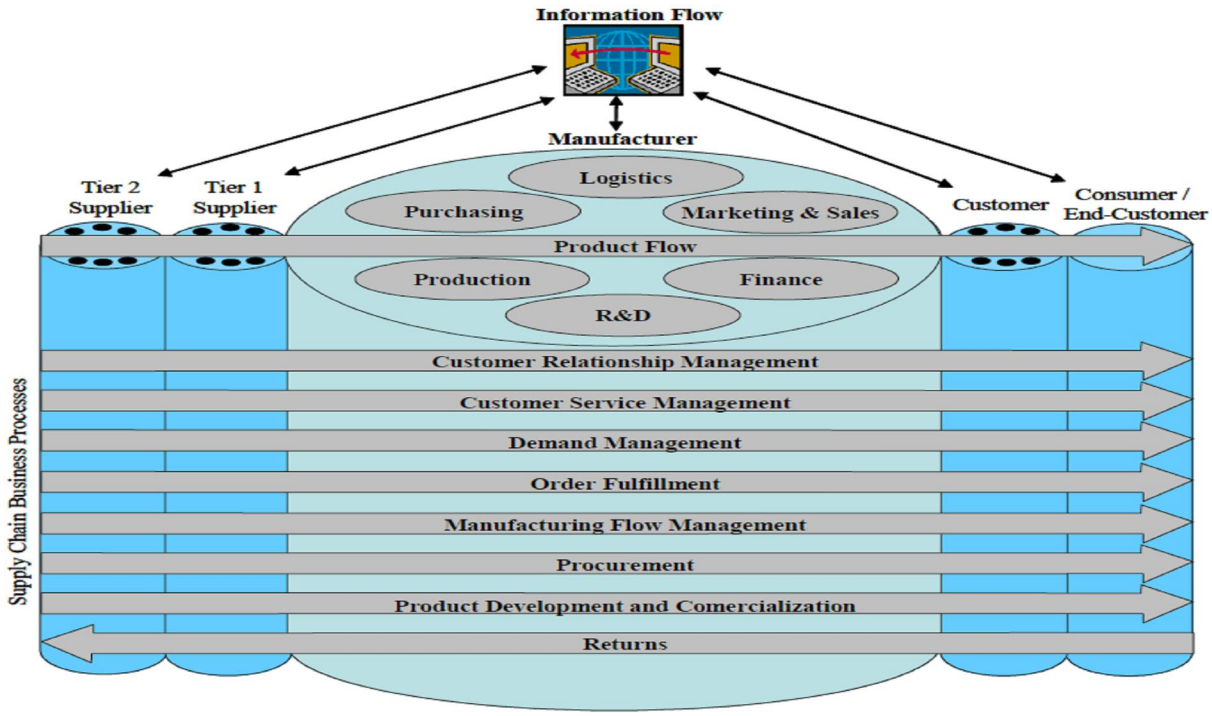

Figure 1: A model of the architecture of supply chain management (Cooper *et al.,* 1997)

The model includes key supply chain business processes; and flows of information and product, over a supply chain network structure. It highlights six key processes within an enterprise: Purchasing; Logistics; Marketing and Sales; Production, Research and Development; and Finance. Processes are integrated within several tier suppliers and several customers or end customers through the key supply chain processes of Customer Relationship Managements, Demand Management, Procurement and Returns, among others, (Cooper *et al.,* 1997).To this end, SCM can be defined as a set of approaches that efficiently integrate and coordinate the materials, information and financial flows across the supply chain so that merchandise is supplied, produced and distributed in the right quantities, to the right locations, and at the right time, in the most cost-efficient way, while satisfying customer requirements,(Cooper *et al.,* 1997).

2.1.3. Supply chain Integration

According to Flynn *et al.*, (2010) supply chain integration (SCI) can be defined as "the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organization processes. The goal is to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer at low cost and high speed." This is why it is so important to instill confidence amongst all the agents, building long-term relationships, frequent communication, share both profit and risk, and look for effective ways of sharing information, make joint decisions and resolve conflicts (Flynn *et al.,* 2010). Through supply chain integration, organization tries to develop strong partnership and effective flow of information links, alliance and cooperation (Power, 2005). The scope of supply chain integration is not limited but it has wide scope ranging from supplier integration to customer integration covering central concept of internal integration also (Flynn *et al.,* 2010; Zhao *et al.,* 2010).

Integration is now widely taken the central concept of successful SCM, because the implementation of SCM needs the integration of processes from sourcing, to manufacturing, and to distribution across the supply chain (Cooper *et al.,* 1997; Ellram and Cooper, 1990; Mentzer *et al.,* 2001). 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 (Sadler, 2007). Many descriptions and measures of supply chain integration have been suggested, some study illustrated about the performance, some concentrating on the relationship of SCI (Flynna *et al.,* 2010). Moreover, Alfalla-Luque *et al.,* (2012) have a comprehensive study on the supply chain integration. The study discloses information integration (II), coordinated resource sharing (CRS) and organizational relationship linkage (ORL) are the main dimensions of SCI.

2.1.4.1. Dimensions of supply chain integration

Alfalla-Luque *et al.,* (2012), stated that supply chain integration has three dimensions which are described as information integration, coordination resource sharing and organizational relationship linkage.

2.1.4.1.1. Information integration

One of the significant subjects in managing a supply chain process is information integration among its partners. To enable the integration, supply chain information resource must be efficiently controlled and shared. Information integration provides networks that transfer information from one supply chain partner to another (Chandra and Grabis, 2007).

Information integration allows management to observe the operations of the organization as a whole rather than uneven manner. Avoiding uncertainty in SC, information integration involves the sharing of appropriate information and knowledge among members of the supply chain (Dam and Larsen, 2005).

Lee *et al.,* (2000) argue that information integration contributes and sharing important information by using the information technology within the supply chain partners. Furthermore, information technology can integrate the supply chain partners through system integration, application and data integration (Berente *et al.,* 2009). Lee *et al.,*(2000) also illustrate that information integration is a core objective of supply chain; it helps to communicate the required information for decision making. Therefore, according to Prajogo and Olhager (2012)

information flows from downstream to upstream support the material flow reciprocal from upstream to downstream. On the other hand, information integration supports two basic concepts, technical which lead to information technology and other social concept that leads to information sharing and trust, for example some studies focus on adapting technology and some studies emphasis on the information sharing between supply chain partners (Prajogo and Olhager, 2012). Also information integration is helping in such activities as reduced cycle time, increased prominence of transactions, reduced transaction cost, better tracing and tracking and gives greater competitive advantage to all the partners in the supply chain. As a result, the level of information integration shows how closely cooperation and coordination are harmonized among the parties (Bagchi and Larsen, 2002)

2.1.4.1.1.1. Information sharing

Information is vital for the effective functioning of any business. It has been described as the lifeblood of organizations. Information sharing refers to the extent to which a firm openly communicates important and sensitive information to its partners (Shou *et al.,* 2012). The notion of information sharing has attracted significant attention from a number of scholars who have stressed its role and influence in the supply chain environment (e.g. Jraisat *et al.,*2013). Information sharing has also been regarded as an effective predictor factor of a supply chain's effectiveness (Zhang & Chen, 2013). In that regard, a study by Hsu *et al.* (2008) found that information sharing contributes largely to improved relationships between suppliers by facilitating efficient coordination and responsiveness as well as integration of partners' information systems. Furthermore, effective sharing of information between supply chain members has also been determined to be a crucial antecedent aspect in mitigating the negative impact of the bullwhip effect (Kelepouris *et al.,* 2008). Chinomona and Pooe (2013) found that timely and accurate sharing of strategic information can foster the reduction of unwarranted wastages and costs in a supply chain, thus leading to increased profitability.

2.1.4.1.1.2. Information technology integration

Since the last decade, integration has become the key aspect of the performance of the supply chain. The interdependency of supply chain partners becomes a cause to raise the importance of

integration processes in the supply chain processes like, sharing of information, information technology and technical support (Cochon & Fisher, 2000). Due to lack of integration and coordination increase the cost of production, increase the inventory level, logistics cost as well as increase replenishment lead time. There is a reason to use the advance information technology in the supply chain that can increase integration by reducing uncertainty, increasing the communication and coordination that influence the decision making between supply chain partners (Cochon & Fisher, 2000). The inventory replenishment can be done timely and accurately due to increasing communication capability that is possible with the help of latest information system and technology (Handfield, 1994).

2.1.4.1.1.3. Collaborative planning

Companies try to get competitive advantage through the collaboration with other business partners, this called supply chain integration (Petersen *et al.,* 2005). Improvement in the information technology, companies try to involve the joint planning for the supply chain performance (Alfalla-Luque *et al.,* 2012). Furthermore, the greatest benefit of the collaborative planning in the supply chain is the better communication and information sharing among the supply chain partners and make big change in the traditional business relationship. However, collaborative planning is required the high quality of information sharing (Petersen *et al.,* 2005).

2.1.4.1.1.4. Joint demand forecasts

Supply chain members forecasts demand of a product individually and each member accomplished of joining forecast apprises in the replenishment process. In that scenario the demand forecast relates to the supplier or buyers. Because of the decentralized structure of information supply chain members do not share the inventory status (Aviv, 2001). According to Alfalla-Luque *et al.,* (2012) avoid the disruption of the demand in the supply chain need to real time and direct information from end consumer to manufactures. Most companies heavily invest in the information system and technology to manage the inventory challenges with high and low demand (Lindsey and Pavur, 2008).

2.1.4.1.1.5. Joint replenishment forecasts

Information integration improves the quality of decision-making, reduce demand uncertainty, and, ultimately, improve supply chain performance. Previous researches describe advantages of collaboration i.e. Improved supply chain performance in several core areas, including increased sales, improved forecasts, more accurate and timely information, reduced costs, reduced inventory, and improved customer service (Whipple and Russell, 2007). By attaining high service levels of the accurate product in the perfect place with the help of better demand forecast and accuracy in replenishment plan across the supply chain (Seifert, 2002).

2.1.4.1.2. Coordination resource sharing

The coordination and resource sharing appreciate organizations for working together, and it depends on the mutual trust and requirements between the supply chain partners. This is however, difficult to remove the barriers and obstacles from the department and organization in the integration process (Alfalla-Luque *et al.,* 2012). When the less coordination diagnoses between the supply chain partners, and production capacity planning is showing the imbalance, its mean the rearrangement is required between the supply chain partners. Furthermore, the logistics features are very essential like delivery agreements, common logistics equipment have high impact on cost, outsourcing reform, quality and agility and packaging customization (Alfalla-Luque *et al.,* 2012). According to Bagchi and Larsen (2002) all the customer and supplier have different level of integration it depends on the originations mutual interest.

2.1.4.1.2.1. Shared decision making

Effective decision making can be possible and implemented if the information is shared and level of trust among potential partners should be high. Limited and low level of information sharing create problem while making decisions in the supply chain. The strongest relationship among supply chain partners is due to cooperation and that leads to effective decision making (Chandra, 2007).

2.1.4.1.2.2. Cooperation

The highest level of supply chain integration is the due to planned cooperation between activities and it also required for the stability of the supply chain. Cooperation is also helpful in required decision making. High reliability cooperation is characterized by the high level of trust and resource sharing (Seuring and Goldbach, 2002).

2.1.4.1.2.3. Work realignment

Supply chain management required different actors to work together in a balanced way to achieve common goal. It needs to be managed coordination and cooperation among the partners of the supply chain to facilitate information sharing as well as to work in a better way (Jespersen and Larsen, 2005).

2.1.4.1.2.4. Reorganization of outsourcing common use of third party logistics

Outsourcing becomes very common practice in many industries. Lower the product cost is due to the reliance on the outside suppliers and on the other hand it provides a high level of product and service quality. Furthermore, outsourcing is also helpful for improving buyer supplier relationship (Wisner, 2008).

2.1.4.1.2.5. Packaging customization standardization

It is important that manufacturers manage their own business operations also need to get involved with upstream and downstream firms network (Handfield, 1994). Frohlich and Westbrook (2001) argue that manufacture; distributors should make a common integration strategy that can enhance the performance of supply chain integration.

2.1.4.1.2.6. Agreement on delivery frequency

The customer satisfaction always provides the delivery frequencies without any interruption. Furthermore, this may enhance the transportation cost on the other hand reduce the inventory cost but if we compare the overall benefits of supply chain than it boost up the operation as well as whole supply chain. These practices of frequent deliveries are rather common in retail chain (Spole, 2012).

2.1.4.1.2.7. Common use of logistics equipment/ containers

Products move from the supplier to retail shelves with reliability and predictability to fulfill the customer demand and to get a major market share common use of logistics equipment is a common practice. This is enhancing the business value for the retailers or distributors as well as the entire industries. This common activity is also effective for the planning, implementing controlling process and efficient the services for example storage of goods and related information from end users to supplier and ensuring the customer's requirement. Furthermore, common use of logistics equipment creates a comparative advantage and higher the level of logistics estimable whole supply chain (Grawe, 2009).

2.1.4.1.2.8. Process integration

The term process integration means sharing information and coordinating resources to jointly manage a process or processes (Wisner and Stanley, 2008). Consequently, process integration is the essence of supply chain management. For process integration in any company supply chain members have need of trust and cooperation among them. Process integration maintaining and creating successful relationships with customers are essential things (Wisner and Stanley, 2008). Lack of process knowledge among the supply chain partners and within the firm can lead to the bad and downfall activities of the supply chain (Wang *et al.,* 2007).

2.1.4.1.3. Organizational relationship linkage

Organizational relationship linkage (ORL) encompasses stable relationship between supply chain partners, which involves common objective and vision, sharing of ideas, sharing of skills, cultural and institutional performance measures. In ORL clear strategic vision is required to achieve common objectives and vision, to overcome risk, promote rewards, reduce costs, develop skills and define joint performance measure (Alfalla-Luque *et al.,* 2012). In recent years, many organizations seek to work with their suppliers and customers so various organization changes their attitude toward their suppliers and customers. Consequently, supply chain integration helps to develop long-term relationship among supply chain partners (Alfalla-Luque *et al.,* 2012).

Companies termed as effective in their SCM practice put a lot of emphasis on developing their human resources through training and retraining of their employees (Gowen and Tallon, 2002). These entities develop specific skills among employees like problem-solving skills, leadership skills, team-building skills and job skills. Furthermore, Shadur and Bamber (1994) a firm that effective SCM practice also rely on teamwork and continuous improvement. Teamwork is critical because it enables pooling of resources and expertise for faster trouble shooting and support improvement. Collaboration is necessary in SCM and its key ingredient is trust. Trust is delivered by people and it is therefore necessary that trust building practices are shared by supply chain members (Basu and Miroshnik, 1999). They also point out that HRM system needs to emphasize extensive skill development, worker adaptability and high motivation and hence suppliers in a supply chain are expected to develop similar HRM practices in order to support the emphasis on collaboration along the chain (Basu and Miroshnik, 1999).

2.1.4.1.3.1. Design and maintaining of communication channels

Communication channels and networking among the members of supply chain help in business policies and tasks. Furthermore, help to reduce the inventory level and distortion in the communication of information (Ross, 2011). In supply chain, information sharing is one of the factors that contribute to the better and stronger relationship as well as also improve responsiveness and coordination within a buyer supplier relationship. The critical examination of information systems must by the supply chain managers within and outside of the firms to support the productive relationship with suppliers. Firstly, the firm must know its insufficient leverage of information sharing and collaborative efforts prior to adopt specific technology that helps the inter-firm communication systems. Furthermore, if a firm wants to leverage information systems must think about its objectives of doing investments and the future impact (Hsu *et al.,* 2008).

2.1.4.1.3.2. Incentive realignment

Incentive alignment in supply chain integration is that in which risk and gains of integration are equally shared (Harrison *et al.,* 2004). In ORL the incentive realignment is one of the elements of performance measurement and incentives such as rewards structures and cost (Dudek, 2009).

2.1.4.1.3.3. Integrated behavior

For effective and efficient flow of product and services to the customers due effective supply chain integration is essential. Furthermore, make effective plans to provide maximum satisfaction to the customers at lower cost as well as to promote business performance (Flynn *et al.,* 2011).

2.1.4.1.3.4. Joint establishment of objectives of all parties in the chain

The relationship of supply chain parties improves with the help of communication and activities regarding problem solving between organizations. In addition, partners should use an objective performance measurement system to make sure that partners have established objective. Furthermore, these activities lead to more improvement in the supply chain (Handfield and Nichols, 2002).

2.1.4.1.3.5. Knowledge Sharing in Supply Chains

Knowledge sharing is an activity through which knowledge i.e. information, skills or expertise is exchanged among people, friends or organization. Knowledge constitutes a valuable intangible asset for creating and sustaining competitive advantages (Miller and Shamsie, 1996). The relationship between supply chain partners is required for supply chain integration. This is therefore; create a deeper cooperation between partners, ability to learn and sharing new skills, rewards and ideas and mutual trust. Furthermore, sharing of skills, ideas and rewards are important features and these are necessary to achieve successful supply chain integration (Gattorna, 1998). Knowledge sharing activities are generally supported by knowledge management systems. Technology constitutes only one of the many factors that affect the sharing of knowledge in organizations. Other factors which facilitate knowledge sharing are organizational culture, and trust and incentives. The sharing of knowledge constitutes a major challenge because employees tend to resist sharing their knowledge with the rest of the organization (Bock and Kim, 2002). Dalkir (2005) identified the common risk in knowledge sharing as rewarding individuals on the basis of what they know, not what they share. If knowledge is not shared, negative consequences such as isolation and resistance to ideas occur. Shared knowledge offers different viewpoints and possible solutions to problems.

Knowledge sharing among the members involved becomes very crucial to achieve cooperative competitive advantages of all the parties concerned. With effective knowledge sharing, the strategic intents of members can easily be attained by combining relevant organizational resources and capabilities (Madhok and Tallman, 1998). Loebecke *et al.,* (1999) assert that knowledge is a great source of competitive advantage, but firms only share knowledge if sharing benefits outweigh the losses realized by relinquishing their monopoly over the knowledge.

2.1.4.1.3.6. Drawing up of contingency plan for quick problem solving

Many authors argue that improvement practices and management that lead to enhanced integration of the supply chain (Bresnen and Marshall, 1999; Briscoe *et al.,* 2004). Besides, the better value can be delivered to the end consumer is due to the improved integration of products and processes in the industry. This is therefore, drawing a plan for work together as a united team in a supply chain moves towards the effective supply chain (Briscoe, and Dainty, 2005).

2.1.4.1.3.7. Trust in Supply Chains

Forging and maintaining long term relationship requires mutual trust among members of the supply chain, close communication, quality assurance and respond (Ross, 1996). Trust can be attributed to relationships between people or organizations. Humans have a natural disposition to trust and to judge trustworthiness (Kosfeld *et al.,* 2005). For trust to occur, one party (trustor) is willing to rely on the actions of another party (trustee), a futuristic inclination characterized by great uncertainty of outcome. In addition, the trust or (voluntarily or forcedly) abandons control over the actions performed by the trustee. While the trustee has performance duty in the relationship, the trust or can only develop and evaluate expectations. The uncertainty involves the risk of failure or harm to the trust or if the trustee will not behave as desired (Mcknight and Chervany, 1996).

Researchers on trust have broadly focused on three perspectives to build trust between supply chain members. The perspectives are characteristics based trust, rational trust and institutional trust. In characteristics based trust, the focus is usually on the characteristics of individual processes, economics, technology and institutional system on establishment of trust (Kwon and Suh, 2005, Schoorman *et al.,* 2007). Key characteristics considered in trust building process are

perceptions, reliability, dependability, credibility, commitment, honesty, benevolence, fairness, goodwill and emotions.

For rational trust, economics of relationship, dynamic capabilities of partners and technology adoption are crucial considerations (Lippert and Swiercz, 2005). From the rational choice perspectives theory, decisions made on trust considerations are presumed to be motivated by rational efficient choice (i.e. to maximize expected gains or minimize expected losses from their transaction). Trust is deemed to take center stage in conditions of ignorance of some aspect of the negotiation or interaction and hence there must be a rational reason to trust.

Members in a supply chain institute trust through legal frameworks, commercial law, control system, agreements and contracts (Child and Mollering, 2003). Shapiro *et al.,* (1992), proposed the notion of deterrence-based trust. They argue that actors act in a trustworthy manner because of the fear of the consequences of trust violation. Trust has a positive influence on inter organizational knowledge sharing (Chenget *et al.,* 2008). Without trust in a collaborative endeavor, information exchanged, or knowledge shared between partners may below in accuracy, (Currall and Judge, 1995). Moreover, it may also lack currency or be less in content and hence create less impact to the user of the information or knowledge.

2.1.4.1.3.8. Creating team works along SC and cross functional teams

Supply chain members working as a team in cross functional nature that help to control supply chain activities Beecroft *et al.,* (2003). Definite collaboration and coordination between supply chain partners is very important in literature. Collaboration is a very important base of mutual trust, shared risks, shared rewards and openness the result is the better performance. (Hogarth-Scott, 1999). Various authors (Gattorna and Walters, 1996; Christopher, 1998; Gunasekaran *et al.,* 2001; Ozkul and Barut, 2009) cited in Raja and Muhammad, (2014) that on collaboration and give stress on the long-term and closer relationship in a way to make responsive and efficient supply chain. Many companies collaborate with supply chain since it offers competitive pricing, market diversity and shorter product life cycle.

In era of globalization supply chain relationships and procedures must be aligned & integrated with business strategy so that the ultimate purpose of customer satisfaction & value addition to

company value delivery network should be materialized. Three major forms of SC integration were investigated which are intra organizational process integration; inter organizational collaboration & Operational excellence. First form relates to strong level of coordination among different functional departments of the organization & its processes, if first form is there it makes possible to integrate the SC functions of organization with suppliers & customers & finally operational excellence make the organization stand at competitive position in terms of cost & service effectiveness. (Morash & Clinton, 1998)

2.2. Empirical Literature Review

Previous researchers have devoted a great deal of attention to the relationship of supply chain management practices and certain aspects of overall organizational performance from different perspective/dimensions or overall supply chain. Some of these researches finding are discussed as follow:

A study conducted by Tan *et al.,* (2009) on supply chain management in the manufacturing sector found out those suppliers, manufacturers and customers, must be effectively integrated in order to achieve an effective supply chain. The study found that integration is much needed especially if the supply chain involves multiple organizations should bring to customers products at the lowest cost and quickest time.

A review on key concepts in a study conducted on factors affecting supply chain management in agribusiness indicated that traditional agricultural and food businesses that focus only on price are unable to meet consumer's expectations. The study highlights the importance of critical factors like mutual trust; leadership by one or two chain members; the use of information technology (IT) in input procurement, production planning, and market access; readjustment of strategies to develop improved production methods to meet consumer preferences and food safety standards; and the intelligent use of market information to help small farmers to overcome production challenges and respond to the challenges of global markets (Chojar, 2009).

The study conducted on impact of information sharing on supply chain performance investigated that a situation in which a buyer can share information with a supplier in a lot sizing framework

given a just-in-time context and it present that simple truth-telling and trusting behavior that enhance supply chain performance (Karl *et al.,* 2008).

The study conducted by Leat and Revoredo*,* (2008) on enhancing the integration of agri-food supply chains; the main motivation behind the topic is that improvements in the relationships amongst the different segments of a chain can enhance its efficiency and effectiveness, (e.g., through improvements in coordination and cooperation), and therefore, its competitiveness and long-term sustainability. The overall results pointed out to five factors affecting the relationships in the malting barley to beer agri-food supply chain: communication, compatibility of aims in the supply chain, contractual relationships backed by professional regard and personal bonds; high levels of trust exist between the chain participants and a willingness to resolve any problems; and commercial benefit.

Generally, from above literature reviews it can be easily understandable that the work on supply chain integration and its determinants on different perspectives of the organization and overall supply chain partners increasing and yields good backgrounds. However, the relationship of SCM with performance cannot be regarded as conclusive (Cousins, *et al.,* 2006). Despite the increase of empirical research in the last few years, important differences in research design undermine comparability: lack of consensus about the definition and dimensionality of the SCM construct, use of different units of analysis, and different approaches to analysis of determinant factors of SCI.

2.3. Conceptual framework of the study

Based on overall review of related literature and particularly from the work of (Karl *et al.,* 2008; Leat and Revoredo*,* 2008; Chojar, 2009; Tan *et al.,* 2009), the following conceptual framework in which this specific study governs developed:

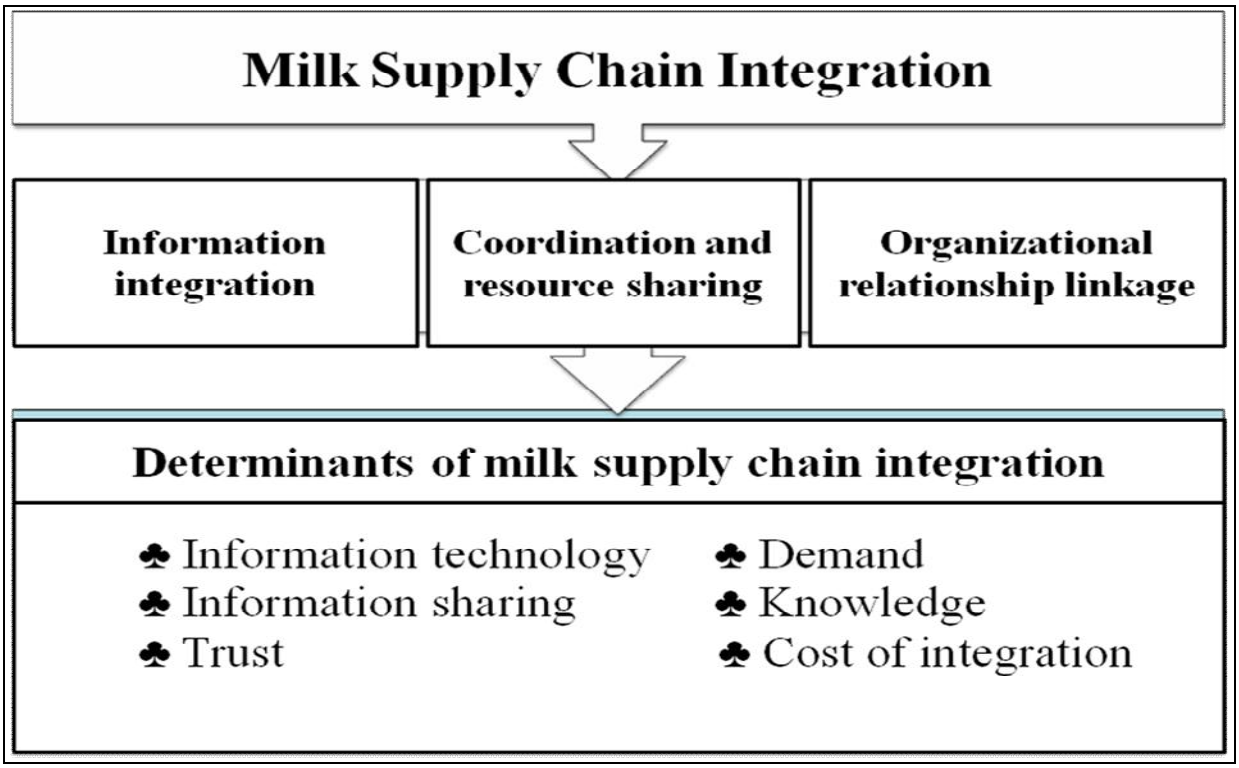

Figure 2: A conceptual framework of the study adopted from (Richey *et al.,* 2009; Flynn *et al.,* 2010).

The study was guided by conceptual framework shown above. According to the conceptual framework, determinants of milk supply chain integration included information integration, coordination resource sharing and organizational relationship linkage. For milk supply chain integration to be effective and efficient; the use of timely and accurately information sharing with latest information system and technology will increase integration by reducing uncertainty, joint demand forecast, increasing the communication and coordination that influence the decision making between supply chain partners; without trust in a collaborative endeavor, information exchanged, or knowledge shared between partners may be low in accuracy. All challenges related to II, CRS and ORL and the fore mentioned determinants above in the framework are the main issues to be considered under this research title. For milk SCI to be effective; it will have to work in an integrated manner across the supply chain. In this manner, it contributes to the development of dairy businesses via increasing efficiency**.**

2.4. Identified Literature Gap

A study conducted to analyze opportunities and constraints for upgrading product quality in the dairy value chain in Ethiopia shows a huge gap between upstream producers' incentives and downstream consumers' motives, leading to limited possibility of dairy quality upgrading (Ruerd *et al.,* 2017). Factors influencing producers' willingness to invest toward intensification by smallholder dairy farmers and cooperatives, and those induce consumers' willingness to pay for health and nutritious dairy products delivered at specific retail outlets were reported the main outlets of quality upgrading (Ruerd *et al.,* 2017). In the milk value chain analysis conducted at two peri-urban areas of western Oromia, no formal milk marketing and processing system leading the milk produced to generally channel through informal routes (Diriba *et al.,* 2014).

A study conducted to identify the key milk marketing channels, and analyze the structure, conduct and performance of cow milk market in Sululta district has reported producers, semi-wholesalers, dairy cooperative unions, milk processing industries and retailers as major actors of the milk marketing in the district and identified six main market channels (Meryem, 2013). Price variations, lack of fair market, lack of demand during fasting, lack of preserving facilities, absence of quality based payment, inability of the producers in deciding milk price were identified major problems of raw milk marketing (Mustefa, 2012). The sub-sector was also reported to face various technical, institutional and policy related constraints that are responsible for the inefficiency embedding in the value chains including; inadequate value chain support services; weak product marketing systems and un assured safety of dairy farming practices and products; (Diriba *et al.,* 2014).

On the other hand, Meryem (2013) has suggested that milk market participation and volume of marketed surplus would be improved through strengthening the access to services such as efficient market information, responsive agricultural extension and family planning supplementing with availing improved agricultural technologies and diversification of alternative sources of income. Another study conducted in Sululta district indicated that promoting potentially collective organizations, groups of traders, which plays important role in reducing the level of oligopolistic nature of market coupled with strategies that improve competitiveness and efficiency of milk market should be in place (Asnakech *et al.,* 2016).

Even though the result of current literature review showed significant efforts that have been made in the analysis of dairy value chain in general, and milk marketing chain analysis in particular in different areas of the country. On the other hand, a more developed and well-organized supply chain coordination is ideal for consistent success and profitability of any business (Habtamu *et al*., 2015). Studies indicated that the supply chain of a given business entity can only satisfy customers' needs only when the whole of its partners along the value chain becomes integrated and coordinated (Haghighat, 2008). Lack of coordination and/or integration in the supply chain is believed to cause incomplete information about the flow of products, information, and funds. Such causes will lead to reduce the supply chain performance as a whole. In order to well integrate the partners/stakeholders along the value chain, identification of the determinants of the supply chain integration is crucial. Regardless of its importance, however, analysis of the determinants of milk supply chain integration has not yet been documented in Sululta district, the largest milk shed district surrounding Finfinne. Therefore, this study was aimed at conducting analysis of the determinants of milk supply chain integration in Sululta district to fulfill the existing literature gaps. The result from this study also believed to give the way forward that used in SCI among milk producers and traders of the study area.

CHAPTER THREE

3. METHODOLOGY OF THE STUDY

This research methodology tried explain how the research was accomplished, what knowledge was required, what information was needed and how information was collected. Research methodology consisted of research approach, sample design-sampling technique, sample size, source and instruments of data collection, methods of data analysis, ethical issues, validity and reliability of the study.

3.1. Description of the study area

Agriculture is the main source of income of the population in the Sululta district. Livestock husbandry and crop production are the predominant economic activities and the major source of livelihood in the district. The farming system of the district is rain-fed and mixed agriculture. The main farming of the study area is livestock rearing followed by crop production, (SDANRO, 2017). The total cattle population in the district is estimated at 284,910 (45 percent are cross-breed) (SDLFO, 2017). The district has 23 kebele administrations, 3 sub-towns (Chancho, Dubar and Derba), and 23 Farmers Training Centers and 20 Animal science husbandries, 7 Veterinary service providers, 7 Cooperative promoters, 21 Plant science, 20 Natural resource and totally, 75 development agents in the district (SDANRO, 2017). There are totally 59 different types of cooperatives. From these cooperatives in the district only 8 of them are primary dairy cooperatives affiliated to the Selale Dairy Cooperative Union (SDCPA, 2017).

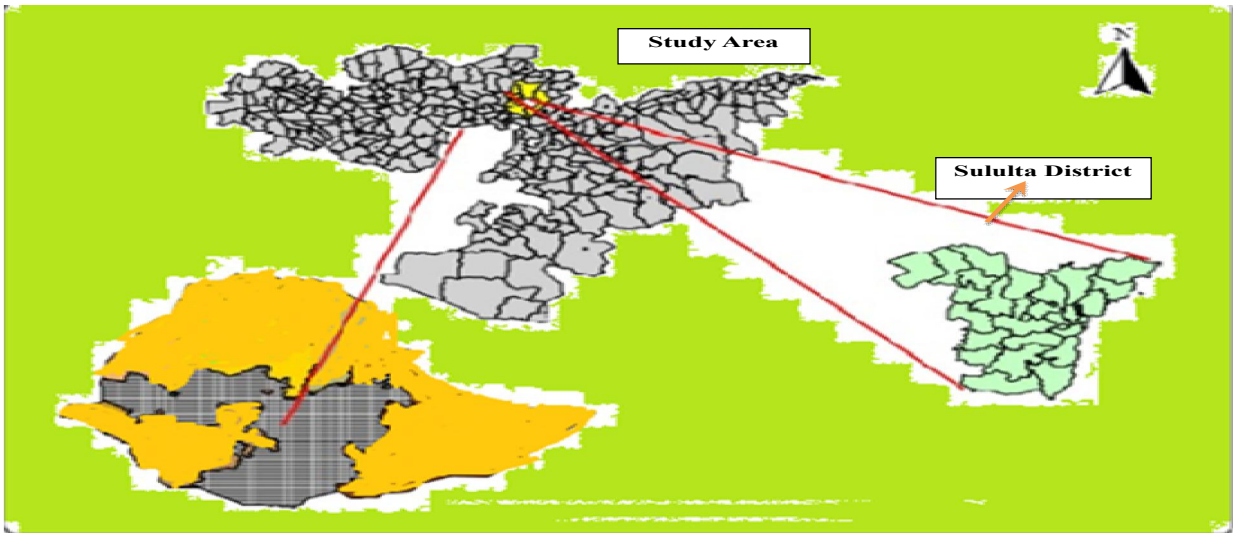

Figure 3: Map of Oromia Regional State and Study areas. Source: Ethio-GIS

3.2. Research approach and design

In order to have a clear direction to carry out this research work, the following study design and approach were developed and used to undertake the current analysis of determinants of milk SCI of the study area.

This study used descriptive research design using cross sectional data, collected with structured questionnaire. Due to the fact that, case study was a comprehensive description and analysis of a number of specific situations. Also, the use of case study research design enabled the researcher to conduct an extensive investigation of the determinant factors of milk SCI of the study area.

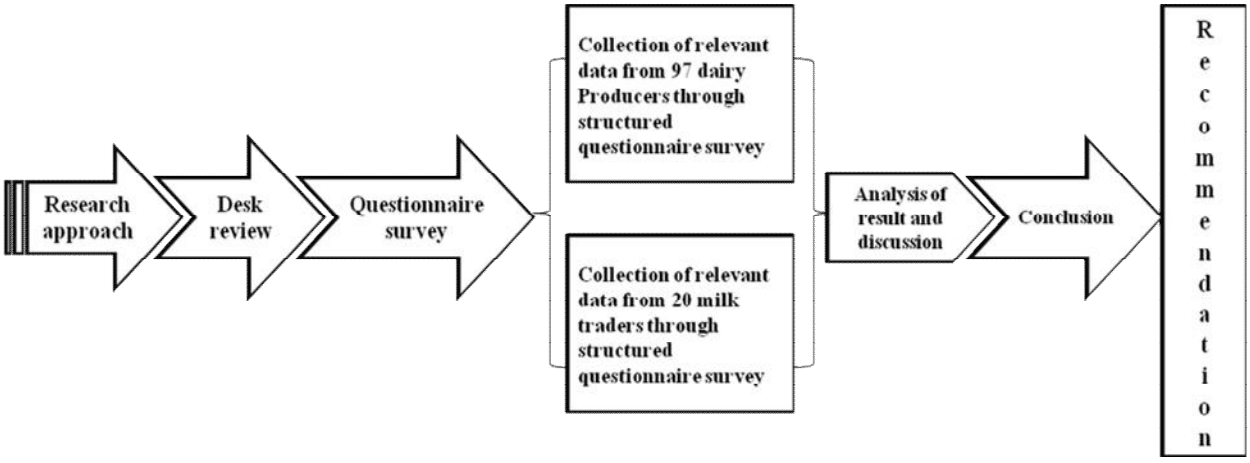

Figure 4: Study design and approach used to conduct analysis of determinants of milk SCI.

3.3. Population and Sample Design

3.3.1. Sampling technique

1. **For dairy farmers**

Random sampling technique was employed in two-stages to select sample households for the study. The district was selected purposively for its known milk production. In the first stage, six *kebeles* (2 from sub-town and 4 from rural) were selected from this district by using simple random sampling procedure. In the second stage, a total of 97 sample respondents both from male and female producers were selected from the sampling frame by using simple random sampling technique in proportion to their number of dairy cows owned. The sample size of respondents was taken from six *kebeles* because of their higher number of dairy cows than the rest *kebeles*. According to this, sample size was determined using a formula provided by Yemane (1967) calculated as:

$n = \frac{N}{1+N(e)2}$ …….. (Yemane 1967)

Where,

n: sample size for the researcher use.

N: total number of households in six *kebeles* = 3,218 (SDLFO, 2017)

e: designates maximum variability or margin of error = 0.05-0.1 percent (for this research=0.1 was used).

e = 0.1 was taken as margin error. It was taken because, as "e" gets approach 0.05 the sample size get larger and larger and as a result it became difficult to manage it.

Using this formula, the total sample size of the dairy households from six *kebeles* was determined as follows:

Table 1: Sample distribution of dairy producers

Name of selected Keble	Total number of dairy producers	Total number of female dairy producers	Total number of male dairy producers	Number of female sample households	Number of male sample households	Total number of Sample households	Proportion of households dairy producers
Chancho Buba	846	716	130	22	4	26	0.26
Eko Efo Babo	784	711	73	22	3	25	0.24
Wererso Malima	720	610	110	18	3	21	0.22
Gorfo	532	455	77	13	2	15	0.17
Chancho Town	210	172	38	4	2	6	0.07
Dubar Town	126	94	32	3	1	4	0.04
Total	**3218**	**2758**	**460**	**82**	**15**	**97**	**1.00**

Source: Sululta District Livestock and Fishery Office Annual Report, 2017 and own design

2. For Traders

All milk traders (semi-wholesalers, dairy cooperatives and processors) from six major milk producing *kebeles* (Chancho town, Chancho buba, Duber town, Gorfo, Warerso-malima and Eko-Efo Babo) of the district were considered in the study. Accordingly, a total of 22 (100 percent) milk traders in the district were considered in the study (Annual Report of SDTMDO and SDCPA, 2017).

Table 2: Sample of traders

Traders	**Market place in the district**						**Total Number**
	Chancho Town	Chancho Buba	Duber Town	Gorfo	Warerso Malima	E/E/ Babo	
Semi-wholesalers	5	1	2	1	2	2	**13**
Dairy cooperatives	1	0	1	2	1	1	**6**
Processors	2	0	-	-	1	-	**3**
Total	**8**	**1**	**3**	**3**	**4**	**3**	**22**

Source: SDTMDO and CPA, Annual Report, (2017)

3.4. Data source and type

Both primary and secondary data were used for this study. Primary data was collected from the sample dairy household heads and traders. The data was collected using two types of questionnaire schedules (one for farmers and the other for traders). The data collected from both milk producers and traders related to the three supply chain integration dimensions: information integration (information sharing and the availability and usage of information technology), coordination resource sharing **(**trust, technical skill, knowledge and management that restrict the supply chain integration among milk producers and traders), and organizational relationship linkage related data which determines the SCI was collected from both milk producers and traders of the proposed area.

Secondary data were obtained from different sources, such as reports of concerned non-governmental and government organizations, at different level. Other sources of secondary data were previous research findings, journals, books, websites and other published and unpublished materials, which were relevant to the study.

3.5. Data collection Procedure

Initially, primary data on the milk supply was collected from sample farmer households producing milk, milk traders and/or supply chain actors using structured survey questionnaires. The researcher used questionnaires because to cover a large sample of respondents in the shortest possible time and using low costs. For this study, primary data was collected through questionnaires. Next, secondary data was collected from different relevant government offices and through reviewing documents and publications.

The enumerators, at least who had college diploma and were familiar with the culture and local language (Afan Oromo), of the community, were employed to conduct the interview. Appropriate training, including field practice, was given to the enumerators to develop their understanding regarding the objectives of the study, the content of the questionnaire and how to approach the respondents to conduct the interview. A pilot survey was conducted to make sure that the questionnaire was well designed and was appropriate material for the study.

3.6. Ethical Considerations

Formal letter was written from Addis Ababa University, School of Commerce, Department of Logistics and Supply Chain Management to concerned governmental and non-governmental bodies at different level. Data collection was started after getting permission from concerned bodies. Additionally, name of the selected sample respondent were not included to maintain confidentiality.

3.7. Method of data analysis and presentation

Data and information collected through household survey during the study were reduced into summary form by using Statistical Package for Social Sciences (SPSS). The findings of the research study were organized, and the data was presented by using descriptive statistics i.e., in the form of mean, standard deviation, percentages, and frequency by using tables and different forms of graphs.

3.8. Validity and Reliability Test

The survey questionnaire were pre-tested on randomly selected households in order to ensure validity of data collected, and this also helped the researcher to be familiar with the study area which made data collection easier.

Reliability is the extent to which results are consistent over time and an accurate representation of the total population under study. If the results of a study can be reproduced under a similar methodology, then the instrument is considered to be reliable (Joppe, 2000). In this study prior to data analysis, data reliability was tested using Cronbach's Alpha based on standardized items. So, the questionnaire had an alpha of 0.623. Which was indicate that all scales was considered as acceptable level because of alpha value of the result found to be greater than 0.5 (Kehoe, J., 1995; Davis, F.B., 1964; Chakrapani, C., 2004; L. D. Streiner and G. R. Norman, 2008).

CHAPTER FOUR

4. RESULTS, DISCUSSION AND INTERPRETATION

The general objective of the research was to determine the factors affecting milk SCI the case of Sululta district, in Oromia National Regional State. Specific objectives were: To find out the challenges that hinders milk supply chain integration across the supply chain actors, to identify the major determinants of milk supply chain integration across the supply chain and to prioritize factors that affect milk supply chain integration across the supply chain actors in the study area. The sample targeted of 119, 117 milk producers and traders (98 percent) responded to the questionnaire. The researcher considered it is adequate for the objectives of this study.

All the data gathered in the categories (producers and traders) were subjected to descriptive analysis using SPSS version 20. The findings were presented with relevant interpretations in three sections: general characteristics of the respondents, assessment of the challenges that hinders milk supply chain integration, extent of milk SCI and factor analysis and prioritize factors that affect milk SCI across the supply chain.

4.1. Respondents demographic characteristics

The research sought to authenticate the information on the general characteristics of the respondents involved in the research with regards to gender, age, marital status and level of education were presented in Figure 5.

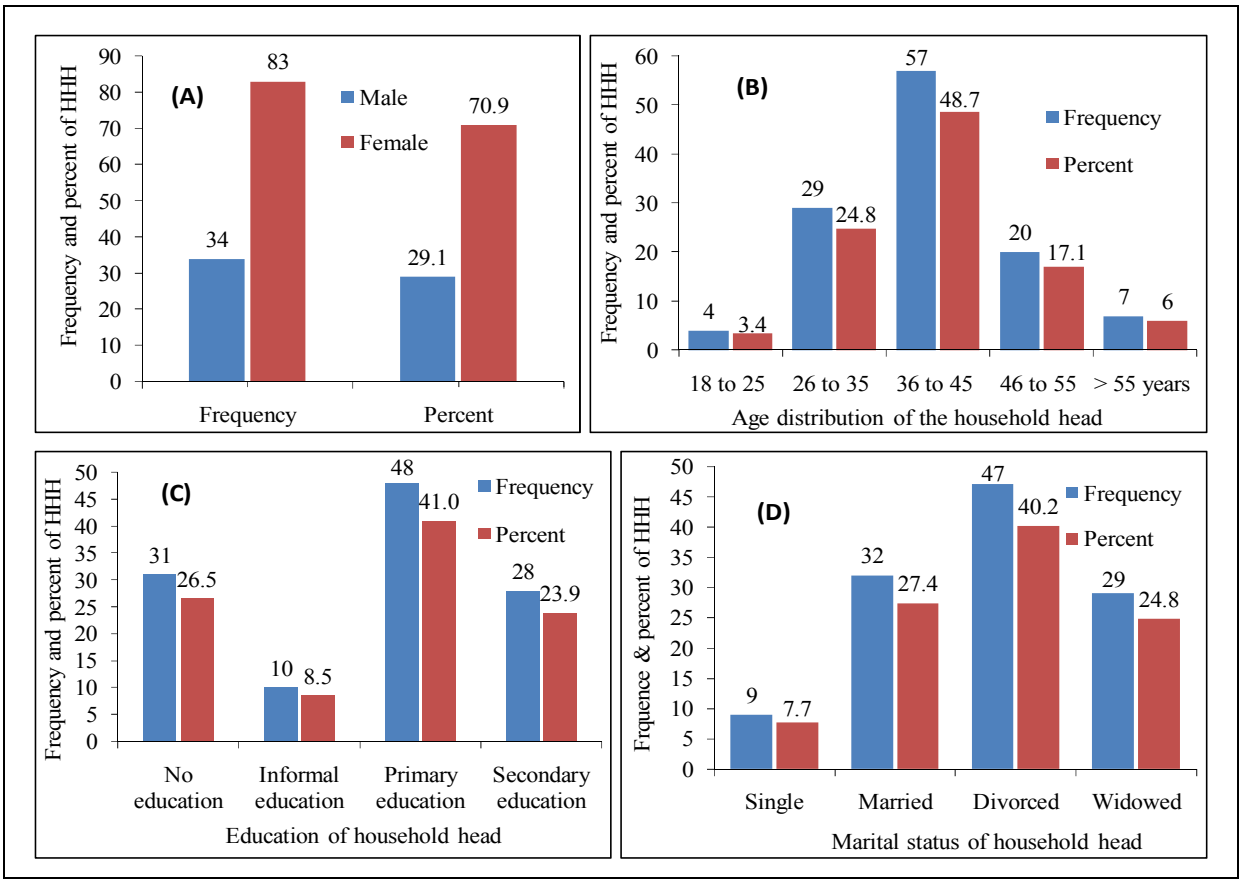

Figure 5. Frequency and percent distribution of gender (A), age (B), level of education (C) and marital status (D) of household head, n=117; *source:* own survey*, 2018*

4.1.1. Gender of the respondents

It is evident that 34 (29.1percent) out of the total 117 respondents were male household, while the remaining 83 (70.9percent) of were female household (Figure 5A). This indicates that milk producers in Sululta district were highly dominated by female households. This result is contradicted with a study conducted for investigation of factors influencing milk production among small scale dairy farmers elsewhere in Kenya (Kamau, 2013) where majority of small scale milk producers have been reported male households. This might be brought by the fact that milk and milk product production, management and control in most part of the country is traditionally considered as women responsibility; hence more female farmers in the current study area were involved in dairy farming as their commercial activity compared to the male households.

4.1.2. Age distribution of the respondents

Ages of the household head in five categorical classes were considered to determine the age distribution of the milk producers and traders of the study area. Majority of the respondents (48.7percent) were fall between the age category of 36-45 years while 24.8percent and 17.1percent of the respondents are aged between 26-to-35 years and 46-to-55 years old. Whereas, responds aged below 25 years and over 55 years were only accounted for 3.4percent and 6.0percent of the total respondent households, respectively (Figure 5B). This result is similar with a study conducted for analysis of cow milk market chain: in the same study area (Meryem, 2013) where the average age of the total sample household heads who participate in dairy business was 44 years. Additionally, a study conducted for determinants of coordination and supply chain performance; the case of fresh milk supply chains elsewhere in Kenya (Birachi, 2006) where the overall mean age of the milk producers have been reported 45.7 years with the modal age being about 35 years old. Bhagyalaxmi *et al.* (2003) they observed that majority of rural dairy women entrepreneurs (68.33 percent) belonged to middle age group, whereas 21.67percent of the dairy women belonged to young age, followed by old age (10percent). Nataraju (2012) conducted a study on participation of women in dairy farming in Chikkamagalore. Nataraju (2012) observed that majority of the respondents (48.30percent) were middle aged group followed by 38.33 and 13.33 percent of young and old aged respectively. This might be brought by the fact that more than 75percent of dairy businesses were practiced by young and middle age class in the study area. Since majority of the productive age were involved in dairy farming activity it indicated that the main livelihood, income source and farming of the study area is more depend on dairy farming. From this, age may not be an obstruction for milk supply chain integration when it comes to innovation, communication and use of technology as younger people are considered as more reachable.

4.1.3. Respondents educational status

The result from descriptive statistics showed that out of the total survey 48 respondents (41percent) were attended primary education, and 31 (26.5percent), 28 (23.9 percent), and 10 (8.5percent) were found illiterate, attended secondary education, and has informal education, respectively (Figure 5C). This result was supported with the study conducted by (Karanja, 2003)

for the dairy industry in Kenya: in case of the post-liberalization agenda; where limited education levels are likely to make ineffective the adoption of new and improved dairy production practices by farmers leading to low milk production. Education generally increases a person awareness of his/her environment and ability to acquire and process information about his/her environment and to detect changes in it. According to the survey no one attained beyond secondary education level. This shows that, even though most respondents have attended from primary to secondary education and would be in a better position to implement best practices in a milk supply chain integration, significant portion (26.5percent) of the respondent households were found illiterate and may not be capable to understand and/or implement the best practice without the strict assistance of experts or agricultural marketing and/or extension officers.

4.1.4. Marital status of the respondents

The result from descriptive statistics on the marital status of respondent household heads related to milk supply chain integration in Sululta district is indicated in Figure 5D. The result showed that the distribution of respondents were ranged from a low of 9 (7.7percent) for unmarried household heads to 29 (24.8percent), 32 (27.4percent), and 47 (40.2percent) for those who have been widowed, married and divorced, respectively in that order. This indicated that proportion of divorced and widowed household heads who have been taking part in milk and milk product businesses in the Sululta district were accounted for the majority (65percent) of the respondents. Gender distortion of the respondent indicated that majority (70.9percent) of these households were women (Figure 5A), confirming that dairy production is the major livelihood source more commonly for the divorced and widowed poor female households in Sululta area. Due to the fact that female households are commonly stay at home managing their home stead activities, it was believed that they less frequently get access to information and less integrate in the supply chain system compared to male households.

4.2. Challenges of milk supply chain integration

The respondents were required to indicate their extent of agreement with the statements regarding milk supply chain integration between milk producers and traders by filling their opinion using five levels Likert scales ranging from strongly disagree to strongly agree.

Accordingly, challenges related to information integration, coordination resource sharing, and organizational relationship linkage has been presented.

4.2.1. Challenges related to information integration

Result from the respondents to the factors related to information integration that challenges milk SCI is indicated in (Table 3). The result showed 93.2percent of the respondents were strongly disagreed, and 5.1percent of the respondents were disagreed that joint replenishment forecast is used via information sharing between producers and traders in order to meet market need of producers, reduce demand uncertainty and provide better customer service for milk supply chain as a challenges of SCI in milk supply in Sululta district. Regardless of the potential benefit of use of collaborative planning and real time information to make a common demand forecast in improving on time delivery and milk marketing activities by introducing the planning process through sharing sustainable and high quality information, significant portion (70.1percent and 72.6percent) of the respondents strongly disagreed and (29.9percent and 22.2percent) of the respondents were disagreed that there exists collaborative planning and real time information to make a common demand forecast was being used among milk producers and traders, hence these were considered among the most challenges of milk SCI in the study district. About 37.6percent and 59.8percent of the respondents were strongly disagreed and disagreed respectively that there is use of compatible information system among milk supply chain partners.

Table 3. Frequency, percentage and mean response of the respondent towards the challenges of milk SCI in relation to information integration in Sululta district.

Statement	1		2		3		4		5		Mean
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Information sharing for improvement of decision making	19	16.2	64	54.7	0	0	31	26.5	3	2.6	2.44
Use of compatible information system	44	37.6	70	59.8	3	2.6	0	0	0	0	1.65
Information to improve collaborative planning process	82	70.1	35	29.9	0	0	0	0	0	0	1.30
Real time information for common demand forecast	85	72.6	26	22.2	5	4.3	1	0.9	0	0	1.31
Use of information to reduce demand uncertainty via joint replenishment forecast	109	93.2	6	5.1	2	1.7	0	0	0	0	1.08
Mean of mean											1.55

1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree; Source: Own survey (2018)

Whereas about 26.5percent of the respondents were agreed that information sharing have been using among milk producers and traders for decision making, i.e., there was some level of information sharing among milk supply chain partners but it is not enough for strategic decision making rather than to make short term decision to milk marketing by using price information (Table 3). The study also agreed with a similar study undertaken by (Meryem, 2013) who reported that, only 27percent of the sample farmers have got weekly price information. The sources of information were mostly informal. According to the report about 16.5percent and 4.7percent of price information from traders and government extension agents respectively disseminated to dairy producers. The frequency of getting market information by sample

households was 27.1percent weekly, 23.5percent bi-monthly, 18.8percent monthly, 16.5percent quarterly and 14.1percent annually. Furthermore, the study also agreed with reported by (Bender, 2000); poor information technology, whether caused by lack of funds or lack of awareness and commitment of top management, has also been identified as a major barrier to successful supply chain integration.

Generally speaking, regardless of the significant importance of information integration for effective and efficient dairy business performance, almost all respondents assured that lack of joint replenishment forecast to reduce demand uncertainty, absence of real time information to make common demand forecast, and lack of sustainable and compatible information sharing system to improve collaborative market planning and decision making as the most important challenges for milk SCI in Sululta district (Table 3).

4.2.2. Challenges related to coordination resource sharing

A response towards questions related to coordination resource sharing has been summarized in the form of means using a descriptive statistics and indicated in (Table 4). The respondents were made to indicate their degree of agreement or disagreement towards coordination resource sharing indicators to know the level of integration among milk producers and traders by filling their opinion.

Table 4. Mean response of the respondent towards the challenges of milk SCI in relation to coordination resource sharing in Sululta district.

Statement	**Mean (SD)**
Use of common logistics features and equipments to improve mutual interest	1.22 (0.43)
Work in collaboration among supply chain partners	1.68 (0.55)
Practice of packaging, customization and standardization to reduce cost of supply chain integration	1.64 (0.60)
Jointly involve in contract agreements	1.42 (0.89)
Availability of effective payment settlement system	1.82 (0.73)
Use of direct interconnection to avoid process duplication	1.11 (0.43)
Mean of means	**1.48**

SD= standard deviation; 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree; **Source: Own survey (2018)**

The study findings showed that respondents were strongly disagreed with a mean response of 1.11 that there was use of process approach that allowed the direct interconnection to avoid process duplication between milk producers and traders. With regardless milk delivery arrangement, common logistics equipments like transportations, milk cans, refrigerators and other handling materials are among logistic features that were used for practicing of shared decision making to improve mutual interest; the respondents were strongly disagreed with a mean value of 1.22 that there exists the use of logistics features among milk supply chain partners. It was evident that average response of 1.42 (Table. 4) the joint involvements of both producers and traders in contract agreements on milk marketing to optimize in the procurement and distribution of milk is among the most challenging of milk supply chain. On the other hand, the study indicated that respondents were disagreed with average response of 1.64 that there was practice of packaging customization and standardization to facilitate handling, transport, and insure quality to reduce cost of supply chain integration. The other most important concept was found to be challenging of work in collaboration with milk SC partners for achieving common objectives had received an average Likert scale score of 1.68. Moreover, most of the respondents were disagreed that there exists effective payment settlement system among milk SC partners with an average Likert scale score of 1.82. In general, the mean of mean for total coordination resource sharing had Likert scale score of 1.48. This result is similar with a study conducted for levels and barriers to supply chain integration in case of haleeb food distributors' elsewhere in Pakistan (Shamaion. S and Huma. K., 2013) where haleeb foods and its distributors are challenging to practice on packaging customization and standardization to facilitate handling, transport, reduce costs and ensure quality. In the same study, in contrast to the above statement haleeb foods and its distributors used the same logistics parties and distributors are quite satisfied that because it's convenient for them for coordination resource sharing (Shamaion. S and Huma. K., 2013). This implies that lack of coordinated resource sharing among producers and traders are found to be the major challenges of SCI of milk supply in the study area.

4.2.3. Challenges related to organizational relationship linkage

The respondents were asked to indicate their extent of agreement with the statements regarding organizational relationship linkage between milk producers and traders using 1 to 5 level Likert scale, where 1=strongly disagree and 5=strongly agree. Respondents were strongly disagreed that there exists share of risks, costs and rewards, attitudinal promotion and plan of action to support an integrated dairy business performance and joint establishment of objectives for the end customer satisfaction were received an average Likert score of 1.08, 1.36 and 1.48.

Table 5. Mean response of the respondent towards the challenges of milk SCI in relation to organizational relationship linkage in Sululta district.

Statement	**Mean (SD)**
Use of active communication channel	2.00 (0.83)
Share of risk cost and rewards	1.08 (0.36)
To promote an attitude and plans of action to support an integrated business performance	1.36 (0.55)
Joint establishment of objectives for the end customer satisfaction	1.48 (0.53)
Practice of skill and idea sharing through conducting training and seminars	1.51 (0.83)
Mean of mean	1.49

SD= standard deviation; 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree; **Source: Own survey (2018)**

On the other hand, the study showed that majority of the respondents were disagreed that there is the use of active communication channel and practice of skill and idea sharing among milk supply chain partners were received an average Likert scale score of 2.00 and 1.51 respectively. Generally, the overall average mean for the organizational relationship linkage had Likert scale score of 1.49 (Table 5). Similar with a study, sharing of skills ideas and institutional culture by conducting training sessions and seminars for best practices, using active communication channels and sharing of risks, costs and rewards were listed as the most important challenges between distributors and Haleeb foods (Shamaion. S and Huma. K., 2013). On the other hand, the joint establishment of objectives and promote an attitude and plans of action to support an integrated business performance were practiced in the same study.

Therefore, the current result clearly showed that lack of active communication channels between producers and traders, lack of systems that enabled producers and their customers to share risks, costs and rewards, lack of arrangements that enable both producers and their customers to promote an attitude and plan of action to support an integrated dairy business performance, lack of joint involvements among the producers and traders in the establishment of objectives for the end customer satisfaction, and lack of skill and idea sharing practice among milk supply chain partners conducting knowledge transfer events were found important organizational relationship linkage factors challenging the SCI of milk supply in the study area. This implies that the organizational relationship linkage in the study area is very insignificant and/or weak for cross functional integration in milk supply chain initiatives.

4.3. Determinants of milk supply chain integration

The response from the respondents towards three categories of milk supply chain integration determinants, i.e., determinants related to information integration, organizational relationship linkage, and coordination resource sharing, were subjected to descriptive statistics in order to obtain average response of the respondents and the result is shown in (Table 6). The result was displayed in terms of mean and standard deviation of Likert scale score.

Table 6. Response of the respondents towards the determinants of milk SCI in Sululta district

S.No.	Statement	(n=117)		Mean of mean rank
		Mean (SD)	Rank	
Information integration				
1.	Availability of adequate information system highly attributes to milk SCI	4.82(0.49)	5th	**1st**
2.	Willingness to share critical milk market information highly attributes to milk SCI	4.88(0.32)	1st	
3.	Availability of compatible information technology highly attributes to milk SCI	4.81(0.43)	6th	
Mean of mean for information integration		**4.84**		

Organizational relationship linkage				
4.	Availability of trust and contract agreement on milk market highly attributes to milk SCI	4.87(0.38)	2th	**2nd**
5.	Availability of joint demand forecasts highly attributes to milk SCI	4.77(0.60)	7th	
6.	Availability of sharing education, technical skill, knowledge about IT and management highly attributes to milk SCI	4.85(0.38)	4rd	
Mean of mean for organizational relationship linkage		**4.83**		
Coordination resource sharing				
7.	Availability of systems that enables to practice packaging customization and standardization highly attributes to milk SCI	4.86(0.37)	3rd	**3rd**
8.	Availability of effective payment settlement system highly attributes to milk SCI	4.61(0.67)	8th	
9.	Availability of process approach that allows direct interconnection to avoid process duplication highly attributes to milk SCI	4.39(0.86)	9th	
Mean of mean for coordination resource sharing		**4.62**		

SD= standard deviation; 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree; **Source: Own survey (2018)**

The first milk supply chain determinant category, information integration, was ranged from an average Likert score of 4.81 to 4.88 with standard deviation of 0.32 to 0.49 for all statements related to information integration. All the respondents were strongly agreed that availing an adequate information system, willingness to share critical milk market information, and availing compatible information technology were significantly determines milk supply chain integration through promoting information integration in the milk supply chain. Similarly, the result was confirmed with a study conducted for analysis of cow milk market chain (Meryem, 2013) where only 27 percent of the sample farmers have got weekly price information. Moreover, according to reports of (Ali *et al* 2017) study conducted for assessing milk market channel and analyzing marketing margins in Northern Ethiopia; only about 25.58 percent of milk market participants had access to market information. This might be brought by the fact that dairy business sectors in most part of the country is traditionally considered and not market oriented.

Hence; the hindrance of information integration is all about hindrance of supply chain integration i.e., unless there is no information integration among SC partners the integration of coordination resources sharing and relationship linkage between producers and traders is unexpected.

Coming to organizational relationship linkage as determinant of milk supply chain integration; both milk traders and producers of the study area, by their virtue of their average score of Likert scale that ranged from 4.77 to 4.87 with standard deviation of 0.38 to 0.60 for all statements related to organizational relationship linkage. It confirmed that, their strong agreement that availability of trust and contract agreement on milk market, availability of joint demand forecasts, and availability of education, technical skill and knowledge sharing and availability of management knowledge sharing are the most important factors determining milk supply chain integration through promoting relationship linkage. This resulted in approval with a report on study conducted for evaluation of supply chains and postharvest losses of selected food commodities in Ethiopia (Tadesse, 2016). According to the report of this study; the majority of the chain actors in these food chains reported that they had no formal or informal relationships with both buyers and suppliers. Specifically, in the milk chain 53percent of respondents had no formal or informal relationships with their buyers and 62percent had none with their suppliers. However, application of supply chain management practices could potentially improve the overall supply chain and enhance integration among supply chain partners. In most cases, this indicates that there were no contractual or trust-based relationships between the supply chain partners. The relationship linkages among the supply chain partners were mostly based on spot transactions, lacking sustainability or long-term market orientation and mutual benefit business relationship linkage.

With regards to factors related to coordination resource sharing, respondents were strongly agreed that availability of systems that enables to practice packaging, customization and standardization, availability of effective payment settlement system, and availability of process approaches that allows direct interconnection between producers and traders to avoid process duplication with average Likert score of 4.39 to 4.86 with standard deviation of 0.37 to 0.86 for all statements related to coordination resource sharing. It assured that were among the most important components of determinants of milk supply chain integration through facilitating coordination resource sharing in the district (Table 6). Similarly, Tadesse (2016) reported that,

the storage facilities in food chains were mostly traditional and had a number of problems resulting in food losses. According to this report, no dairy farmer in the study area had a temporary cooling facility for evening milk and farmers use cold water as a means of cooling the evening milk for a night, which is not successful during the warm season. In addition to this, the study also reports the existing carrying/packaging tools used in the selected food chains were also found to be associated with problems. In the milk chain, the use of plastic jars with a narrow opening was a major problem identified, particularly in relation to hygiene and milk quality for the reason that, it is very difficult to clean inside due to the narrow opening. Moreover, they absorb heat easily, making the milk vulnerable to microbial development. This implied that, regardless of the dairy farming is the main livelihood and income source of the study area; milk production and marketing in most part of the country is traditionally practiced. In other words, to identify customer gap related to scarce resource and supply market oriented product via integrated manner were not considered.

To prioritize the most determinant factors of milk supply chain integration based on the study results of supply chain actors were presents as follows: the willingness of milk supply chain partners to share critical milk market information, availability of trusty and contract agreement on milk market, availability of systems that enables to practice packaging customization and standardization, availability of sharing education, technical skill and knowledge and availability of adequate information systems were ranked from 1 to 5 as highly attributed to milk supply chain integration (Table 6). Additionally, availability of compatible information technology, availability of joint demand forecasts, availability of effective payment settlement system and process approach that allows direct interconnection to avoid process duplication were ranked 6 to 9 as highly attributes to milk supply chain integration (Table 6).

Generally speaking, the three dimensions of supply chain integrations i.e. information integration, coordination resource sharing and organizational relationship linkage were prioritized from the most to the list determinant factors of milk supply chain integration in the study area. As the study showed in the above (Table 6) information integration, organizational relationship linkage and coordination resource sharing were prioritized as first, second and third by their virtue of their mean of mean score of Likert scale of 4.84, 4.83 and 4.62 respectively.

Similarly, a study by Lee *et al.,* (2000) illustrated that information integration is a core objective of supply chain. Effective decision making can be possible and implemented if the information is shared and level of trust among potential partners should be high. The strongest relationship among supply chain partners is due to cooperation and that leads to effective decision making (Chandra, 2007). The level of information integration shows how closely cooperation and coordination are harmonized among the parties (Bagchi and Larsen, 2002). On the other hand, Hsu *et al.* (2008) found that information sharing contributes largely to improved relationships between suppliers by facilitating efficient coordination and responsiveness as well as integration of partners' information systems. Moreover, information integration supports two basic concepts, technical which lead to information technology and other social concept that leads to information sharing and trust. And information flows from downstream to upstream support the material flow reciprocal from upstream to downstream (Prajogo and Olhager, 2012). Furthermore, the coordination and resource sharing depends on the mutual trust and requirements between the supply chain partners (Alfalla-Luque *et al.,* 2012). Teamwork is critical because it enables pooling of resources and expertise for faster trouble shooting and support improvement (Basu and Miroshnik, 1999). This implies that, information integration is an essential for the effective functioning of the whole supply chain integration. Which is led to sustainable relationship linkage and trust among supply chain partners and lastly, the integration of coordination resource sharing might be brought among supply chain partners due to high level of trust.

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presented the summary of key data findings. It also provided discussion of the findings and provided conclusions based on the objectives of the research study. The chapter was structured into summary of findings, conclusions, recommendations and area for further research.

5.1. Summary of Major Findings

In this thesis, determinants of milk supply chain integration among milk producers and traders in terms of information integration, coordination resource sharing and organizational relationship linkage in the study area were analyzed. The major findings of this study were summarized as follows. The results showed that out of the 117 total sample survey, 29.1percent were male and 70.9percent of were female household heads (Figure 5A). This indicates more female farmers in the current study area were involved in dairy farming as their commercial activity compared to the male households. More than 75percent of dairy businesses were practiced by young and middle age class in the study area; since majority of the productive age were involved in dairy farming activity it indicated that the main livelihood, income source and farming of the study area is more depend on dairy farming. From this, age may not be an obstruction for milk supply chain integration when it comes to innovation, communication and use of technology as younger people are considered as more reachable. According to the survey no one attained beyond secondary education level and significant portion (26.5percent) of the respondent households were found illiterate and may not be capable to understand and/or implement the best practice without the strict assistance of experts or agricultural marketing and/or extension officers.

Result from respondents to the factors related to information integration that challenges milk SCI is indicated in (Table 3). In most cases, regardless of the significant importance of information integration for effective and efficient business performance, almost all respondents assured that lack of joint replenishment forecast to reduce demand uncertainty, absence of real time information to make common demand forecast, and lack of sustainable and compatible

information sharing system to improve collaborative market planning and decision making as the most important challenges for milk SCI in study area (Table 3). Whereas 26.5percent of the respondents were agreed that information sharing have been using among producers and traders for decision making, i.e., there was some level of information sharing but it is not enough for strategic decision making rather than to make short term decision (Table 3).

A response towards questions related to coordination resource sharing has been summarized in the form of means using a descriptive statistics and indicated in (Table 4). The study findings showed that majority of respondents were ranged from strongly disagreed to disagree with the use of logistics features among milk supply chain partners, joint involvements of both producers and traders in contract agreements and the practice of packaging customization and standardization. In general, the mean of mean for the coordination resource sharing had Likert scale score of 1.48. This implies that lack of coordinated resource sharing among milk producers and traders are found to be major challenges of SCI of milk supply in the study area.

Concerning to organizational relationship linkage respondents were strongly disagreed that there exists share of risks, costs and rewards, attitudinal promotion and plan of action and joint establishment of objectives were received an average Likert score of 1.08, 1.36 and 1.48. In most cases, the total mean of mean for the organizational relationship linkage had Likert scale score of 1.49 (Table 5). This implies that the organizational relationship linkage in the study area is very insignificant and/or weak for cross functional integration in milk supply chain initiatives.

Concerning to determinants of milk SCI the result of the findings were shown as follows: the first milk SC determinant category information integration, was ranged from an average Likert score of 4.81 to 4.88 with SD of 0.32 to 0.49 for all statements related to information integration. Which means, the respondents were strongly agreed that availing an adequate information system, willingness to share critical milk market information, and availing compatible information technology were significantly determines milk SCI through promoting information integration in the milk SC.

Coming to organizational relationship linkage as determinant of milk SCI; both milk traders and producers of the study area, by their virtue of their average score of Likert scale that ranged from

4.77 to 4.87 with SD of 0.38 to 0.60 for all statements related to organizational relationship linkage. It confirmed that, their strong agreement that availability of trust and contract agreement on milk market, availability of joint demand forecasts, and availability of education, technical skill and knowledge sharing and availability of management knowledge sharing are the most important factors determining milk SCI through promoting relationship linkage. This implies the relationship linkages among the SC partners were mostly based on spot transactions, lacking sustainability or long-term market orientation and mutual benefit business relationship linkage.

With regards to factors related to coordination resource sharing, respondents were strongly agreed that availability of systems that enables to practice packaging, customization and standardization, availability of effective payment settlement system, and availability of process approaches that allows direct interconnection between producers and traders to avoid process duplication with average Likert score of 4.39 to 4.86 with SD of 0.37 to 0.86 for all statements related to coordination resource sharing. This implies that, regardless of the dairy farming is the main livelihood and income source of the study area; milk production and marketing in most part of the country is traditionally practiced.

To prioritize the most determinant factors of milk SCI based on the study results of both SC partners were presents as follows: the willingness of milk SC partners to share critical milk market information, availability of trusty and contract agreement on milk market, availability of systems that enabled to practice packaging customization and standardization, availability of sharing education, technical skill and knowledge and availability of adequate information systems were ranked from 1 to 5 as highly attributed to milk SCI (Table 6).

Generally speaking, the three dimensions of SCI were prioritized from the most to the list determinant factors of milk SCI in the study area. As the study showed in the above (Table 6) information integration, organizational relationship linkage and coordination resource sharing were prioritized as first, second and third by their virtue of their mean of mean score of Likert scale of 4.84, 4.83 and 4.62 respectively. This implies that, information integration is an essential for the effective functioning of the whole SCI. Which is lead to sustainable relationship linkage and trust among SC partners and lastly, the integration of coordination resource sharing might be brought among SC partners due to high level of trust.

5.2. Conclusions

The study concluded that, there was no effective information integration between milk producers and traders in the study area. Significant portion (70.1percent and 72.6percent) of the respondents strongly disagreed that there exists collaborative planning and real time information respectively. Whereas 26.5percent of the respondents were agreed that information sharing have been using among producers and traders for decision making, i.e., there was some level of information sharing but it is not enough for strategic decision making rather than to make short term decision. About 37.6percent and 59.8percent of the respondents were strongly disagreed and disagreed respectively that there is use of compatible information system (Table 3).

Although, it has been evident that the total mean of mean for the organizational relationship linkage had Likert scale score of 1.49 (Table 5), the study concluded that the level of trust among supply chain partners is limited. This implies that the organizational relationship linkage in the study area is insignificant and/or it is very challenging for cross functional integration in milk supply chain initiatives.

The study also concluded that, there was the absence of coordination resource sharing and this might lead to high cost of supply chain integration among supply chain partners i.e., respondents were disagreed with average response of 1.64 that there was practice of packaging customization and standardization to facilitate handling, transport, and insure quality to reduce cost of supply chain integration. And the mean of mean for the coordination resource sharing had Likert scale score of 1.48 which indicated that respondents were strongly disagreed with availability of coordination resource sharing among supply chain partners.

Further, the demographic characteristics of the respondents in light of their education levels and marital status provided meaningful insight into the nature of milk supply chain integration. Even though, more of the respondents (41percent) were attended primary education and significant portion (26.5percent) of the respondent households were found illiterate and may not be capable to understand and/or implement the best practice without the strict assistance of experts or extension and/or marketing officers. Concerning to marital status the proportion of divorced and widowed household heads who have been taking part in milk and milk product businesses in the

study area was accounted for the majority (65percent) of the respondents. Gender distortion of the respondent indicates that majority of these households are women, confirming that dairy production is the major livelihood source more commonly for the divorced and widowed poor female households in Sululta area.

Concerning to determinants of milk SCI the study concluded that, the first milk SC determinant factor information integration had an average Likert score of 4.81 to 4.88 for all statements related to information integration. Which means, the respondents were strongly agreed that availing information integration were significantly determines milk SCI through promoting information integration in the milk SC. The next factor organizational relationship linkage confirmed that, respondent's strong agreement that availability of trust and contract agreement on milk supply were the most important factors determining milk SCI through promoting relationship linkage. Which is indicates the relationship linkages among the SC partners were mostly based on spot transactions, lacking sustainability or long-term market orientation and lack of mutual benefit business relationship linkage. The other determinant factor is coordination resource sharing, the respondents were strongly agreed that availing of coordination resource sharing determines milk SCI through facilitating coordination resource sharing in the study area.

Generally speaking, the three dimensions of SCI i.e. information integration, coordination resource sharing and organizational relationship linkage were prioritized from the most to the least determinant factors of milk SCI in the study area. Information integration, organizational relationship linkage and coordination resource sharing were prioritized as first, second and third by their virtue of their mean of mean score of Likert scale of 4.84, 4.83 and 4.62 respectively. This implies that, information integration is an essential for the effective functioning of the whole SCI. Which leads to sustainable relationship linkage and trust among SC partners and lastly, the integration of coordination resource sharing might be brought among SC partners due to high level of trust.

5.3. Recommendations

To improve milk supply chain management through milk supply chain integration practices at Sululta district, the researcher recommended the following measures to be taken: to avoid milk supply chain integration challenges among both milk producers and traders, the legal framework (based on commercial law, regulatory mechanisms and written contract agreement plat form) should be established and enforced to make it applicable by Ministry of Trade, Ministry of Agriculture and Livestock Resource and other concerned government organizations with the line offices of the region, zone and district. This in turn plays a crucial role to safeguard both milk producers and traders through optimizing procurement and distribution (pricing, effective payment settlement system, delivery frequency, and on time delivery). The use of written contracts agreement should make it easier for the milk producers to increase their investments in their milk production and consequently benefit from their commercial activities via building trusty among SC actors.

To overcome the challenge of lack of awareness on milk supply chain practices among milk producers, the potential buyers or traders should provide frequent information and awareness on product quality, milk handling facilities and other logistics activities and price information to their suppliers. Additionally, the government organizations and other concerned bodies like research institutions should provide frequent training to SC partners on the best practices of supply chain in form of seminars and workshops to improve both knowhow and technical skill of the actors in order to enhance the integration among SC partners. Both milk SC partners (milk producers and traders) and any concerned organization intends to achieve operational efficiency must place great importance to the integration of milk supply chain actors so as to reduce unsold milk, increase the speed of transactions, reduce cost of supply chain integration and eliminate waste.

- ✓ Concerned government body should be able to facilitate compatible information technology system to disseminate accessible milk market information by establishing a department in government structure which can disseminate milk market information through information board and short message service (SMS) regularly;

- ✓ Milk traders need to improve the provision of critical milk market information to milk producers on time.
- ✓ Coordination resource sharing should be introduced among SC partners in order to increase quality and minimize cost of milk SCI. This resource sharing can be enhanced by providing equipments that help milk supply and credit services (if any) to producers on agreement basis;
- ✓ Concerning milk production and marketing regulatory body should inspect and take corrective action on a regular basis as per contract agreements of the SC actors.
- ✓ There should need to trust development among trading members to build long term visionary relationships by establishing written contract agreement platform between the members.
- ✓ Incorporating education, training, and capacity building sessions for milk supply chain partners, would help to bring sustainable milk market through enhancement of milk supply chain integration activities.

5.4. Future Research Recommendation

Although, supply chain is a collection of viewpoints that search for integration and effective collaborations between materials, information, and financial flows throughout the chain, its implementation would not be possible without necessary integration and restrict dedication by all concerned supply chain stakeholders. But this thesis particularly contributed to analysis the determinant factors of milk supply chain integration among producers and traders by considering information integration, coordination resource sharing and organizational resource sharing were only focused. However, the future research could be conducted on;

1) The contribution of milk supply chain integration practice to attaining business goals and operational performance of the whole supply chain stakeholders based on the factors affecting supply chain integration.
2) Determine the detailed kind of strategies and policy intervention requires examples;
   - → To assess ways of organizing central milk and milk product market information center and information dissemination system) to improve related information integration challenges of supply chain actors.

→ The relationships between members in a supply chain institutes trust through legal frameworks and/or contract agreement were among the most determinant factors of milk supply chain integration so, introducing standardized milk supply chain platform, contract agreement format and its regulatory systems should be subject areas of future studies.

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APPENDIXES

Appendix I: Milk Producers *Questionnaire*

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Dear respondents, I am **Gutu Tamasgen,** currently I am pursuing my Masters Degree from the Addis Ababa University and conducting a research "***Determinants of Milk Supply Chain Integration in Oromia National Regional State: The Case of Sululta District".*** The study is purely for academic purpose and thus not affects you in any case. So, your genuine, frank and timely response is vital for successfulness of the study. Therefore, I kindly request you to respond to each items of the question very carefully.

In order to investigate the effect of Determinants of Milk Supply Chain Integration in Sululta District, the researcher prepared the following questions, please tick **(√)** on the appropriate question number to indicate the extent to which you agree or disagree with each statement.

I assure you that your response will be kept confidential and it will be used only for research purpose.

Thanks in advance for your kind cooperation to be part of my study!

Name: Gutu Tamasgen

(Moble Phone: +251913332077

e-mail: guta944@gmail.com

Section I: Basic Information

Household demographics

Kebele: _____			
1.Gender [1] Male [2] Female	**2.Age of household head** [1] ≤ 18 years [2] 18 –25 years [3] 26 – 35 years [4] 36 – 45 years [5] 46 – 55 years [6] > 55 years	**3.Highest class attended in school** [1] = Have no education [2] = Informal education [3] = Primary (1-8th) [4] = Secondary (9-12th) [5] = Diploma (12+2) [6] = Bachelor [7] = Masters [8] = PhD	**4.Marital status** [1] = Single [2] 2= Married [3] 3=Divorced [4] 4=Widowed

Section II: Challenges of supply chain integration (has 3 sub-sections; A, B and C)

A) Information integration

To what extent do you agree or disagree with the following statements regarding information integration between you and your customer? **Please rate your opinion in the Likert scale ranging from:** 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly agree

Variable (information integration challenges of milk supply chain of Sululta district)	**1**	**2**	**3**	**4**	**5**
5. You share information with your customers to improve decision making					
6. You and your customer use the same or compatible information system					
7. Collaborative planning is introduced in your milk market to improve the planning process with your customer through sharing sustainable and high quality information					
8. There is real time information to make a common demand forecast for your milk supply with your customers					
9. A joint replenishment forecast is used between you and your customer to meet your market need in order to reduce demand uncertainty and to provide better customer service					

B) Coordination resource sharing

To what extent do you agree or disagree with the following statements that your customers and you have coordination resource sharing? **Please rate your opinion in the Likert scale ranging from:** 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly agree

Variable (coordination resource sharing challenges of milk supply chain of Sululta district)	**1**	**2**	**3**	**4**	**5**
10. You and your customers practice of shared decision making to improve mutual interest by using logistics features like delivery arrangement, common logistics equipments (transportations, milk cans, refrigerators and other handling materials)					
11. You work in collaboration with your customers and other SC actors for achieving the same objectives					
12. You and your customers practice on packaging customization and standardization to facilitate handling, transport, and insure quality in order to reduce cost of supply chain integration					
13. You and your customers jointly involve in contract agreements on milk price and delivery frequency to optimize in the procurement and distribution of milks for example Lead time, on time delivery					
14. You and your buyers has effective payment settlement system					
15. Use of process approach that allows the direct interconnection between you and your buyer to avoid process duplication.					

C) Organizational relationship linkage

To what extent do you agree or disagree with the following statements that you and your customer have organizational relationship linkage? **Please rate your opinion in the Likert scale ranging from:** 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly agree

Variable (organizational relationship linkage challenges of milk supply chain of Sululta district)	**1**	**2**	**3**	**4**	**5**
16. You are using active communication channels with your customer					
17. The availability of systems that enables you and your customers share risks, costs and rewards					
18. You and your customer promote an attitude and plans of action to support an integrated business performance					
19. With regard to milk supply you and your customer involve for the joint establishment of objectives for the end customer satisfaction					
20. There is skill and idea sharing practice between you and your customer by conducting training and seminars					

Section III. Determinants to supply chain integration

To what extent do you agree or disagree with the following statements that there are determinants to supply chain integration between milk producers and traders? **Please rate your opinion in the Likert scale ranging from:** 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly agree

Determinant Variables to milk SCI:	**1**	**2**	**3**	**4**	**5**
21. Availability of adequate information system highly attributes to milk SCI					
22. Willingness of buyer to share critical milk market information highly attributes to milk SCI					
23. Availability of compatible information technology highly attributes to milk SCI					
24. Availability of trust and contract agreement on milk market highly attributes to milk SCI					
25. Availability of joint demand forecasts highly attributes to milk SCI					
26. Availability of sharing education, technical skill, knowledge about IT and management highly attributes to milk SCI					
27. Availability of systems that enables to practice packaging customization and standardization to facilitate handling, transport, and insure quality in order to reduce cost of SCI highly attributes to milk SCI					
28. Availability of effective payment settlement highly attributes to milk SCI					
29. Availability of process approach that allows direct interconnection of buyer to avoid process duplication highly attributes to milk SCI					

Appendix II: Milk Traders *Questionnaire*

Section I: Basic Information

Household demographics

Kebele: _____			
1. Gender [1] Male [2] Female	**2. Age of household head** [1] ≤ 18 years [2] 18 –25 years [3] 26 – 35 years [4] 36 – 45 years [5] 46 – 55 years [6] > 55 years	**3. Highest class attended in school** [1] = Have no education [2] = Informal education [3] = Primary (1-8th) [4] = Secondary (9-12$^{th)}$ [5] = Diploma (12+2) [6] = Bachelor [7] = Masters [8] = PhD	**4. Marital status** [1] = Single [2] 2= Married [3] 3=Divorced [4] 4=Widowed

Section II: Challenges of Supply chain integration (has 3 sub-sections; A, B and C)

A) Information integration

To what extent do you agree or disagree with the following statements regarding information integration between you and your customer? **Please rate your opinion in the Likert scale ranging from:** 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly agree

Variable (information integration challenges of milk supply chain of Sululta district)	**1**	**2**	**3**	**4**	**5**
5. You share information with your suppliers to improve decision making					
6. You and your supplier use the same or compatible information system					
7. Collaborative planning is introduced in your milk market to improve the planning process with your supplier through sharing sustainable and high quality information					
8. There is real time information to make a common demand forecast for your milk demand with your supplier					
9. A joint replenishment forecast is used between you and your supplier to meet your market need in order to reduce demand uncertainty and to provide better customer service					

B) Coordination resource sharing

To what extent do you agree or disagree with the following statements that your customers and you have coordination resource sharing? **Please rate your opinion in the Likert scale ranging from:** 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly agree

Variable (coordination resource sharing challenges of milk supply chain of Sululta district)	**1**	**2**	**3**	**4**	**5**
10. You and your suppliers practice of shared decision making to improve mutual interest by using logistics features like delivery arrangement, common logistics equipments (transportations, milk cans, refrigerators and other handling materials)					
11. You work in collaboration with your suppliers and other SC actors for achieving the same objectives					
12. You and your suppliers practice on packaging customization and standardization to facilitate handling, transport, and insure quality in order to reduce cost of SCI					
13. You and your suppliers jointly involve in contract agreements on milk price and delivery frequency to optimize in the procurement and distribution of milks for example Lead time, on time delivery					
14. You and your supplier practices effective payment settlement system					
15. Use of process approach that allows the direct interconnection between you and your supplier to avoid process duplication					

C) Organizational relationship linkage

To what extent do you agree or disagree with the following statements that you and your customer have organizational relationship linkage? **Please rate your opinion in the Likert scale ranging from:** 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly agree

Variable (organizational relationship linkage challenges of milk supply chain of Sululta district)	**1**	**2**	**3**	**4**	**5**
16. You are using active communication channels with your supplier					
17. The availability of systems that enables you and your suppliers share risks, costs and rewards					
18. You and your supplier promote an attitude and plans of action to support an integrated business performance					
19. With regard to milk supply you and your supplier involve for the joint establishment of objectives for the end customer satisfaction					
20. There is skill and idea sharing practice between you and your supplier by conducting training and seminars					

Section III. Determinants to supply chain integration

To what extent do you agree or disagree with the following statements that there are determinants to supply chain integration between milk producers and traders? **Please rate your opinion in the Likert scale ranging from:** 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly agree

Determinant variables to milk supply chain integration	**1**	**2**	**3**	**4**	**5**
21. Availability of adequate information system highly attributes to milk SCI					
22. Willingness of supplier to share critical milk market information highly attributes to milk SCI					
23. Availability of compatible information technology highly attributes to milk SCI					
24. Availability of trust and contract agreement on milk market highly attributes to milk SCI					
25. Availability of joint demand forecasts highly attributes to milk SCI					
26. Availability of sharing education, technical skill, knowledge about IT and management highly attributes to milk SCI					
27. Availability of systems that enables to practice packaging customization and standardization to facilitate handling, transport, and insure quality in order to reduce cost of SCI highly attributes to milk SCI					
28. Availability of effective payment settlement highly attributes to milk SCI					
29. Availability of process approach that allows direct interconnection of supplier to avoid process duplication highly attributes to milk SCI					

Appendix III: Descriptive Statistics

Frequency Table

BA05

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	19	15.7	16.2	16.2
	2.00	64	52.9	54.7	70.9
	4.00	31	25.6	26.5	97.4
	5.00	3	2.5	2.6	100.0
	Total	117	96.7	100.0	
Missing	System	4	3.3		
Total		121	100.0		

BA06

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	44	36.4	37.6	37.6
	2.00	70	57.9	59.8	97.4
	3.00	3	2.5	2.6	100.0
	Total	117	96.7	100.0	
Missing	System	4	3.3		
Total		121	100.0		

BA07

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	82	67.8	70.1	70.1
	2.00	35	28.9	29.9	100.0
	Total	117	96.7	100.0	
Missing	System	4	3.3		
Total		121	100.0		

BA08

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	85	70.2	72.6	72.6
	2.00	27	22.3	23.1	95.7
	3.00	5	4.1	4.3	100.0
	Total	117	96.7	100.0	
Missing	System	4	3.3		
Total		121	100.0		

BA09

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	109	90.1	93.2	93.2
	2.0	6	5.0	5.1	98.3
	3.0	2	1.7	1.7	100.0
	Total	117	96.7	100.0	
Missing	System	4	3.3		
Total		121	100.0		

Table 1. Descriptive Statistics towards the challenges of milk SCI in relation to II

Descriptive Statistics

	N	Mean	Std. Deviation
BA05	117	2.4444	1.12529
BA06	117	1.6496	.53039
BA07	117	1.2991	.45985
BA08	117	1.3162	.55164
BA09	117	1.085	.3366
Valid N (listwise)	117		

Table 2. Descriptive Statistics towards the challenges of milk SCI in relation to CRS

Descriptive Statistics

	N	Mean	Std. Deviation
BB10	117	1.2222	.43769
BB11	117	1.6838	.55164
BB12	117	1.6410	.60830
BB13	117	1.4188	.89288
BB14	117	1.8205	.73830
BB15	117	1.1111	.43107
Valid N (listwise)	117		

Table 3. Descriptive Statistics towards the challenges of milk SCI in relation to ORL

Descriptive Statistics

	N	Mean	Std. Deviation
BC16	117	2.0085	.83558
BC17	117	1.0855	.36133
BC18	117	1.3675	.55083
BC19	117	1.4872	.53523
BC20	117	1.5128	.83682
Valid N (listwise)	117		

Table 4. Descriptive Statistics towards the determinants of milk SCI

Descriptive Statistics

	N	Mean	Std. Deviation
C21	117	4.8291	.49638
C22	117	4.8803	.32596
C23	117	4.8120	.43414
C24	117	4.8718	.38369
C25	117	4.7778	.60331
C26	117	4.8547	.37749
C27	117	4.8632	.36920
C28	117	4.6154	.66755
C29	117	4.3932	.86061
Valid N (listwise)	117		