

***Determinants of supply chain management performance: the case of  
Arjo Dedessa Sugar Factory***

*A Thesis Submitted to the School of Graduate Studies of Jimma  
University, College of Business and Economics in Partial Fulfillment of  
the Requirements for the Degree Of Master's Of Arts in logistics and  
supply chain management*

**BY**

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**LSCM PROGRAM**

**MAY, 2021**

**JIMMA, ETHIOPIA**

*Determinants of supply chain management performance: the case of  
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## DECLARATION

I hereby declare that this thesis “**The Determinants of supply chain management performance: the case of Arjo Dedessa Sugar Factory**” has been carried out by me under the guidance and supervision Dr. Taye Amogne and Mrs. Nechitu Legese

The thesis is original and has not been submitted for the award of any degree or diploma to any university or institutions.

Researcher's Name	Date	Signature
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## CERTIFICATE

This is to certify that the thesis entitles “**The Determinants of supply chain management performance: the case of Arjo Dedessa Sugar Factory**” submitted to Jimma University for the award of the Degree of Master of Logistics and supply chain management (LSCM) and is a record of confide research work carried out by Fekadu Tamiru under our guidance and supervision.

*Therefore, we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.*

*Main Adviser’s Name*

*Date*

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*Co-Advisor’s Name*

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## **ABSTRACT**

*Supply Chain Performance measures clearly show not only how well an institution meets the needs of its customers but also how it handles its customers in terms of quality and efficiency to add customer value for goods and services. This has triggered the need for performance measures, or metrics, for global supply chain performance improvements. Nevertheless, no study has been conducted to identify or assess the determinants of supply chain management performance in sugar factories. This study mainly tries to examine the determinants of supply chain management performance in Arjo Dedessa Sugar Factory. The study problem was answered through a combination of quantitative approach in order to reduce the limitation and an explanatory design was employed in the current study to assess the determinants of supply chain management performance. The populations of the study were consisted of 1,100 employees and suppliers of the factory. Sampling size 293 employees and suppliers was select randomly. The researcher used primary and secondary data for further analysis. Linear Regression Model was applied in explaining the relationship between dependent and independent variables since the outcome variable is continuous variable that ranges from strongly disagree to strongly agree. Furthermore, the value of regression analysis shows that supplier buyer relation, human metrics, external supply chain, environmental factor and information sharing have a statistical significant effect on supply chain management performance. All the independent variables in the study influenced supply chain performance and with the highest influence were being the external supply chain and environmental factors and the least being information sharing and Supplier-Buyer relations. In order to improve the supply chain management performance, the factory needs to create a long-term strategic approach.*

**Keywords: Supply Chain Management Performance**

## **ACKNOWLEDGEMENT**

First of all I would like to thank almighty God for helping me to accomplish my work successfully. Next I would like to express my heartfelt gratitude to Arjo Dedessa Sugar Factory for providing me necessary information as well as for giving me building ideas to conduct my thesis. Then I would also like to express my heartfelt gratitude to my advisors Dr. Taye Amogne and Mrs Nechitu Legesse whose cognitive expertise played a great role giving me solid and constructive ideas and suggestion which is the basic towards correcting my own problem and wrong doings enabling me to conduct successful research. The last I would also like to thank each and every body that helped me in conducting this research in all directions.

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## ACRONYMS / ABBREVIATIONS

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SCM	Supply chain management
SCMP	Supply chain management performance
GTP	Growth and Transformation Plan
SC	Supply chain
CII	Confederation of Indian Industry
CSR	Corporate Social Responsibility
IS	Information Sharing
HM	Human Metrics
VIF	Variance inflation factor
SPSS	Statistical Package for the Social Sciences
SBR	Supplier-Buyer Relation
EF	External Factors
EF	Environmental factors
R&D	Research and Development
TCD	Ton Cane per Day
LPI	Logistics Performance Indicator

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# CHAPTER ONE

## INTRODUCTION

### 1.1. Background of the Study

In the new era, understanding of supply chain performance is vital to achieve supply chain performance improvements. Supply chain performance measures clearly show not only how well an institution meets the needs of its customers but also how it handles its customers in terms of quality and efficiency to add customer value for goods and services (Deloitte 2007, p. 111&234).

Nowadays measures, actions and decisions that happen within a factory are no longer the sole determinants of performance instead everyone that has connection or some form of association with the organization has a huge and meaningful overall results of the Supply Chain (SC) as every factor is connected to every other factors in one way or the other. The competition having shifted from individual organizations to supply chains because Supply Chain Management (SCM) is an essential element that must be implemented effectively when organizations form global alliances (Halldorsson et al. 2008, p. 126). Supply Chain that involves all levels of the manufacturers and suppliers; transporters, warehouses, retailers as well as the end users full-fill a customer's desire and request is ultimately linked with customer's satisfaction and meet their needs in turn produces profits for the company itself.

Currently African in general and Ethiopia in particular, manufacturing industries, like anywhere in the world where competition is very high, are facing similar challenges: consequently, both multinational and other import substitute companies whose profit is highly determined by the quality and standard of the supply chain are required to enhance the quality of their products, reduce cost, provide better services and supply a wider variety of products, all fulfilled at once in a given scenario that (Dangayach and Deshmukh 2003, p. 279) are included in the new competition parameters. Gunasekaran et al. (2004, p. 265) stated that, many companies are not able to increase their prospective of supply chains due to failure in the implementation of performance measures and metrics targeted to integrate the chain in a more efficient manner which may result in the enhancement of effectiveness and efficiency of the companies.

Despite that fact that many factors are cognizant of the benefits of supply chain management in the routine daily operations, there are yet many more that do not comprehend fully how important and useful supply chain management is for to integrated the chains and thereby measure the performance given the metrics. In fact, without a precise measurement of the performance it is highly unlikely to expect improvement. Hence, there needs to be an approach of measurement to have an open dispatch of the levels of strategy, operation and tactics to get the actual scope of the operation (Bhagwat and Sharma 2007, p. 56).

What makes supply chain management more important is that the supply efficiency chain needs to and can be improved; however, the nature of its measurement is more qualitative than quantitative and is rated in a unit of ratio. Therefore, while there is no doubt supply chain is still measurable through qualitatively the support it gives to improvement of supply chain can be enhanced through measuring supply chain performance (Chen and Paulraj 2004, p. 45) what can be measured can also be improved up on the measuring gives insights into the division that needs upgrading for more efficient performance.

Although the sharp contrast that the manufacturing sector proliferating in an astonishing rapidity in countries, such as India and China and seems decline in the giant advanced economies it remains pivotal to assure steady growth in the manufacturing sector which is only possible through creating a conducive atmosphere for global competitiveness both in quality and quantity from the initial establishment of a plant to the integrated supply chain until a product reaches to the consumer (Deloitte 2007, p. 234). When considering mass production and competitiveness index in the global stage the Asia, China, India and Korea are the top three (CIMA 2010) while India standing at 46th on Logistics Performance Indicator (LPI). This illustrates the fact that supply chain performance measurement method is a necessary among other things to ensure the balance between manufacturing and co

mprehensive supply of products.

In generally the sugar industry in Ethiopia has great potential to enhance manufacturing and export production and thereby to increase employment opportunities and reduce poverty. It has several competitive advantages in different areas. Thus managing the supply chain in this business environment has a major impact of performance of all parties involved in the chain. In

this study was different SCM perspective including supply chain performance in selected manufacturing industries has been to examine, so this study was focus to identify determinants of supply chain management performance: the case of Arjo Dedessa Sugar Factory.

## **1.2. Statement of the problem**

There are three large-scale sugar establishments in the Ethiopia; two of them in the Awash Basin (Wonji/shewa and Metehara) and one (Finchaa) in the Blue Nile Basin. These sugar companies presently produce sugar for the local market. White sugar mainly imported the neighboring countries such as Djibouti, Saudi Arabia, Somalia and India in quantities ranging between 10,000 to 163,000. The other sugar factories that were established after the Wonji, Fichaa, Metehara and others factories. From additional sugar factory construction Arjo Dedessa Sugar Factory is one. Arjo Dedessa Sugar Factory developed 50,000 hectares and has a capacity to process 8,000 ton cane per day (TCD). Ethiopia started the implementation of a five-year Growth and Transformation Plan (GTP) in 2010/2011 with the aim of becoming a middle-income country with a climate-resilient green economy by the year 2025.

For the duration of the GTP, the sugar sub-sector (production and processing of sugarcane) has been given top priority together with a few other sub-sectors such as the textile industry, and the meat and leather processing industry. Compared to the recent development in the sugar sub-sector, development has been very slow both in terms of the area under production and the number of factories from the establishment of the first commercial sugarcane production in 1953 until 2006 (Wendimu et al. 2015, p. 201). Ethiopia has one of the highest sugarcane yields (land productivity) in the world.

Now a day, factories are changing as companies discover new ways of working together to achieve the ultimate supply chain goal, the ability to fill customer orders faster and more efficiently than the competition. This has triggered the need for performance measures, or metrics, for global supply chain performance improvements. According to Beamon (1999) performance measures must show not only how one is providing for your customers (service metrics) but also how an organization is handling its business (speed, asset, inventory and financial metrics). Measurement of supply chain performance is necessary to be carried out in

order to solve some problems that may arise out of the supply chain before the widespread impacts are realized.

Supply chain performance measurement would organize supply-chain coordination to cope with consumer demands (Chopra and Meindl 2001), evaluate holistically supply chain performance, and create more efficient supply chain integration (Balfaqih et al. 2016). Agro-industrial supply chain management has a different model from conventional manufacture, that perishable raw materials and product, business activity depends on seasonal condition, raw material varied size and quality, voluminous and hard handling (Marimin et al. 2010). By these constraints, the complexity of agriculture and agro-industrial supply chain has not been studied and reviewed widely (Higgins 2007). Sugarcane agro-industry supply chain as a business process to produce sugar from cane -a product of agriculture- has many constraints and differences with other supply chain model.

The complexity of sugarcane supply chain model can be seen as agricultural product characters, involve multi-actor and multi-sector to make a business decision, and uncertainty supply chain business process input and output factors (Chiadamrongm and Kawtummachai 2008). Supply chain performance measurement is needed to ensure the supply chain objectives achievement and to know the company's capabilities to overcome the supply chain problem. There is no study conducted in the area of determinants of supply chain management performance in the case of Arjo Dedessa Sugar Factory. Some studies states that, supply chain management plays pivotal role in the effectiveness and efficacy of sugar factories.

Those study conducted previously will in other countries and in different sector of manufacturing industries which possesses completely different culture and development stage respectively. Thus, one could assume that the study was different in developed countries where SCM performance will more advanced and under developing countries like Ethiopia. According to Wendimu et al. (2015) related the issue of supply chain management performance of sugar factories both from the perspectives of demand side and supply side. There is such a gap in the sugar industry sector in Ethiopia and Arjo Dedessa Sugar Factory about the determinant factors of supply chain management performance in the sugar factory industry. Therefore, precisely, the problem of supplier-buyer relations, environmental factors, human factors external supply chain and information sharing is the part of the problem and this pressurized the researcher to conduct



this study so that the above mentioned gap is a problem of determinant factors of supply chain management performance in the sugar factory. Nevertheless, no study has been conducted to identify or assess the determinants of supply chain management performance in Arjo Dedessa sugar factory. So this motivates me to conduct a research on the above mentioned factory. Hence, this study thus aims to test these controversies. This study was mainly trying to examine the determinants of supply chain management performance in Arjo Dedessa Sugar Factory.

### **1.3. Research question**

The research questions can be articulated in the following research questions:

1. How supplier-buyer relationship affects the supply chain management performance in Arjo Dedessa Sugar Factory?
2. What is the effect of information sharing on supply chain management performance in Arjo Dedessa Sugar Factory?
3. How human metrics affects the supply chain management performance in Arjo Dedessa Sugar Factory?
4. What is the effect of external supply chain on supply chain management performance in Arjo Dedessa Sugar Factory?
5. How environmental factor affects the supply chain management performance in Arjo Dedessa Sugar Factory?

### **1.4. Research Question**

This study would have the following general and specific objectives:

#### **1.4.1. General Objective of the study**

The general objective of this study was to examine, the major determinant factors of supply chain management performance of Arjo Dedessa Sugar Factory.

### **1.4.2 Specific objective of the study**

The specific objectives include;

1. To identify the effects of supplier-buyer relationship on supply chain management performance in Arjo Dedessa Sugar Factory.
2. To examine the effects of information sharing on supply chain management performance in Arjo Dedessa Sugar Factory.
3. To identify the effects of human metrics on supply chain management performance in Arjo Dedessa Sugar Factory.
4. To examine the effects of external supply chain on supply chain management performance in Arjo Dedessa Sugar Factory.
5. To identify the effects of environmental factor on supply chain management performance in Arjo Dedessa Sugar Factory.

### **1.5. Significance of the study**

Nowadays, the topic determinants of supply chain management performance are getting more and more importance due to its impact on organization's survival, continuity, and growth. Therefore, the determinant of supply chain management performance study was crucial topic for organizations, as well as, for academicians. The finding of the study was important in a number of ways: First to Arjo Didessa Sugar Factory and policy makers was use the research finding and recommendation to identify the determinant of supply chain management performance.

Secondly, the study was also significant to researchers as it provides basis upon which further studies can be carried out and useful in providing information of organization. It is also hoped that this study was add to the available body of knowledge and increase the understanding of how to efficiently manage and improve the supply chain management performance. Third it helps to add pool of knowledge to the readers who want to know about the determinant of supply chain management performance.

## **1.6. Scope of the study**

The objective of this study was to assess the determinants of supply chain management performance the case of Arjo Dedessa Sugar Factory. Despite the location of the company in different part of the world and our country, but this study was limited only to Arjo Dedessa Sugar Factory. Although there are different dimensions and practices of supply chain management, the researcher was analyze the effect of supplier-buyer relationship, information sharing, human metrics, environmental factors and external supply chain on the determinants of supply chain management performance. Moreover, the study was examining the determinants of supply chain management performance. Geographically, the study was conducted in Arjo, East Wellega Zone, Oromia Region of Ethiopia, particularly in Arjo Dedessa Sugar Factors.

## **1.7. Definition of key terms**

**Supply Chain:** Supply chain is the group of manufacturers, suppliers, distributors, retailers and transportation, information and other logistics management service providers that are engaged in providing goods to consumers (Chow, Heaver and Henriksson, 1999).

**Supply Chain Management (SCM)** is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model (Supply Chain Visions, 2010).

**Supply Chain Management Performance:** this definition implies that supply chain performance measures effectiveness and efficiency.

**Environmental Factors:** The source of events and changing trends and regulations which create opportunities and threats for an individual organization.

**Information Sharing:** The extent to which critical and proprietary information is communicated to one's supply chain partner'' (Li et., p. 110).

**Supplier Buyer Relations:** The long-term relationship between the organization and its suppliers. It is designed to leverage the strategic and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits'' (Li et al., 2006, p.109).

**Human Metrics:** Behavioral and support issues while establishing and implementing the key supply chain management and metrics (Tony and Kelvin 2007, p. 6).

**External Supply Chain:** External supply chain facing environmental factors that can affect a direct and indirect on the supply chain. They can be due political reasons, economic, technological or geographical (Kleindorfer &Saad, 2005).

## **1.8. Organization of the paper**

This paper is organized into five chapters. While the first chapter highlights the introduction section, the second chapter presents the review of related literatures that includes theoretical framework, empirical reviews and conceptual framework. Chapter three is about methodology of the study that includes research design, population and sampling, data type and method of collection, methods of data analysis. Chapter four presents results and discussion. Finally chapter five presents conclusion and recommendations based on the findings.

# **CHAPTER TWO**

## **LITERATURE REVIEW**

### **1. INTRODUCTION**

This chapter presents a literature review about the concept of supply chain management performance sugar factory and related company supply chain, supply chain management issues and other associated concepts. Supply chain management performance and manufacturing experiences was present to describe supply chain management performance. At the end of chapter was the unique characteristic of organization adaption of supply chain management was discussed in conceptual framework. Against the purpose of this section is to provide a critical evaluation of the available research evidence about supply chain management performance among Sugar Factory in Arjo Dedessa. It covers the determinants of supply chain management performance, measures of supply chain management performance.

### **2.1. THEORETICAL FRAMEWORK**

#### **2.1. 1. Supply chain**

Christopher (1998) defined supply chain as a network of organizations that are involved, through upstream and downstream linkages in the different processes and activities that produce value in the form of products and services in the hand of the ultimate consumer.”(Liu, 2011) from the council of supply chain management professionals (2010) defined supply chain as “the material and informational interchanges in the logistical process, stretching from acquisition of raw materials to delivery of finished products to the end user.

All vendors, service providers, and customers are links in the supply chain” (CSCMP, 2014). The supply chain includes suppliers, manufacturers, distributors, retailers and customers. A supply chain consists of all stages involved, directly or indirectly, in fulfilling a customer request. The supply chain not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers and customers themselves...” (Chopra S., & Meindl P., 2003).

In general a supply chain is considered to be “the flow and management of resources across the enterprise for the purpose of maintaining the business operations profitably” (Sehgal, 2009); Schileru has the same vision (2008), which defines the supply chain as “a very complex process

of planning, implementing, and controlling an efficient and effective flow of goods, services and specific information from point of origin to point of consumption so as to achieve compliance with the customer's requirements"; in addition the concept refers to "three or more organizations directly linked by one or more of the flows of products, services, finances, and information from a source to a customer" (Mentzer, et al., 2001, p.4); more we can say that the supply chain represents "the sequentially-connected organizations and activities involved in creating and making a product available" (Russell, 2007, p. 58); Aitken (2004) defines it as " a network of connected and interdependent organizations, mutually and co-operatively working together to control, manage and improve the flow material and information from suppliers to end users".

### **2.1.2. Supply chain management**

Supply Chain management is aimed at examining and managing Supply Chain networks. Ayers (2001) reported that Supply Chain management is the maintenance, planning, and Supply Chain processes activity for the satisfaction of consumers needs. According to Christopher (1998) supply chain refers to the organizations network that are involved in the diverse processes and activities that generate value in the form of goods and services in the hands of the end customer. Supply Chain Management (SCM) is the "strategic and efficient coordination of the conventional business functions and the strategies across these business functions within a specific corporate and across businesses within a supply chain, for the aims of developing the long-term performance of the corporate and the supply chain as an entire.

A Supply Chain is an interconnected set of relationships from customer to supplier, through a number of intermediate stages such as sourcing, organization, manufacturing, and warehousing and distribution and it is a network of companies which influence each other (Agarwal& Shankar 2002). SCM is 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 (Hugo, et.al, 2011).The objective of SCM is to achieve a sustainable competitive advantage (Handfield, et al., 2009).

More importantly, supply chain management creates value for companies, customers and stakeholders whom interacting effectively and efficiently throughout the supply chain

(Estampea, *et al.*, 2013). Supply Chain Management is the systemic and strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain for the purposes of improving the long-term performance of the individual companies and that of the member of a given Supply Chain as a whole (Mentzer, 2001).

### **2.1.3. Supply chain and supply chain management**

Supply chain (SC) is a system of an organization that is networked to implement multiple processes and activities that is targeted to bring about a value which include finished products and services that are intended to directly reach the end users (Christopher 1998, p. 35). In other words, a supply chain is a network that stretches between the manufacturer and the end customer and also serves to connect the two extreme ends so as to deliver either a product or a service that carry a definitive value to the end user (ibid 1998). Alternatively, supply chain is defined as “the network of facilities and activities that performs the functions of product development, procurement of material from suppliers, the movement of materials between facilities, the manufacturing of products, the distribution of finished goods to customers, and after-market support for sustainment.”

Supply Chain Management (SCM) is a scheme that is widely implemented in various business worlds and is catching the attention of academics being the subject of study and research for the benefits are worthy. Supply Chain Management has the function of connecting business entities with companies, such as manufacturer and distributor through managing the dynamics in the chain located at various stages (Ballou et al. 2000). Numerous researchers have been conducted until today to assess the system. Also, articles that attempted to define the supply chain management and predict the level of influence through empirical research methodology have been published (Cooper et al. 1997; Lambert & Cooper 2000; Larson & Rogers 1998, p. 67).

Supply Chain Management is a network constructed in such a way that it enables to connect the upstream and downstream paths of supply chain aiming to produce a product or a service of a certain definite value and through the process reach the target users. The chain involves the design and control of products of not costlier (Li et al. 2006, p. 107). The supply chain minimizes inefficiency through inspection of the network and takes process oriented approach in the management system in order to provide input to make decisions to improve performance (Bowersox and Class 1996, p. 94).

#### **2.1.4. Supply chain management performance**

Supply chain management performance is becoming more and more important when SCM is coming into focus. The purpose of a supply chain management performance measurement system is to ensure that standards and objectives are set clearly. Performance is regularly and objectively assessed for accomplishments, and that actions are taken to improve and enhance performance potential in the future (Ababneh, 2008). Supply chain management performance measurement can be defined as the process of qualifying the efficiency and effectiveness of action.

A performance measure can be defined as a metric used to quantify the efficiency and/or effectiveness of an action (Neely et al. 1995). Developing SCM needs a qualified measurement system for measuring SCM performance. Supply chain management Performance measurement systems play important role in organizational and manufacturing firms in business strategy implementation. SCM should be measured because of the management interest in measuring how efficient SCM is. Usually there are several kinds of interests and several management levels which are interested in knowing about SCM capability and performance. Measuring is also needed when SCM is going to be developed. Developing SCM needs a qualified measurement system for measuring SCM performance. Performance measurement systems play important role in different organizational. Performance measurement system provides information for the monitoring, control, evaluation and feedback functions for company management.

The supply chain management performance is an evolving dynamic process. So determinants of supply chain management performance is have advantage and more important especially in sugar factory. Such process is always in search of innovative approaches to the management of organizational resources in order to better track, monitor and improve the different aspects of organizational performance. In generally supply chain management the objectives of supply chain performance management are to improve the competence and success of a supply chain (Beamon 1999; Gunasekaran et al. 2001).

Supply Chain Performance The overall efficiency and effectiveness of a supply chain Supply Chain management Performance refers to the extent to which a supply chain meets end-customer requirements, and contains operational efficiencies which can deliver that performance. Supply



chain management performance measures effectiveness and efficiency by how well these two goals are met. A determinant of supply chain management performance depends on factors like external supply chain, human metrics, information sharing, supplier-buyer relations and environmental factors.

### **2.1.5. Determinants of supply chain management performance**

There various determinants that influence supply chain performance in organizations, the main determinants of supply chain management performance among sugar factory include external supply chain, supplier-buyer relations, human metrics, information sharing and environmental factors in a single in the Arjo Dedessa Sugar Factory.

#### **2.2.1. Environmental Factors (EF)**

The effects of globalization, technology and the growing need for environmental responsibility and sustainability is forcing organizations and individuals to make changes in the way they work. Environmental factors are among the factors that determine the performance of an organization. Therefore, the responsibility to do environmental protection works, along with the growing technology and global trade calls for environmental responsibility that requires changes in the way and system companies as well as individual's employ in their business (Lenz 1980). The private sector plays a pivotal role in addressing social responsibilities.

In this regard confederation of Indian industry (CII) had reported that in corporate social responsibility (CSR) most of nation's organizations have implemented the program, a huge step to promote environmental safety and responsibility that is growing recently. Unlike the times elapsed that introduced many technological and economic changes. The increasing number of population coupled with the needs to ensure safety and security will trigger social changes. The coming decades, therefore, may see adjustments in the way companies deal with the social compulsive demands.

#### **2.2.2. External supply chain (ESC)**

The nature of global supply chain is that of collaboration at various levels. This factor is common to ever world Class Company in the world from textile factories to car making and pharmaceutical supply producers is based on the organizational establishment and the support it

gains from the supply chain network. Strategic partnership is, therefore, is the key motive behind the integral objective activities that strengthens and nurtures the supply chain. Networks of supply are growing to more complex level than ever before. The challenge and opportunity of companies is whether or not to establish complex networks together with others so as to reap the benefits of multilateral collaborations.

As a result of the emergence of networks that operates not only at inter-organizational level but also at trans-organizational level (Bititci et al. 2006, p. 27) there by create a lasting and more dependable chains of supply. This is a leap from the traditional method of chain supply to a complex and comprehensive approach (Gunasekaran et al. 2005, p. 266). This increase in efficiency both in terms of performance and timely delivery can have a number of positive results: reducing entire supply chain costs, facility costs, and labor and transportation costs. This in turn will reduce the price of products and services and enhance volume of sales (Simchi-Levi et al. 2000, p. 69).

### **2.2.3. Supplier-Buyer relationship (SBR)**

In supply chain management strategies supplier relationship activities play an important role (Wisner, 2003). Long-term relationships refer to intention that the arrangement is not going to be temporary (Chen and Paulraj, 2004). A successful strategic alliance and integrated relationship with suppliers and buyers is very much needed. It should be revolved around trust, loyalty, positive sum game (a win-win relationship), cross-functional teams, achieving common goals and collaboration (Chandra and Kumar, 2000). A firm's success linked to the strength of its relationship with supply chain partners and it could reduce and increase revenue (Spekman, Kamauff and Myhr, 1998).

### **2.2.4. Human metrics (HM)**

Human metrics is an indicator of the key factors that affect the implementation of performance measures and metrics other factors behavioral, cultural and political issues. They are key factors that require wholesome approach to manage their effect. An effective supply chain management demands organizational capability and management in addition to the shared values of trust, commitment and collaboration (Mello and Stank 2005, p. 550). Moreover, the human factor is

most critical (Tony and Kelvin 2007, p. 4) in affecting the supply chain and is also a critical factor in achieving strategic and operational objectives (Hoek et al. 2002). Managerial components are essential and the findings show that the four pillars of management must be implemented. In order for supply chain to achieve the required result, these managerial supports are top management support, broad-based functional support, channels support and infrastructural or governance support. Details are available on the works of (Robinson and Malhotra 2005, p. 320 and Wouters 2009, p. 69).

Implementing supply chain management initiatives require proper cultural elements, such as shared values and artifacts as well as assumptions (Mello and Stank 2005, p.552). Besides, organizational commitment and good governance are essential to achieve success in supply chain performance while lack of these components can result in failure in implementing supply chain initiatives (Fawcett et al. 2006, p. 27). Generally, human and organizational issues need to be measured and evaluated and in doing so performance measuring can deal with in a wholesome manner to get the desired outcome.

### **2.2.5. Information sharing (IS)**

Information sharing is therefore described as getting access to private data among business partners for the common goal of monitoring and adjusting the process of products and orders through the constant flow and exchange process at various stages in the supply chain (Simatupang and Sridharan 2002, p. 490). This process is mainly comprised of elements, such as consistent data acquisition, storage, processing, presentation, retrieval, and broadcasting of supply and demand equilibrium and forecast the output, inventory status and location, order status and cost related data, performance status and presentation. Information is the essential inputs that determine the process of data and improves supply chain clarity that is used as a springboard to arrive at sound decision which in turn contributes to the improvement of the system.

Hence, information needs to be relevant, timely, reliable and accurate when and if one of these is missing, the outcome can be wrong and therefore the decisions is wrong (Simatupang and Sridharan 2005, p. 493; Thatte 2007, p. 69). Shared information is the basis of right decision and helps business partners to take the right step in making the right decision. The actions following

the decision of can be geared towards adjusting the process to the benefit of both producers and end customers (Davenport et al. 2001, p. 31; Tathee 2007, p. 96). One of the fundamentals of supply chain effectiveness is to have a clear understating of the basic concepts of supply chain and the transparency and willingness to give and receive information between partners that is essential for both in order to be competitive in the business (Lummus and Vokurka 1999; cited in Thatte 2007, p. 84).

### **2.3. Empirical review**

Studies in Africa have focused on supply chain performance, Gichuhi (2003, p. 62) found that integration highly influence supply chain performance among commercial banks in Kenya. In another study, Livohi (2012, p. 89) concludes that the downstream supply chain performance measurement led to supply chain performance in oil marketing companies in Kenya. A study by Gwako (2008, p. 29) found that supply chain management was key in achieving performance of Kenya Airways. These studies were too broad and thus did not address the problem of this study which is to establish the determinants of supply chain management performance in Arjo Dedessa Sugar Factory in Ethiopia. There is no study was conducted in the area of determinants of supply chain management performance in the case of Arjo Dedessa Sugar Factory.

In addition, some studies conducted in Ethiopia in general and sugar factories in particular, states that the supply chain management plays pivotal role in the effectiveness and efficacy of sugar factories. According to (Wendimu et. al. 2015, p. 213) associated the issue of supply chain management performance of sugar factories both from the perspectives of demand side and supply side. These includes environmental factors, supplier-buyer relations, external supply chain, information sharing and human factors supply chain models use in the overall sugar industry. Unfortunately, despite decades of research using a variety of methods, the debate over whether the performances of supply chain management remain unsettled, largely due to theoretical and methodological controversies. Those study conducted previously will in other countries and in different sector of manufacturing industries which possesses completely different culture and development stage respectively. Thus, one could assume that the study was different in developed countries where SCM performance will more advanced and under developing countries like Ethiopia. There is such a gap in the sugar industry sector in Ethiopia and Arjo Dedessa Sugar Factory about the determinant factors of supply chain management

performance in the sugar factory industry. Therefore, precisely, the problem of supplier-buyer relations, environmental factors, human factors external supply chain and information sharing is the part of the problem and this pressurized the researcher to conduct this study so that the above mentioned gap is a problem of determinant factors of supply chain management performance in the sugar factory which makes this study was researchable. Hence, this study thus aims to test these controversies. This study was mainly trying to examine the determinants of supply chain management performance in Arjo Dedessa Sugar Factory.

The supply-chain for sugarcane agro-industry ranged from ensuring sugarcane raw materials availability, processing plant and packaging then storage in warehouses. Results of the value added analysis showed that processing plant had a greater profit percentage rather than plantations and potentially took advantage of the value-added ratio; moreover it is needed to improve. Sugarcane agro=industrial supply-chain performance demonstrated in very low and poor performances or was in critical condition. Such a condition required strategies for an improvement in supply-chain performance for the purpose of preserving the company and enhancing productivity (Muhammed et al. 2017).

Performance improvement of the supply chain would be executed by implementing alternative strategies and accompanied with a good control as well as paying attention to implications that might be generated. Results of expert opinions illustrated that strategy execution of encouraging research and development and performance was the most suggested to be implemented. Qualities, yields and performance are key factors for enhancing supply chain performance and enhancing consumer trust. Research and development for quality and yield basically had been accommodated by the research and development section (Muhammed et al. 2017). Improvement measures necessarily are that the research and development do not merely focus on plantations but on processing by incorporating with research centers and partnerships. For further application, we have to applied research Centre and control management for all chain, not only focus on plantation but also for minimizing quality and yield degradation in processing then distribution to consumer. Furthermore, the companies have to pay attention to internal strategic integration, which would improve company's financial performance (Qi et al. 2016) as impact of strategies implementation.

A research study by Michael (2018) stated that Top management support and logistics integration is very important in SCM performance. Therefore top management should recognize and give full support to SCM functions within their organizations. Logistics is a key component of supplies chain management. Players to given SCM should integrate their logistics activities. Previous research found that collaborative relationship between customer and supplier has positive significant influence to SCM performance improvement (Fearne and Hughes 1999; Humphreys et al. 2001; Ounnar and Giambiasi 2007). The supplier satisfaction and contribution lead to customer satisfaction and SCM performance (Alfred Wong 2002). The research also found that trust has strong prediction to a long-term relationship with customer and supplier (Sahay 2003; Van Weele 2005; Tumala et al 2006; Chandra and Kumar 2000). Therefore, a good, trust-based and long-term relationship with customer and supplier will lead to high performance of supply chain.

A research studies conducted by Prahalad (1998) stated that the following eight significant discontinuities that are emerging simultaneously and they must be managed simultaneously have been identified : These are: global customers and increasingly global competition , unstoppable trend toward deregulation and privatization , new level of volatility, convergence of multiple technologies, indeterminate industry boundaries , evolving new standards , shrinking distance between the producer and end-user and increasing eco-sensitivity.

(Fawcett et al. (2006) indicated that four types of managerial support are needed to achieve the highest levels of supply chain success: top management support, broad-based functional support, channels support and infrastructural/governance support. Few more research works (Robinson and Malhotra 2005; Wouters 2009) clearly support the need for a performance measurement system taking the holistic picture, including the human side and organizational issues. Frequent meetings and transparent communication system such as web based information systems was helpful to overcome barriers that arise due to behavioral and political factors (Gunasekaran & Kobu 2007). Thus, there is significant positive relationship expected between human metrics and SCM performance.

Researchers suggested that an appropriate performance measurement system is a critical requirement for the effective management of a supply chain (Liang et al. 2006). There are studies

about the performance measurement systems and metrics of supply chains by critically reviewing the contemporary literature and suggesting possible avenues for future research (Shepherd and Gunter, 2006). SCM needs to be assessed for its performance in order to evolve an efficient and effective supply chain (Gunasekaran et al. 2001). Another finding suggests that customer satisfaction is increasingly being recognized as an appropriate measure for determining how well a particular organization is accomplishing its mission and while customer satisfaction surveys provide valuable information and may be used to improve the entire operation (Swinehart and Smith 2005). But, there are a number of important problems have not been yet addressed (Shepherd and Gunter 2006). Generally from the literature review it is clear that researcher was have different views on the supply chain management performance that are to organizational performance

## **2.4. Conceptual framework**

Conceptual frameworks are used to explain the research problems. Among different supply chain management performance variables stated in the literatures reviewed, the researcher was selected human metrics, information sharing, environmental factors, external supply chain and supplier-buyer relation and to assess determinants of supply chain management performance of Arjo Dedessa Sugar Factory. In this study human metrics, information sharing, environmental factors, external supply chain and supplier-buyer relation are independent variable and determinants of supply chain management performance is the dependent variable.

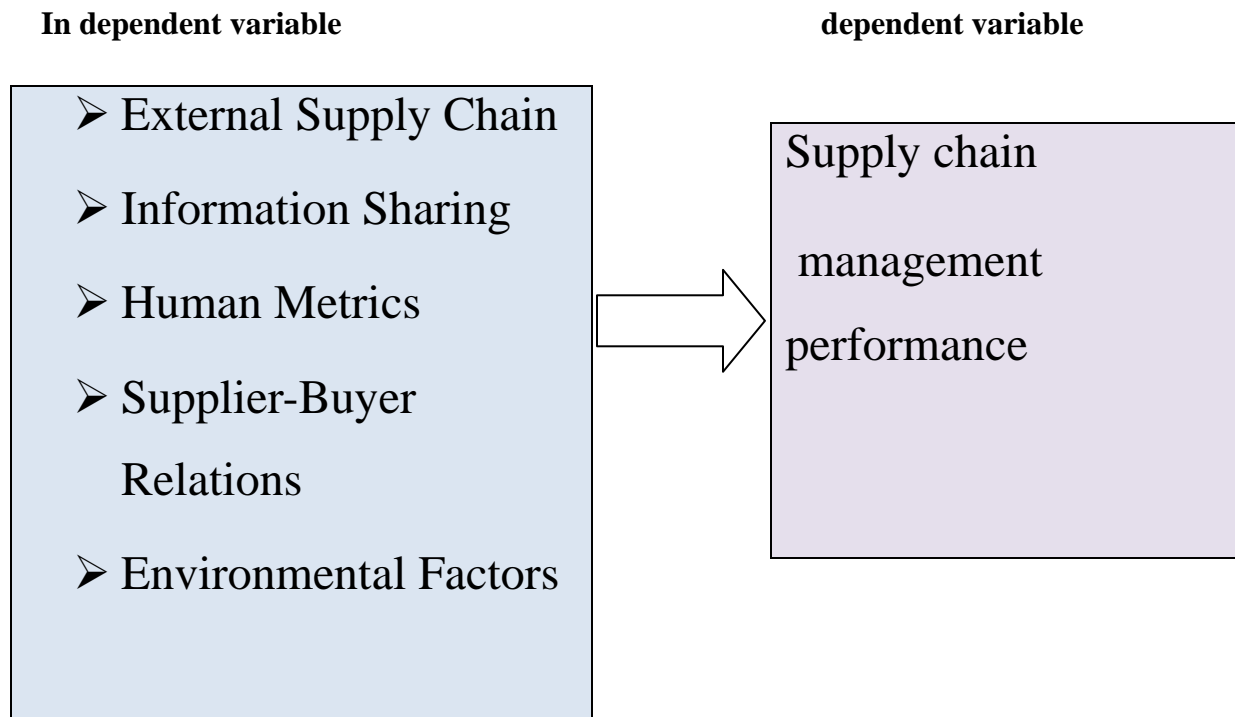
Accordingly the researcher was developed the following conceptual framework and indicated the relationship between the independent and dependent variables so the conceptual model (figure 2.1) identifies to assess the determinant of supply chain management performance. Supply chain management performance is highly influenced by supplier-buyer relations, external supply chain, environmental factors, human metrics and information sharing and industries need to understand these to reach peak performances so as to take timely measures either to take advantage of them or to combat the challenges.

The factors that affect the enterprise's performance can be also be classified as internal and external factors. The framework proposes that SCM performance was having a dependent variable and independent variable. The factors that affect the enterprise's performance can be

also be classified as internal and external factors. To relate the conceptual framework with the study objectives, supply chain management performance is the dependent variable whereas supplier-buyer relations, external supply chain, environmental factors, human metrics and information sharing are all the independent variables in the study area was those variables are developed through the review of different theoretical and empirical studies. The constructs and relationships between research variables are illustrated in the following figure;



**Figure 2.1 Conceptual Frameworks of Determinants of Supply Chain Management Performance**



**Source :** Source: Marwah et al. 2012

# CHAPTER THREE

## RESEARCH METHODOLOGY

### 2. Introduction

This chapter presents the research methodology that was used in this study: description of the study area, research designs, target population of the study, sampling and sampling techniques, source of data and collection methods, data collection and analysis was present.

### 3.1 Description of The Study Area

The study was conducted at Arjo-Didessa Sugar Factory which located in the western part of the country, Oromia national regional state, on the border of east wellega, Buno Bedelle and Jimma zones within Didessa valley. Arjo Dedessa Sugar Factory is far 395 kilometers from Addis Ababa, Nekemte-Bedelle route and Jimma-Bedelle-Nekemte route 540 kilometers distance far from Addis Ababa. The command area of Arjo Didessa Sugar Factory encompasses 15 kebeles of 4 weredas from east wellega zones, 31 kebeles of 5 weredas from Buno Bedelle zone and 5 kebeles of 1 wereda from Jimma zone. Arjo Dedessa sugar factory previously called Al-Habash sugar mills and established by Pakistan investor in 2009, was transferred to FDRE Sugar Corporation and commenced operation as of August, 2012. Arjo-Didessa Sugar Factory is located at 9° N latitude and 39° E longitudes, with an altitude of 1300- 1600 masl. The area receives high rain fall from June to September with average of 1477 mm annually. The area has a mean maximum and minimum monthly temperature is 31.1°C and 19.1°C, respectively, the soil types of the experimental site are dominated by Vertisols and few red Latosols (ESISC, 2008).



Figure 3.1 map of study area source: Google

### **3.2. Research design**

There are different research methodologies, depending on the type of research that are undertaken. A descriptive and explanatory research design was used. The Descriptive research design was used to understand and systematically describe the determinants of supply chain management performance. According to Mugenda (2003) a descriptive research is a process of collecting data in order to answer questions concerning the current status of the subjects in the study. The purpose of a descriptive research is to determine and report the way things are done. Descriptive research was used to obtain information concerning the current status of the phenomena to describe what exists with respect to variables or conditions in a situation.

The methods involved a range of activities: from the survey which describes the status quo to the regression study which investigates the relationship between variables. The primary use of descriptive statistics is to describe information or data through the use of numbers (create number of pictures of the information). Therefore, this research was employ descriptive and explanatory research approaches in order to give an adequate depiction of the association between the determinants of supply chain management performance in Arjo Dedessa Sugar Factory.

### **2.3. Target population of study area**

The population for this study was the Employees and suppliers of Arjo Didessa Sugar Factory. Thus, employees of the factory working in relevant departments/units were the constituents of the target population of the study. The factory has five key departments (human resource, factory operation, agriculture operation, finance and Supply and facility management). The target population consists of 1,100 employees and suppliers of the Arjo Dedessa Sugar factory. Therefore, for this study the target population was employees and suppliers of Arjo Didessa Sugar Factory.

### **3.4. Sampling techniques and sampling size**

As the objective of this study was focus on determinants of supply chain management performance with regard to probability sampling the researcher was use simple random sampling with stratification. Stratified sampling was employed based on the strata of the departments and simple random sampling using random table was done accordingly. The reason for using

stratified simple random sampling is that first, we can have more clear information inside the sub-population about the variables we are studying. And second, we can raise precision of the estimate of the variables of the whole population. Accordingly, the 5 key departments from the strata. A stratified sampling technique was applied so as to get a reasonable sample size and give equal chance to the respondents. In order to Arjo Dedessa Sugar Factory employees and suppliers of the factory who are directly related with this study. The factory has five key departments which are human resource, factory operation, agriculture operation, finance, and Supply and facility management. So, the researchers take all these employees and suppliers of the factory in the sample randomly. The target population of Arjo Dedessa Sugar Factory 1100 employees, including suppliers of the factory. Sampling size 293 employees and suppliers was select randomly. The formula was used for sample size determination with 95% confidence level, degree of variability = 0.5 and level of precision 5% (0.05 ) This sampling technique can be derived by the support of a simplified formula to calculate sample size by Yemane(1967).

$$n = \frac{N}{1+N(e^2)}$$

Where, n = sample size, N = total (target) population and for this study it is 1100 and e= level of precision 5 % was taken.

$$\begin{aligned} n &= 1100/1+1100 (0.05)^2 \\ &= 1100/3.75 \\ &= 293 \\ &= \underline{293} \end{aligned}$$

**Table 3.1 Number of target population and sample**

No	Department	Total number of employee	Sample taken	Percentage	Remark
1	Human resource	103	27	9	
2	Factory operation	285	76	26	
3	Finance	99	26	9	
4	Agriculture operation	338	90	31	
5	Supply and facility management	250	67	23	
6	And suppliers of Arjo Dedessa Sugar Factory	25	7	2	
	Total	1100	293	100	

In order to get proportional sample size, the total sample size (293) was distributed proportionally across the all departments in factory and suppliers of the factory.

#### **2.4. Data Source and Type**

The researcher was use primary and secondary data collection methods. Primary data collection methods are questionnaires. Secondary data was collect from annual reports, journal articles, books and others. Data related to organizational level variables was collect from a variety of sources such as financial records, Activity and financial reports and surveys of Chief Executive Officers (CEO), who are presumed to be representing of their organization. Self-administered close ended questionnaire was use to collect data from employees at different levels. The indicators of supply chain management performance is measured use a five point Likert scale (1=strongly disagree; 5=strongly agree) where higher values indicated stronger determinant on

supply chain management performance. The study adopts a standard questionnaire used by (Marwah et al. 2014).

## **2.5. Data Collection Methods**

Different types of analytical methods can be used to evaluate different research results and make a sound conclusion was for a given survey information. Literature reveals that each and every analytical method has their advantages and limitations; it is always advisable to select the one that can better suit to answer the specific purpose (Hopkins et al., 1996; Pallant, 2001). Multiple regression model best fit to assess the determinant of supply chain management performance. Quantitative techniques was used to analyses the data inferential statistics (Correlation, Regression) analysis was applied in order to summarize data and test the significance of the differences in opinions of the respondents.

## **2.6. Multiple regression**

Multiple regression models was applied in explaining the relationship between dependent and independent variables since the outcome variable is continuous variable that ranges from strongly disagree to strongly agree. The study was Pearson correlation and simple multiple regressions to identify the determinants of supply chain management performance.

The regression equation was:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \alpha$$

Where: **Y**: is the dependent variable (Supply Chain Management Performance),

**$\beta_0$** : is the regression coefficient/constant/**Y**-intercept,

**$\beta_1$ ,  $\beta_2$ ,  $\beta_3$ ,  $\beta_4$  and  $\beta_5$** : are the slopes of the regression equation,

**X1**: is Supplier-Buyer Relations

**X2**: is External Supply Chain

**X3**: Human Metrics,

**X4:** is Environmental Factors,

**X5:** is Information Sharing.

### **3.8 Validity Test**

According to Creswell (2003) validity is the extent to which results acquired from process of analysis of the data actually embodies the phenomenon under study. There are two types of validity: content validity and face validity. Face validity refers to probability that a question is misinterpreted or misunderstood. According to Cooper and Schindler (2006) pre-testing is a proper way to increase the possibility of face validity. On the other hand, content validity, also referred to as logical validity, refers to the degree to which a measure depicts all facets of a given social construct. In this study, the content validity was improved by seeking the opinions of experts in the field of study, particularly the supervisors. Also, the face validity of the research instrument was improved by carrying out a pilot test and changing any unclear and ambiguous question.

### **3.9 Reliability Test**

Measurement or questionnaire adopted from several journals was used to ensure higher validity. The questionnaire adopted for this research undertaking, is known as the Workforce diversity survey. The decision to utilize the particular measuring instrument is because its psychometric properties were evident, and the questionnaire had been used in a number of empirical studies Cooper & Schindler (2003). The questions consisted of 5 point Likert scale where the respondent expected to strongly agree, agree, neutral, disagree and strongly disagree with carefully constructed that ranged from very positive to very negative toward an attitudinal phenomenon.

The questionnaire was tested by using Cronbach reliability coefficient testing. Cronbach's Alpha can be interpreted as percentage of variance where the observed scale would explain in hypothetical true scale composed of all possible items in the universe. According to Zikmund *et. al.*, (2010) scales with coefficient alpha score of 0.6 and 0.7 indicate fair reliability, a Cronbach's alpha score of .70 or higher and considered as adequate to determine reliability. An alpha coefficient of 0.7 was obtained. Thus, the data generation was reliable and free of random error.

### Reliability test

One of the methods to estimate the reliability of the scores on a test or measurements is Cronbach's coefficients alpha method. Hence, Cronbach's coefficients alpha refers to the extent to which there is interrelatedness among the responses to the multiple items comprising in the Likert scale. Hence, as explored by Field (2009), if Alpha Coefficients were above 0.70, consistency and suitability were considered high. Accordingly, the reliability measures of each of the major variables are presented in the following table to ease the process of the data analysis

**Table 3.2 Reliability Statistics**

	<b>Cronbach's Alpha</b>	<b>Number of items</b>
Supplier-Buyer Relations	.821	5
External Supply Chain	.857	8
Human Metrics	.864	8
Environmental Factors	.884	11
Information Sharing	.765	5
Supply chain management performance	.759	6

Thus, as shown in table 3.1 the reliability of the scores was evident by strong Cronbach's alpha coefficients for all variables, which used as independent and dependent variables of the study. The Cronbach's alpha ranged from 0.759 to 0.884, indicating that items are highly reliable to measure the variables they are expected to measure.



## **CHAPTER FOUR**

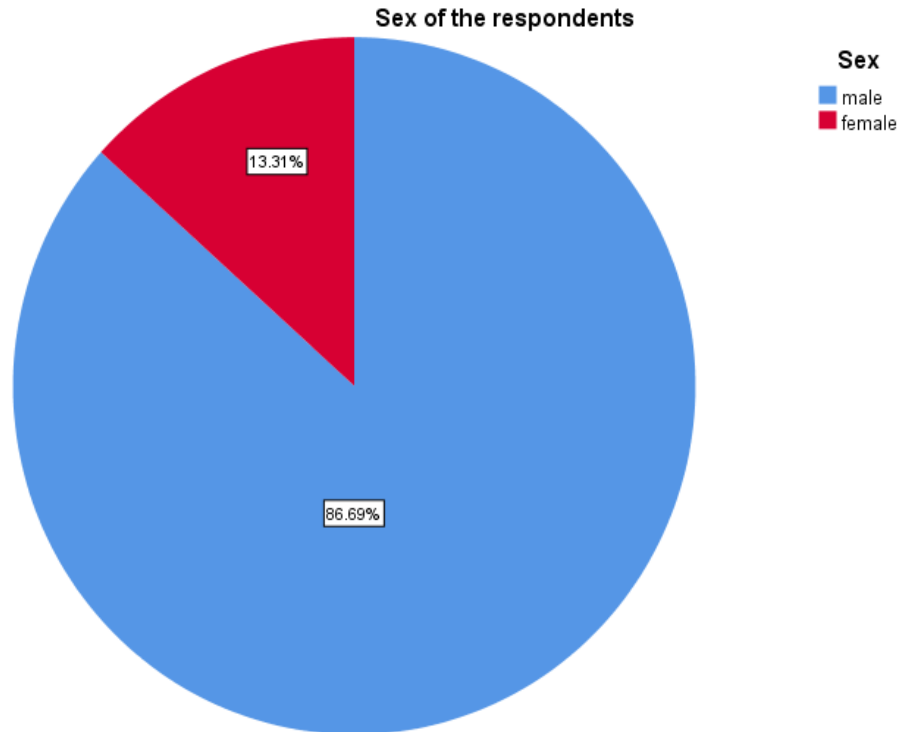
### **DATA ANALYSIS, INTERPRETATION AND PRESENTATION**

#### **4.1 INTRODUCTION**

The analysis and interpretation of this study is based on the data collected from employees and suppliers of Arjo Didessa Sugar Factory. The data was collected through survey questionnaire. The survey questionnaires were distributed to a randomly selected 293 employees and suppliers of the factory. Eleven respondents could not be returned and a total of returned 4 responses were excluded from analysis due to irrelevant information and not correctly filling the questionnaires. Thus, the study analysed the data on only 278 responses of employees and suppliers of the factory, which resulted a sufficient percentage (94.9%) response rate. Hence, the data gathered were organized and analysed in a manner that enables to answer the basic research questions raised at the beginning of the study by SPSS version 26.

#### **4.2 Background information of the respondents**

The questionnaires were distributed with stratified random sampling method to the respondents who are eligibly available at Arjo Didessa Sugar Factory. The demographic characteristic consists of sex, age, educational background, experience, salary, and position of the employees. This aspect of the analysis deals with the personal data which is briefly described through the bar chart, pie chart and tables found below.



**Figure 4.1 Sex of the respondents**

The above pie-chart gives information on the composition of the respondents in terms of sex. The reason that the researcher included this part is for example, to make sure that respondents are in appropriate mix in terms of sex. As a result, the responses to the items in the instrument are also expected to be balanced. The survey showed that there were more males as compared to females. Male respondents represented 86.69%; on the other hand 13.31% were females. As a result, as the pie-chart indicates there is no balancing of sex in the study area.

**Table 4.1 Educational background of the respondents**

<b>Educational background</b>	Frequency	Percent	Valid Percent	Cumulative Percent
Certificate	23	8.3	8.3	8.3
Diploma	36	12.9	12.9	21.2
Degree and above	219	78.8	78.8	100.0
Total	278	100.0	100.0	

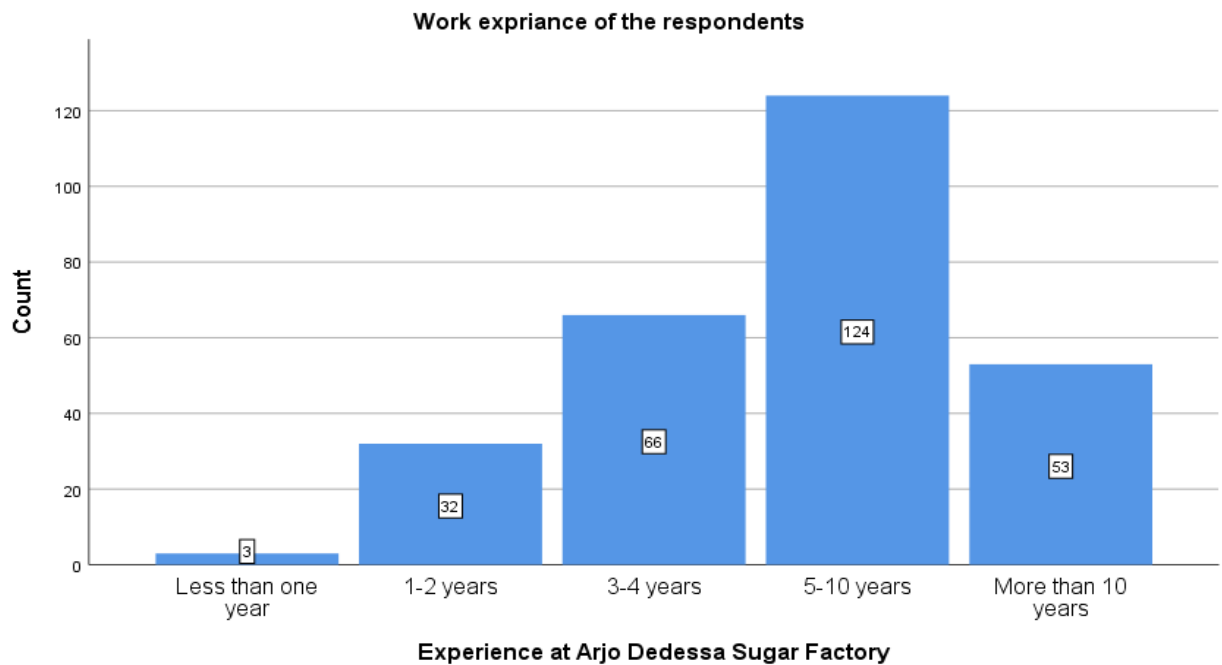
When it comes to the educational background of respondents, it is clearly understood from the above table 4.1 that about 8.3% of the respondents were certificate holder, 12.9% of the

respondents were diploma holder and 78.8% of the respondents were 1<sup>st</sup> degree holder and above. This indicates that most of the respondents can understand and evaluate the subject matters and its paramount important for the successful acquisition of the respondents' valuable judgment pertaining to the study area.

**Table 4.2 Age of the respondents**

Age	Frequency	Percent	Valid Percent	Cumulative Percent
18-34	83	29.9	29.9	29.9
35-49	76	27.3	27.3	57.2
50-64	84	30.2	30.2	87.4
above 64	35	12.6	12.6	100.0

A table 4.2 summarizes the respondent's age composition. Information on age might give a clue about respondents understanding level about the issues raised on the survey questionnaires. Most of the respondents are in the age range of 50-64 and it's also about 30.2% of the total sample size. The second largest portion was found to be the age category between 18- and 34 about 29.9% of total sample size.



**Figure 4.2 Work experiences of the respondents**

The above bar-chart gives information on the composition of the respondents in terms of work experience. As it can be easily observed on the above mentioned bar chart, about 124(44.6%) of the respondents had 5-10 years of experience followed by 3 to 4 years of experience. Minority of the respondents 3(1.1%) had less than one years of working experience.

**Table 4.3 Monthly Salary of the respondents**

Salary	Frequency	Percent	Valid Percent	Cumulative Percent
2,000-4,000 Birr	12	4.3	4.3	4.3
4,000-6,000 Birr	32	11.5	11.5	15.8
6,000-8,000 Birr	90	32.4	32.4	48.2
8,000-10,00 Birr	89	32.0	32.0	80.2
Above 10, 000 Birr	55	19.8	19.8	100.0
Total	278	100.0	100.0	

A table 4.3, deal with salary of the respondents and majority of the respondents 32.4% of them were earn a monthly salary of 6,000 to 8,000 ETB followed by 8,000 to 10,000 ETB. Minority of the respondents 4.3% were earn monthly salary of less than 4000 ETB.

### **4.3 Descriptive analysis**

In order to see the general perception of the respondents regarding the determinants of supply chain management performance at Arjo Dedessa Sugar Factory, the researcher has included the measures stated in the following tables and followed by analysis & interpretation supplemented using mean standard deviation, tables, percentage and frequencies.

The mean or average is a measure of central tendency that offers a general picture of the data without unnecessarily covering one with each of the observations in the data set. The mean of respondents in each question drawn by the researcher and mean dimensions of supply chain management performance suggest that the average amount that each dimension has positive or negative response of respondents. In this case, the mean of each item together with their respective dimension overall mean/average mean was calculated in order to conclude the overall supply chain management performance of Arjo Dedessa Sugar Factory. The mean statistical values of the items were based on the 5 point Likert scale and will be illustrated through the following assumptions: if the mean (M) score is below 2.5 it implies that the respondents“ disagree with the statement, if the mean score is found between 2.5 to 3.5 it indicates that the

respondents“ prefer to stay Neutral or moderate, and finally if the mean score is above 3.5 it implies that the respondents“ agree with the statement.

Accordingly, the mean scores have been computed for all the five supply chain management performance factors that includes supplier buyer relationship, information sharing, Human metrics, environmental factor and external supply chain and also the dependent variable determinants of supply chain management performance by equally weighting the mean scores of all the items under each dimension. The average mean result of each independent and dependent variables were separately presented, analysed and interpreted as follows.

#### 4.4. 1. Supplier buyer relationship

Supplier buyer relationship is a core dimension of supply chain management performance. The depict table 4.4 pinpoints the frequency, percentage standard deviation and mean value of each item related to Supplier buyer relationship with its aggregate average.

**Table 4.4 Supplier-buyer relationship**

No.	Item	S/Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	S/Agree (%)	Mean	Std.
1	The Factory consider quality as number one criterion in selecting supplier	7(2.5)	41(14.7)	43(15.5)	122(43.9)	65(23.4)	3.70	1.06
2	The Factory helps suppliers to improve their product quality	3(1.1)	28(10.1)	32(11.5)	136(48.9)	79(28.4)	3.93	.95
3	The Factory include key suppliers in planning and goal setting activities	2(.7)	55(19.8)	36(12.9)	149(48.9)	36(12.9)	3.63	1.01
4	We have continuous improvement programs that include our key suppliers	14(5.0)	23(8.3)	61(21.9)	147(52.9)	33(11.9)	3.58	.97

5	The Factory actively involves key suppliers in new product development processes	9(3.2)	58(20.9)	50(18.0)	129(46.4)	32(11.5)	3.42	1.04
<b>Aggregate average</b>							<b>3.48</b>	<b>.64</b>

As it can be seen in the above table 4.4, quality as number one criterion in selecting supplier, 122(43.9%) of the respondent agreed, 65(23.4%) of the respondents strongly agreed, and 43(15.5%) of the respondents were responded neutral. In contrary, the remaining 3(1.1%) and 28(10.1%) of the respondents were disagreed and strongly disagreed, respectively. Similarly, related to improving their product quality, 136(48.9%) of the respondent were respond agree, 79(28.4) of the respondents strongly agreed, and 28(10.1%) of the respondents were disagreed.

With regard to planning and goal setting activities, 149(48.9%) of the respondent were agreed, 36(12.9%) of the respondents agreed, and 55(19.8%) of the respondents were strongly disagreed. Furthermore from the table above improvement programs that include our key suppliers, 29.2% of the respondent strongly agreed, (38.8%) of the respondents agreed, and 48(22.6%) of the respondents were undecided. Regarding actively involves key suppliers in new product development processes, majority of the respondent were agreed 129(46.4%), whereas minority of them were strongly disagreed.

Based on the information provided in the study the overall feeling ( $M=3.48$ ) and ( $SD=0.64$ ) is that, almost all the respondents were agreed that supplier buyer relationship has an effect on supply chain performance. This result was supported by Wisner, (2003), he suggest that in supply chain management strategies, supplier relationship activities play an important role. Through close relationship supply chain partners are willing to share risks and reward, and maintain the relationship on long term basis (Cooper and Ellram, 1993). A long-term perspective between the buyer and supplier increase the intensity of firm-supplier integration (Toni and Nassimbeni 1999). Therefore the factory should focus on this construct for further improvement. A successful strategic alliance and integrated relationship with suppliers and buyers is very much needed. It should be revolved around trust, loyalty, positive sum game (a win-win relationship), cross-functional teams, achieving common goals and collaboration (Chandra and Kumar, 2000).

#### 4.4.2. External Supply Chain

External supply chain can increase efficiency both in terms of performance and timely delivery and it has a number of positive results: reducing entire supply chain costs, facility costs, and labor and transportation costs. This in turn will reduce the price of products and services and enhance volume of sales (Simchi-Levi *et al.* 2000).

**Table 4.5 Respondents opinion on External Supply Chain**

No.	Item	SD(%)	D(%)	N(%)	A(%)	SA(%)	Mean	Std.
1	The supply chain partner of the factory is afraid of what might happen if it leaves the supply chain relation ship	3(1.1)	54(19.4)	43(15.5)	141(50.7)	37(13.3)	3.55	.98
2	The supply chain partner of the factory works towards reputation of the Factory rather than profitability	5(1.8)	42(15.1)	49(17.6)	124(44.6)	58(20.9)	3.67	1.02
3	The supply chain partner of the Factory thinks that the factory these days move from alliance to alliance too often	2(.7)	33(11.9)	22(7.9)	171(61.5)	50(18.0)	3.84	.88
4	The Factory supply chain partner is ready for mutual investments on certain projects	10(3.6)	48(17.3)	40(14.4)	150(54.0)	29(10.4)	3.52	1.06
5	Factory supply chain partner feels like "part of the family" in this supply chain relationship	13(4.7)	75(27.0)	41(14.7)	117(42.1)	32(11.5)	3.28	1.12
6	Factory supply chain partner feels "emotionally attached "	4(1.4)	27(9.7)	41(14.7)	149(53.6)	57(20.5)	3.82	.91

	to this supply chain relationship							
7	The supply chain partner of the Factory shares risk with Factory.	7(2.5)	17(6.1)	47(16.9)	152(54.7)	55(19.8)	3.83	.90
8	The supply chain partner of the Factory believes that a factory must always be loyal to its supply chain relationship	19(6.8)	40(14.4)	76(27.3)	93(33.5)	50(18.0)	3.41	1.14
<b>Aggregate average</b>							<b>3.83</b>	<b>.67</b>

As it can be seen in the above table 4.5, about half of the respondents were agreed 141(50.7%) on supply chain partner of the factory while 54(19.4%) remained disagree and 43(15.5%) neutral with that belief. Majority of the respondents 124(44.6%) have agreed that the supply chain partner of the factory works towards reputation of the Factory rather than profitability, whereas 42(15.5%) were disagreed and 5(1.8%) were strongly disagreed with the statement. About 149(53.6%) of the respondents strongly agreed that factory supply chain partner feels "emotionally attached" to this supply chain relationship whereas 41(14.7%) remained neutral and 27(9.7%) of them were disagreed with the statement.

Table: 4.5 also showed the average respondents' level of agreement on external supply chain practice of their organizations. The external supply chain constructs scored (M=3.83 and SD= 0.67), which is above the average. The organization works towards achieving the common goal with their SC partner and the existence of alliance to alliance relationship and feeling were the neglected issues in the factory. The sense of belonging to this SC relationship, risk sharing on supply chain partner and readiness for mutual investments on certain project were also the other cases ignored by the factory.



#### 4.4.3. Human Metrics

Human Metrics is another core dimension of supply chain management performance. The depict table 4.6 pinpoints the frequency, percentage standard deviation and mean value of each item related to human metrics with its aggregate average.

**Table 4.6 Respondents opinion on Human Metrics**

No.	Item	SD(%)	D(%)	N(%)	A(%)	SA(%)	Mean	Std.
1	The degree of dealings between Factory and its supply chain partner is very high	5(1.8)	29(10.4)	74(26.6)	123(44.2)	47(16.9)	3.64	.94
2	The factory is powerful enough to ask its supply chain partner to readjust their Product and price strategy	9(3.2)	73(26.3)	69(24.8)	99(35.6)	28(10.1)	3.23	1.04
3	The supply chain partner of the Factory perceives that the factory is perfectly honest and truthful	12(4.3)	82(29.5)	71(25.5)	97(34.9)	16(5.8)	3.08	1.02
4	Factory willingly share all information that might help the supplier	11(4.0)	95(34.2)	74(26.6)	77(27.7)	21(7.6)	3.00	1.04
5	The supply chain partner of the Factory perceives that the factory is perfectly have high integrity	13(4.7)	83(29.9)	70(25.2)	91(32.7)	21(7.6)	3.08	1.05
6	The Factory provides training to support supply chain partner	9(3.2)	18(6.5)	46(16.5)	152(54.7)	53(19.1)	3.79	.93
7	The Factory would like to inform everything about new developments for the supply	11(4.0)	40(14.4)	84(30.2)	118(42.4)	25(9.0)	3.38	.97

	chain partner							
8	The supply chain partner and the Factory know the strength and weakness of each other very well	6(2.2)	31(11.2)	52(18.7)	152(54.7)	37(13.3)	3.65	.92
<b>Aggregate average</b>							<b>3.36</b>	<b>.73</b>

As shown in the above table 4.6, majority of the respondents were agreed 123(44.2%) on “the statement degree of dealings between factory and its supply chain partner is very high” while 29(10.4%) remained disagree and 74(26.6%) neutral with that belief. Similarly, more than half of the respondents were agreed on the statement “The Factory provides training to support supply chain partner”, whereas 18(6.5%) were disagreed and 46(16.5%) were neutral with the statement. About 152(54.7%) of the respondents agreed that the supply chain partner and the Factory know the strength and weakness of each other very well, whereas 52(18.7%) remained neutral and 31(11.2%) of them were disagreed with the statement.

Table 4.6 also depicts the average mean value with regard to the human metrics and the dimension scored an average value of (M=3.36 and SD=0.73) and the figures pointed out the agreement for the respondents towards the dimension. The human metrics has also a higher value (M=3.36) and this conditions significantly affecting the SCM effectiveness (Tony and Kelvin 2007) and SCM managers are a critical factor in achieving strategic and operational objectives and changes in the supply chain (Hoek *et al.* 2002). In addition, leadership management factors contribute to the effective business relationships of SCM. The result scored a low score for leadership management construct and the leadership management encompasses compatible culture/values, respects confidentiality, accepts responsibility, demonstrates positive management skills, positive attitude, makes decisions quickly, demonstrates ability to evolve, behaves professionally, engages in ethical practices, provides an atmosphere of continuous improvement and regularly reviews performance and capabilities (Meier *et al.* 2004).

#### 4.4.4. Environmental Factors

Environmental factor is another core dimension of supply chain management performance. The depict table 4.7 pinpoints the frequency, percentage standard deviation and mean value of each item related to human metrics with its aggregate average.

**Table 4.7: Respondents opinion on Environmental Factors**

No.	Item	SD(%)	D(%)	N(%)	A(%)	SA(%)	Mean	Std.
1	Customers' requirements regarding product features are difficult to forecast	10(3.6)	37(13.3)	57(20.5)	131(47.1)	43(15.5)	3.57	1.01
2	The Factory is affected by the infrastructure facilities provided by the government	6(2.2)	15(5.4)	60(21.6)	155(55.8)	42(15.1)	3.76	.85
3	Technology is changing significantly in our industry	8(2.9)	20(7.2)	71(25.5)	128(46.0)	51(18.3)	3.69	.94
4	Globalization has helped in Factory Performance		17(6.1)	25(9.0)	150(54.0)	86(30.9)	4.09	.79
5	Customers' needs are unpredictable and suppliers engineering level is unpredictable	1(.4)	5(1.8)	27(9.7)	74(26.6)	171(61.5)	4.47	.77
6	Competition is intensified in the industry		18(6.5)	59(21.2)	168(60.4)	33(11.9)	3.77	.73
7	Suppliers' delivery time can easily go Wrong	1(.4)	22(7.9)	27(9.7)	163(58.6)	65(23.4)	3.96	.82
8	Technological changes provide opportunities for enhancing competitive advantage in the industry	8(2.9)	19(6.8)	50(18.0)	142(51.1)	59(21.2)	3.80	.94
9	Improving technology generates new products	51.8	14(5.0)	32(11.5)	141(50.7)	86(30.9)	4.03	.88

	frequently in this industry							
10	Technological breakthrough results in many new product ideas in industry	1(.4)	31(11.2)	37(13.3)	167(60.1)	42(15.1)	3.78	.84
11	Suppliers' product quality is Unpredictable	2(.7)	14(5.0)	66(23.7)	130(46.8)	66(23.7)	3.87	.85
<b>Aggregate average</b>							<b>3.61</b>	<b>.71</b>

As it can be seen in the above table 4.7, customers' requirements regarding product features are difficult to forecast, 131(47.1%) of the respondent agreed, 43(15.5%) of the respondents strongly agreed, and 57(20.5%) of the respondents were responded neutral. In contrary, the remaining 37(13.3%) and 10(3.6%) of the respondents were disagreed and strongly disagreed, respectively. Similarly, related to infrastructure facilities provided by the government, 136(48.9%) of the respondent were respond agree, 155(55.8%) of the respondents agreed, and 60(21.6%) of the respondents were disagreed.

Regarding improving technology generates new products frequently, 163(58.6%) of the respondent were agreed, 65(23.4%) of the respondents strongly agreed, and 19(6.8%) of the respondents were disagreed. in this industry Regarding on the statement "suppliers' delivery time can easily go wrong", 163(58.6%) of the respondent were agreed, 65(23.4%) of the respondents strongly agreed, and 19(6.8%) of the respondents were disagreed.

Table 4.7 also depicts the average mean value with regard to the environmental factors and the dimension scored an average value of (M=3.61 and SD=0.71) and the figures pointed out the agreement for the respondents towards the dimension. The environmental factor constructs scored a value less than the average and this clearly indicated that the effects of globalization, technology and the growing need for environmental responsibility and sustainability is forcing organizations and individuals to make changes in the way of the factory towards environmental factors.

#### **4.4.5. Information Sharing**

Information sharing is another element of supply chain management performance. Table 4.8 depicts the mean value of information sharing. It seems surprising that, the respondents are under

complain due to the absence of informing trading partners in advance of changing needs and sharing proprietary information. Respondents also show their disagreements on existence of informing about issues that affect the business and sharing of business knowledge of core business processes by trading partners.

**Table 4.8: Respondents opinion on Information Sharing**

No.	Item	SD(%)	D(%)	N(%)	A(%)	SA(%)	Mean	Std.
1	Trading partners of the Factory share proprietary information with Factory	1(.4)	26(9.4)	40(14.4)	151(54.3)	60(21.6)	3.87	.86
2	The Factory inform trading partners in advance of changing needs	7(2.5)	17(6.1)	47(16.9)	154(55.4)	53(19.1)	3.82	.89
3	Factory and its trading partners keep each other about events or changes that may affect the other partners	20(7.2)	46(16.5)	75(27.0)	91(32.7)	46(16.5)	3.34	1.15
4	Factory and its trading partners exchange information that helps establishment of business planning	5(1.8)	31(11.2)	74(26.6)	122(43.9)	46(16.5)	3.62	.94
5	Trading partners of the Factory keep the Factory fully informed about issues that affect its business	5(1.8)	68(24.5)	73(26.3)	101(36.3)	31(11.2)	3.30	1.017
<b>Aggregate average</b>							<b>3.62</b>	<b>.75</b>

Table 4.8, majority of the respondents were agreed 123(44.2%) on the “statement degree of dealings between factory and its supply chain partner is very high” while 29(10.4%) remained disagree and 74(26.6%) neutral with that belief. Similarly, more than half of the respondents were agreed on the statement “The Factory provides training to support supply chain partner”, whereas 18(6.5%) were disagreed and 46(16.5%) were neutral with the statement. About 152(54.7%) of the respondents agreed that the supply chain partner and the factory know the

strength and weakness of each other very well, whereas 52(18.7%) remained neutral and 31(11.2%) of them were disagreed with the statement.

Table 4.8 also shows the average mean value with regard to the information sharing and the dimension scored an average value of (M=3.62 and SD=0.75) and the figures pointed out the agreement for the respondents towards the dimension. The above result clearly shows that there is a problem of information sharing in Arjo Dedessa Sugar Factory. But recent technological developments in information systems and technologies have the potential to facilitate the coordination among different functions, allowing the virtual integration of the entire supply chain. Therefore the factory should be practiced information technology and systems for reducing the time-lag between measuring the performance and applying them for any corrective actions. Low information transparency within the network, e.g. in inventory levels or planned customer demand, is a major weak point. It is generally agreed that a lack of information may be a 'killer criteria' in a customer oriented, competitive market (Simatupang and Sridharan 2002).

#### 4.4.6. Supply chain management performance

Table: 4.9 shows that the average mean of dependent dimensions is between 3.15 and 3.73, with standard deviation between 0.77 and 1.12, which indicate that there is an agreement in Arjo Dedessa Sugar Factory on implementation of the dependent dimensions. The dependent variable scored an average value of M=3.65 and SD=0.77.

**Table 4.9 Respondents opinion on Supply Chain management performance**

No.	Item	SD(%)	D(%)	N(%)	A(%)	SA(%)	Mean	Std.
1	The supply chain of the Factory is able to rapidly introduce large numbers of product improvements/variatio	11(4.0)	74(26.6)	80(28.8)	87(31.3)	26(9.4)	3.15	1.04
2	The Factory fills customer orders on time	20(7.2)	64(23.0)	71(25.5)	92(33.1)	31(11.2)	3.17	1.12
3	The Factory has fast customer response time	10(3.6)	28(10.1)	45(16.2)	139(50.0)	56(20.1)	3.73	1.01
4	Supply chain of the Factory is able to meet special customer	11(4.0)	40(14.4)	88(31.7)	115(41.4)	24(8.6)	3.36	.96

	specification							
5	The Factory has short order-to-delivery cycle time	6(2.2)	31(11.2)	52(18.7)	152(54.7)	37(13.3)	3.65	.92
6	There is a high level of integration of information systems in the Factory	9(3.2)	34(12.2)	55(19.8)	135(48.6)	45(16.2)	3.62	1.00
<b>Aggregate average</b>							<b>3.65</b>	<b>.77</b>

As shown in the above table 4.9, introduce large numbers of product improvements/variations, 87(31.3%) of the respondent agreed, 26(9.4%) of the respondents strongly agreed, and 80(28.8%) of the respondents were responded neutral. In contrary, the remaining 74(26.6%) and 11(4.0%) of the respondents were disagreed and strongly disagreed, respectively. Similarly, related to Factory fills customer orders on time, 92(33.1%) of the respondent were respond agree, 79(28.4) of the respondents strongly agreed, and 28(10.1%) of the respondents were disagreed.

With regard to fast customer response time, 139(50.0%) of the respondent were agreed, 36(12.9%) of the respondents agreed, and 55(19.8%) of the respondents were strongly disagreed. Furthermore from the table above short order-to-delivery cycle time, 29.2% of the respondent strongly agreed, (38.8%) of the respondents agreed, and 48(22.6%) of the respondents were undecided.

The analysis depicts that the respondents disagreed on the existence of activities to meet special customer specification and adjustment of capacity to accelerate or decelerate production in response to changes in customer demand. The respondents were also provided their disagreement on the issue of introduction of large numbers of product improvements and the level of communication and coordination between all functions.

#### **4.4. Relationship between determinants and Supply Chain Management Performance**

According to Wajahat (2010), before the start of regression analysis it is important to check the correlation test between dependent variable and independent variables. The Pearson correlation scale ranges from -1 to 1, any value greater than zero indicate a positive direct relationship between the two variables, which implies that every increase in the independent variable will

lead to increase the dependent variable, while any value less than zero indicate a negative indirect relationship between two variables, this means that every increase in the independent variable will lead to the decrease on the dependent variable (Hafiz, 2007). Different authors suggest different interpretations; However, (Saunders *et.al*, 2009) suggests about strength of relationship as:  $r = 0$  to  $0.39$  or  $0$  to  $-0.39$  small(weak) relationship,  $r = 0.4$  to  $0.69$  or  $-0.40$  to  $-0.69$  medium (moderate) relationship and  $0.70$  to  $1$  or  $-0.70$  to  $-1$  large (strong) relationship. The following table shows the relationship between each variable.

**Table 4.10: Relationship between determinants and Supply Chain Management Performance**

		Supplier-Buyer Relations	External Supply Chain	Human Metrics	Environmental Factors	Information Sharing	Supply Chain management performance
Supplier-Buyer Relations	Pearson Correlation	1	.135*	.148*	.042	.026	.172**
	Sig. (2-tailed)		.024	.014	.488	.660	.004
External Supply Chain	Pearson Correlation	.135*	1	.830**	.678**	.226**	.754**
	Sig. (2-tailed)	.024		.000	.000	.000	.000
Human Metrics	Pearson Correlation	.148*	.830**	1	.567**	.157**	.633
	Sig. (2-tailed)	.014	.000		.000	.009	.060
Environmental Factors	Pearson Correlation	.042	.678**	.567**	1	.238**	.605**
	Sig. (2-tailed)	.488	.000	.000		.000	.000
Information Sharing	Pearson Correlation	.026	.226**	.157**	.238**	1	.286**
	Sig. (2-tailed)	.660	.000	.009	.000		.000
Supply Chain management performance	Pearson Correlation	.172**	.754**	.133	.605**	.286**	1
	Sig. (2-tailed)	.004	.000	.061	.000	.000	

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The table 4.10 above explains the relationship between the independent variable and supply chain management performance. Based on the output of the correlation matrix; External supply chain(  $r=0.754$ ,  $p<0.05=$ ) has a strong relationship with supply chain management performance. Supplier-buyer relations ( $r=0.172$ ,  $p<0.05=$ ), and Information sharing (  $r=0.286$ ,  $p<0.05$ ) have a weak relationship with supply chain management performance. Environmental factors (  $r=0.605$ ,  $p<0.05=$ ), has moderate positive relationship with supply chain management performance. But Human Metrics ( $r=0.133$ ,  $p>0.05=$ ) has no relationship with supply chain management performance.



In general this result show, Supplier-Buyer relations, External supply chain, Environmental Factors, and Information sharing have a positive effect on supply chain management performance, but human metrics have no effect on supply chain management performance at Arjo Didessa Sugar Factory.

#### **4.5 Determinants of supply chain management performance using multiple linear regressions**

##### **4.5.1 .Assumption tests**

Testing assumption of multiple linear regression analysis models is very important before running regression analysis. So each assumption results were discussed in the following sub topics. In the previous section of this paper the descriptive and correlation analysis was carried out separately with the existence of association between the dependent and independent variables with the intension of investigate the determinants of supply chain management performance, in the case of Arjo-Didessa Sugar Factory. However, identification of these factors is not enough for meaningful conclusion. Therefore, the determinant of each independent variable must be assessed and identified sequentially. The researcher used multiple linear regression models assumptions as follow.

##### **4.5.1.1. Multi-collinearity Test between independent variables**

According to Gujarati (2003) Multicollinearity tests helps identify the high correlation between explanatory variables and to avoid double effect of independent variable from the model. When independent variables are multicollinear there is overlap or sharing of predictive power. Predictor variable should be strongly related to dependent variable but not strongly related to each other. This may lead to the paradoxical effect, whereby the regression model fits the data well but, none of the explanatory variables (individually has a significant impact in predicting the dependent variable. For this purpose, variance inflation factor (VIF) and tolerance test were used to check Multicollinearity for variables if the value of VIF is less than 10 there is no Multicollinearity and on the other hand if VIF greater than or equal to 10 there is a serious Multicollinearity problem.

According to Gujarati, (2003) to avoid serious problem of Multicollinearity omitting the variable with 10 and more from the analysis, in addition tolerance is an indicator how much of the variability of independent variable is not explained by the other independent variable in the

model and is calculated using the formula  $1 - R^2$  for each variable. If the value is very small (less 0.1), it shows the multiple correlation with other variable is high.

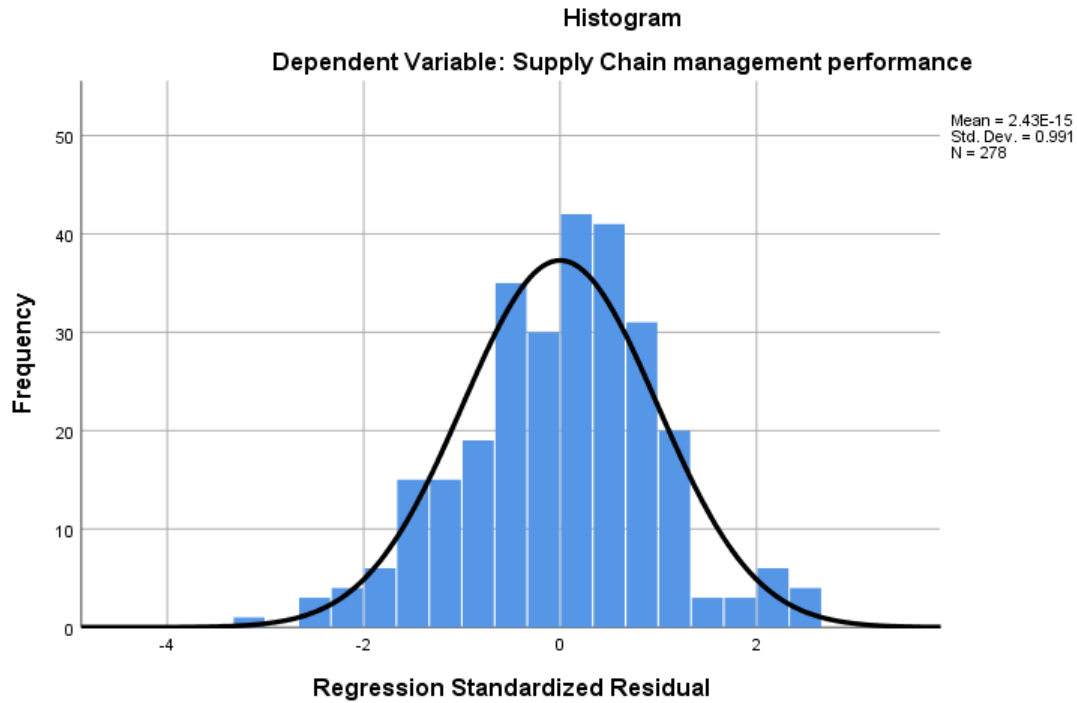
**Table 4.11: Multicollinearity Test between independent variables**

<b>Independent variables</b>	<b>Tolerance</b>	<b>VIF</b>
Supplier-Buyer Relations (SBR)	.973	1.028
External Supply Chain (ESC)	.245	4.085
Human Metrics (HM)	.309	3.239
Environmental Factors (EF)	.531	1.885
Information Sharing (IS)	.932	1.073

Table 4.11 shows the division result that the value of VIF all variables were by far less than 10 and the value of tolerance statistics being above 0.1 they were accepted entered in to regression model for the estimation of variables.

#### **4.5.1.2 Normality test**

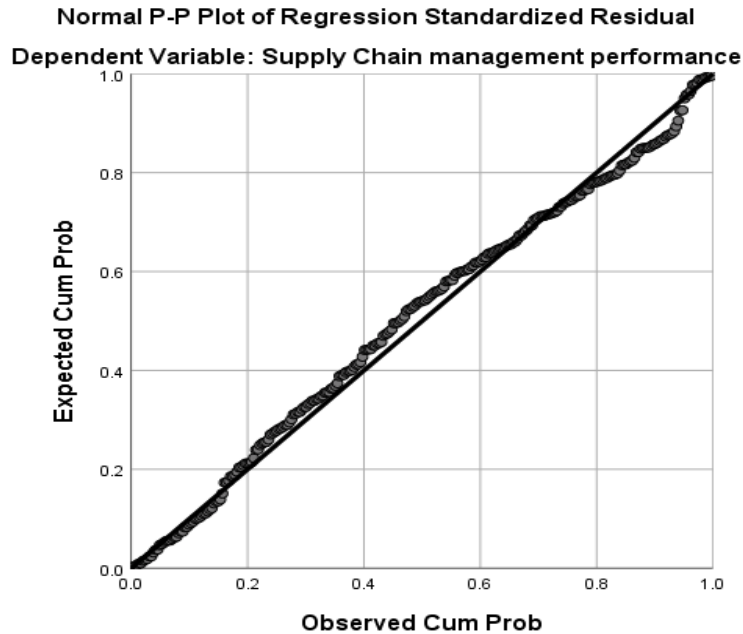
Normality assumption is around the mean of the residuals is zero and used to determine whether a data set is well modeled by a normal distribution or not and also to indicate un underlying random variable is to be normally distributed (Gujarati.2009). There the researcher was used histogram methods of testing the normality of the data. If the residuals are normally distributed about its mean of zero, the shape of histogram should be a bell-shaped and regression standardized residual plotted between -3.3 and 3.3. From the figure below data normality can be indicated.



**Figure 4.4: Histogram regression standardized residual**

#### 4.5.1.3 Linearity Test

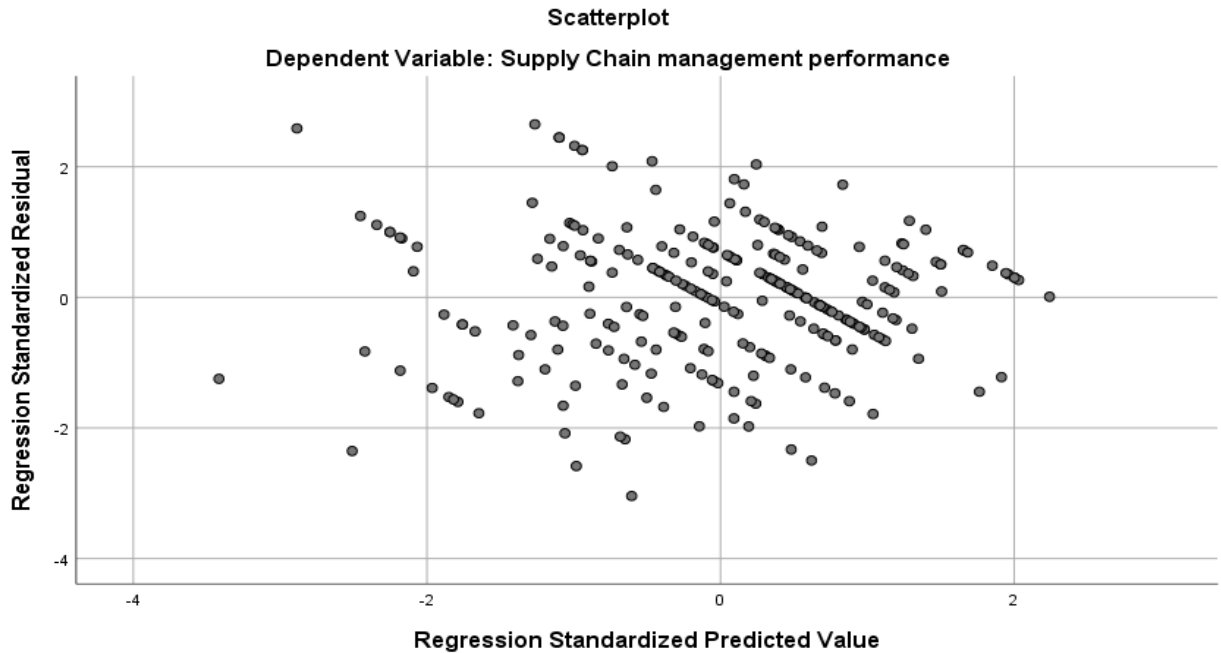
Linearity is used to check whether all the estimates of regression including regression coefficients, standard errors and tests of statistical significance are biased or not (Keith, 2006). To check the linearity assumption in multiple linear regressions the normal P-P plot was used, the plot shows all observed values somewhat spread along the straight diagonal line. Figure 4.5 in below shows us most of the observed values are spread very close to the straight line; there is high likelihood that the data are normally distributed and linear.



**Figure 4.5: p-p plot; Linearity test results**

#### **4.5.1.4 .Heteroscedasticity test**

Heteroscedasticity is the equality or violation of the residuals for every set of values for independent variable. So the researchers assume that errors are spread out constantly between the variables. Heteroscedasticity problem exist when scatter plot is greater than 3.3 and less than -3.3. Therefore, as it was indicated in figure 4.6 below the data did not violate Heteroscedasticity assumption and instead it was homoscedastic.



**Figure 4.6: Scatter plot Heteroscedasticity test result**

After the model assumption was checked presentation and interpretation of the analysis output is mandatory. The prediction or estimation of the value one variable (the dependent or the predicted variable; called as Y from one or more independent or predictor variables (called as X) (Keith, 2006).

**Table 4.12 Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.776 <sup>a</sup>	.602	.594	.49081	1.648

From table 4.12 it can be seen that R value is 0.776. Consequently, R value designates that there is a strong positive relationship between independent and dependent variable. The adjusted R squared of 0.594 indicates that 59.4% of the variances in supply chain management performance can be explained by the independent variables. The remaining variances on the dependent variable could be explained by other explanatory variables not included in this study.

**Table 4.13 ANOVA**

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	99.023	5	19.805	82.211	.000 <sup>b</sup>
Residual	65.524	272	.241		
Total	164.547	277			

From table 4.13, it is apparent that the regression model was significant using ‘between the independent variable and supply chain management performance. An F statistic of 82.21 and a probability value of 0.000 clearly indicate that the model was significant or good fit.

**Table 4.14 Standardize and unstandardized coefficient**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% CI for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
	(Constant)	-.176	.251				-.700
Supplier-Buyer Relations	.095	.046	.080	2.06	.040*	.004	.186
External Supply Chain	.635	.084	.587	7.59	.000*	.470	.799
Human Metrics	.025	.072	.024	.344	.731	-.117	.166
Environmental Factors	.188	.060	.165	3.13	.002*	.070	.305
Information Sharing	.111	.041	.108	2.72	.007*	.031	.191

\* Significant p<.05%,

In this study, four explanatory variables were identified to determine a significant difference on supply chain management performance at 5% level of significance.

The estimated regression model was

$$\text{SCM Performance} = -0.176 + 0.095 \text{ Supplier-Buyer Relations} + 0.635 \text{ External Supply Chain} + 0.188 \text{ Environmental Factors} + 0.111 \text{ Information Sharing} + \varepsilon_i$$

Hence, the coefficient explains the average amount of change in dependent variable that is caused by a unit of change in the independent variable. Accordingly, the unstandardized beta coefficients ( $\beta$ ) tell us the unique contribution of each factor to the model. A small p value (<0.05) indicate the predictor variable has made a statistically significance contribution to the model.

The largest beta coefficient was 0.635, which was for External Supply Chain. This means that this variable makes the strongest unique contribution of 63.5% to explain the supply chain

management performance, when the variance explained by all other variables in the model was controlled. The Beta value for environmental Factors and information Sharing was resulted in beta coefficient of 0.188 and 0.111, respectively, indicating that independently they made the second and third higher contribution for supply chain management performance to explain it with 18.8% and 11.1% respectively, keeping other variables constant for each. A supplier-Buyer relation has a beta value of 0.095; this means that Supplier-Buyer relations have the least contribution for the supply chain management performance. In general information sharing, external supply chain, environmental factor, and supplier-buyer relations have a positive effect on supply chain management performance at Arjo Didessa Sugar Factory.

Different research indicated that supplier-buyer relationship practices and information sharing can contribute to the organizational success in supply chain management practices efforts as well as its performance (Scott and Westbrook 1991; Ellram 1991 and Turner 1993). Previous research found that collaborative relationship between customer and supplier has positive significant influence to SCM performance improvement (Fearne and Hughes 1999; Humphreys *et al.* 2001 and Ounnar *et al.* 2007).

In supply chain management strategies, supplier-buyer relationship and external supply chain activities play an important role (Wisner, 2003). A successful strategic alliance and integrated relationship with suppliers and buyers is very much needed. A firm's success is linked to the strength of its relationship with supply chain partners and it could reduce and increase revenue (Spekman, Kamauff and Myhr, 1998). Information sharing pertaining to key performance metric and process data improves the supply chain visibility thus enabling effective decision making. Information shared in a supply chain is of use only if it is relevant, accurate, timely, and reliable (Simatupang and Sridharan, 2005;T hatte, 2007).

# **CHAPTER FIVE**

## **CONCLUSION AND RECOMMENDATION**

### **5.1. INTRODUCTION**

This chapter provides the summary of major findings, conclusions and recommendation of the study.

### **5.2. Summary of the Major findings**

In this study, the researcher looked for the determinants of supply chain management performance in case of Arjo Dedessa Sugar Factory. The study also illustrated the relationship that exists between the supply chain management performance and factors affecting dimensions and also along the dimensions of determinants of supply chain management performance with the intent of knowing the strength of the relationship of the dimensions in this particular case. In order to achieve these objectives, data were collected from the employees and suppliers of the factory in quantitative of descriptive approach and also used regression analysis.

The demographic characteristic consists of sex, age, educational background, experience, salary, and position of the employees. From the demographic characteristics of respondents male were 86.69%; and the remaining 13.31% were female respondents. In relation to their qualification level, the respondents had a minimum of certificate holder in which we can infer that it is stacked with educated employees. Finally, when we came to the work experience of the respondents, they had adequate exposure to the work area and had a potential of bringing change to the enterprise which reasonably increase the validity (as a whole the quality) of this research.

The analysis result depicts that the mean score values for supplier buyer relation (3.48), human metrics (3.36), and external supply chain (3.83), environmental Factors (3.61) and information sharing (3.62) dimensions were above the average mean value, which really indicates the agreement of the respondents towards independent variables. The study also found a positive correlation among the five (supplier buyer relation, human metrics, external supply chain, environmental factor and information sharing) supply chain managements performance determinants.



Under this study, the major determining factors of supply chain management performance identified based on the response of employees were Supplier Buyer relation (B=0.095), external supply chain (B=0.635), Human Metrics (B=0.025), Environmental Factors (B=0.188), Information sharing (B=0.111). These values showed that supplier buyer relation, external supply chain, information sharing and environmental factor have a positive effect on supply chain management performance.

### **5.3. Conclusions**

Five determinants of supply chain management performance were developed and addressed in this research and unfortunately all the dimensions were rated above the average mean value. In other words, it shows big emphasis was given towards the determinants factors in the factory.

Although, the result of correlation coefficient between each independent variable and dependent variable shown a significant positive relationship, the findings of regression coefficient showed that supplier buyer relation, external supply chain, environmental factors, and information sharing were significant to affect supply chain management performance. Thus, it can be concluded that the performance of supply chain management in Arjo Dedessa Sugar Factory does positively influenced by their supplier buyer relation, external supply chain, environmental factors, and information sharing.

The results given on the conclusion entails us that the practice of the five determinants developed in this study were considerably rated high by the employees which actually indicates the determinants factors are at the required level of its employees. All the independent variables in the study influenced supply chain management performance at 59.4% with the highest influence are the external supply chain and the least being supplier-buyer relations and environmental factors.

### **5.4. Recommendation**

By relying on the study findings, the researcher suggests the following points as credible recommendations to the problem.

- To improve the supply chain management performance, the researchers recommend that supply chain company recommendable very good relationships with customer by they have to share orders status with customers during product manufacturing. They better uses information technology well to exchange information with suppliers, and the Arjo Dedessa Sugar Factory advisable have access to inventory levels of their supply chain activities.
- Understanding of determinants of supply chain management performance with in the factory is a primary activity in any organization. To Arjo Dedessa Sugar factory advisable to give a critical emphasis on environmental factors and other relates factors to improve the supply chain management performance.
- In order to improve the supply chain management performance, the factory needs to create a long-term strategic supplier-buyer relation. So the factory recommendable first classify effectively the goods and services being procured based on strategic significance, then it recommendable create long supplier-buyer relationship for items which have high value and high importance in all the factory and Arjo Dedessa Sugar Factory with the right suppliers.
- The factory recommendable strengthens their supply chain management by putting greater effort to the implementation of some key best practices. Specifically, external supply chain and information sharing to improve the supply chain management performance in Arjo Dedessa Sugar Factory.
- In Arjo Dedessa Sugar Factory Providing skill development training, based on need assessment, both for management and employees for all in need of it.
- Future researches advisable also conduct a study that will focus on all sugar factories located in the country. Such study will have a significant contribution for policy and decision making in the sugar sector.

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## Appendices

**Jimma University**  
**College of Business and Economics**  
**Department of Management**  
**Program: Logistics and Supply Chain Management**  
**Post Graduate Program**

**Subject: Request for response for the research questions**

Dear Sir/Madam,

I am conducting Thesis research entitled “The determinants of supply chain management performance: the case of Arjo Dedessa Sugar Factory” for partial fulfillment of the Degree of Masters in logistics and supply chain management at Jumma University College of Business and Economics. To make the research work realistic it needs response from the respondent.

Therefore, I kindly request you a few minutes of your time to answer the research questions in regard to practices in your organization. All the information provided will be purely used for academic purposes and your identity will be treated with utmost confidentiality. Your assistance will be highly appreciated and thank you in advance. Yours faithfully,

Fekadu Tamiru  
Master’s Degree Candidate  
In Logistics and Supply Chain Management  
College of Business and Economics, Jimma University  
Email: fikadutamiru2019@gmail.com

## General Instructions

- ❖ No need of writing your name.
- ❖ For Likert scale type statements or questions indicate your answers with a check mark (X) in the appropriate block
- ❖ For the multiple choice questions please encircle on the letter of your choice
- ❖ For the last part (part III) write your answer on the blank spaces provided.

## Part I: Background Information (Socio-demographic characteristics)

1. Age of the respondent
  - a. 18-34
  - b. 35-49
  - c. 50-64
  - d. above 64
2. Sex
  - a. Male
  - b. Female
3. Educational level
  - a. Below grade 10/12
  - b. Grade 10/12 complete
  - c. Certificate
  - d. Diploma
  - e. degree and above
4. Experience at Arjo Dedessa Sugar Factory
  - a. Less than one year
  - b. 1-2 years
  - c. 3-4 years
  - d. 5-10 years
  - e. More than 10 years
5. Salary
  - a. 1,000-2,000 Birr
  - b. 2,000-4,000 Birr
  - c. 4,000-6,000 Birr
  - d. 6,000-8,000 Birr
  - e. 8,000-10,00 Birr
  - f. Above 10,000 Birr
6. Current Position
  - a. Managerial (Forman & Above)
  - b. Non Managerial (Below Forman)
  - c. Others

**Part II: Supply Chain Management Performance**

Please indicate the supply chain management performance by the scale give 1-5 given below

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

**Please indicate the extent of Supplier-Buyer Relations**

	<b>Supplier-Buyer Relations</b>	1	2	3	4	5
1	The Factory consider quality as number one criterion in selecting supplier					
2	The Factory helps suppliers to improve their product quality					
3	The Factory include key suppliers in planning and goal setting activities					
4	We have continuous improvement programs that include our key suppliers The Factory have continuous improvement programs with key suppliers					
5	The Factory actively involves key suppliers in new product development processes					

**Please indicate the extent of External Supply Chain**

	<b>External Supply Chain</b>	1	2	3	4	5
1	The supply chain partner of the Factory is afraid of what might happen if it leaves the supply chain relation ship					
2	The supply chain partner of the Factory works towards reputation of the Factory rather than profitability					
3	The supply chain partner of the Factory thinks that the factory these days move from alliance to alliance too often					
4	The Factory supply chain partner is ready for mutual investments on certain projects					
5	Factory supply chain partner feels like "part of the family" in this supply chain relationship					
6	Factory supply chain partner feels "emotionally attached " to this supply chain relationship					
7	The supply chain partner of the Factory shares risk with Factory.					
8	The supply chain partner of the Factory believes that a factory must always be loyal to its supply chain relationship					

### Human Metrics

	Human Metrics	1	2	3	4	5
1	The degree of dealings between Factory and its supply chain partner is very high					
2	The factory is powerful enough to ask its supply chain partner to readjust their Product and price strategy					
3	The supply chain partner of the Factory perceives that the factory is perfectly honest and truthful					
4	Factory willingly share all information that might help the supplier make better decisions					
5	The supply chain partner of the Factory perceives that the factory is perfectly have high integrity					
6	The Factory provides training to support supply chain partner					
7	The Factory would like to inform everything about new developments for the supply chain partner					
8	The supply chain partner and the Factory know the strength and weakness of each other very well					

### Environmental Factory

	Environmental Factors	1	2	3	4	5
1	Customers' requirements regarding product features are difficult to forecast					
2	The Factory is affected by the infrastructure facilities provided by the government					
3	Technology is changing significantly in our industry					
4	Globalization has helped in Factory Performance					
5	Customers' needs are unpredictable and suppliers engineering level is unpredictable					
6	Competition is intensified in the industry					
7	Suppliers' delivery time can easily go Wrong					
8	Technological changes provide opportunities for enhancing competitive advantage in the industry					
9	Improving technology generates new products frequently in this industry					
10	Technological breakthrough results in many new product ideas in industry					
11	Suppliers' product quality is Unpredictable					

### Information Sharing

	Information Sharing	1	2	3	4	5
1	Trading partners of the Factory share proprietary information with Factory					
2	The Factory inform trading partners in advance of changing needs					
3	Factory and its trading partners keep each other about events or changes that may affect the other partners					
4	Factory and its trading partners exchange information that helps establishment of business planning					
5	Trading partners of the Factory keep the Factory fully informed about issues that affect its business					

### Supply Chain management performance

	Supply Chain management performance	1	2	3	4	5
1	The supply chain of the Factory is able to rapidly introduce large numbers of product improvements/variations					
2	The Factory fills customer orders on time					
3	The Factory has fast customer response time					
4	Supply chain of the Factory is able to meet special customer specification					
5	The Factory has short order-to-delivery cycle time					
6	There is a high level of integration of information systems in the Factory					

