



**School of Commerce**

COLLEGE OF BUSINESS AND ECONOMICS SCHOOL OF COMMERCE  
DEPARTMENTS OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

A MASTER THESIS

On

**THE EFFECT OF SUPPLY CHAIN INTEGRATION ON THE  
PERFORMANCE OF CONSTRUCTION MATERIALS  
PRODUCERS IN ADDIS ABABA HOUSING PROJECT: IN  
THE CASE OF THERMO SITE PRODUCERS**

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**A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY COLLEGE  
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AND SUPPLY CHAIN MANAGEMENT**

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## **Declaration**

I declare that this research paper entitled “The Effect of Supply Chain Integration on the Performance of Construction Materials Producers in Addis Ababa Housing Project: in the Case of Thermo Site Producers” is my original work in partial fulfillment of A degree for Master in Art of Logistics and Supply Chain Management form Addis Ababa University College of Business And Economics School of Commerce Department of Logistics and Supply Chain Management. All the sources of materials used in this study have been appropriately acknowledged.

Declared by:- Ayele Lashetew

Signature: \_\_\_\_\_

Date of Submission: \_\_\_\_\_



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## **Conformation**

This is to certify that Ayele Lashetew carried out his own work on entitled “The Effect of Supply Chain Integration on the Performance of Construction Materials Producers in Addis Ababa Housing Project: In The Case Of Thermo Site Producers” under my supervision. This work is original in nature and not be presented in any University for the partial fulfillments of degree for the Masters of Art in Logistics and supply chain management.

Dr. Mengistu Bogale (Ph.D)

Signature:-\_\_\_\_\_

Date:-\_\_\_\_\_

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## **ACRONYMS**

**SCI** - Supply Chain Integration

**SCM** –Supply Chain management

**SME** - Small and Micro Enterprises

**AAMSEDA**- Addis Ababa Micro and Small Enterprise Development Agency

**SCP**- Supply Chain Performance

**INFI**-Information Integration

**INI**- Internal Integration

**COL**- Collaboration

**QOP**- Quality of Product

**LTP**- Lead time of Production

## **Abstract**

*The purpose of this study was to analyze the supply chain integration factors on the performance of the construction material producers with the supply of Addis Ababa housing project. The supply chain integration concepts were summarized on the information integration, internal integration, collaboration, quality of product and lead time of production. By considering these concepts the researcher performed the study of supply chain integration on the performance of production of construction materials in SME in thermo site project. The study uses descriptive and explanatory research designs as well as quantitative research approach were engaged in conducting the study. The study used the sampling techniques of stratified random sampling and from the total population size of one hundred eighty eight enterprises on the site. The researcher used the sample of one hundred twenty eight enterprises which represent the seventy two for construction and fifty six for manufacturing enterprises. From the total of 128 questionnaire distributed to the enterprise 122 was filling and returned. By using SPSS software the supply chain performance expressed by mean and standard deviation as well as correlation and regression analysis was made. The result of the study showed there is a high correlation between all variables and the relationship between the dependent and independent variable was positive except that of lead time of production. With this result the researcher conclude that information sharing, internal integration and quality of product have positive and significant effect on the supply chain performance but collaboration and lead time of production have positive effect on the performance of construction material producers rather not significant roll. Based on the findings the following issues are recommended enterprises and housing project built simple computerized mechanizes like telegram, What's-App mobile application in order to effective information sharing. More over future studies will consider other variables not included in this research as well as all enterprises found in the city.*

**Keywords:** *Supply chain performance, internal integration, information sharing, quality of product, lead time production.*

# **CHAPTER ONE**

## **INTRODUCTION**

The researcher interested in the supply chain integration concepts on the firm's integration and its effects. With this study small and micro enterprises integration with Addis Ababa housing project was evaluate the collaboration, internal integration, information integration quality of product and lead time of production was analyze.

### **1.1 Background of the Study**

A supply chain is a collection of integrated processes, by which raw materials are manufactured into final products and delivered to customers, through warehousing, distribution activities, retailing and so on (Cooper et al., 1997). Moreover, supply chain integration (SCI) is expressed with a situation where members along the supply chain collaborate and work together for a better performance and profitability while meeting the demands of the customer. More precisely performance measurement is crucial for supply chain management that means the process of managing the processes of planning, coordinating and controlling the movement of materials, parts and products across the supply chain, from the suppliers to the final customers (Simchi-Levi et al., 2008). Firms integrating their information and material flow would lead to the best management of the supply chain (Samaranayake P., 2005). Moreover, it involves the alignment of business functions internally within a firm and with its supply chains partners to reduce costs, increase customer value as well as overall performance across the supply chain for all partners (Stank et.al, 2001). Supply chain integration articulated as close alignment and coordination within a supply chain. The concept of supply chain refers to everything required to produce a product from raw materials, to manufacturing, shipping and supporting services. There are several levels of integration. The context of integrated supply chain is explained in multi-firm relationship management within a framework expressed by capacity limitations, information, core competencies, capital, and human resource constraints (Donald J. et.al, 2002,). Research suggests that relationship between supply chain partners and manufacturers needs for an intimate collaboration for a long time in order to achieve best supply chain integration (A. Subburaj et al., 2020).

According to Flynn et al. (2010), operational performance and business performance are the two widely used measures of firm performance. Following these studies, this research considers operational performance key aspect of measuring performance. According to this idea one of the most important factors improving SME operation is implementing supply chain management practices that will translate to enterprises operational performance.

Shortage of housing in Addis Ababa city is one of the major problems that call for immediate action. Moreover houses in Ethiopia are below qualitative standard and lack sufficient space which is extent of prerequisite for water supply, electricity, and drainage is also very minimal (Guseh D. 2017). In Ethiopian case the small and micro enterprises sector be identified as a tool in bringing about economic transition by efficiently using the skill and talent of the people without requesting high-level training, much capital and sophisticated technology, (Wolde & Geta, 2015). The sector is also expressed as the national home of entrepreneurship, they are the primary vehicles by which new entrepreneurs provide the economy with a continuous supply of ideas, skills, and innovations, (Katua, 2014).

The importance of SMEs reflects the need to contribution employment, improve economic growth, and generate additional capital for large-scale operations in fewer developed countries (Hailey, 1987). Other argues that SMEs contribute to self-sustained growth and development of nations (Muma, 2002). In recently years, factors such as privatization, specialization, corporate restructuring and downsizing have additionally encouraged in the growth of such enterprises (Solymossy and Penna, 2000). Moreover, the development of SME is seen as accelerating the achievement of wider countries. In Ethiopia, SMEs are the second largest employer next to agriculture. A study conducted in 2016/2017(2009E.C) by (CSA) revealed that 3,627 SMEs had crated employment opportunities for about 293,058 citizens (FDRE, 2011), other report from FEMSEDA in the year 2014 addressed that there were 8,593 micro enterprise and 10,061 small scale enterprises in Addis Ababa which are occupied in different business activities (Sisay, 2019). Moreover it is highly recognized that small-scale businesses have crucial role in economic development and in general industrial development particular.

## **1.2 Statement of the Problem**

There are constraints in the whole supply chain which critically affects operational performance of an organization such as longer lead times, supply disruptions caused by global customs, foreign regulations and port congestion, political and/or economic instability in a source country, and changes in economics such as exchange rates which in turn leads to increasing cost of product, reduces speed of delivery of product and flexibility of the company. More generally globally the operational problems of wholesale business is expressed through: Lack of guidelines for creating alliances with supply chain partners; Failure to develop measure for monitoring alliances; Failure to broaden the supply chain vision beyond procurement or product distribution to encompass larger business processes; Failure to integrate the company's internal procedures; Lack of trust inside and outside a company; organizational resistance to the concept; Lack of integrated information systems and electronic commerce linking firms (Fernie&Sparks,2014).

The main objectives of supply chain integration are to improve efficiency and reduce redundancy while also enhancing product availability. Moreover supply chain integration strives to connect better demand with supply which leads both improve customer service and lower costs. (Tagay and Lamesgin, 2019).

The major challenges of producing construction material producers in thermo site project are inefficiency on the material flow between enterprises and Addis Ababa housing. Accordingly, based on the pre assessment conducted in SMEs in thermo site construction material producers problems related to operational performance include lack of departmental integration between Addis Ababa housing and the enterprise. The enterprises interrupt their work due to lack of materials as Addis Ababa housing project delay the supply of raw materials on time. Materials are not deliver as needed by the enterprises which leads to the enterprise order extra quantity. Check and balance were not done with a specific period of time. Products not deliver with proper schedule of production. This study was assessed by the supply chain integration of raw material suppliers of Addis Ababa housing project with SME in thermo site producers. These producers faced the challenges of these concepts of supply chain integration. After

reviewing the concepts and underlying variables from each article, a conceptual framework is consist of mainly five SCI concepts is develop for this study, information integration, collaboration, internal integration, quality of product and lead time of production answers the supply chain performance gap in the enterprises.

### **1.3 Research Question**

1. What are the effects of information sharing implies on the performance of construction materials producers of SME and Addis Ababa housing projects?
2. What are the roles of internal integration on the performance of production of construction materials?
3. How does the collaboration affect the performance of construction materials producers of SME?
4. What are the supply chain integration factors affecting the quality of product?
5. How do measure a delay on the production of construction material on the enterprises?
6. What are the factors affecting supply chain performance in the enterprise?

### **1.4 Research Objectives**

#### **1.4.1 General Objectives**

The main objective of this study is to consider the supply chain integration factors on the performance of the construction material producers with the supply of Addis Ababa housing project.

#### **1.4.2 Specific Objectives of the Study**

1. To evaluate the role of information integration among the supply chain participants on the performance of small and micro enterprises in thermo site project and Addis Ababa housing project.
2. The role of material flow on the overall internal integration on the performance of construction material producers in the case of SME in thermo site project.
3. The role of collaboration on the performance of construction materials producers in SME.

4. To evaluate the performance of supply chain integration with in time limits of production of construction material in thermo site.
5. To determine the supply chain integration factors of affecting quality of product.
6. To determine the supply chain performance factors in the enterprise

### **1.5 The significance of the study**

Findings from this study will be used as input for enterprises of construction materials producers, Addis Ababa housing project for checking their supply chain integration with SMEs. Policy makers in order to revises police between with the activities done between two parties with respect to supply chain integration was efficient or not. The employees of the enterprise as well as the Addis Ababa housing project managers who will participate in supply chain integration to do their job in efficient manner. Further the researchers who have an idea of doing research on the area indicate some information on the field. More over the academicians also will engage to do more studies on the supply chain integration concepts of construction material producers.

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

The topic covers the issues of information integration, internal integration, and collaboration, quality of product and lead time of production on the operational performance and doesn't include other performance measurements like of profitability. The study covers the small and micro enterprise workers who are directly involved in the supply chain integration process (general managers, procurement, warehouse production) it exclude other workers who have no direct contacts with the chain in the enterprises. The geographical scope of the study cove Addis Ababa city administration Akaki kality sub-city woreda 07 because the enterprises establish and found in this place.

### **1.7 Limitation of the Study**

There are service providers or building contractors, household equipments producers and other types of activities are done in the site the researcher is interested in doing of the only construction material producers were consider in this research. Since the concept of supply chain is vast the research limited with the specified variables.

## **1.8. Definition of Terms**

SME established to reduce un-employment rate of the country as well as considered as spring board for broad-based growth and enhance competition and entrepreneurship, and hence have external benefits in terms of economy-wide efficiency, innovation, and aggregate productivity expansion.

Addis Ababa housing project established with the mission of reducing house shortage in Addis Ababa city by advancement of integrated system that involves contractors, counselors, small and micro enterprises, as well as strengthens construction industry by using vast labor power, build up condominium houses and make the residents house owners through reasonable distribution.

**Utilization:-** is a capacity that “the quantity can be produced” from a separate manufacturing perspective, we can define capacity as “ the maximum number of parts that can be manufactured”. Capacity is basically a part-based metric.

**Flexibility:-** covers the system’s skill to be changed to produce new product types, and ability to change the order of operations executed on a part.

## **1.9 Organization of the Study**

This paper was organized in to five chapters, the first chapter deals with introduction part reflecting on the background of study, statement of the problem, research question, and objectives of the study, significance, scope and limitation of the study as well as definition of terms and organization of the study. The second chapter was discussed about review of related literatures concerning theoretical (conceptual) and empirical evidence on the supply chain integration concepts. Chapter three was explained about the design and methodology of the research and description of the study area. And the fourth chapter was dealing with presentation of data and analysis of the given data. Finally based on the finding of the study vital conclusion and recommendations were presented in chapter five.

## **CHAPTER TWO**

### **RELATED REVIEW LITERATURE**

The researcher was classifying the review literature part with three concepts. That was classified as the theoretical, conceptual and empirical review of literature on the supply chain integration concepts.

#### **2.1 Theoretical Review of the Research**

According to the module of Addis Ababa University college of business and economics with the title of principle of supply chain management describes, the term “supply chain management” arose in the late 1980s and came into extensive use in the 1990s. Earlier to that time, business used terms such as “logistics”, and “operations management”.

Supply chain management (SCM) is the integration in the flow and transformation of goods from raw materials stage (extraction), through to the end user, as well as the associated information flows. Material and information flow both up and down the supply chain. The supply chain includes the management of information systems, sourcing and procurement, production scheduling, order processing, inventory management, warehousing, customer service and after market disposition of packaging and materials (Handfeild & Nichols, 1999).

SCM is as a management idea that takes a system approach to viewing the supply chain as a single unit. This means that the partnership concepts, supply chain concepts, supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer demand. A supply chain consists of the manufacturers and suppliers; moreover it includes transporters, warehouses, retailers and customers themselves (Chopra and Meindl, 2001). The objective of every supply chain should be to maximize the overall value generated. The value a supply chain generates is the difference between what the final product is worth to the customer and the costs the supply chain incurs in filling the customer's request. For most commercial supply chains, value will be strongly correlated with supply chain profitability (also known as supply chain surplus), the difference between the revenue generated from the customer and the overall cost across the supply chain. (Chopra and Meindl, 2006)

### **2.1.1 Supply Chain Integration**

Moreover Supply Chain Management (SCM) is an effective approach to sustain the competitive advantage and firm performance (Li et al., 2006). SCM, the theory mainly involves managing an associated activities having assorted origins and it is concerned with planning, coordinating, and controlling movement of materials, parts, finished goods, financial resources, decisions and information from the supplier to the customer (Ipeak et.al ,2011).

To some authors, the concept of integration is implicit in the very definition of SCM As such; Cooke (1997) defines SCM as the successful coordination and integration of all the activities associated with moving goods from the raw materials stage through to the end users for sustainable competitive advantage. Authors describe the concept of integration as a mechanism to support business processes across the supply network to overcome intra- and inter-organizational boundaries (Romano, 2003). More over SCI is strictly related to coordination mechanisms and in particular implies that business processes should be streamlined and interconnected, both inside and outside company boundaries (Cagliano et al. 2006).

Moreover SCI is “the degree to which a manufacturer strategically collaborates with its supply chain associates and collaboratively manages intra-organization and inter-organization processes”; external partners is “the degree to which a manufacturer partners with its external partners to composition of inter-organizational strategies, practices and processes into collaborative, synchronized processes”; and internal integration is “ the degree to which a manufacturer structures have possession of organizational strategies, practices and processes into collaborative, synchronized processes, in order to accomplish its customers’ requirements” (Flynn et.al.,2010).

In literature supply chain integration in manufacturing could be classified in two main streams product integration and process integration which could be Product integration refers to the involvement of suppliers and customers in the development of new products and aims to support such development through close interactions with supply chain partners (Baofeng et.al, 2014). Process integration is the establishment of collaborative and synchronized processes with suppliers and customers and aims to support product manufacture and delivery (Baofeng et.al, 2014).

According to Cox and Townsend (1998) defines relationship as ‘partnering is a long term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant’s resources. The relationship is based on trust, dedication to common goals and an understanding of each other’s individual expectations and values. Expected benefits include improved efficiency and cost effectiveness, increased opportunity for innovation, and the continuous improvement of quality products and service’.

### **2.1.2 Supply Chain Collaboration**

Supply chain collaboration is defined as a long term relationship where participants generally cooperate, share information, and work together to plan and even modify their business practices to improve joint performance (Whipple et al., 2010). Others state that collaboration’s goal is to have parties work cooperatively to devise and implement better approaches to solving problems and delivering the value customers expect (Fawcett et al. 2008). Further the authors assert collaboration goes beyond managing transactions for efficiency to managing relationships for creativity and continuous improvement. These collaborative relationships are long-term endeavors where partners know the capabilities and needs of each other and actively seek to develop new or improved practices. The level to which an organization purposefully collaborates with partners and manages intra and inter-organizational processes so as to activate efficient and effective flows of products, services, information, money, and decisions (Halme, 2010). Collaboration concerns the interpersonal processes and reflects the level of trust and commitment between people and also the sense of belonging to a team in the supply chain (Kache and Seuring, 2014). Because construction is a project-based industry, collaboration should be considered at the project-team level because inter-organizational and intra-organizational collaboration will change per project and over time (Briscoe and Dainty, 2005).

If companies want to derive the benefits of collaboration, they have to be prepared for the work that goes into collaborating. Maintaining long-term strategic coordination between partners, poor internal communication prior to collaboration, and the speed with which to expect benefits have all lead to collaborative failures (Bowersox et al., 1999; Fawcett and Magnan, 2002; Barratt, 2004; Daugherty et al., 2006).

### **2.1.3 Supply Chain and Information Integration**

The supply chain information integration consists of information technology and information sharing and they are viewed as an example for the supply chain integration. The information technology deals in the technical part that is IT connection of the supply chain information integration and information sharing part covered the social portion including sharing of information and trust (Daniel et.al 2012).

According to Prajogo and Olhager (2012) investigated into the effects of supply chain integration on firm performance. The study examined specifically how long-term effects relationships, information technology and sharing and logistics integration have an impact on firm performance. It's not enough for the firms to capture the entire success, by only integrating; the design, procurement, manufacturing and distribution processes within the new methods and also the management, in accordance with the implementation of advanced technology (Huseyin. et. al. 2013). SCM applications such as; strategic supplier partnership, customer relationship, information sharing and information quality level, provide significant competitive advantages for the companies (Mzoughi et al., 2008).

Customer relationship management (CRM) is an important element for SCM practices. It includes all relationship management practices, the creation long-term relationships and development of customers' satisfaction. In order to ensure satisfaction of customers, companies designate suitable suppliers for each customer needs (Choy et.al 2002).

Reimbursement of information sharing in supply chain networks are a rising area of interest among researchers and practitioners from diverse disciplines (Arshinder et.al. 2008).

Studies also indicating that information sharing drastically contributes in dropping supply chain costs, improving partner relationships, escalating materials flow, enabling faster delivery, improving order fulfillment rate thus contributing to customer satisfaction, enhancing channel coordination, and facilitating the achievement of competitive advantage (Ipek et. al. 2011)

Sharing Information among supply chain members may bring a number of benefits to industries. Among these benefits, (Lee et al. 2000) demonstrates the potential advantages of information sharing for the manufacturers in two ways, either expected cost reduction

or inventory reduction. According to (Zhao et al.2002), if information sharing is used efficiently, the manufacturers are able to reduce the inventory costs by 5 to 35 presents when the service level may be maintained or increased to the retailers.

Sharing Information within a supply chain may encounter certain challenges. Among these barriers are confidentiality of the information shared, incentive issues, reliability and cost of information technology, anti-trust regulations, the timelessness and accuracy of the shared information, and finally the development of capabilities that allow companies to utilize the shared information in an effective way (Zahra Lotfi et al.2013)

### 2.1.4. Internal Integration

Internal integration is defined as a process of inter-departmental interaction and collaboration that brings departments together into a cohesive organization (Kahn and Mentzer, 1996). Internal integration could create a close link between manufacturing and distribution processes to distribute products and services in appropriate and effective manner (Tan, 2001). An organization is considered to have a high level of integration when the information systems used by different functions are linked together with all functions able to access accurate and real-time information from other functions, and there are also effective means of communication across functions (Sabath, 1995; and Frohlich et.al 2001)

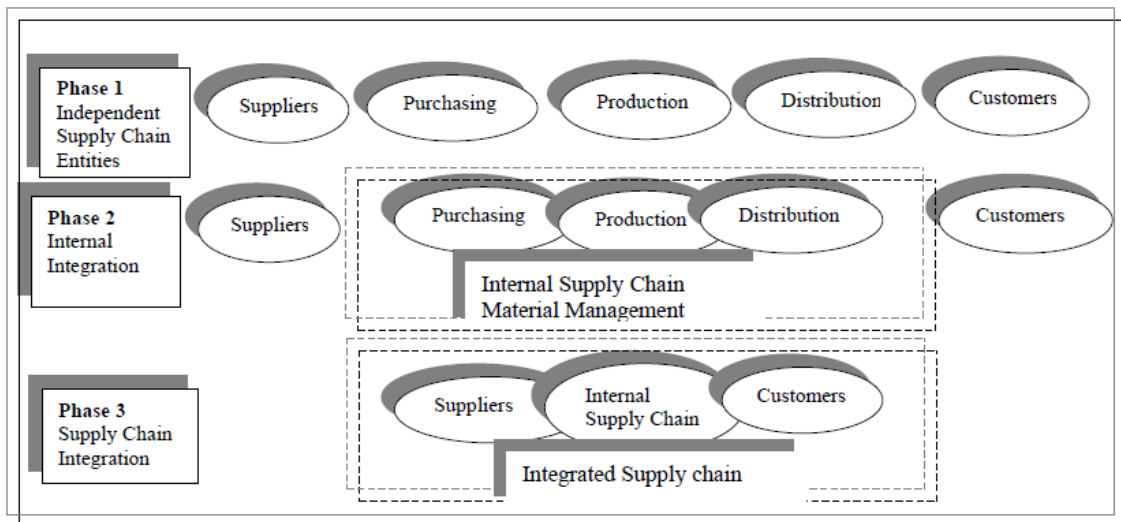


Figure 1:- Developing an integrated supply chain (Lee and Larry, 2003)

### **2.1.5 The Effect of SCI on Operational Performance**

Effective and efficient supply chain integration achieves the well defined flows of products and services, information, money and decisions, to grant maximum worth to customers at low cost and high speed (Flynn et. al. 2005). Studies indicating that mainly, SCI expressed in three levels which are integration with suppliers, integration with customers and intra-organizational integration, allows firms to attain enlarged SCP, through enabling a centralized approach of management across the comprehensive value networks consisting of various parties (Ipek et. al. 2011). Further more studies indicates that SCM practices are expected to improve an organization's competitive advantage through price/cost, quality, delivery reliability, point to market, and product innovation and also prior studies have indicated that the various components of SCM practices (such as strategic supplier partnership) have an impact on various aspects of competitive advantage (Huseyin et.al. 2013). Although financial performance has been widely used as a key output measure of firm performance, numerous studies have pinpointed the limitations in relying solely on financial performance measures in supply chain studies (Baofeng et.al. 2014). Different organizations use financial performance as a key output measure of firm performance, but many studies conducted on supply chain described that, relying only on financial performance measures results for various limitations (Eccles and Pyburn, 1992).

Others suggested that performance is defined as the efficiency and effectiveness of action, (Stefan T., 2004; Kurien and Qureshi, 2011) which leads to the following definitions:

*“.... (i). Performance measurement is defined as the process of quantifying the efficiency and effectiveness of action; (ii). A performance measure is defined as a metric used to quantify the efficiency and/or effectiveness of an action; and (iii). Performance Management System is defined as the set of metrics used to quantify the efficiency and effectiveness of an action.”*



Figure 2:-Aligning operational performance for business goal (B. Noche and T.Elhasia, 2013).

Many literatures assured a great importance of supply chain integration for achieving operational performance (Frohlich and Westbrook, 2001). However, some authors found no direct relationship between internal integration and operational performance (Koufteros et al., 2005; Gimenez. C, 2004). Those authors, who identified a positive relationship between Internal Integration and operational performance, indicate the positive effect of internal integration on cost, quality, delivery, flexibility, innovation, process efficiency, time-based performance and logistics service performance (Daniel and Shambachew, 2017).

### 2.1.6 Lead Time of production

Lead time reduction has been a main point for performance enhancement efforts of the organization (Treville, 2004). According to Ramjan and Nagndna (2013) they were on focus the effects of LJIT practices and SCI on performance of lead time. From a practitioner perspective, the pressure between LJIT approaches and SCI approaches to overall organizational performance improvement is well established (Bruun & Mefford,

2004). According to Kuhlman et al. (2011), lead time is the duration of time (minutes, hours, days etc.) needed by any process to change the inputs (materials, customers, cash, data) into outputs (products, services). Proper management of lead time can result in higher customer satisfaction albeit at an additional cost (Liao & Shyu, 1991). Generally, lead-time comprises functions such as planning manufacturing, assembling delivering of products and services. Silver et al. (2008) have also described lead time as the time that passes by between when the product requests are placed and the time that the items requested are received into stock and that when effectively done, an efficient lead time can impact positively or negatively on customer satisfaction depending how effective it is implemented by a firm and inventory costs.

The reduction of lead time is a major factor of several industrial customers which shows present industrial scenario. Supply chain initiatives in manufacturing industries have guided industrialists to expect that remarkable reductions in lead time are possible in all stages of their industry (Kenneth D. Walsh et al., 2002). Interest in lead time reduction was also originally awakened by JIT production, even though lead time reduction is considerably less emphasized in the JIT literature than was reduction in waste- especially excess inventory (Blackburn, 1991) where as JIT is focused primarily on repetitive manufacturing, (Goldratt & Cox, 1984) addressed lead time reduction in a batch flow environment, drawing attention to the impact of bottleneck resources and lot sizing on lead times. SCM theory clearly deals with the constraints to improving demand chain performance through the transfer of demand information when lead times are long (Heikkila, 2002).

Logistics management is the governance of supply chain functions. Logistics management activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply/demand planning, and management of third party logistics services providers. To various degrees, the logistics function also includes customer service, sourcing and procurement, production planning and scheduling, packaging and assembly. Logistics management is part of all levels of planning and execution: strategic, operational and tactical. It is an integrating function that coordinates all logistics activities. It also integrates logistics activities with other

functions including marketing, sales manufacturing, finance, and information technology. The definition includes the flow of materials and services in the manufacturing and services sectors. (Lambert et. al., 2006)

We focus our attention upon physical distribution or outbound logistics systems. Physical distribution management is an attempt to systematically manage a set of interrelated activities including transportation, distribution, warehousing, finished goods, inventory levels, packaging and materials handling, to assure the efficiency of delivery of finished goods to customers. The focus of physical distribution management is to manage finished goods distribution in a way that meets customer expectations at the lowest possible cost. In addition to transportation, physical distribution management involves close liaison with production planning, purchasing, order processing, material control and warehousing. All these areas must be managed so they can interact with each other to provide the level of services that the customer demands and at a cost that the company could afford. The distribution process begins when a supplier receives an order from a customer (Kwame. et.al 2014).

The most recently introduced approach of demand chain management attempts to capture the proposed synergies between SCM and marketing by starting with the specific customer needs and designing the chain to satisfy these needs, instead of starting with the supplier/manufacturer and working forward (Heikkila, 2002). Such integration seems mandatory in today's marketplace, where customers benefit from having real-time access to their accounts, making real-time changes in their customized product configuration and communicating their individual service requirements (Ericsson, 2012).

### **2.1.7 Quality of Product**

Supply chain management is an advancement to integrating suppliers, manufacturers, distributors and retailers, such that products are produced and distributed at the right quantities, at the right time, to the right location, with the mutual goal of minimizing system wide costs and satisfying customer service requirements ( Simchi-Levi et. al. 2008).

Quality is one of the most important factors for companies in their relationship between suppliers and customers. In fact, quality is so critical that today's executives question

whether their companies should be participating in global sourcing as many global suppliers are not able to meet quality requirements (Brockwell, 2011).

Quality management improvements in reducing process variation directly impact on several supply chain performance measures. With continuous quality management improvement, defects - and therefore, process and production variation, are reduced. In turn, as consistency in the supply chain improves due to the variation reduction, cycle times are reduced (the time between two successive replenishments) and on-time delivery improves (Flynn & Flynn, 2005).

In accordance, we synthesize the SCI and quality management perspectives in this study and define SCQI as the degree to which an organization's internal functions and external supply chain partners strategically and operationally collaborate with each other to jointly manage intra- and inter organizational quality-related relationships, communications, processes, etc., with the objective to achieve high levels of quality-related performance at low costs (Baofeng et.al, 2014)

## **2.2 Empirical Review of the Research**

According to (Baofeng et.al, 2014) they were studying the supply chain integration on the content of SCI (i.e. internal, process and product integration) and explore its effectiveness in improving firm performance under different competitive strategies. With the use of simple random sampling techniques questionnaire analysis of 604 respondents and checking with chi-square test they were found the results regarding the internal integration performance relationship are largely consistent with those of previous studies, which reinforce the need to break function walls. Internal integration is the most important type of SCI and leads to both operational and financial performance, whereas process and product integration can only enhance operational and financial performance, respectively. Then the conclusion of their study was fit between SCI practices and competitive strategies will determine performance. And also the correlations between SCI practices and financial performance are stronger when firms emphasize competitive strategies.

According to Tsion Alemayehu (2017), in the study of supply chain integration to enhance the performance of Ethiopian footwear industry with the use of 16

questionnaires were distributed to the 4 footwear factories production /purchasing/marketing and finance managers. The study found that Ethiopian footwear industry has a poor performance with in the sector. The main reason behind this poor performance is lack of supply integration and customer integration within the footwear industry. And recommend improving the poor product quality and loose competitiveness of the sector, the industries has to start to see supply integration as performance improvement approach.

According to Fasika et.al., (2014) with the title supply chain integration in the manufacturing firms in developing country: an Ethiopian case study with the methodology of field study of using systematical sampling mechanism with covering letter and semi- structured interviews to nine Ethiopian manufacturing industries. They were found that supply chain integration plays an important role in achieving the firm's goals. Then they were conclude that fragmented information flows, lack of integration amongst different company's departments/functions, low level of rationalization, and standardization in operational processes. Finally they were recommending with the use of supply chain integration in developing countries integrated within the organization and with their suppliers and customers even with existing resource constraints.

According to Daniel and Shambachew(2017), with the title the effect of supply chain integration on operational performance: a study on chemical and chemical product manufacturing firms in Ethiopia. The study was conducted 35 populations of chemicals and chemical product manufacturing firms in Ethiopia. The study hypothesis the supply chain integration on internal integration, customer integration and supplier integration are independent variables while operational performance is a dependent variable. And using of Kendall's tau correlation coefficient the study found that Effective supply chain integration (internal, customer and supplier integration) leads directly to a higher operational performance. More over the study found that the importance of applying supply chain integration in an industry, because supply chain integration can be a source of competitive advantage leading to superior performance through enhancing firms' operational performance.

### 2.3 Conceptual Frame Work of the Research

According to Li et al. (2006), their studies describing strategic supplier partnership can improve supplier performance, reduce time to market and increase the customer satisfaction more over information sharing has an impact to levels of supply chain integration by enabling organizations to make dependable delivery and introduce products to the market quickly. Information sharing and information quality are positively associated with customer satisfaction and partnership quality. The research was analysis the supply chain integration on the performance of construction material producers of thermo site project with the Addis Ababa housing project. This was hypothetically describes in the frame work of the study by internal integration with the performance of production that enterprises produced.

There are factors with government involvement on the production of construction materials like of utility factors like water facilities, electricity facility and infrastructures as well as production spaces to the enterprises.

Independent Variables

Dependent Variable

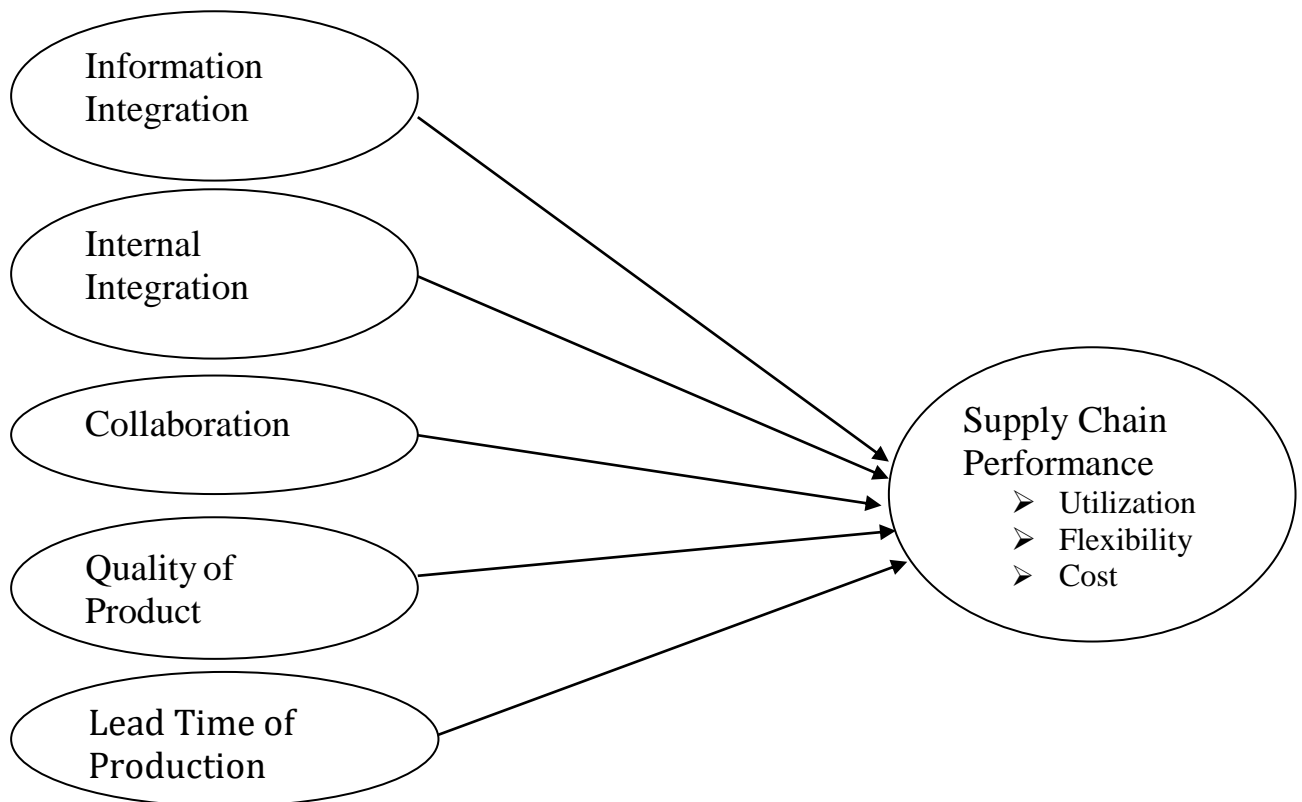


Figure 3:-Modified model of performance measurement (Nicholas J. Mathys, 2006)

### **2.3.1 Research Gap**

There are a lot of studies on supply chain integration concepts with in Ethiopia and globally. But they were discussing with the concepts with regard to manufacturing industries and service giving organizations. This study was emphasized on construction material producers on the supply chain integration concepts.

## **CHAPTER THREE**

### **METHODOLOGY**

This chapter describes the methodology that would be used in this research. The adopted methodology to accomplish this study used the following techniques: review of literature related to supply chain management integration, information about the research design, questionnaire design, research population, research sample size, instrument reliability and statistical data analysis, evaluation of the material supply chain process, conclusion and recommendations.

#### **3.1 Research Approach**

This study was used mixed approach of data in order to examine and measure the performance of producers of construction materials producers of SME in thermo site projects. By the deductive approach of was used for the generalization of facts. Deductive research approach has been stated that deductive means reasoning from the particular to the general. If a causal relationship or link seems to be implied by a particular theory or case example, it might be factual in many cases. A deductive design would test to see if this relationship or link did obtain or more common circumstance (Gulati, 2009).

#### **3.2 Research Design**

The study was used a research design of explanatory research design. Explanatory research design was used for the purpose of this study which enable the researcher to interpret the findings adequately and accurately. Explanatory research was used because of it is not intended to provide conclusive evidence, but helps us to have a better understanding of the problem. The study examines the effect of supply chain integration on the performance of construction materials producers in thermo site. Thus, descriptive and explanatory research employed in order to examine the study.

#### **3.3 Population and Sampling**

The target population is the total number of subjects targeted by the study or the group of elements to which the research requirements to make inference (Mundia et al., 2015). According to the office of Addis Ababa Micro and Small Enterprise Development Agency (AAMSEDA) Akaki Kality sub-city woreda 07 office of small and micro

enterprise the number of small and construction material producers are summarized and listed below. The total number of enterprise in the study is 188 SME in thermo site. The researcher lives the enterprises which are not involved in the production of construction material in thermo site, which is because of their involvement in the supply chain integration with Addis Ababa housing are zero.

Table 3. 1Number of Enterprises in Thermo Site

	Small	Micro	Total
Manufacturing	16	66	82
Construction	0	106	106
<b>Total</b>	<b>16</b>	<b>172</b>	<b>188</b>

Source: AAMSEDA in Woreda 07

The site is located at the southern Addis Ababa and around 18KM from the center starts from Piazza. Moreover the site located at the town of Kality and found at the back of shewa bakery.

### 3.3.1 Sampling Design

According to Kothari, 2004 probability sampling also expressed as ‘random sampling’ or ‘chance sampling’ and that means every item of the universe has an equal chance of inclusion in the sample. And it is also expressed with a lottery method in which individual units are picked up from the whole group not deliberately but by some mechanical process. The study used stratified random sampling method. With this sampling design, stratified sampling the population is divided into several sub-populations that are individually more homogeneous than the total population (the different sub-populations are called ‘strata’) and then we select items from each stratum to compose a sample (Kothari, 2004). Since each stratum is more homogeneous than the total population, we are able to obtain more precise estimates for each stratum and by estimating more accurately each of the element parts; we get an enhanced estimate of the whole. In brief, stratified sampling has results in more reliable and detailed information (Kothari, 2004).

The researcher was considering of construction materials producers and manufacturing of SME organization in thermo site project. With these SME all have their respective of

employees in order to do their jobs. Administration of SME have at least three or above shareholders in each enterprise. The researcher was assigned a questionnaire to each enterprise with the appropriate managerial structures. These were started by general administrator of the enterprise and the personnel directly involved in supply chain of the Addis Ababa housing project.

The researcher was plan to addressee the questionnaire with regarded to address the supply chain integration effects on the performance of production of construction materials. And all the staffs have an effect but the main participants on the supply chain network with Addis Ababa housing projects are general managers, procurement department staffs, production departments and warehouse staffs. So in order to address these staffs of SME enterprise the researcher was planned to use stratified random sampling techniques.

### **3.3.2 Sampling Size**

Due to time and finance constraints the researcher was used construction material producers of thermo site projects in order to saw the performance of supply chain integration.

The researcher was analyses the stratified sampling techniques with the number of enterprises in thermo site and the number of employees in each enterprise. The researcher was got the data of each employee from the perspectives enterprise.

This study was applied a simplified formula provided by (Yamane 1967) to determine the required sample size at 95% confidence level, degree of variability is 0.5 and level of precision is 5%

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

Where n= required sample size

N= the population size given

e= is the level of precision

Our population is described in the above table3.1 188 and the confident interval is 95% so the precision value given 5% so

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

$$n = \frac{188}{1+188(0.05^2)}$$

$$n = \frac{188}{1+0.47}$$

$$n = \frac{188}{1.47}$$

$$n = 127.89$$

There is no digital person so the sample size will be used  $n = 128$

From the above formula the enterprise selected will be 128 enterprises. Which divided proportionally selected for the manufacturing and construction. These can be calculated as below.

The number of manufactures in the above table given the above is 88 and the number construction is 106 so the researcher is calculating the proportional method to specify number of questionnaire to the construction and the manufacturing in SME in thermo site project. Proportional allocation is considered most efficient and an optimal design when the cost of selecting an item is equal for each stratum, there is no difference in within-stratum variances, and the purpose of sampling happens to be to estimate the population value of some characteristic (Kothari, 2004)

Let us assign the letter N1 for construction and letter N2 for manufacturing representations. So for the formula for the proportion according to Kothari, 2004 gives as:

$$n_1 = \frac{N_1}{N} n$$

$n_1$  is represented as the sample size of construction enterprise and

$n_2$  is represented as the sample size of manufacturing enterprise of SME in thermo site projects.

So we can put the amounts in the formula specified on the above equation.

$$n_1 = \frac{N_1}{N} n$$

$$n_1 = \frac{106}{188} 128$$

$$n_1 = 72.17$$

$$n_1 \approx 72$$

and

$$n_2 = \frac{N_2}{N} n$$

$$n_2 = \frac{82}{188} 128$$

$$n_2 = 55.83$$

$$n_2 \approx 56$$

The researcher was used 72 questionnaires for construction and 56 questionnaires for manufacturing enterprises.

### **3.4 Data Collection**

The researcher was used primary and secondary data in the study. The primary data that was used questionnaires of the prospective enterprise in thermo site projects which is the cost minimization approach comparing to observation method. In addition semi-structured interviewers on some personnel who involved on the supply chain integration channels on Addis Ababa housing project. And secondary data that found from books, magazines, brochures, journals on supply chain integration, internet information and the like.

The researcher grouped the enterprise with strata which would be manufacturing and construction both can be separated in their material usage of Addis Ababa housing projects as well as their products also differ each other. The employee also differs in the character of production they produce. The questionnaire consists of three parts. Part one was prepared to gather general information about the respondents gender, age, education, for how many time the employee work in the area and working department in the enterprise. Part two is prepared to ask respondents to answer the main part of the study about the supply chain integration variables that the researcher considers. Part three consists of 4 semi-structured interview questions with regard to factors affecting in the production of construction materials in thermo site. Questions in part two were assessed by using a five point Likert scale. According to Subedi (2016), Likert type data are commonly used to measure attitude providing a range of responses to a given question or statement. Each question of the questionnaire is assigned a number indicating strongly agree measured as 1, agree measured as 2, no opinion (neutral) as 3, disagree measured as 4, and strongly disagree measured as 5. The independent variables are information integration, internal integration, and correlation, quality of product and lead time of production.

The observational data and interviews getting from the enterprises would be used in the summarized form and the researcher analyzes it with respect to secondary data available in literatures.

### **3.5 Pilot Study of the Research**

According to P. Schattner and D.Mazza (2006) a pilot study can be defined as a ‘small study to test research protocols, data collection instruments, sample recruitment strategies, and other research techniques in preparation for a larger study. Generally, 10–20% of the main sample size is a reasonable number for conducting a pilot study (Hazzi and Maldaon, 2015).

Pilot study would be used to test measurement instrument (questionnaire) comprehensible and appropriate and that the questions are well defined, clearly understood and presented in a consistent manner. From the total sample size of the research the researcher was used 10% to the pilot study that means from the sample size of 128 respondents the researcher uses 13 respondents of SME in thermo site project.

### **3.6 Data Analysis**

The researcher was analyzed the study by using of SPSS IBM version 20 for the questionnaires data gathered. The data found in the questionnaires was given by the respondents idea on the supply chain integration effects on the performance of the construction materials produces. Data was processing and analyzing consists of a number of closely related operations, first one was editing for checking the data that was collected to detect and/or correct errors or omissions. Moreover, the collected questionnaires were verified carefully for the completeness of the responses. Finally, data was summarized and arranged in a compact form for further analysis. Moreover, the data that was gathered through distributing the structured questionnaires was analyzed by using IBM SPSS version 20.

#### **3.6.1 Descriptive Statistical Analyses**

For the general information part of the research descriptive statistical analysis was used in order to describe the gender of respondents, age, educational backgrounds the work experience of the respondents and the position of the respondent in the enterprise. This

was presented in the form of table generally describing by percentages and cumulative values from frequency analysis. For the variables of the research mean value and standard deviation were used. According to Kothari (2004), measures of central tendency (or statistical averages) tell us the point about which items have a tendency to cluster. Such a measure is considered as the most representative figure for the entire mass of data. The mean was described the central tendency of the respondents in the site. And standard deviation was described the variation of the respondents on the construction materials producers of thermo site project.

### **3.6.2 Inferential statistical Analysis**

The researcher was used inferential statistical analysis method like of correlation; multiple linear regressions were used to determine the dependent variable (supply chain performance) with the independent variables (information integration, internal integration, and collaboration, quality of product and lead time of the product). To test the independent variables impact on the supply chain integration on the performance of construction material producers. The result was presented in table and each was copied from the output of SPSS IBM version 20 results and has an interpretations.

#### **3.6.2.1 Correlation Analysis**

According to Kothari (2004) Karl Pearson's coefficient of correlation is also known as the product moment correlation coefficient. The value of ' $r$ ' lies between  $\pm 1$ . Positive values of  $r$  indicate positive correlation between the two variables (i.e., changes in both variables take place in the same direction), whereas negative values of ' $r$ ' indicate negative correlation i.e., changes in the two variables taking place in the opposite directions. A zero value of ' $r$ ' indicates that there is no association between the two variables. When  $r = (+) 1$ , it indicates perfect positive correlation and when it is  $(-) 1$ , it indicates perfect negative correlation, meaning thereby that variations in independent variable ( $X$ ) explain 100% of the variations in the dependent variable ( $Y$ ). We can also say that for a unit change in independent variable, if there happens to be a constant change in the dependent variable in the same direction, then correlation was termed as perfect positive. But if such change occurs in the opposite direction, the correlation was termed as perfect negative. The value of ' $r$ ' nearer to  $+1$  or  $-1$  indicates high degree of

correlation between the two variables. Karl Pearson's coefficient of correlation (or simple correlation) is the most widely used method of measuring the degree of relationship between two variables. This coefficient assumes the following:

- (i) That there is linear relationship between the two variables;
- (ii) That the two variables are casually related which means that one of the variables is independent and the other one is dependent; and
- (iii) A large number of independent causes are operating in both variables so as to produce a normal distribution.

As statistical estimate,  $r$  is inevitably subject to some error and should be tested for its reliability by conducting some test of significance (Koutsoyiannis, 1977). While computing a correlation, the level of significance shall be set at 95% with alpha value of 0.05).

### **3.6.2.2 Multiple Regression Analysis**

According to Kothari (2004), when there are two or more than two independent variables, the analysis concerning relationship is known as multiple correlations and the equation describing such relationship as the multiple regression equation. Multiple regression analysis was used to determine the supply chain performance in construction materials producers of thermo site projects with the independent variables of information integration, internal integration, and collaboration, quality of product they produced and lead time of production.

The study was used the multiple regression models of dependent variable  $Y$  and five independent variables.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \epsilon$$

Where  $Y$ = Supply chain performance

$X_1$ = Information integration

$X_2$ = Internal integration

$X_3$ = Collaboration

$X_4$ = Quality of Product

$X_5$ = Lead time of Production

In the model  $\beta_0$ = Constant and  $\beta_1$ to  $\beta_5$  =Regression coefficients.

$\epsilon$  =Error term which captures the unexplained variation in the model.

### **3.7 Descriptions of Variables**

This study would have one dependent variable and five independent variables on the study. The independent variables were the information integration concepts, the internal integration concepts, collaboration on the supply chain integration, and quality of production with respect to the supply chain integration and duration/lead time / of production on the supply chain integration. With these independent variables were shown the performance of construction material producers of SME in thermos site projects. The dependent variable in the study was performance of production of construction material with respect to supply chain integration between two parties. That would have an impact of the Addis Ababa housing project building of condominium houses in the city.

### **3.8 Reliability Test of the Study**

The study was used reliability test by using IBM SPSS software techniques of Cronbach's alpha coefficient. According to Hamed Taherdoost (2016), reliability concerns with the measures of phenomenon provides stable and consist result and repeatability in the constant condition respites the result. The most commonly used internal consistency measure is the Cronbach alpha coefficient. It is viewed as the most appropriate measure of reliability when making use of Likert scales (Whitley, 2002, Robinson, 2009). The coefficient of alpha varies from 0 to 1 and the value of 0.6 or less is generally indicates unsatisfactory internal consistency reliability.

According to Hamed Taherdoost (2016) scales with coefficient alpha between 0.6 and 0.7 indicate fair reliability, a Cronbach's alpha score of .70 or higher will be considered as adequate to determine reliability. Based on the above range all the variables designed are found to be a good measure of the internal consistency.

Table 3. 2 Reliability test Statistics

	Instrument Dimension	Cronbach's alpha	Number of items	Reliability range
1	Internal Integration	0.838	5	Good
2	Information Sharing	0.847	9	Good
3	Collaboration	0.854	5	Good
4	Quality of production	0.839	5	Good
5	Lead time of production	0.856	5	Good
6	Supply chain integration	0.762	9	Accepted
	<b>Overall</b>	<b>0.957</b>	<b>38</b>	Excellent

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

### 3.9 Validity of the Study

Validity of the research is the extent to which differences found with a measuring instrument reflect true differences among those being tested (Kothari, 2004), In other words, validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure In order to ensure the quality of the research design content and construct validity of the research was checked. According to (Kothari 2004) Content validity is the extent to which a measuring instrument provides adequate coverage of the topic understudy. It is the degree to which the measurement device, in this case, the measuring questions in the questionnaire, provides sufficient coverage of the research investigative questions. To maintain the validity of the study the researcher adaptively used previous method of questionnaire development mechanizes the rests were done by carefully reviewing literatures in the chapter two of the research.

### 3.10 Ethical Consideration

The study was ethically clear from department of logistics and supply chain management department. The researcher was used the data from employees and managers which are collected through questionnaire; permission was asked from the SME and Addis Ababa housing project. To maintain the confidentiality of the information provided by the respondents, the respondents was instructed not to write their names on the questionnaire

and assured of that the responses were used only for academic purpose and kept confidential. Brief description of the central objectives or purpose of the study and the potential benefit of the research outcome to respondents clearly stated in the introductory part of the questionnaire so as to motivate them and participate in the study and provide pertinent information about the organization under study.

## CHAPTER FOUR

### DATA ANALYSIS, RESEARCH FINDINGS AND DISCUSSIONS

#### 4.1 Introduction

In this chapter the researcher was presented the analysis of the data on the study of the impact of supply chain integration on the performance of construction material producers in thermo site project in Addis Ababa housing projects. The analysis and interpretation of the data was guided by the research objectives in chapter one in this study.

#### 4.2 Response Rate

Response rates approximating 60% for most research should be the goal or researchers and certainly are the expectation of the editor and associate editors of the Journal and for the survey research intended to represent all schools and colleges or pharmacy, a response rate of  $\geq 80\%$  is expected (Jack E.F, 2008).

Table 4. 1 Respondents Returning Rate

<b>Filling and Returned data</b>				
	Frequency	Percent	Valid Percent	Cumulative Percent
Not Returned	6	4.7	4.7	4.7
Filled and returned	122	95.3	95.3	100.0
Total	128	100.0	100.0	

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

From the above table 4.1, from the total population of 188 SME the sample of 128 determined in chapter three of this studies. From the total number of questionnaires distributed to the enterprises in thermo site 6 respondents not return it with the percentage of 4.7% from the total. 122 respondents were returned the questionnaire which is represented in percentage of 95.31%. The respondents were both the construction enterprises and manufacturing one. This percentage was higher than the expected rate of return.

### 4.3 Respondents General Information

This section presents the general information of the respondents. The researcher presents the gender of the respondents, the age of respondents, educational back ground, work experience of the respondents, working position of the respondents in the enterprise. Gender tells the study to understand the involvement of both genders in the enterprise. The age of the respondents on the production of construction materials production tells the study those involvements of youths in the sector. Work experience tells an effect on the production as well as the knowledge of the supply chain integration effect on the performance of construction material producers. The working positions of respondents in the enterprise have an impact on the knowledge of supply chain integration with Addis Ababa housing project.

#### 4.3.1 Gender of the Respondents

The study gets the following genders dispersion on the enterprises with the table 4.2.

Table 4. 2 Respondents Gender

<b>Gender</b>			
	Frequency	Percent	Cumulative Percent
FEMALE	21	17.2	17.2
MALE	101	82.8	100.0
<b>Total</b>	<b>122</b>	<b>100.0</b>	

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

From the above table 4.2 the respondents were a female were 17.2% and the remains were male which represented as 82.8%. This indicates that the number of males is far larger than females and most of the construction enterprise sectors were controlled by males.

#### 4.3.2 Age of the Respondents

The age of the respondents in the enterprise this indicates the distribution with young's and elders in the construction industries of the SME. The study gets the following distribution on the table 4.3.

Table 4. 3 Respondents Age

<b>Age</b>			
	Frequency	Percent	Cumulative Percent
Under 20 Years old	2	1.6	1.6
20-30 Years old	42	34.4	36.1
30-40 Years old	47	38.5	74.6
Above 40 Years old	31	25.4	100.0
<b>Overall</b>	<b>122</b>	<b>100.0</b>	

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The table 4.3 indicates that the largest respondents in the enterprise were between 30-40 years old which 38.5% of the total respondents and the least was under 20 years old which indicates 1.6% of the total respondents. Between 20-30 years old and above 40 years old in the respondents were 34.4% and 25.4% respectively. From the discussion on the above ones the enterprise organized the possibility of new entrance was very slow.

### 4.3.3 Educational Background of the Study

The respondent's educational background was indicating the understanding of the concepts of supply chain integration in the enterprise as well as creativity of new ideas in the enterprise in order to facilitate. The following table 4.4 indicates the respondent's educational background.

Table 4. 4Educational background

<b>Educational Qualification</b>			
	Frequency	Percent	Cumulative Percent
Under Grade 10 Completed	22	18.0	18.0
Grade 10 Completed	41	33.6	51.6
Grade 12 Completed	21	17.2	68.9
College Diploma Completed	26	21.3	90.2
First Degree	9	7.4	97.5
Second Degree and Above	3	2.5	100.0
<b>Total</b>	<b>122</b>	<b>100.0</b>	

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The respondents from the above table 4.4 indicate that the respondents rate of under grade 10 completed were 18.0%. Grade 10 completed in the respondents were 33.6% and it was the largest number in the study. Grade 12 completed respondents were 17.2% from the total respondents. College diploma holders in the study were 21.3% and it's the second largest percent of the study. First degree holders in the study were 7.4%. And finally, second degree and above educated respondents in the study were 2.5% which is the least number in the study.

#### 4.3.4 Work Experience of the Respondents

The respondents were asked to indicate their years of experiences. The number of years that an individual has been in the enterprise and his or her age determines the level of dealing with supply chain integration practice in the research area.

Table 4. 5 Work experiences of the respondents

<b>Work experience</b>			
	Frequency	Percent	Cumulative Percent
Under 2 Years	5	4.1	4.1
2-5 Years	38	31.1	35.2
5-10 Years	28	23.0	58.2
Over 10 Years	51	41.8	100.0
<b>Total</b>	<b>122</b>	<b>100.0</b>	

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The result in the table 4.5 indicating that experience of less than two years was 4.1% between two and five years was 31.1% which was the second largest and between five and ten years experience in the enterprise was 23% and above ten years of experience in the respondents were 41.8% which was the largest of the all in the study. It indicates that the majority of the enterprise workers were more than two years of experience in the construction material and they have achieve of experience in the supply chain integration practice.

### 4.3.5 Working Department in the Enterprise

The respondents were asked to their working department in the enterprises. In order to assess the respondents are involved in supply chain integration or not. The study sought to know the various departments that respondent's relevant knowledge in their area of specialization.

Table 4. 6Departments of the respondents

<b>Your working department on the enterprise</b>			
	Frequency	Percent	Cumulative Percent
General Manager	48	39.3	39.3
Procurement Department	27	22.1	61.5
Warehouse Department	4	3.3	64.8
Production department	19	15.6	80.3
Others	24	19.7	100.0
<b>Total</b>	<b>122</b>	<b>100.0</b>	

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

From above table 4.6 the general manager of the enterprise 39.3% of from the total respondents and it's the largest one. Procurement department response rate was 22.1% and warehouse department 3.3% which was the least one. Production department response 15.6% and others like of assistance managers and related personnel's also answer the questionnaire which takes 19.7% from the total respondents.

### 4.4 Supply Chain Performance with Descriptive Statistics

The study used a five-point Likert scale method with 1=strongly agree, 2= agree, 3=neutral, 4=disagree, 5=strongly disagree was used to evaluate the information sharing on supply chain integration performance evaluation.

Analysis of data was done by using of mean and standard deviation. The mean is interpreted as 1-1.49 = strongly agree, 1.50-2.49 = agree, 2.5-3.49 = neutral, 3.5-4.49=disagree and 4.5 - 5= strongly disagree Lin (2014).

#### 4.4.1 Information Sharing in Supply Chain Integration

The first objectives of this study is to evaluate the role of information sharing among the supply chain participants on the performance of small and micro enterprises in thermo site project and Addis Ababa housing project. The role information sharing in the enterprise described by effective information sharing between two parties, transparency of each others, sharing of production plans between Addis Ababa housing project and SME, usage of IT technologies in the communication channels, information sharing impacts on construction materials production performance, cost reduction effects of information sharing, role of customer satisfaction, enhancing supply chain coordination and impact on competitive advantage. The study shows the role of information sharing in the supply chain integration of construction materials of SME in thermo site project.

Table 4. 7Information sharing in supply chain integration

<b>Information Sharing</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Effective information sharing between two parties	122	3.87	1.113
Transparency of each others	122	4.00	1.012
Sharing of production plans	122	3.90	1.146
Using of IT technologies	122	3.65	1.142
Impact of information sharing on the performance	122	3.64	1.121
Reduction of supply chain costs	122	3.40	1.176
Customer satisfaction	122	3.67	1.000
Enhancing chain coordination	122	3.54	1.172
Competitive advantage	122	3.87	1.028
<b>Overall</b>	<b>122</b>	<b>3.7268</b>	<b>.73995</b>

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The table 4.7 shows the overall mean and standard deviation of (M=3.7268 and SD=0.73995) that means information sharing between the enterprise and Addis Ababa housing project disagreed scale. It indicates that the enterprise and Addis Ababa housing project fail to get an impact of the supply chain integration performance on the production of construction materials. As implied from the table information sharing between SME and Addis Ababa housing project on the production of construction

materials production (M=3.87 and SD=1.113) and its lie on the disagreed scale. Transparency between the information sharing of two parties has (M=4.00 and SD=1.012) the highest mean value from all the variables and describes on the disagreed scale. Information sharing of the parties with respect to the production plans has (M=3.9 and SD=1.146) which implies that respondents disagreed. Usage of IT technology in the enterprise that (M=3.65 and SD=1.142) lies on disagreed scale. Impact of information sharing on the performance of construction material production the respondents replies that (M=3.64 and SD=1.121) result of disagreed scale. Information sharing with the impact on reduction of supply chain costs respondents replies (M=3.40 and SD=1.176) this tells that the respondents result of neutral on the scale and also the largest mean variation with the result of standard deviation. With the customer satisfaction concept with respect to information sharing impacts (M=3.67 and SD=1.000) the result lies on the disagreed scale. In addition the enhancement of information sharing with chain coordination of the parties (M=3.54 and SD=1.172) the result lies on disagreed scale. Finally the information sharing with the benefit of competitive advantage on the enterprises the respondents result of (M=3.87 and SD=1.028) the result lies on disagreed scale.

The analysis shows that the mean and standard deviation range between (3.40 and 4.00) and (1.000 and 1.176) respectively implies that the respondents disagreed. That implies information sharing has an impacts of supply chain integration on the performance of construction materials producers.

The findings of the information sharing in the supply chain integration of SME construction materials producers in thermo site with Addis Ababa housing project results from the above table (4.7) agreed with the literatures. According to Ipek et.al.,(2011), explains information sharing significantly contributes in reducing supply chain costs, improving partner relationships, increasing material flow, enabling faster delivery, improving order fulfillment rate thus contributing to customer satisfaction, enhancing channel coordination, and facilitating the achievement of competitive advantage.

#### 4.4.2. Internal Integration on the Supply Chain Management

The second specific objective of study is that the role of material flow on the overall internal integration on the performance of construction material producers in the case of SME in thermo site project.

Table 4. 8Internal integration on supply chain management

<b>Internal integration</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Functional departments effective communication	122	3.71	1.132
Production department integrated plan	122	3.78	1.168
Warehouse department integrated inventory management	122	3.69	1.220
Finance department smooth communication	122	3.67	1.209
Each department habit of communication	122	3.79	1.137
<b>Overall</b>	<b>122</b>	<b>3.7279</b>	<b>.91419</b>

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The overall shows in the above table 4.7 (M=3.7279 and SD=0.91419) the respondents respond to the study that disagreed scale. The enterprise failed to get that internal integrations impact on the performance of construction materials producers. The study shows that the functional departments of SME effective communication with Addis Ababa housing project functional departments result show that (M=3.71 and SD=1.132) implies that disagreed with their opinion. With the production of construction materials (M=3.78 and SD=1.168) implies that they are not working with the integrated production plan of each parties. With respect to warehouse management (M=3.69 and SD=1.220) disagreed up on the integrated inventory management between two parties on the supply chain management. In addition with smooth relationship on the finance department of each other (M=3.67and SD=1.209) implies that disagreed on they were not smooth relationship on financial departments. Finally with respect to habit of communication of departments between two parties (M=3.79 and SD=1.137) disagreed on the communication habit of each other.

The analysis shows that the mean and standard deviation between (3.79 and 3.67) and (1.132 and 1.220) respectively that indicating the respondents disagreed. That implies internal integration of SME and Addis Ababa housing projects has an impact on the performance of construction materials production.

The findings from the above table 4.8 agree with the literatures in this study, an organization is considered to have a high level of integration when the information systems used by different functions are linked together with all functions able to access accurate and real-time information from other functions, and there are also effective means of communication across functions (Sabath, 1995; Frohlich and Westbrook, S. Boon-itt 2001). Internal integration is the most important type of SCI and leads to both operational and financial performance, whereas process and product integration can only enhance operational and financial performance, respectively (Baofeng et.al.,2014).

#### 4.4.3 Supply Chain Collaboration on the Performance

The third objective of this study is that the role of collaboration of integration on the performance of construction materials producers in SME.

Table 4. 9Collaboration on the supply chain performance

<b>Collaboration on the performance</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Effective collaboration each other	122	3.84	1.094
Creativity of new idea	122	3.61	1.243
Solving of supply chain problem	122	3.39	1.301
Strong level of trust	122	3.57	1.266
Long term collaboration	122	3.84	1.136
<b>Overall</b>	<b>122</b>	<b>3.6508</b>	<b>.96125</b>

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

As shown in the above table4.9, an overall mean and standard deviation (M=3.6508 and SD=0.96125) the respondents opinion disagreed on the roll of collaboration on the performance of production of construction materials in SME. As a reviled in the table above effective coordination between SME in thermo site producers and Addis Ababa housing projects disagreed by the mean and standard deviation values (M=3.84 and SD=1.094). Moreover the mean and standard deviation value (M=3.61 and SD=1.243) respondents disagreed on the collaboration on the creativity of new idea on the production of their products. In addition, the respondents indication (M=3.39 and SD=1.301) neutral on effects of collaboration on solving of supply chain problems on the enterprise. Furthermore the respondents indication (M=3.57 and SD=1.266) disagreed on

the collaboration with strong level of trust between two parties. Finally the respondents opinion (M=3.65 and SD=1.136) disagreed on long term collaboration with other parties in the supply chain management.

The analysis shown in the above table indicates that the mean and standard deviation between (3.84 and 3.39) and (1.094 and 1.301) respectively indicating respondents disagree. That implies collaboration of SME and Addis Ababa housing project has an impact on the supply chain integration performance on the production of construction materials production.

The findings from the above table 4.9 indicates that agreed with the literatures, Supply chain collaboration is defined as a long term relationship where participants generally cooperate, share information, and work together to plan and even modify their business practices to improve joint performance and parties work cooperatively to devise and implement better approaches to solving problems and delivering the value customers expect trust and commitment between people and also the sense of belonging to a team in the supply chain and others also discussed collaboration should be considered at the project-team level because inter-organizational and intra-organizational collaboration will change per project and over time (Whipple et al., 2010, Fawcett et al. 2008 Kache and Seuring, 2014 Briscoe and Dainty, 2005).

#### 4.4.4 Supply Chain Integration on Quality of Product

The fourth objectives of this study determine the supply chain integration factors of affecting quality of product.

Table 4. 10Supply chain integration on quality of product

<b>Quality of Product</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
SCI impact on quality of product	122	3.83	1.169
SCI impact on continuous improvement	122	3.61	1.203
Constancy of production	122	3.58	1.272
Communication when defect happen	122	3.47	1.325
Mechanism of control	122	3.49	1.287
<b>Overall</b>	<b>122</b>	<b>3.5951</b>	<b>.97657</b>

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The table on the above show that the overall mean and standard deviation of (M=3.5951 and SD=0.97657) indicating the respondent disagreed. That means the enterprise and Addis Ababa housing project were not doing proper supply chain integration in order to produce quality of product. As stated on the above table supply chain integration impact on the quality of product (M=3.83 and SD=1.169) that means respondents disagreed with the impacts. With respect to supply chain integration impact on continuous improvements (M=3.61 and SD=1.203) of production on the enterprise they disagreed with the impacts. The opinion of respondents (M= 3.58 and SD= 1.272) disagreed with respect to the consistency of production the enterprise produce. When defects happen the communication of Addis Ababa housing and SME in thermo site has (M=3.47 and SD=1.325) implies that respondents were neutral opinion. Finally if they have a mechanism in order to control the quality of products which your enterprise produced, their respond (M=3.49 and SD=1.287) which was lies on neutral opinion.

The analysis shown in the above table 4.10 indicates with the mean and standard deviation of (3.83 and 3.47) and (1.325 and 1.169) the respondents disagreed. That implies supply chain integration factors are affecting quality of product.

Findings on the above table 4.10 the supply chain integration on determinate the supply chain integration factors of affecting quality of product agreed with review literatures. Quality management improvements in reducing process variation directly impact on several supply chain performance measures. With continuous quality management improvement, defects - and therefore, process and production variation, are reduced. In turn, as consistency in the supply chain improves due to the variation reduction, cycle times are reduced (the time between two successive replenishments) and on-time delivery improves (Flynn & Flynn, 2005).

#### **4.4.5 Supply Chain Integration on Lead Time of Production**

The fifth objective of this study is to evaluate the performance of supply chain integration with in time limits of production of construction material in thermo site.

Table 4. 11Supply chain integration on lead time of production

<b>Lead Time of Production</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Production duration on SCI	122	3.70	1.239
Delay on inbound and outbound logistics	122	3.81	1.201
Demand chain production	122	3.71	1.243
Just in time delivery	122	3.59	1.245
Extra cost due to delay	122	3.63	1.207
<b>Overall</b>	<b>122</b>	<b>3.6885</b>	<b>.97812</b>

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The shown the above table 4.11 the overall mean and standard deviation of (M=3.6885 and SD=0.97812) indicates that the respondents disagreed. That implies the enterprises failed to show the supply chain integration has an impact on the production lead time or production time limits on the performance of construction materials producers in the enterprise. The mean and standard deviation (M=3.70 and SD=1.239) implies that the respondents disagreed on the production duration impact on the supply chain integration. With mean and standard deviation (M=3.81 and SD=1.201) indicating that the respondents disagreed. That implies there is delay in in-bound and out-bound logistics activities due to inappropriate supply chain integration. Moreover mean and standard deviation (M=3.71 and SD=1.243) indicating that respondents disagreed on the enterprise usage of demand chain production strategies in order to satisfy the needs of Addis Ababa housing project. The mean and standard deviation (M=3.59 and SD=1.245) the respondents disagreed on they use just in time delivery of products after producing construction materials. Finally the mean and standard deviation (M=3.63 and SD=1.207) respondents disagreed. That means the enterprise incurred extra cost due to delay of productions.

The analysis shown in the above table 4.11 indicating that mean and standard deviation (3.81 and) and (1.201 to 1.245) respondents disagree scale. That implies supply chain integration with in time limits of production has an impact on the performance of construction materials producers.

Findings from the above table 4.11 on the evaluation of supply chain integration performance on the lead time of production agreed on review literatures. Lead time is the

duration of time (minutes, hours, days etc.) needed by any process to change the inputs (materials, customers, cash, data) into outputs (products, services) (Kuhlang et al., 2011).

#### 4.4.6 Supply Chain Integration on the Performance

The final objective of this study is to determine the supply chain performance factors in the enterprise.

Table 4. 12Supply chain integration on the performance

<b>Supply chain performance</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Measurement of customer satisfaction with quality	122	3.89	1.130
Measurement of customer satisfactions with order fulfillment	122	3.98	1.028
Effective labor productivity	122	3.84	1.136
Effective on supply chain costs	122	3.54	1.172
Efficient asset utilization	122	3.87	1.113
Efficient inventory management	122	4.00	1.012
Facilitated transaction of money	122	3.90	1.146
Decision are made on time	122	3.65	1.142
Production with high speed	122	3.71	1.132
<b>Overall</b>	<b>122</b>	<b>3.8206</b>	<b>.65313</b>

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The above table 4.12 indicating that the overall mean and standard deviation (M=3.8206 and SD=.65313) respondents disagreed. The result indicates that the enterprises were not fulfilling the supply chain performance factors. With the mean and standard deviation (M=3.89 and SD= 1.130) of the respondents disagreed. It indications is that they were failed to measurement of customer satisfaction on quality of product with supply chain performance efficiency. In addition mean and standard deviation (M=3.98 and SD= 1.028) the respondents disagreed. Implies they were failed to measurement of customer satisfaction with order fulfillments with respect to supply chain performance. The mean and standard deviation (M=3.84 and SD=1.136) indicating disagreed. It implies that they were failed on labor productivity efficiency on the performance of supply chain integration in the enterprise. Moreover the mean and standard deviation (M=3.54 and SD=1.172) indicates that the respondents disagreed. The enterprises were failed by the

efficiency of supply chain integration on supply chain costs. The mean and standard deviation (M= 3.87 and SD=1.113) the respondents disagreed on the asset utilizations on the enterprises. The mean and standard deviation (M=4 and SD=1.012) of the respondents disagreed on the efficient inventory management on the enterprises over supply chain integration. The mean and standard deviation (M=3.90 and SD=1.146) the respondents disagreed on the facilitated money transaction between SME and Addis Ababa housing project. Moreover the mean and standard deviation (M=3.65 and SD=1.142) indicating that the respondents disagreed on the decision made by Addis Ababa housing project on time to the enterprises. Finally the mean and standard deviation (M= 3.71 and SD= 1.132) the respondents disagreed on the enterprises production to fulfill the needs of Addis Ababa housing project with high speed.

The analysis of the above table 4.12 shows that there is disagreed scale of opinion on the respondents which is shown by the mean and standard deviation (4.00 and 3.59) and (1.012 and 1.172) respectively that frailer to achieve the mission of the enterprise and the projects by the role of the supply chain integration.

Findings from the above table 4.12 indicates that supply chain integration on the performance of the construction materials producers agreed on the review literatures, effective and efficient supply chain integration achieves the well defined flows of products and services, information, money and decisions, to provide maximum value to the customer at low cost and high speed (Flynn et., al. 2005). According to Daniel and Smachew,(2017) Effective supply chain integration (internal, customer and supplier integration) leads directly to a higher operational performance. More over the study found that the importance of applying supply chain integration in an industry, because supply chain integration can be a source of competitive advantage leading to superior performance through enhancing firms' operational performance.

#### **4.5 Statistical Analysis on Supply Chain Integration**

The objectives of this section is in order to examine the relationship between supply chain performance in the enterprise and the information sharing, internal integration, collaboration, quality of product and lead time in the production. The dependent variable in the study is supply chain performance and the independent variables are information

sharing, internal integration, and collaboration, quality of product and lead time of production.

#### **4.5.1 Correlation Analysis**

According to Bristol university note correlation is a technique for investigating the relationship between two quantitative, continuous variables, for example, age and blood pressure. Moreover Pearson's correlation coefficient ( $r$ ) is a measure of the strength of the association between the two variables and ( $p$ ) value significance indication. The correlation of variable is measured by Pearson correlation coefficients. The sign of the correlation coefficient determines whether the correlation is positive or negative. The magnitude of the correlation coefficient determines the strength of the correlation. Correlation is an effect size and so we can verbally describe the strength of the correlation using the guide that Evans (1996) suggests for the absolute value of  $r = 0.00-0.19$ : “very weak”  $r = 0.20-0.39$  “weak”,  $r = 0.40-0.59$  “moderate”,  $r = 0.60-0.79$  “strong” and  $r = 0.80-1.0$  – “very strong” (Beldjazia and Alatou, 2016).

Table 4. 13Correlation Coefficients

Correlations		Information Integration	Internal Integration	Collaboration	Quality of Product	Lead Time of Production	Supply Chain Performance
Information Integration	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	122					
Internal Integration	Pearson Correlation	.800**	1				
	Sig. (2-tailed)	.000					
	N	122	122				
Collaboration	Pearson Correlation	.756**	.660**	1			
	Sig. (2-tailed)	.000	.000				
	N	122	122	122			
Quality of Product	Pearson Correlation	.751**	.642**	.673**	1		
	Sig. (2-tailed)	.000	.000	.000			
	N	122	122	122	122		
Lead Time of Production	Pearson Correlation	.611**	.595**	.614**	.773**	1	
	Sig. (2-tailed)	.000	.000	.000	.000		
	N	122	122	122	122	122	
Supply Chain Performance	Pearson Correlation	.887**	.776**	.721**	.720**	.553**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	122	122	122	122	122	122

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

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

To test the relationship between the supply chain performance of dependent variable and information integration, internal integration, collaboration, quality of product and lead time of production in the above table 4.13 . Pearson correlation coefficient and significance ( $r = 0.887$ ,  $p < 0.05$ ) indicating that positively very strongly and significantly correlation between supply chain performance and information integration. The other one is that correlation between the supply chain performance and internal integration of the enterprise strong correlation ( $r = 0.776$  and  $p < 0.05$ ) and significance at two tailed. Moreover the correlation of supply chain performance and collaboration is ( $r = 0.721$  and  $p < 0.05$ ) positively strong correlation and significance relationship. Relationship between supply chain performance and quality of product ( $r = 0.721$  and  $p < 0.05$ ) positively strong correlation and significant with the variables. Beside the correlation between supply chain performance and lead time of production ( $r = 0.553$  and  $p < 0.05$ ) positive moderately correlation and significant.

The above table 4.13 show that information integration is positively and very strongly correlate and significance relationship with internal integration( $r = 0.800$  and  $p < 0.05$ ). In addition information integration is positively and strongly correlated and significantly associated with collaboration ( $r = 0.756$  and  $p < 0.05$ ). Further more information integration is positively and strongly correlated and significant with quality of product ( $r = 0.751$  and  $p < 0.05$ ). Moreover information integration is positively and strongly correlated and significantly associated with lead time of production ( $r = 0.611$  and  $p < 0.05$ ).

Internal integration is positively strongly and significant correlation with collaboration ( $r = 0.660$  and  $p < 0.05$ ). And also internal integration is positively strongly and significant correlation with quality of product ( $r = 0.642$  and  $p < 0.05$ ). Moreover internal integration is positively and moderately collaborated and significant with lead time of production ( $r = 0.595$  and  $p < 0.05$ ).

Collaboration is positively and strongly correlate and significance relationship with quality of product ( $r = 0.673$  and  $p < 0.05$ ). And also collaboration is positively and strongly correlated and significant relationship with lead time of production ( $r = 0.614$  and  $P < 0.05$ ). Moreover quality of product is positively and strongly correlated and significant relationship with lead time of production ( $r = 0.773$  and  $p < 0.05$ ).

### 4.5.2 Regression Analysis

It is a useful technique that can be used to analyze the relationship between a single dependent (criterion) variable and several independent variables (predictor or explanatory) at one time (Ali.Z et al., 2010). In this analysis, a set of independent variables is weighted to form the regression variables (regression equation or model) and that may be used to explain its relative contribution toward one dependent variable (Hair et al., 1995).

Before the regression analysis carried out the researcher try to describe the assumption of regression that the data must meet the required analysis valid and reliable. The following regression assumptions were analyzed using SPSS version 20.

1. **Linearity Assumption:** - is described by plotting the outcome variable against the predictor variable; the pattern should be approximately linear (Robert J. et.al.2014). That means the dependent variable is linear function of predictors (independent) variables. It is expressed by p-p plot indicated in appendix B of this research by visual indication of each independent variable with the dependent.
2. **Multi-collinearity Assumption:-** is a condition in which the independent variables are highly correlated such that the effects of the independents on the dependent variable cannot be separated (Peter S., 2016). More over under this assessment of relative strength of dependent variables and their interaction effects are unreliable. The most broadly applicable method of detecting the multi-collinearity is Variance Inflation Factors (VIF) and it's very precise in determining the problem of multi-collinearity (Reddy et. al., 2013). The maximum VIF of the research is 4.438 and tolerance of 0.386 and minimum VIF of the research is 2.588 with tolerance of 0.225 indicating that  $VIF < 10$  and tolerance  $>0.2$  by rule of thumb it is acceptable range. And the table in appendix B indicating all the variables indicated.
3. **Normality Assumption:-** The normality test is a parametric approach in inferential statistics, the values that are assumed to be normally distributed the means across the sample which is elaborated that parametric stat does not state that the observations within a given sample are normally distributed, nor does it state (J. Toby,2016). The two common method of check normality assumption include using a histogram and normal P-P plot indicating appendix B.

4. **Homoscedasticity Test:-** Refers to whether these residuals are equally distributed, or whether they tend to bunch together at some values, and at other values, spread far apart, more over as equality of variances or homogeneity of variances (Statistics solution, 2017). It is to assign the missing data for each group (missing data pattern), and then apply a complete data method to the completed data (Mortaza J. and Siavash J., 2010). By Dublin-Watson a rule of thumb is that test statistic values in the range of 1.5 to 2.5 are relatively normal and the research indicates 1.551 implies that the study is positive autocorrelation.

Table 4. 14Regression coefficients

Model	Coefficients <sup>a</sup>			t	Sig.
	Un-standardized		Standardized		
	B	Std. Error	Beta		
(Constant)	.967	.139		6.958	.000
Information Integration	.537	.075	.609	7.174	.000
Internal Integration	.134	.049	.188	2.718	.008
Collaboration	.066	.044	.097	1.490	.139
Quality of Product	.117	.051	.175	2.282	.024
Lead Time of Production	-.084	.044	-.125	-1.902	.060

a. Dependent Variable: SUPPLYCHAINPERFORMANCE

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

From the above table the regression model is

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

Then the model in the research is that

$$SCP = 0.967 + 0.537INFI + 0.134INI + 0.066CO + 0.117QOP - 0.084LTP$$

Where dependent variable Y represented by SCP supply chain performance and  $\beta_0$  is the constant that all independent variables equals zero the supply chain performance equals 0.967.  $\beta_1$  is the coefficient for the information integration and represented by INFI.  $\beta_2$  is coefficient for the internal integration and represented by INI.  $\beta_3$  is coefficient for

collaboration and represented by CO.  $\beta_4$  is coefficient for quality of product represented by QOP.  $\beta_5$  is the coefficient of lead time of production and represented by LTP.

From the above table 4.14 all independent variables except from lead time of production are positive relation effect with dependent variable supply chain integration. Information integration is largest positive relation effects and significant at 5% level with supply chain integration (beta=0.609 and p=0.000 which is <0.05). In addition internal integration is positive relation and significant with supply chain performance (beta=0.188 and p=0.008 which is <0.05). More over quality of product is positive relation effect and significant with supply chain performance (beta=0.175 and p=0.024 which is <0.05). Collaboration is positive relation effects on supply chain integration but it has no significant effects (beta=0.097 and p=0.139 which is >0.05). Finally lead time of production is negative relation effect and has no significant effect on supply chain integration (beta=(-0.125) and p =0.060 which is >0.05).

Overall observation from the above table 4.14 the positive relation effects of the variables will have an effect of one unit change in each independent affect the dependent variable supply chain performance with positively. And the negative effect of lead time of production will has negative factor on the supply chain performance with beta coefficient factors.

Table 4. 15Coefficients

<b>Coefficients<sup>a</sup></b>				
Model	t	Sig.	Collinearity Statistics	
			Tolerance	VIF
(Constant)	6.958	.000		
Information integration	7.174	.000	.225	4.438
Internal integration	2.718	.008	.339	2.949
Collaboration	1.490	.139	.386	2.588
Quality of product	2.282	.024	.277	3.616
Lead time of production	-1.902	.060	.374	2.677

a. Dependent Variable: SUPPLY CHAIN PERFORMANCE

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The above table 4.15 shows collinearity effects on the variance inflation factors (VIF) and tolerance. Various recommendations for acceptable levels of VIF have been published in the literature. Perhaps most commonly, a value of 10 has been recommended as the maximum level of VIF (Hair, Anderson, Tatham, & Black, 1995). Acceptable levels of tolerance a recommended minimum value as high as 0.20 has also been suggested (Menard, 1995). Therefore all the variables in the table are tolerance acceptable which are >0.20 and the VIF values also less than 10. Based on this possible to conclude that there is no multi-collinearity effect on the result.

Table 4. 16 Model Summary

<b>Model Summary<sup>b</sup></b>								
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			Durbin-Watson
					R Square Change	F Change	Sig. F Change	
1	.901a	.812	.804	.28934	.812	100.106	.000	1.551

a. Predictors: (Constant), Lead Time of Production, Internal Integration, Collaboration, Quality of Product, Information Integration

b. Dependent Variable: Supply Chain Performance

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The above table 4.16 shows that the “R” represents the multiple correlations of independent variables. The value of 0.901 represents there is very strong correlation between supply chain performance and the five independent variables. R-Square represent the proportion of variance on supply chain performance is explained by the five independent variables in the model. The value of 81.2% variance of supply chain performance is represented by the five independent variables. According to Will Kenton (2019) the Durbin Watson (DW) statistic is a test for autocorrelation in the residuals from a statistical regression analysis and a rule of thumb is that test statistic values in the range of 1.5 to 2.5 are relatively normal. According to Will Kenton (2019) the Durbin–Watson statistic, while displayed by many regression analysis programs, is not applicable in certain situations. From the above table 4.16 shown Durbin-Watson is 1.551 which indicates a positive autocorrelation the model is fit.

Table 4. 17ANOVA

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	41.904	5	8.381	100.106	.000b
1	Residual	9.712	116	.084		
	Total	51.616	121			

a. Dependent Variable: Supply Chain Performance

b. Predictors: (Constant), Lead Time Of Production, Internal Integration, Collaboration, Quality Of Product, Information Integration

Source: SPSS V20 Computed by the researcher from the primary data, (2020)

The above table 4.17 shows the F-value is greater than the significant level 5% and the significant value is less than the p values (F=100.11 which is greater than and p=0.000 which is less than 0.05) the model is good fit for the data.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION**

In this chapter discussion of summarizing the findings from the chapter four and also discuss the conclusion and recommendations of the research. The specific objectives of this study were to evaluate the information integration on the supply chain performance of construction materials producers, to the role of materials flow on the internal integration of the enterprise, the roll of collaboration on the performance, to evaluate the performance with duration of time the enterprise production, to determine the supply chain performance factors on quality of product finally to evaluate the supply chain practice on the performance of construction materials producers in thermo site. Therefore the study findings, conclusion and recommendations are based on these objectives of the study.

#### **5.1 Summary of Findings**

Descriptive and explanatory research designs as well as quantitative research approach were employed in conducting the study. Based on the research specific objectives the research questions were developed with the purpose of leading and constructing the study. Accordingly to meet these objectives the researcher develops a questionnaire and interviewee with review of literature in order to collect and analysis the study from the samples. Respondents who were owners, managers, employees in the SME in thermo site project who were directly involve in the supply chain integration of Addis Ababa housing project. A total number of 128 questionnaires were distributed to the respondents in the enterprise and a return of 122 which is the response rate of 95.31%. An overall value of Cronbach alpha ( $\alpha = 0.957$ ) was found and overall internal consistency test of research instruments obtained “excellent” range of reliability. Due to the gender the males are far larger than the females in the construction materials production sectors with the percentage of 82.8% and 17.2% respectively. With involvements of the age of the respondents in the enterprises majority were in between 30 and 40 years old which represented by the percentage of 38.5%. With educational background aspect of the research the largest percentage 33.6% was grade 10 completed. With the experience aspect of the research the respondents were over 10 year experience were the largest percentage and represented by

41.8%. With respect to positions of the respondents in the enterprises majorities were general managers of the enterprises and represented by 41.8%.

The first objective of the study was to evaluate the role of information sharing among the supply chain participants on the performance of small and micro enterprises in thermo site project and Addis Ababa housing project. The result indicates that with descriptive statistics of an overall mean and standard deviation of ( $M=3.7268$  and  $SD= 0.73995$ ) the respondents disagreed and indicating there is information sharing shortage between small and micro enterprises and Addis Ababa housing projects.

The second objective of the research was the role of material flow on the overall internal integration on the performance of construction material producers in the case of SME in thermo site project. With the result found was an overall mean and standard deviation of ( $M=3.7279$  and  $SD=0.91419$ ) the respondents disagreed that implies enterprises failed to get that internal integrations impact on the performance of construction materials producers.

The third objective of the research was the role of collaboration of integration on the facilitation of housing distribution in Addis Ababa house seekers. The result indicated with the mean and standard deviation of ( $M=3.6508$  and  $SD=0.96125$ ) the respond failed to show the collaboration impacts on the supply chain performance in construction materials producers.

The fourth objective of the research was to determine the supply chain integration factors of affecting quality of product. The result indicated with the mean and standard deviation of ( $M=3.5951$  and  $SD=0.9757$ ) the respondent indicating that the enterprise and Addis Ababa housing project were not doing proper supply chain integration in order to produce quality of product.

The fifth objective of the research was to evaluate the performance of supply chain integration with in time limits of production of construction material in thermo site. The result indicate that the mean and standard deviation of ( $M=3.6885$  and  $SD=0.97812$ ) the enterprises failed to show the lead time of production on the performance of supply chain integration.

The final objective of the study was to determine the supply chain performance factors in the enterprise. The result indices the overall mean and standard deviation of ( $M=3.8206$

and  $SD=0.65313$ ) the response indicates that the enterprises were not fulfilling the supply chain performance factors. Beside all the interview and open ended questionnaires indicates that there were challenges in supply chain performance from them an interruption of power, shortage of water, unavailability of materials and road facilitation were accustomed factors. These factors were also contributed to the failed performance of construction materials production.

Regarding to the relationship of the independent (information integration, internal integration, collaboration, quality of product and lead time of production) and dependents (supply chain performance) variables the result indicated that the correlation of all have strong and positive relation. Person correlation of supply chain performance with information integration( $r=0.887$  and  $p<0.05$ ), internal integration( $r=0.776$  and  $p<0.050$ ), correlation( $r=0.721$  and  $p<0.05$ ), quality of product( $r=0.720$  and  $p<0.05$ ) and lead time of production( $r=0.553$  and  $p<0.05$ ) indicate the significant and positive relationship. The results are consistent with other researches (Baofeng et.al, 2014, Tsion A., 2017, Daniel and Shambachew, 2017 and Fasika et.al, 2014).

From regression of analysis of the study indicates the five independent variables will influence the dependent variable. And the R square from the model summary values of ( $R^2 = 0.812$ ) indicating that 81.2% of supply chain performance of the construction materials producers of SME is explained by these independent variables. The result of Durbin-Watson 1.551 indicates the model positively auto-correlate and positive. The other ANOVA test results the independent variables statistically significant and predict the dependent variable ( $F=100.106$  and  $p=0.000$ ) also the model is good fit for the data.

## **5.2. Conclusion**

The main purpose of this study was to analyze the supply chain integration factors on the performance of the construction material producers with the supply of Addis Ababa housing project. Based on the study from the five independent variables which were information integration, internal integration, collaboration, quality of product and lead time of production all positive relationship with dependent variable supply chain performance. In addition based on the study with descriptive statistics results indicated that all independent variables were disagreed with the concepts of supply chain integration

concepts that means they were not practiced in their production of construction material production with the association of Addis Ababa housing project. More over the supply chain performance explained by the independent variable in the study indicating that 81.2% and the other factors not included on the study was expressed by 18.8% only. With the open ended questionnaire the research were added some factor like of interruption of power, shortage of materials availability, water interruption in the site and facilitation of road construction in the site also some factors on the performance of production.

Thus based on the study the research questions were answered by the findings the research found. Information sharing roll in the participants of supply chain integration on the performance of production was significant and positive relation. Internal integration also has positive and significant role on the performance of construction materials producers. Collaboration has also positive effects on the performance but not significant role on the supply chain performance of production. Quality of product was determined by the supply chain performance of the construction materials production with the study indicates significance and positivity related with performance. Finally the lead time of production was positively related with the supply chain performance but it was not significant in relationship.

This study has provided empirically justifies the effects of supply chain integration on the performance of construction materials production in thermo site project. The five independent variables of the study indication of all positive correlation with the dependent variable of supply chain performance.

### **5.3 Recommendation**

The findings of the study indicates the SME in thermos site project were not doing with the proper supply chain integration concepts and they shown it by disagree with the questionnaires. But the study confirms that the supply chain integration concepts have positive and significant relationship or impact on the performance of production of construction materials in the site. The researcher recommends the enterprises the following concepts,

- In order to overcome effective information sharing between two parties they built up computerized mechanisms like of mobile application telegram and

Whats-Up for communication each others. The educational personnel also needed in order to facilitate these mechanisms. Transparency of information between two parties could be on time and facilitated. Production of the construction materials must do with the communication plan of two parties.

- In order to overcome effective internal integration the departments of the enterprises and Addis Ababa housing project communicate each other effectively. Production plane of the enterprise coherent with the specific needs of Addis Ababa housing project. Financial departments of the two parties proper work each other in order to achieve effective supply chain performance. The departments of the two parties built up habit of communication in order to have effective supply chain performance.
- With respect to collaboration of integration on the facilitation of housing distribution in Addis Ababa house seekers. SME and Addis Ababa housing project collaboration each other in order to have effective supply chain performance and it lead to facilitate the house seekers time shortage. The two parties also develop mechanisms of creativity of new ideas in their supply chain integration. The two parties also built strong level of trust between each other. And the enterprises of SME needs to built long term collaboration with the suppliers of materials suppliers.
- In order to determine the supply chain integration factors of affecting quality of product, the enterprise using effective supply chain integration. Usage of supply chain integration helps the enterprise in order to improve quality of product. The two parties build mechanisms of if defects happen on the production. Addis Ababa housing project must build quality control mechanism in order to control the quality of product.
- With respect to lead time of production on the supply chain integration the two parties develop the schedule of production with discussions. In bound and out bound logistics of materials flow restricted with time frame. Demand chain production and just in time delivery mechanism built by two parties and it helps them reducing the cost of production as well as reduction dalliance.

With the respect to determine the supply chain performance factors in the enterprise they have to measure the customer satisfaction with quality as well as order fulfillment. The enterprises built effective mechanisms of labour productivity as well as asset utilization management. Effective inventory management mechanisms between two parties will help the performance effective on the supply chain performance. The two parties recommend to use facilitated transaction of money in order to get well supply chain performance. Decisions on the production of construction material must be addressed to the enterprise made on time.

#### **5.4 Limitation and Suggestions for Future Research**

This study is limited to small and micro enterprises in thermo site. The finding of the research limited to these enterprises and not generalized to enterprises in the city or in the country so other researchers will do the all enterprises in the city or the country. Other researcher will also considering other variables other than mentioned in this study. Other researcher will also study the concepts of supply chain with regard to these manufacturing enterprises.

## References

- ❖ Androniceanu, A. (2017). The Three-Dimensional Approach of Total Quality Management, an Essential Strategic Option for Business Excellence. *Amfiteatru Economi*, Vol. 19(44), pp. 61-78.
- ❖ A. Subburaj, Sriram and Sangeeta Mehroliia (2020) .Effects of supply chain integration on firm's performance: A study on micro, small and medium enterprises in India. *Journal of Uncertainty supply chain management*. Vol. 8(1), pp231-240.
- ❖ Ali Hussein Zolait, Abdul Razak Ibrahim, V.G.R Chandran Govindaraju and Veera Pandiyan (2010). Supply Chain Integration: an empirical study on manufacturing industry in Malaysia. *Journal of Systems and Information Technology*. Vol. 12(3), pp. 210-221.
- ❖ Arshinder, KA., Deshmukh, SG. (2008). Supply Chain Coordination: Perspectives, empirical studies and research directions. *International Journal of Production Economics*. Vol.115, pp. 316-335.
- ❖ Baofeng Huo, Yinan Qi, Zhiqiang Wang and Xiande Zhaov (2014). The Impact of Supply Chain Integration on Firms Performance: The Moderating Role of Competitive Strategy. *An International Journal*. Vol. 19(4), pp. 369-384.
- ❖ Baofeng Huo, Xiande Zhao and Fujun Lai (2014). Supply Chain Quality Integration: Antecedents and Consequences. *IEEE Transactions on Engineering Management*. Vol. 61(1), pp38-51.
- ❖ Beldjazia, A. and Alatou, D. (2016). Precipitation Variability on the Massif Forest of Mahouna (North Eastern-Algeria) from 1986 to 2010. *International Journal of Management Sciences and Business Research*, Vol. 5(3), pp. 21-28.
- ❖ Bernd Noche and Tarek Ethasia (2013). Approach to Innovative Supply Chain Strategies in Cement Industry; Analysis and Model Simulation. *Procedia-Social and Behavioral Sciences*. Vol.75, pp. 359-369.
- ❖ Blackburn, J. (1991). *Time-Based Competition*. Homewood.IL: Business One Irwin. Homewood IL.

- ❖ Briscoe, G. and Dainty, A. (2005). Construction Supply Chain Integration: An elusive goal? Supply Chain Manage. *International Journal of Management*. Vol. 10(4), pp 319-326.
- ❖ Bristol University of West England (2020). Pearson's Correlation Coefficient. [Online] Available at <http://learntech.uwe.ac.uk/da/Default.aspx?pageid=1442> Accessed at the date of 15/05/2020.
- ❖ Brockwell, J. (2011). Strategies for Strategic Sourcing. *Industry Week/IW*. Vol. 257(1), pp. 28-30.
- ❖ Bruun, P. and Mefford R.N. (2004). Lean Production and the Internet. *International Journal of Production Economics*. Vol. 89(3), pp. 247-260.
- ❖ Cagliano, R., Caniato, F. and Spina, G.(2006). The linkage between Supply Chain Integration and Manufacturing Improvement Programmers. *International Journal of Operations and Production Management*. Vol. 26(3), pp. 282-299.
- ❖ Campus Academic Resource Program. San-Francisco State University HSS 344. 415-405-0971. [carp1@sfsu.edu](mailto:carp1@sfsu.edu). [www.sfsu.edu/~carp1](http://www.sfsu.edu/~carp1). Accessed at the date of 04/01/2020.
- ❖ Choy, K.L., Lee W.B., and Lo, V. (2002). Development of a case based intelligent customer-supplier relationship management system. *Expert Systems with Applications*. Vol. 23(3), pp 281-297.
- ❖ Chopra, S. and Meindl, P. (2006). *Supply Chain Management: Strategy, Planning and Operation* (3<sup>rd</sup> Ed.) Prentice-Hall of India; New Delhi.
- ❖ Chopra Sunil and Peter Meindl (2001). *Supply Chain Management: Strategy, Planning and Operations*. Upper Saddle River, NJ: Prentice-Hall, Inc.
- ❖ C.R. Kothari, (2004). *Research Methodology Methods & Techniques*. Publishing For One World.
- ❖ Cooper M.C., Lambert D.M. and Pagh J.D (1997). Supply Chain Management: More than a new name for logistics. *The International Journal of Logistics Management*. Vol.8 (1), pp. 1-13.
- ❖ Cox, A. and Townsend, M. (1998). *Strategic Procurement in Construction*. Thomas Telford, London.

- ❖ Dag Ericsson (2012). Demand Chain Management- The evolution. *Journal of Research Gate*. Vol. 27(1), pp. 45-81.
- ❖ Daniel Atnafu and Shambachew Omer Hussen (2017). The Effect of Supply Chain Integration on Operational Performance: A Study on Chemical and Chemical Product Manufacturing Firms in Ethiopia. *European Journal of Logistics, Purchasing and Supply Chain Management*. Vol. 5(2), pp. 10-18.
- ❖ Daniel Pagogo and Jan Olhager (2012). Supply Chain Integration and Performance: The Effect of Long-Term Relationship, Information Technology and Sharing, and Logistics Integration. *International Journal of Production Economics*. Vol.135(1), pp. 514-522.
- ❖ Donald, J., Bowersox, David J. Closs and M. Cixby Cooper (2002). *Supply Chain Logistics Management*. McGraw-Hill/ edition, in England.
- ❖ Eccles R.G. and Pyburn, P.J. (1992). Creating a Comprehensive System to Measure Performance. *Management Accounting*. Vol. 74(4), pp. 41-44.
- ❖ Evans, J.D. (1996). *Straightforward Statistics for the Behavioral Science*. Pacific Grove, CA: Brooks/Cole Publishing.
- ❖ Fawcett, S.E., Fawcett, A.M., Watson, B.J. and Magnan, G.M.(2012). Peeking Inside the Black Box: Toward an Understanding of Supply Chain Collaboration Dynamics. *Journal of Supply Chain Management*. Vol. 48(1), pp. 44-72.
- ❖ Ferni, J., and Sparks, L.(2014). *Logistics and Retail Management: Emerging Issues and Nes Challenges in the Retail Supply Chain*. Kogan Page Publishers.
- ❖ Fikite Wolde and Endrias Geta (2015). Determinants of Growth and Diversification of Micro and Small Enterprises: The case of Dire Dawa, Ethiopia. *Journal of Developing Country Studies*. Vol. 5(1), pp. 61-75.
- ❖ Flynn, B.B., and Flynn, E.J. (2015). Synergies between Supply Chain Management and Quality Management: Emerging Implications. *International Journal of Production Research*. Vol. 43(16), pp. 3421-3436.
- ❖ Frohlich, M.T. and Westbrook, R. (2001). Arcs of integration: an International Study of Supply Chain Strategies. *Journal of Operations Management*. Vol. 19(2), pp. 185-200.

- ❖ Gimenez, C. (2004). Supply Chain Management Implementation in the Spanish Grocery Sector: an Exploratory Study. *International Journal of Integrated Supply Management*. Vol. 1(1), pp. 98-114.
- ❖ Goldratt, E.M. and Cox, J. (19984). *The Goal*. Croton-on-Hudson, NY: North River Press.
- ❖ Grant, D.B., Lambert, D.M., Stock, J.R. and Ellram, L.M. (2006). *Fundamentals of Logistics Management*. European Edition, Maidenhead: McGraw-Hill.
- ❖ Gulati P.M. (2009). *Research Management: Fundamental and Applied Research*. Global Indian Publication.
- ❖ Hamed Taherdoost (2016). Validity and Reliability of Research Instrument; How to Test the Validation of Questionnaire/Survey in Research. *International Journal of Academic Research in Management (IJARM)*. Vol. 5(3), pp. 28-36.
- ❖ Hailey, J.M. (1987). *Entrepreneurs and Indigenous Business in the Pacific*. PIDP, East West Centre, Honolulu, HI.
- ❖ Hair, J. F. Jr., Anderson, R.E., Tatham, R.L. and Black, W.C. (1995). *Multivariate Data Analysis* 3<sup>rd</sup> ed. New York: Macmillan.
- ❖ Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1995). *Multivariate Data Analysis*. 4<sup>th</sup> ed. Prentice-Hall, Engelwood Cliffs, NJ.
- ❖ Handfield, R.B. and Nichols, E.L. (1999). *Introduction of Supply Chain Management*. New Jersey: Prentice Hall, Inc.
- ❖ Hazzi, A.O. and Maldaon, S.I (2015). *A pilot Study: Vital Methodological Issues*. Vilnius Grdiminas Technical University. Vol. 16(1), pp. 53-62.
- ❖ Heikkila, J. (2002). From Supply to Demand Chain Management: Efficiency and Customer Satisfaction. *Journal of Operations Management*. Vol. 20(6), pp. 747-767.
- ❖ Huseyin Ince, Salih Zeki Imamoglu, Halti Keskin, Aliekber Akgun, Mehmet Naci Efe (2013). The Impact of ERP Systems and Supply Chain Management Practices on Firm Performance: Case of Turkish Companies. *Procedia- Social and Behaviral Sciences*. Vol. 99, pp. 1124-1133
- ❖ Ipeck Kocoglu, Salih Zeki Imamoglu Huseyin Ince and Halti Keskin (2011). The Effect of Supply Chain Integration on Information Sharing: Enhancing the Supply

Chain Performance. *Procedia Social and Behavioral Sciences 7<sup>th</sup> International Strategic Management Conference*. Vol.24, pp.1630-1649.

- ❖ Jack E. Finacham (2008). Response Rates and Responsiveness for Surveys, Standards and Journal. *American Journal of Pharmaceutical Education*. Vol. 72(2) pp 43 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2384218/> Accessed at the date of 05/05/2020.
- ❖ Jelle Simon, Jowan Koolwijk, Clarine Joanne Van Oel, Johannes Willhelumus Franciscus Wamelink and Ruben Vrijhoef (2018). Collaboration and Integration in Project-Based Supply Chains in the Construction Industry. *Journal of Management Engineering*. Vol. 34(3) pp. 001-13
- ❖ J.Toby, (2011). *The assumptions of normality*. [Online]. Available at [www.psychology.uiowa.edu/faculty/mordkoff/GradStats/part](http://www.psychology.uiowa.edu/faculty/mordkoff/GradStats/part) Accessed at the date 25/05/2020.
- ❖ Kache, F. and Seuring, S. (2014). Linking Collaboration and Integration to Risk and Performance in Supply Chain Via a Review of Literature Reviews. *Supply Chain Management. International Journal*. Vol. 19 pp. 664-682.
- ❖ Kahn, K.B. and Mentzer, J.T. (1996). Logistics and Interdepartmental Integration. *International Journal of Physical Distribution & Logistics Management*. Vol. 26(8) pp. 6-14.
- ❖ Ngui Tomas Katuna (2014). “The role of SMEs in Employment Creation and Economic Growth in Selected Countries”. *International Journal of Education and Research*. Vol.2 pp. 461-472.
- ❖ Kiage, J. (2013). Factors Affecting Procurement Performance: A Case of Ministry of Energy. *Journal of Business and Commerce*. Vol. 3(1) pp. 54-70.
- ❖ Koufteros, X., Vonderembes, M. and Jayaram J. (2005). Internal and External Integration for Product Development: the Contingency Effect of Uncertainty, Equivocality, and Platform Strategy. *Journal of Decision Science*. Vol. 36(1), pp. 97-133.
- ❖ Koutsoyiannis, A (1977). *Theory of Econometrics*. 4<sup>th</sup> ed. New York: Palgrave.
- ❖ Kuhalang, P., Edtmayr, T. and Sih W. (2011). Methodical Approach to Increase Productivity and Reduce Lead Time in Assembly and Production- Logistic

- Processes CIRP. *Journal of Manufacturing Science and Technology*. Vol. 4(1), pp. 24-32.
- ❖ Kwame Owusu Kwateng, John Frimpong Manso and Richard Osei-Mensha (2014). Outbound Logistics Management in Manufacturing Companies in Ghana. *Review of Business and Finance Studies*. Vol. 5(1), pp. 83-92.
  - ❖ Lee, J. Krajewski, and Larry P. Ritzman (2003). *Operations Management: Strategy and Analysis*. 5<sup>th</sup> ed. Addison-Wesley. England
  - ❖ Lee H.L., So K.C. and Tang C.S. (200). The value of Information Sharing in a Two-Level Supply Chain. *Journal of Management Science*. Vol. 46(5), pp.626-643. [Online]. Available at <https://pubsonline.informs.org/doi/abs/10.1287/mnsc.46.5.626.12047> Accessed at the date of 24/10/2019.
  - ❖ Li, S., Ragu-Nathan, B., Ragu-Nathan, T.S. and Subba Rao, S (2006). The Impact of Supply Chain Management Practices on Competitive Advantage and Organizational Performance. *Journal of Omega*. Vol. 34(2), pp. 107-124.
  - ❖ Liao, C. and Shyu, C. (1991). An Analytical Determination of Lead Time with Normal Demand. *International Journal of Operation and Production Management*. Vol. 11(9) pp. 72-78.
  - ❖ Lin, H.F. (2013). The Impact of Socialization Mechanisms and Technological Innovation Capabilities on Partnership quality and Supply Chain Integration. *Journal of Information System e-Bus Management*. Vol. 12(2), pp. 285-306.
  - ❖ Mortanza Jamshidian and Siavash Jalal (2010). Test of homoscedasticity, normality and missing completely at random for incomplete multivariate data. *Journal of Psychometrika*. Vol. 75(4), pp. 649-674.
  - ❖ Muma, P.A. (2002). *Small Business in the South Pacific: problems, Constraints and Solutions*. Zania Books, Suva.
  - ❖ Mundia C., Langat K.E. and Lelegwe S. (2015). Effect of Information System on Upstream Supply Chain Management among Supermarkets in Nakuru Town, Kenya. *International Journal of Economics, Finance and Management Sciences*. Vol. 3(5), pp 535-540.

- ❖ Mzoughi, N., Bahri, N. and Ghachem, M.S. (2008). Impact of Supply Chain Management and ERP on Organizational Performance and Competitive Advantage: Case of Tunisian Companies. *Journal of Global Information Technology Management*. Vol. 11(3), pp. 24-46.
- ❖ Nargundkar, R (2008). *Marketing Research: Text and Cases*. Tata McGraw-Hill Educational. pp. 39.
- ❖ Peter Steyn (2016). *Data Assumption: Multicollinearity*. Intro Spective Mode.
- ❖ Ramjanm S. and Nagendra S. (2013). Effect of Lean/JIT Practices and Supply Chain Integration on Lead Time Performance. *Journal of Supply Chain Management Systems*. Vol. 2(1), pp. 32-36.
- ❖ Reddy C.M., Balasubramanyam P. and Subbarayudu M. (2013). An Effective Approach to Resolve Multi-Collinearity in Agriculture Data. *International Journal of Review in Electronics & Communication Engineering*. Vol.1(1)
- ❖ Robert J. Casson Dphil Franzo and Lachlan D.M. Farmer (2014). Understanding and checking the assumption of linear regression: a prime for Medical researcher. *Journal of Clinical and Experimental Ophthalmology*. Vol. 42(1), pp. 590-596.
- ❖ Robinson, J (2009). Triandis' Theory of Interpersonal Behaviour in Understanding Software Privacies Behavior in South African Context. Master degree, University of the Witwatersrand.
- ❖ Romano, P. (2003). Co-ordination and Integration Mechanisms to Manage Logistics Processes across Supply Networks. *Journal of Purchasing and Supply Management*. Vol. 9, pp. 119-134.
- ❖ Samaranyake, P. (2005). A Conceptual Framework for Supply Chain Management: a Structural Integration. *An International Journal of Supply Chain Management*. Vol. 10(1), pp 47-59.
- ❖ Saunders, M., Lewis P. and Thornhill, A. (2012). *Research Methods for Business Students*. 6<sup>th</sup> ed. Pearson Education Limited.
- ❖ Scott Menard (2001). *Applied Logistic Regression Analysis: Sega University Series on Quantitative Application in the Social Sciences*. 2<sup>nd</sup> ed. Thousand Oaks, CA: Sage Publication.

- ❖ Simchi-Levi D., Kaminsky, P. and Simchi-Levi, E. (2008). *Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies*. 3<sup>rd</sup> ed. McGraw-Hill, NY.
- ❖ Sisay Sintayehehu (2019). Assessing the Role of SMEs in Industrial Development of Addis Ababa City. *Global Science Journal*. Vol. 7(3), pp. 921-931.
- ❖ Solymossy E. and Penna A.A. (2000). *Sustainable Growth of the Small Business: A Theory of Organizational Transition*. Western Illinois University, Moline, IL.
- ❖ Stank, T.P., Keller, S. B. and Closs, D.J. (2001). Performance Benefits of Supply Chain Logistical Integration. *Journal of Transportation*. Vol. 41(2/3), pp. 32-46.
- ❖ Statistics Solution (2017). Testing Assumptions of Linear regression. [Online]. Available at <https://www.statisticssolutions.com/testing-assumptions-of-linear-regression-in-spss/> Accessed at the date of 25/05/2020.
- ❖ Subedi, P.B. (2016). Using Likert Type Data in Social Science Research: Confusion, Issues and Challenges. *International Journal of Contemporary Applied Sciences*. Vol. 3(2), pp. 36-49.
- ❖ Tagay Firde Abebe, Lamesgin Desalegn (2019). Integration as Tool of Supply Chain Management and Its Effect on Performance of Private Road Construction Firms in Ethiopia. *Journal of Logistics Management*. Vol. 8(2), pp. 45-50.
- ❖ Tan, K.C. (2001). A Framework of Supply Chain Management Literature. *European Journal of Purchasing and Supply Management*. Vol. 7(1), pp. 39-48.
- ❖ Treville, S. Shapiro, R.D. and Hameri, A. (2004). From Supply Chain to Demand Chain: The Role of Lead Time Reduction in Improving Demand Chain Performance. *Journal of Operations Management*. Vol. 21(6), pp. 613-627.
- ❖ Tsion Alemayehu (2017). *Supply Chain Integration to Enhance the Performance of Ethiopian Footwear Industry*. A Master's Thesis. Addis Ababa University Mechanical Engineering.
- ❖ Whipple, J. M., Lynch, D. F. and Nyaga, G.N. (2010). A Buyer's Perspective on Collaborative Versus Transactional Relationships. *Industrial Marketing Management*. Vol. 39(3), pp. 507-518.
- ❖ Whitley, B.E. (2002). *Principals of Research and Behavioral Science*. Boston, McGraw-Hill.

- ❖ Will Kenton (2019). *Durbin Watson Statistic Definition. Financial analysis. Investopedia editorial.* [Online]. Available at <https://www.investopedia.com/terms/d/durbin-watson-statistic.asp> Accessed at the date of 18/05/2020.
- ❖ Yamane, T. (1967). *Statistics, an Introductory Analysis*. 2<sup>nd</sup> ed. Harper and Row, New York.
- ❖ Zahra Lotfi, Muriati Mukhtar, Shahnorbanum Shran and Ali Taei Zadeh (2013). Information Sharing in Supply Chain Management. The 4<sup>th</sup> International Conference on Electrical Engineering and Informatics. *Procedia Technology*. Vol.11, pp. 298-304.
- ❖ Zailinawati Abu Hassan Peter S. and Danel M. (2006). Doing a Pilot Study: why is it Essential? *Malysian Family Physicaian*. Vol.1 (2&3), pp. 70-73.
- ❖ Zhao Y. (2002). *The Impact of Information Sharing on Supply Chain Performance*. A Thesis for Doctor of Philosophy. Northwestern University. Evanston, Illinois.

## Appendix

### Appendix A: Questionnaire



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

Questionnaire to be distributed to SME owners and employees of thermo site project

Dear participants,

These questionnaires are developed for gathering primary data from the enterprises of thermo site project owners and staffs that will be used to assess the effect of supply chain integration on the performance of construction material producers in Addis Ababa housing project. It will be used for the partial fulfillment of the requirement of Degree in Masters of Art in logistics and supply chain management, Addis Ababa University School of Commerce.

The information obtained from this questionnaire will be kept confidential and will not be used for any other purposes. Hence, I kindly request you to answer the question freely and openly to share your competence and knowledge with me.

Thank you for your cooperation

Ayele Lashetew

Cell phone: 0911488782

Email address: [ayeleshetew@gmail.com](mailto:ayeleshetew@gmail.com)

January 2020

Addis Ababa, Ethiopia



## Part II: Basics Questions

Direction: - please put your level of agreement/disagreement by tick (√) the appropriate opinion you believe appropriate to indicate the extent to which you agree or disagree with each statement.

Where: - 1= strongly agree, 2=agree, 3=neutral, 4=disagree, 5=strongly disagree

No	Perceptions of respondents	Agreement scale				
		1=strongly agree	2=agree	3=neutral	4=disagree	5=strongly disagree
	<b>Items</b>					
<b>1</b>	<b>Information Integration</b>					
1.1	You have effective information sharing between your enterprise and Addis Ababa housing project about production					
1.2	There is transparency between Addis Ababa housing project and SME about supply chain					
1.3	Your production have done with Addis Ababa housing plan					
1.4	You are using of IT technologies in the communication channel					
1.5	Information sharing between two parties impact on the performance of construction material production					
1.6	Information sharing reduce supply chain costs					
1.7	Information sharing have an impact on customer satisfaction					
1.8	Information sharing enhancing chain coordination					
1.9	Information sharing have impact on competitive advantage					
<b>2</b>	<b>Internal integration</b>					
2.1	Your functional departments are effective communication with Addis Ababa housing project departments with all aspects					
2.2	Your production departments effective communication with that of Addis Ababa housing project about production planning					

2.3	Your warehouse managers are effective in providing product management with your company's product management and Addis Ababa housing departments.					
2.4	Finance department of you enterprise and Addis Ababa housing project communicate each other smoothly					
2.5	Each departments a habit to communicate each other with respect to develop effective supply chain integration between enterprises and Addis Ababa housing project					
<b>3</b>	<b>Collaboration</b>					
3.1	Your enterprise has effective collaboration with Addis Ababa housing project					
3.2	Collaboration of your enterprise and Addis Ababa housing project helps to creativity of new idea development.					
3.3	Your organization works in partnership with the Addis Ababa housing Project to solve supply chain problems					
3.4	There are strong level of trust between your enterprise and Addis Ababa housing project					
3.5	Your enterprise has long term collaboration with any parties					
<b>4</b>	<b>Quality of Production</b>					
4.1	Supply chain integration between your organization and Addis Ababa housing project impact on quality of production					
4.2	Supply chain integration has impact on continuous improvement on quality of production of construction material					
4.3	Your enterprise constantly producing construction material in order to satisfy the needs of Addis Ababa housing project					
4.4	There is effective communication with when defects happen on production of construction materials					
4.5	Addis Ababa housing project has a mechanism in order to control the quality of products which your enterprise produced					
<b>5</b>	<b>Lead Time of Production</b>					
5.1	Production duration/ lead time/ of production has an impact on the supply chain integration of your enterprise and Addis Ababa housing project					
5.2	A delay on inbound or outbound logistics activities between your organization and Addis Ababa housing projects					
5.3	Your enterprise has use demand chain production strategies in the production of activities					
5.4	Your enterprise uses just in time delivery of products after producing construction materials					
5.5	Your enterprise has extra costs due to delay of productions or your income will reduce due to delay					
<b>6</b>	<b>Supply Chain Performance</b>					
6.1	Your measurement of customer satisfaction with respect to quality are effective					

6.2	Your measurement of customer satisfaction with respect to perfect order fulfillment are effective					
6.3	Your enterprise effective with respect to labour productivity					
6.4	Your enterprise effective with respect to reduction of supply chain costs					
6.5	Your enterprise efficient on asset utilization					
6.6	Your enterprise effective on inventory management					
6.7	There is facilitated transaction of money with your enterprise and Addis Ababa housing project.					
6.8	Decisions are made on time to your enterprises					
6.9	You can produce construction materials with high speed					

**PART III:- Interview Questions**

1. What would be the factors that reduce production performance on your enterprise interfaces on production of construction materials?

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2. What mechanisms your enterprise uses in order to solve the factors?

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3. What could be the government involvements on the performance of construction material production on your enterprise?

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4. How do you handle the interruption of production with breakdown of machinery or other factors happen?

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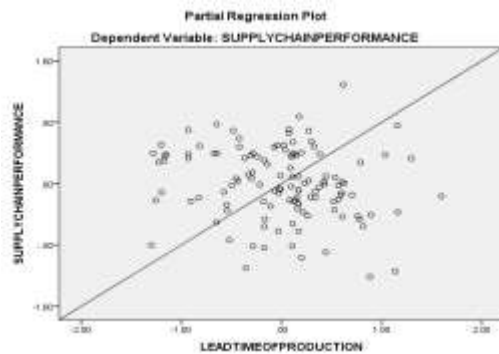
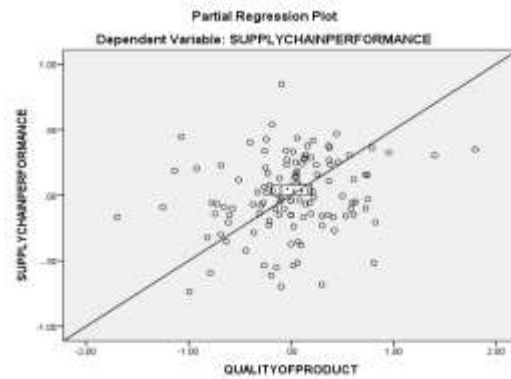
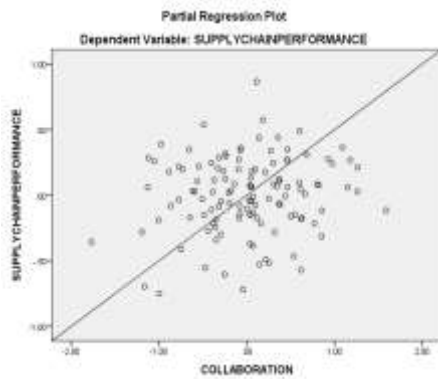
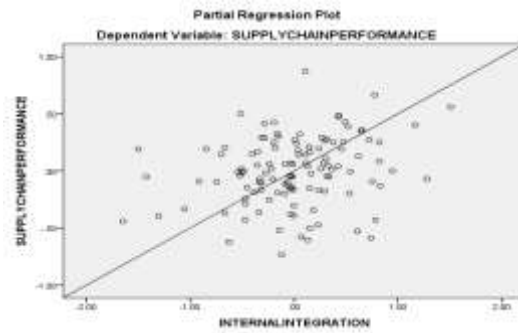
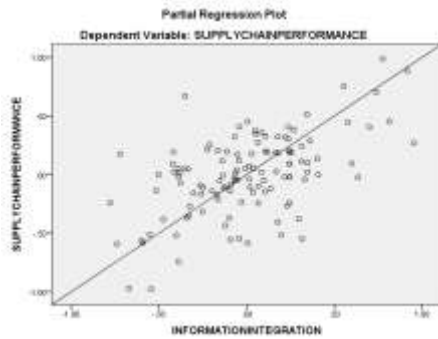
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## Appendix B: Regression Assumption

### 1. Linear regression Assumption

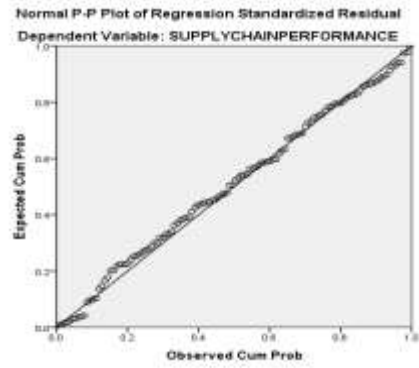
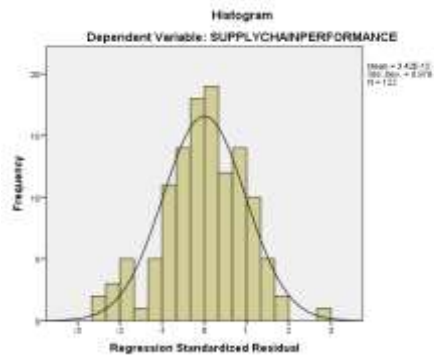


### 2. Multi-Collinearity Assumption

		<b>coefficients<sup>a</sup></b>	
Model		Collinearity Statistics	
		Tolerance	VIF
1	INFORMATIONINTEGRATION	.225	4.438
	INTERNALINTEGRATION	.339	2.949
	COLLABORATION	.386	2.588
	QUALITYOFPRODUCT	.277	3.616
	LEADTIMEOFPRODUCTION	.374	2.677

a. Dependent Variable: SUPPLYCHAINPERFORMANCE

### 3. Normality assumption



### 4. Homoscedasticity Test

