ASSESSMENT OF LIMESTONE DISTRIBUTION EFFECTIVENESS: THE CASE OF GUDER LIMESTONE FACTORY.

By

Adugna Demeke Geletu

A Thesis submitted to the School of Graduate Studies of the Addis Ababa University School of the Commerce for the Partial Fulfillment of the Requirements for the Degree of Master of Arts in Logistic and Supply Chain Management

Advisor: Tarku Jebena (PhD)

February, 2021

Addis Ababa, Ethiopia

ASSESSMENT OF LIMESTONE DISTRIBUTION EFFECTIVENESS: THE CASE OF GUDER LIMESTONE FACTORY.

By

Adugna Demeke Geletu

A Thesis submitted to the School of Graduate Studies of the Addis Ababa University School of the Commerce for the Partial Fulfillment of the Requirements for the Degree of Master of Arts in Logistic and Supply Chain Management

February, 2021

Addis Ababa, Ethiopia

Approval Sheet

The undersigned certify that they have read and hereby recommend to the School of Graduate studies of the Addis Ababa University School of Commerce to accept the Thesis submitted by Adugna Demeke and entitled: Assessment of Limestone Distribution Effectiveness: The Case of Guder Limestone Factory**,** in partial fulfillment of the Requirements for the Degree of Master of Arts in Logistic and Supply Chain Management

Submitted by:

Full Name: Adugna Demeke Geletu

Signature: _____ Date: _____

Approved by Board of Examiners:

Name of Advisor: Tarku Jebena (PhD)

Signature: _____ Date: _____

Name of External Examiner: Nakachew Bashu (PhD)

Signature: _____ Date: _____

Name of Internal Examiner: Shiferaw Mitiku (PhD)

Signature: _____ Date: _____

Declaration

I, Adugna Demeke, do hereby declare that this thesis entitled “Assessment of Limestone Distribution Effectiveness: The Case of Guder Limestone Factory, West Shewa Zone, Oromia National, Regional State” is my original work and that all the sources of materials used for the study have been duly acknowledged.

This study has not been submitted, by any other person for an award of degree in any other university or educational institution.

Name: Adugna Demeke Signature_____

Advisor: Tarku Jebena (PhD) Signature_____

February, 2021

Statement of Certification

This is to certify that the thesis carried out by Adugna Demeke on the topic entitled; “Assessment of Limestone Distribution Effectiveness: The Case of Guder Limestone Factory, West Shewa Zone, Oromia National, Regional State” is his original work and is suitable for submission for the award of Masters of Arts Degree in Logistics and Supply chain Management.

Advisor: Tarku Jebena (PhD)

_____

Date and Signature

ACKNOWLEGEMENT

I have dimensionless respect for my advisor and instructor Dr. Tarku Jebena. I appreciate how you made things simple and understandable.

I have enormous appreciation for Mr. Yohannis Geleta for his endless effort in transferring knowledge.

My special thanks also go to my dear wife, Abezash Tesemma not only for this study, but also for the motivation and commitment in my entire life. I would also especially like to thank my sons Rabirra Adugna, Kenna Adugna and Sinbone Adugna, for their endless patience, understanding and support throughout my work.

Finally, I want to thank all people in one way or another who have provided me help and moral support, in the accomplishment of this study.

ABBREVIATIONS/ACRONYMS

ADF	Africa Development Fund
CSA	Central Statistical Agency
DA	Development Agent
FGD	Focus Group Discussion
FIFO	First in, first out
FTC	Farmers Training Centre
GDP	Growth Domestic Product
GLF	Guder Limestone Factory
GOs	Government Organizations
GTP-II	Gross and Transformation Plan-II
KII	Key Informant Interview
MDG	Millennium Development Goal
NGOs	Non-Governmental Organization
OBANR	Oromia Bureau of Agriculture and Natural Resource
ROI	Return on Investment
SCM	Supply Chain Management
WAO	Woreda Agriculture Office

TABLE OF CONTENTS

List of Table

LIST OF FIGURES

Abstract

The purpose of distribution is fundamentally concerned with ensuring that products reach target customers in the most direct, in the right quantity, at the right time, and cost-efficient manner. Distribution is mainly designed to flow the products through the best configuration of the network to fill customers' demand with minimum total cost. Most activities involved in this process include order handling, information processing, inventory control, storage, and transportation. However, distribution effectiveness in supply chain management is affected by different factors. The main objective of this study looked into assessing and identifying challenges that affect the limestone distribution effectiveness in supply chain management, the case of the Gudar lime factory, West Shoa Zone. For this research objective, the study adopted a qualitative and quantitative method. However, the primary data were collected from 95 employees working in Gudar limestone factories, woreda agriculture office, Primary cooperative agency, and Kebele administration by using Likert scale type questioner as measuring instrument collection of data. Then, the collected data were analyzed using descriptive and inferential statistics. The finding of the study indicated that the limestone distribution effectiveness in supply chain management affected by lack of coordination among stakeholders, lack of fulfillment of demand request, lack of sufficient warehouse construction, lack of awareness on inventory and warehouse management, lack of appropriate dispatching procedure; poor transportation availability and carrying capacity, poor road network, and lack of using information technology for detecting truck location.

According to FGD, Key informant interview and physical observation indicated that the limestone distribution from the factory warehouse to the Woreda agriculture office and the cooperative agency was taken as a direct distribution method and implemented by government organizations. There is no whole sealers or retailer between the factory and the Woreda Agriculture and the cooperative agency.

Key Words: Distribution Effectiveness, limestone, GLF,

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

In a supply chain system, distribution contributes a considerable amount to supply chain performance. Distribution plays a significant role in the customer's responsiveness and ability to deliver products from manufacturers to satisfy customers' requirements, such as lead time and product availability which are also identified as the main parameters in a competitive market (Nabhani and Shokri, 2009). Besides, the distribution also generates roughly 20% of manufacturing costs and for commodity products, it can be higher up to 30% of production and selling costs (Russel and Taylor, 2009). Distribution is mainly designed to flow the products through the best configuration of the network to fill customers' demand with minimum total cost (Ambrosino and Scutell, 2006). Distribution management may involve a diverse range of activities and disciplines including: detailed logistics, transportation, warehousing, storage, inventory management as well as channel management including selection of channel members and rewarding distributors (Armstrong *et al.*, 2014).

Determining the right number of facilities and locations, selection of a distribution configuration is an essential policy for every company and supply chain. This policy is challenging due to some conflicting aspects such as the warehouse and transportation costs (Benjaafar and Elhedhli, 2008). Although there is a tendency to reduce the use of more facilities or more stages in the distribution to avoid extra expenses, involving more entities in a distribution system is necessary to reach a wider market geographically dispersed locations. Rushton et. al., (2010) create more challenges to manage the system properly, particularly in the supply chain context.

Distributors are responsible for the distribution of finished products to the consumer as well as the public. The distribution business is managed by individuals, departmental stores, specialty stores, and discount stores. This, coupled with the fact that firms are

now trying to implement specific distribution strategies and standards upon their unique set of various distribution strategies and practices available with the view to establishing the strategy or practice, which has the most influence on performance.

Kotler and Keller (2011) described many companies do not sell their products directly to end-users. In mass production and consumption industries, particularly many manufacturers rely on distributors, representatives, sales agents, brokers, retailers, or some combination of these intermediaries to distribute their products (Hughes and Ahearne, 2010). On the same note, the Limestone product is not an exception. These intermediaries perform a variety of functions and constitute a marketing channel, which also refers to a trade channel or distribution channel (Kotler and Keller, 2008).

Various kinds of distribution strategies are regularly used and played a crucial role in the distribution company. These are among the well-known factors of distribution effectiveness, distribution function, distribution channel, physical distribution, storage, packing, labeling, and transportation. The importance of having well-standardized distributors have grown in recent days, due to increasing size, improved level of product knowledge, technical competence, specialization, and various other factors. Therefore, the divergent objectives of the distribution effectiveness standard are to describe the required structure, standards, and processes. Moreover, it provides a guide for every aspect of the distributor business and should form the basis of a successful partnership between the distributor and the manufacturers. Consequently, there is a knowledge gap to fill, and this Research paper was an attempt to contribute to this effort, yet it is not easy to find research findings on the subject, especially here in Ethiopia.

1.2. Statement of the Problem

Agriculture accounts for 46. 3 percent of the nation’s Gross Domestic Product (GDP), 83.9 percent of exports, and 80% of the labor. Small holder farmers operating under entirely rain-fed conditions dominate the sector and it accounts for 95% of the total area under crop cultivation (ADF, 2002). Despite its role, the sector is characterized by low productivity and high exposure to risk due to adversely varying environmental conditions (Bekele and Holder, 1998). For this challenging output of agriculture in the region, various explanations can be postulated. One of the reasons for the decrease in

agricultural production is resource depletion. Research findings have shown that resource degradation, particularly soil degradation in the form of nutrient depletion, is a major cause of the country's decline in agricultural production (Bekele and Holder, 1998). Soil acidity is now a serious threat to crop production in the high land of Ethiopia in general and in Oromia in particular. Currently, it is estimated that about 41% of the total cultivated land in Ethiopia is affected by soil acidity and 28% of cultivated land is highly acidic, (Abdenna *et al*., 2007; Taye, 2008) which covers Improving the soil pH application of lime, nitrogen, and phosphorus has increased yield by three folds and 30-40% increased by liming alone (James et al., 2018). The Oromia Bureau of Agriculture and Natural Resources (OBoANR) will therefore seek to ensure the effective and high-performance management of integrated soil fertility by restricting the use of calcium and magnesium-rich materials, Guder Limestone factory have been attempting to improve the distribution of lime at the right quality, quantity, and affordable price. To the best of my knowledge, I did not come across with a similar study that addressed the limestone distribution effectiveness around the study area; however, the researcher wants to identify the challenges that hinder the effective distribution of limestone and identify the causes that delay limestone distribution effectiveness that implies a slow response to farmers. Hence, this study looked into assessing the distribution effectiveness of limestone and its challenges that the limestone distribution effectiveness in the limestone supply system of the Gudar Lime Factory, West Shoa Zone, Oromia National Regional State, and recommends future research directions.

1.3. Research Questions

The questions the study will answer are the following:

1. What are the challenges that affect the effectiveness of the limestone distribution in the Guder limestone factory?

2. What distribution method was the Guder limestone factory used?

1.4. Research Objectives

The general objective of this study is to assess limestone distribution effectiveness in the study area.

The specific objectives of the study are:-

1. To assess the challenges that affect the limestone distribution effectiveness in supply chain management, the case of the Gudar limestone factory, West Shoa Zone.
2. To identify the distribution method and its characteristics that the Guder limestone factory used.
3. To identify the major factors that hinder the limestone distribution effectiveness in the supply chain of Gudar limestone factory.

1.5. SIGNIFICANCE OF THE STUDY

The finding of this research would contribute primarily to Guder Limestone factory, in briefing the strengths and weakness of the limestone distribution effectiveness in the supply chain of the limestone distribution system, prove recent information on factors affecting the effectiveness of the limestone distribution, secondly the finding contributes to the Agriculture and Natural resource office informing what is the cause for the delay of limestone distribution. Thirdly, these findings contribute to the government's how to ensure proper limestone production, distribution, and application by the farmers to increase production and productivity of agriculture and the needs of the full acid soil reclamation on sustainable mechanisms. Besides, the research finding could be used to raise awareness among different stakeholders and development of enhanced government services that facilitate farmer awareness, local demonstrations, assistance with last-mile delivery, and the availability of financing and credit to smallholder farmers for lime procurement and application and also serve as background information for others who seek to do further related research in the area.

1.6. SCOPE OF THE STUDY

The scope of this work is to study the challenges that affect the limestone distribution effectiveness in supply chain management of the Gudar lime factory. This implies that the study was focused on the distribution effectiveness and functioning of the company and the relationship among the actors within the distribution channels. Besides, it covers seven woredas which were the users of limestone for improving agricultural production and productivity.

The focus of this research was to assess the distribution effectiveness and ensuring the supply chain option and quantity of limestone products of the Gudar limestone factory during all aspects of the distribution process. More specifically, the study was focused on two scopes the first one being the geographic scope. The study only focuses on seven Woredas in the West Shoa Zone, Oromia National, Regional State, which are the users of limestone for agricultural production purposes. The second scope of the study was the conceptual scope. The study focuses on the limestone distribution effectiveness in seven Woreda of the West Shoa Zone. The population of the study consists Expert of selected Woreda Agriculture office, Development Agent Office (FTC) Primary farmer's cooperatives, and Kebele administration and or agro-dealers. Furthermore, institutions involved directly or indirectly in limestone distribution will be examined to generate relevant data

1.7. LIMITATION OF THE STUDY

Due to resource constraints, the analysis is limited in terms of geographical area, methodology, variables, and resources used (money, time, and experience). It is therefore limited to addressing the objectives set out in this research paper, which is the assessment of the effectiveness of the limestone distribution supply system of the Guder Limestone Factory, West Shoa District, Oromia National Regional State.

1.8. Definition of Terms

Distribution: - is the process by which all the logistics involved in delivering a company's products or services to the right place, at the right time, for the lowest cost (Weiss and Gershonm, 2002)

Effectiveness: Effectiveness is defined as the resource getting ability, and refers to an absolute level of output attainment, it is the extent to which the logistics function's goals are accomplished (Graeml, &Peinado, 2011; Fugate et al., 2010)

Agricultural Sectors: are the agriculture and Natural Resource office, primary farmer's cooperative agency, and farmers training centers which are involved in improving agricultural production.

P**erformance**: is the accomplishment of a given task measured against preset known standards of accuracy, completeness, cost, and speed (business dictionary.com, 2018).

Ethics: are the norms or standards of conduct that distinguish between right and wrong (business dictionary.com, 2018).

Validity: Degree to which an instrument, selection process, statistical technique, or test measures what it is supposed to measure (Hamed T., 2016).

Reliability: Consistency and validity of test results determined through statistical methods after repeated trials (Hamed T., 2016).

Consistency: Logically ordered and/or following the same pattern (Hamed T., 2016).

Precision: is a description of random errors, a measure of statistical variability (Hamed T., 2016).

1.9. ORGANIZATION OF THE STUDY

This study was organized into five Chapters; the first chapter includes the Background of the study, Statement of the problem, Research questions, Research objectives, Significance of the study, Scope of the study, Limitation of the study, and Definition of terms and Organization of the study. Chapter two was a review of related literature (theoretical and empirical). Chapter three was the research methodology (research design, the population of the study, sampling techniques, sample size, data collection instruments, the data collection procedures, and ends with data analysis approach). Chapter four was the results of the research and the discussion of the findings. Finally, the fifth chapter was focused on the summary of the major findings, conclusion, and recommendations based on the research outcome.

CHAPTER TWO

2. REVIEW OF LITERATURE

This section reviews related literature on the assessment of limestone distribution effectiveness, in the Guder limestone factory supply system. Accordingly, the related study conducted in some different countries was reviewed.

2.1. Theoretical Literature Review

2.1.1. Overview of Limestone Distribution

The distribution process has the end objective of delivering limestone at the right time and in the right quantities to satisfy farmers' facility demands; it entails various activities along the supply chain, from demand planning to the physical delivery of agricultural input to the agriculture facility.

The distribution of agricultural inputs is an important activity in the supply chain and involves several players. It consists of procuring, holding and supplying of limestone products. Distribution activities are carried out by manufacturers, importers, wholesalers/distributors, retailers and other persons authorized to supply agricultural input products in the public and private sectors (Belson, 2005).

Limestone distribution has never been just about delivering. It is about getting the right quantity product, at the right time to the right place safely and efficiently. However, different information technologies such as product identification, usage related information, and electronic identification have been applied to facilitate the rapid distribution of the limestone in the supply chain (Belson, 2005).

2.1.2. Distribution Effectiveness Activities

For this study, the effectiveness of limestone distribution was considered and discussed. Various kinds of distribution strategies are regularly used and played a crucial role in distribution effectiveness.
Distribution effectiveness refers to the process of overseeing the movement of goods from supplier or manufacturer to point of sale. It is an overarching term that refers to numerous activities and processes such as packaging, inventory, warehousing, supply chain and logistics.

Distribution effectiveness is an important part of the business cycles for distributors. The profit margins of businesses depend on how quickly they can turn over their goods. The more they sell, the more they earn, which means a better future for the business. Having successful distribution effectiveness is also important for businesses to remain competitive and to keep customers satisfied.

Distribution effectiveness is critical to a company's financial success and corporate longevity. Executing it successfully requires effective management of the entire distribution process. The larger a corporation or the greater the number of supply points a company has, the more it will need to rely on automation to effectively manage the distribution effectiveness. Modern distribution management encompasses more than just moving products. It also involves gathering and sharing relevant information that can be used to identify key opportunities for growth and competitiveness of distribution. Most progressive companies now use their distribution forces to obtain market intelligence which is vital in assessing distribution effectiveness (Douglas and Lambert, 1997)

Distribution effectiveness is the process of making a product or service available for use or consumption by a consumer or business user, using direct means, or using indirect means with intermediaries. Or are the movement of goods and services from the source through a distribution channel, right up to the final customer, consumer or user, and the movement of payment in the opposite direction, right up to the original producer or supplier. An order or pattern formed by the tendency of a sufficiently large number of observations to group themselves around a central value (Wren, 2007).

Distribution effectiveness is the process of making a product or service available for the consumer or business user who needs it. This can be done directly by the producer or service provider, or using indirect channels with distributors or intermediaries. Decisions about distribution need to be taken in line with a company's overall strategic vision and mission. Developing a coherent distribution plan is a central component of strategic planning. At the strategic level, there are three broad approaches to distribution, namely mass, selective or exclusive distribution.

2.1.3. Customer Service Management Activity

Customer Service management is that the firm’s face to the customer service provides the customer with a period on secure shipping dates and merchandise handiness through interfaces with the firm’s functions like the offer and logistics. The customer service method might also embrace aiding the customer with product applications (Douglas and Lambert, 1997). Customer relationship management provides the structure for a way the relationships with customers may be developed and maintained. Management identifies key customers and customer teams to be targeted as a part of the firm’s business mission. The goal is to section customers supporting their price over time and increase client loyalty by providing custom-made products and services, customer groups work with key customers, improve processes, and eliminate demand variability and non-value-added activities (Douglas and Lambert, 1997).

2.1.4. Inventory Management Activity

The inventory management policy affects how efficiently a firm deploys its assets in producing goods and services. Developing effective inventory control systems reduces waste and stock outs, manufacturing or service organizations is a complex problem.

The right amount of inventory supports manufacturing, logistics, and other functions, but inventory is a sign of poor inventory management that creates an unnecessary waste of scarce resources. Besides, excessive inventory adversely affects financial performance. The need for better inventory management systems continues to challenge operations managers (Wisner & Leong, 2012).

To ensure the supply of good quality lime and avoid the financial penalties of a loss of lime conditions, warehouse managers must understand the risks of prolonged storage and manage their lime stocks in a way that mitigates these risks. Where possible warehouse managers should apply the principle of First in First out (FIFO), so the oldest stocks are discharged first.

2.1.5. Demand Management Activity

Customer demand is out and away from the biggest supply of variability, and it stems from irregular order patterns. Given this variability in client orders, demand management is essential to effective distribution. Demand management provides chain management method that balances the customer's requirement with the capabilities of effective distribution. With the right process in place, management will match provide with demand proactive and execute the arrangement with least distributions. The method isn't restricted to forecasting. It includes synchronizing provide and demand, increasing flexibility, and reducing variability. A good demand management system uses point-of-sale and "key" customer data to reduce uncertainty and provide economical flows throughout the provision chain selling requirements Associate in Nursingd production plans ought to be coordinated on an enterprise-wide basis. Thus, multiple sourcing and routing choices are thought of at the time of order receipt which permits market necessities and production plans to be coordinated on an organization-wide basis. In advanced applications, client demand and production rates are synchronized to manage inventories globally (Douglas &Lambret, 1997).

2.1.6. Order fulfillment activity

Order achievement may be a key manner in handling the delivery chain. Its customers' orders that positioned the delivery chain in motion, and filling them successfully and efficiently is step one in offering customer support. However, the order achievement manner includes coming up with a community and a manner that allows an organization to fulfill patron requests even as minimizing the full added cost. Most of the cutting-edge distribution community research use parameters primarily based mostly totally at the customer support stage, that is the carrier insurance place consisting of the wide variety

of distribution facilities and therefore the stock stage with minimal overall fees (Amiri, 2006, Benjaafar et al., 2008, 2006 and Selim and Ozkarahan, 2008). However, most effective a confined wide variety of researchers keep in mind shipping time with minimal overall fees or keep in mind all parameters consisting of the stock stage, lead time, carrier insurance areas, and fees at the same time (Altiparmak et.al., 2006 and Farahani, and Elahipanah, 2008).

2.1.7. Transportation and Distribution of Limestone

In this state of affairs of globalization, the importance of supply management has an adult in numerous areas within the case of most industries, logistics facilitate to optimize the prevailing production and distribution processes supported similar resources through management techniques for promoting the potency and aggressiveness of enterprises (Santosh *et. al.*, 2014). The transportation is that the key part in the logistics and provide a chain that joints the separated Transportation occupies third of the quantity in the logistics prices and transportation systems influence the performance of logistics systems massively (Santosh et al., 2014). Transporting is needed in the whole production procedures, from manufacturing to delivery to the ultimate Therefore, transportation refers to the movement of product from one location to another, because the products are seldom made and consumed within the same location (Tsao & Lu, 2012), it's just about impossible in today's economy for a firm to operate while not the help of transportation.

The backbone of the whole supply chain is that the transportation management that creates it possible to attain the well-known seven Rs- the proper product in the right amount and at the proper condition, at the right place, at the right time, for the right customer, at the right Transportation may be a vital a part of any international supply effort attributable to the long distances that may separate a firm from its customers. A transportation system should match inside alternative logistics activities. Historically, national governments have exercised tight economic management over transport organizations, either through direct company possession, or through laws supposed to manage the method those businesses were run (Santosh et al. , Transportation is an important operate in logistics for delivering the products, however, in several of the general public sectors, enough attention isn't given to the event of the transport system specifically for delivering. However, the transportation wants higher management with

better security, and potency to scale back lead-times, which may directly impact the quantity of inventory the system has to carry out. In many countries, transportation is the weakest link that self-addressed impacts the inventory, order management, and client service (Sangeeta and Nadeem, 2004).

Transportation systems can now not be managed on an ad-hoc but ought managed as a regular delivery system. This suggests that programs demand to either invest in transportation systems or obtain choices to source this operate non-public corporations that may guarantee timely regular delivery (Sangeeta and Nadeem, 2004). Developing an economical and a property lime delivery system is vital that balances price-effectiveness with widespread farmer adoption and job creation by using different procedures for distribution, corresponding to collection, delivery, outsourcing, or public-private partnerships.

Transportation cost accounts for regarding 10-20% of the stock value therefore, the distribution systems ought to be optimized (Anna, 2013). The delivery schedule ought to be established and routes planned, taking native wants and conditions. Security risks ought to even be taken into consideration once designing the schedule and routes of the delivery.

2.2. Empirical Review of Literature

This section reviews literature from studies carried out related to the assessment of limestone distribution effectiveness, the case of Guder limestone Factory, West Shoa Zone, Oromia National Regional State.

Joel (2010), challenges that facing supply chain management, in the case of oil marketing companies in Kenya, founds that long lead times, lack of continuous supply of petroleum products, and high distribution cost of petroleum.

Ebsittu (2013), a study of the logistics management practice of Total Ethiopia S.Co founds that the transportation management, inventory planning, supply management, long import process, warehouse design, and customer service satisfaction level need

some improvement from the previous practice to reduce the total logistics costs of the company.

Abel (2017) the study of Logistics Management Practice in Awash Bank S.Company found that transportation management, customer service management; inventory planning, management, warehouse management, poor transportation and distribution management, lack of adequate and experienced staffs, poor customer service management about logistics, lack of technology support/innovation, poor warehouse management frequent stock out and poor procurement have been the major problems of the company that needs due attention.

Demeke (2019) the study of the factor affecting the effectiveness of pharmaceutical distribution, the case of Ethiopian pharmaceuticals supply agency Addis Ababa branch, founds that productivity indicator for inventory control practice, quality, time and productivity indicator for order fulfillment, communication, and customer service management, productivity indicator for transport and distribution system wa s positively related to the effectiveness of pharmaceutical distribution in organizational in strong level.

2.3. Conceptual Framework of the Study

The chart below shows the relationship of variables that play a role in distribution effectiveness as the dependent variable and the benefits of overcoming the challenges of supply chain distribution effectiveness as the independent variables.

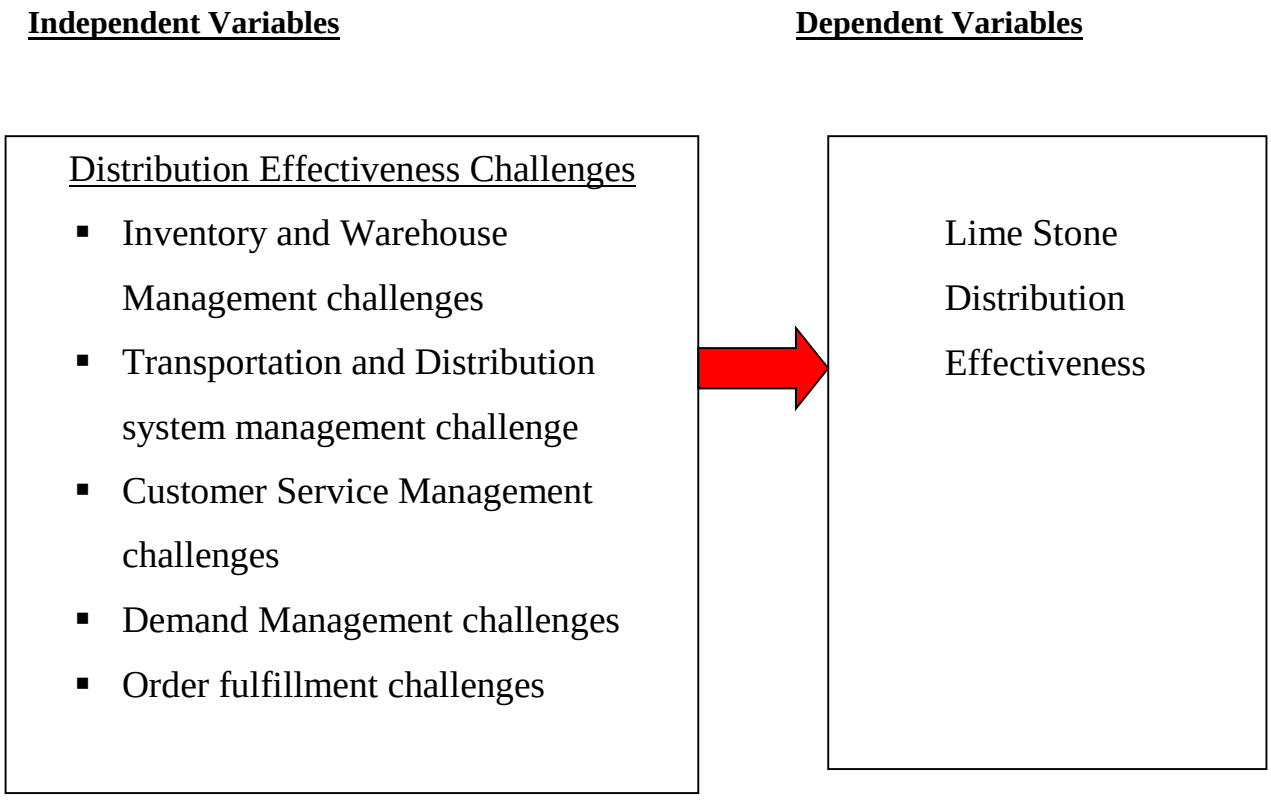


Figure 1: Conceptual Framework adapted from Taylor (2005)

CHAPTER THREE

3. RESEARCH METHODOLOGY

Before research is undertaken, it is important to create guidelines that give orders and direction for the research project. So that, it assists the researcher to focus on the research inquiry (Best, 2003). This has done through research methodology. Thus, it comprises research approach, types of research, time dimension, research methods, sampling design, source of data, operational variables, and the method data analysis presentation will be discussed in the subsequent sections.

3.1. Description of the study area

The Gutter Limestone Factory is found, in the West Shoa Zone, of Oromia National Regional State. As a study area, the Gudar Limestone factory was selected purposefully because Gudar Limestone factory is the only government factory established by Oromia Agriculture and Natural Resource Bureau in 2002 E.C. to fasten the Growth and Transformation Plan in the agricultural sector by designing and implementing improved soil fertility management to increase production and productivity through the distribution of lime to different woredas, capacitating the agricultural experts and farmers at all levels for proper implementation and enhancement of soil productivity.

According to the Oromia Research Institute report, the Woredas in West Shoa have soil acidity problems. For this reason, the distribution of limestone activity is mandatory to overcome the problems. From the 22 woredas found in the West Shoa Zone, the study covers 7 words, which were supported by the Agricultural Growth program. In these seven woredas, there are 177 kebeles, 170 farmers training centers, 59 primary farmers' cooperative agency centers, and 114,278 household beneficiaries. The vision of the company is to improve the livelihoods of farmers by supplying and distributing lime products and its mission is to avail affordable and quality limestone products sustainable to all farmers. The study focused on the effectiveness of limestone distribution in the Guder limestone factory.

3.2. The Research Approach

This study used, both quantitative and qualitative research methods to assess the limestone distribution effectiveness in seven Woredas in West Shoa Zone, using various research techniques, such as closed-ended questionnaires for quantitative research approach, and focus group discussion (FGD), unstructured interview, and observation for qualitative research approach.

3.3. Research Design

The design of this study was descriptive and explanatory research design. Descriptive research design is considered best for observing, describing, recording, analyzing, and reporting conditions that exist without alterations, whereas explanatory study is examining the relationships between variables

3.4. Study population

Target population refers to the aggregation of elements from which the sample was selected (Barbie, 2010). The total population of the study is 292. (Seven Worda agricultural Expert and Management staff (96), Development agent who teaches farmers by the adoption of limestone in FTC and on model farmers plot (133), unions, public association and primary farmers cooperative agency (35) and kebele administration and agro-dealer (28).

3.5. Sample size

The sample size was taken from the target population of 292 seven woreda agriculture office, Development agent, primary farmers cooperative agency, and Kebele administration that workings with Gudar limestone factory.

The sample size of the study area was calculated by using formulas of sample size determination cited by Yamane (1967) suggested simplified formula for calculating sample size when population size is finite. According to him, for a 95% confidence level and p = 0 5, size of the sample should be:-

$$n=\frac{N}{1+Ne^2}$$

Where, N is the population size and e is the level of precision. Let this formula be used for population, in which N =292 with ±5% precision. Assuming 95% confidence level and p =0.5, we get the sample size as

$$n=\frac{292}{1+292*0.05^2}$$

$$n=\frac{292}{1+292*0.0025}$$

$$n=\frac{292}{1.73}$$

$$n=169$$

According to Singh and Masuku (2014), if the population is small, then the sample size is reduced slightly. This is because a given sample size provides proportionately more information for a small population than a large population. The sample size (n0) can be adjusted using this equation:

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Therefore, in the study,

N= is the population size

n =is the sample size

No= is Singh and Masuku sample size recommendation

This adjustment can substantially reduce the necessary sample size for small populations. And is also called population correction (Singh, A., and Masuku, M. 2014). Therefore, the sample size of this study was as follows:

$$\frac{169}{1+\frac{(169-1)}{292}}$$

$$\frac{169}{1.575}$$

=107

n=107

3.6. Sampling Techniques

According to Singh and Masuku (2014), the stratified random sampling method was useful for data collection. If the population is heterogeneous, the entire heterogeneous population is divided into some homogeneous groups, usually known as Strata, each of these groups, homogeneous within itself, and units sampled at random from each of these strata. The sample size in each stratum varies according to the relative importance of the stratum in the population. The technique of drawing this stratified sample is known as Stratified Sampling (Singh and Masuku, 2014). In other words, stratification is the technique by which the population is divided into subgroups/strata. Sampling will then be conducted separately in each stratum. Strata were chosen because the evidence is available, which was related to the outcome. Therefore, for this study, the researcher used a stratified simple random sampling technique to select 107 representatives from the total population. The information was collected from limestone distribution actors and Gudar limestone factory internal staff. Therefore, to achieve efficient results, stratified sampling was used to ensure a larger sample in the study. The target population for the study was divided into four strata based on the level of limestone distribution effectiveness of the study area. After dividing the population, into strata, the researcher was drawn a random sample from each sub-population.

Table 1, bellows show the total sample used in the study. To accomplish the research effectively, the researcher selects the following respondents as a sample size

Table 1. Sample Size of the Target Population

No	Strata group	Sampling Technique	Number of Population	Sample Drawn
1	Woreda Agriculture office of 7 Woredas	Stratified S.T	96	35
2	Woreda Development Agent	Stratified S.T	133	49
3	Unions, Public association, and Primary farmers cooperative agency	Stratified S.T	35	13
4	Kebele administrative and agro-dealers	Stratified S.T	28	10
	Total		292	107

Source: Survey data of 2020

3.7. Data Source and Types

3.7.1. Primary Data

Primary data are those collected afresh and for the first time, and thus happen to be original. These could be collected using observation, interviews, questionnaires, and focus group discussion schedules (Kothari, 2009).

3.7.2. Secondary Data

Secondary data were obtained from reports of the woreda Agricultural Development Office, Gudar limestone factory, Regional Bureau, NGOs, and other published and unpublished materials.

3.8. Data collection procedure

The researcher collects data from primary sources. The primary data was collected through questionnaires with open and closed-ended questions. Open-ended questions can be employed both to gather information and to motivate respondents (Ports, 2011). In this work, the researcher used open-ended questions to avoid steering respondents in a particular direction.

2.1. Ethical Considerations

Ethics are the norms or standards of conduct that distinguish between right and wrong. Approval to conduct this study was sought from Addis Ababa university school of commerce. For this research, the researcher got permission from Gudar lime Factory (GLF), Woreda agriculture office, Development Agent (FTC), primary farmer's cooperative agency, and kebele administration in West Shoa Zone. The researcher informed participants who volunteers to participate in the evaluation about the case of data collection, its purpose of the research, and are free to withdraw their participation at any time, and questionnaires were distributed without negatively impacting their involvement in future services or the current study.

3.10. Method of Data Analysis and Presentation

In analyzing data, both qualitative and quantitative data analysis approaches were employed depending on the data collected. The researcher used descriptive statistics and inferential statistics for examining the relationship between variables for data analysis, which is an explanatory research design to analyze data to allow for the meaningful description of data collection using statistics. The data collected through questionnaires coded, interpreted, and entered into the statistical package for social science (SPSSV-20) software for analysis.

3.11. Validity and Reliability Test

3.11.1. Validity

Validity implies the degree to which a question measures what it's intended to measure. The questionnaires were developed based on previous studies and a review of related literature.

3.11.2. Reliability Test

Reliability refers to the extent to which the research findings can be replicated as well as the consistency of the findings (Merriam, 1998). Yin (2014) also argues the objective of reliability is to reduce the errors and biases in the research study. The data reliability test was measured using Cronbach's Alpha. Cronbach's Alpha is also calculated as part of the reliability test to assess how valid the results and should produce similar generalized results if the sample size were increased (Field, 2006). The Alpha value ranges from a maximum of 1.0 for a perfect score to a minimum of zero, a good measure of the alpha should be 0.70 or higher (Neuman, 2007).

Table 2. Cronbach's Alpha

Construct	Variables	Number of Items	Cronbach's Alpha
Limestone Distribution Effectiveness	Inventory control and Warehouse management Effectiveness	16	0.863
	Order fulfillment and Customer Service Effectiveness	7	0.765
	Transport and Distribution System Effectiveness	12	0.821
	Total Cronbach's alpha of all	35	0.816

Source: Survey data, 2020

CHAPTER FOUR

4. DATA ANALYSIS AND PRESENTATION

This chapter presents the data analysis, result, and interpretation of the research. The analysis is conducted in descriptive and inferential statistics examining the relationship between dependent and independent variables.

4.1. Descriptive Analysis

The questionnaires were administered, and the mass of raw data was systematically organized in a manner that facilitated analysis. All data collected was checked for consistency of responses and cleaned before entry into a computer file. The data were analyzed using statistical methods and the results, displayed using tables, charts, and graphs. In this part of the analysis, the researcher has divided the analyses into two parts. The first part focuses on the demographic information on the respondents, frequencies, and the percentage used for this analysis. The second part focused on descriptive statistics mainly frequencies; percentage, mean, and the standard deviation used to summarize the responses. This study was used to analyze objective (I) assess the challenges that affected limestone distribution effectiveness in supply chain management of Gudar lime factory, objective (II) identify the distribution method that the Guder limestone factory used, and (III) identify the major factors that hinder the limestone distribution effectiveness in the supply chain of Gudar limestone factory. Data were analyzed using Statistical Package for Social Sciences (SPSS) V20.

4.1.1 Demographic Data of the Respondents.

The profile of the respondents was taken from 94 target populations working in the Gudar limestone factory, the woreda agriculture office, the Primary cooperative agency, and the Kebele administration. These demography profiles are summarized into five parts of this survey; respondents' sex, age, education, Organizations, and their position in an organization.

4.1.1.1. Respondents Sex

As indicated in Table 3, below quite clear that out of the total respondents investigated in this study, an overwhelming majority (80.9 percent) of the respondents are males.

Table 3. Sex of the Respondents

Sex	Frequency	Percent
Male	76	80.9
Female	18	19.1
Total	94	100.0

Source: Survey data, 2020

4.1.1.2. Age of the Respondents

As it is clearly shown in Table 4, below, more than 75% of the respondents are between the age of 19 and 35. From this, we can say that most of the respondents are from the younger population.

Table 4. Distribution of sample by age group (%)

Age Group	Frequency	Percent	Cumulative %
19-25	5	5.3	5.3
26-30	40	42.6	47.9
31-35	24	25.5	73.4
36-40	13	13.8	87.2
41-45	7	7.4	94.7
46 and above	5	5.3	100
Total	94	100.0	

Source: Survey data, 2020

4.1.1.3. Educational profile of Respondents.

Education is one of the most important characteristics that might affect the person's attitudes and the way of looking at and understanding any particular social phenomena. In a way, the response of an individual is likely to be determined by his/her educational status and therefore it becomes imperative to know the educational background of the respondents. According to the data collected, most respondents have a good educational background. Hence the variable 'Educational level' was investigated by the researcher and the data about education was presented in Table 5, below.

Table 5. Educational status of Respondents

Education status	Frequency	Percent
Certificate	2	2.1
Diploma	11	11.7
Degree	66	70.2
Masters	15	16.0
Total	94	100.0

Source: Survey data, 2020

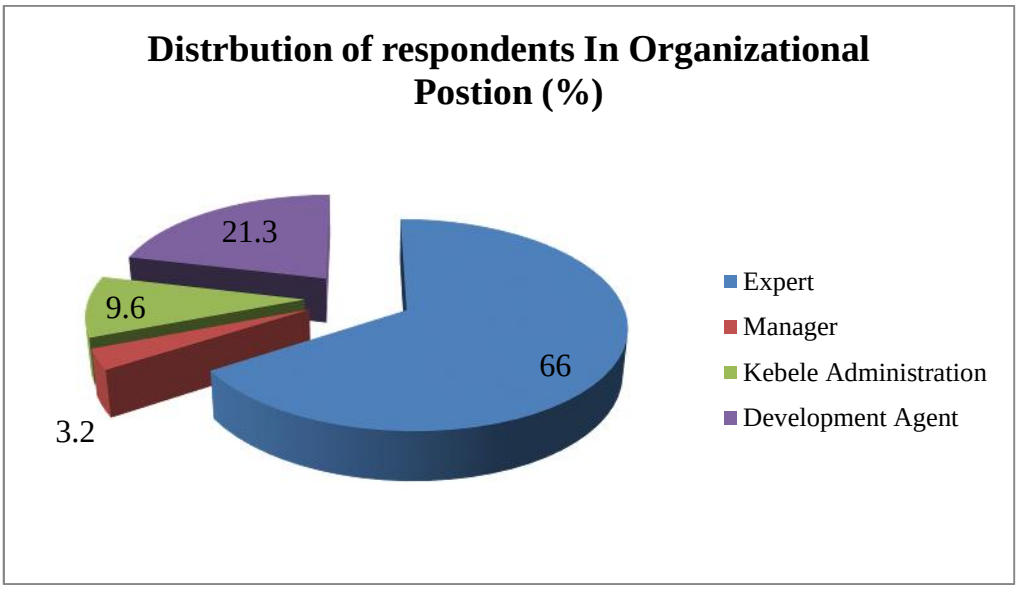
Table 6. Organization of the Respondents

Description	Frequency	Percent
Factory	31	33.0
WAO	43	45.7
Coop	11	11.7
Kebele Adm	9	9.6
Total	94	100.0

Source: Survey data, 2020

The other important factor in the respondents' demographic variable was the respondents' Organization that was used for decision-making and implementation of the various schemes and solving the problems and the difficulties in the organization structure. Table 6, above, describes the organization of the respondents. The respondents from the Woreda Agriculture office and the Factory covered 78.7% of the respondents.

Graph 1 Organizational Position of Respondents



Source: Survey data, 2020

4.1.2. Descriptive Analysis of Variables used

4.1.2.1. Descriptive statistics of Distribution Effectiveness Variables

Specific objective one, the limestone distribution effectiveness was measured by coordination among stakeholders, demand, and request of customers order (amount), direct delivery system, sufficient warehouse, technology, warehouse management practice, and warehouse management training for warehouse operators. The impact of these variables was measured in the Likert scale the effectiveness of the distribution system. The Likert value five (5) was given for strongly agree four (4) agree, three (3) neutral, two (2) disagree, and one (1) strongly disagrees.

Table 7. Distribution effectiveness Indicator mean value by Respondents

NO	**Indicators**	**Number of Respondents**	**Likert Mean Value**	**Std. Deviation**
1	Strong coordination among stakeholders	94	3.19	1.05
2	Demand and request of customers order	94	2.90	1.09
3	Direct product delivery	94	2.97	1.29
4	Sufficient warehouse	94	2.68	1.04
5	Modern technology	94	2.54	1.22
6	Warehouse management practice	94	2.93	0.99
7	Warehouse management raining for warehouse operators	94	2.61	1.00

Source: Survey data, 2020

The distribution effectiveness measured by the seven indicators result based on respondent education status, Organizations, and the organizational position was tabulated below in Table 8. The analysis depicts that those who were the majority of respondents in education, Organization, and Organizational position are Degree holders, Woreda Agriculture office staffs, and Experts respectively.

The First-degree holders rated the existence of strong coordination among stakeholders with 3.3 mean values, which indicates its role in the effectiveness of the distribution system not significant. These respondents were also asked to rate the response to customer requests, whether it is about time and according to their expectation or not?' The result showed that demand is not fulfilled on time and according to the customers' expectations. The average value given for this variable by the degree holders' respondents was 2.79, which showed the dissatisfaction of the customers. For the question about 'the existence of sufficient storage space for the limestone storage, which is one of the critical factors for distribution effectiveness, the respondents responded that there is no sufficient storage. The mean value rated for this variable is 2.61. The warehouse management practice and training about the warehouse management of the

Guder Limestone factory was rated at 2.86 and 2.61 average value by these First Degree holders. This indicates the shortage of skill in warehouse management and the less effort made to improve the skill gap in training. Another variable examined to understand the distribution effectiveness was the direct product delivery from the factory Warehouse to Woreda warehouses, the response showed an average value of 2.95. The value was triangulated with Key informant's discussion. Accordingly, the direct delivery is conditional based on road availability and weather. When roads are only dry weather, road the distribution reaches up to Woreda level, even beyond up to Keble whereas during the rainy season the delivery will be limited up to accessible reaches. Besides, these respondents indicated the poor utilization of technology with an average value of 2.58.

The distribution effectiveness analysis based on the education rated as 2.85 average values while based on the respondent's organization and organizational position analysis rated as 2.88 and 2.75 respectively. In general, the distribution effectiveness was rated with an average value of 2.83, which shows the less effectiveness of the distribution. The detailed analysis based on each education, organization, and organization position is given below in Table 8.

Table 8. Distribution effectiveness indicator mean value based on Categories

Category	Description	Frequency	Strong Coordination	Demand request	Sufficient warehouse	Direct Delivery system	Warehouse Mgt	Technology	Warehouse Mgt training
Education	Certificate	2	2.5	4.0	2.5	4.0	3.0	1.5	2.0
	Diploma	11	2.73	3.0	3.0	2.82	3.18	2.91	2.73
	Degree	66	3.3	2.79	2.61	2.95	2.86	2.58	2.61
	Masters	15	3.13	3.2	2.8	3.13	3.0	2.27	2.6
Organization	Factory	31	3.29	3.1	2.81	3.52	2.97	2.17	2.68
	Woreda Agr. Office	43	3.05	2.65	2.56	2.81	2.84	2.52	2.53
	Cooperatives	11	3.36	3.0	3.0	3.0	3.09	3.09	2.82
	Kebele	9	3.33	3.33	2.44	2.56	3.0	2.69	2.44
Position	Expert	62	3.19	2.92	2.69	3.08	2.89	2.44	2.66
	Manager	3	3.33	2.0	3.0	3.0	2.0	1.33	2.33
	Keble Administrator	9	3.33	3.33	2.44	2.67	3.0	3.0	2.44

	Development Agent	20	3.1	2.8	2.7	2.75	3.15	2.85	2.55

Source: Survey data, 2020

Specific objective two, to identify the distribution method and it's characteristics that Guder limestone factory uses is measured by monitor safety and security of products, FIFO procedure, loading-unloading, stocks renewed according to schedules, proper method to check customer satisfaction, the right place delivery, a distance of delivery and capacity building of the warehouse. Accordingly, the mean Likert value of the indicators showed that the FIFO procedure, the mean value was 3.26, loading and unloading the mean value 3.15, the right place delivery the mean value 3.06 and effect of distance on transportation priority the mean value 3.0, monitoring product safety and security 2.45, stocks renewed according to scheduled date mean value 2.90, a proper method established to check customer satisfaction mean value 2.97 and capacity building of the warehouse the mean value of 2.61. This shows that the FIFO principle is applicable for distribution due to the perishability of the product. The time taken for loading and unloading as a part of the distribution method was explained as normal, which is no delay or not fast. The result of the effect of Woreda warehouse distance from the factory didn't show any signs of the distribution method. There is no established method to measure the existing direct distribution method's convenience for customers with other methods that involve private sectors. Besides, the result showed that there is a minimum effort to improve the existing direct distribution method.

Table 9. Distribution Method Indicators Mean Value by Respondents

No	Item Statistics	N	Mean	Std. Deviation
1	Monitor the safety and security of Products	94	2.45	1.20
2	FIFO Procedure	94	3.26	1.15
3	Time of loading-unloading	94	3.15	1.19
4	Stocks renewed according to schedule	94	2.90	1.10
5	The proper method to check customer satisfaction	94	2.97	1.12
6	The right place delivery	94	3.06	1.14
7	Direct Deliver product (from the factory warehouse to customer warehouse)	94	3.29	1.03
8	Distance of delivery	94	3.00	1.12
9	Capacity building for warehouse	94	2.61	1.00

Source: Survey data, 2020

The FGD, Key informant Discussion, and physical observation indicated that the distribution of the limestone from the factory warehouse to the Woreda can be taken as a direct distribution method. There are no whole sealers or retail sealers between the factory and the Woreda Agriculture and the cooperatives. The Woreda Agriculture and the cooperatives after procuring the product directly and/or through the kebele administration distribute the lime for the end-users farmers. The map below shows the distribution from the factory to the farmers (figure 1)

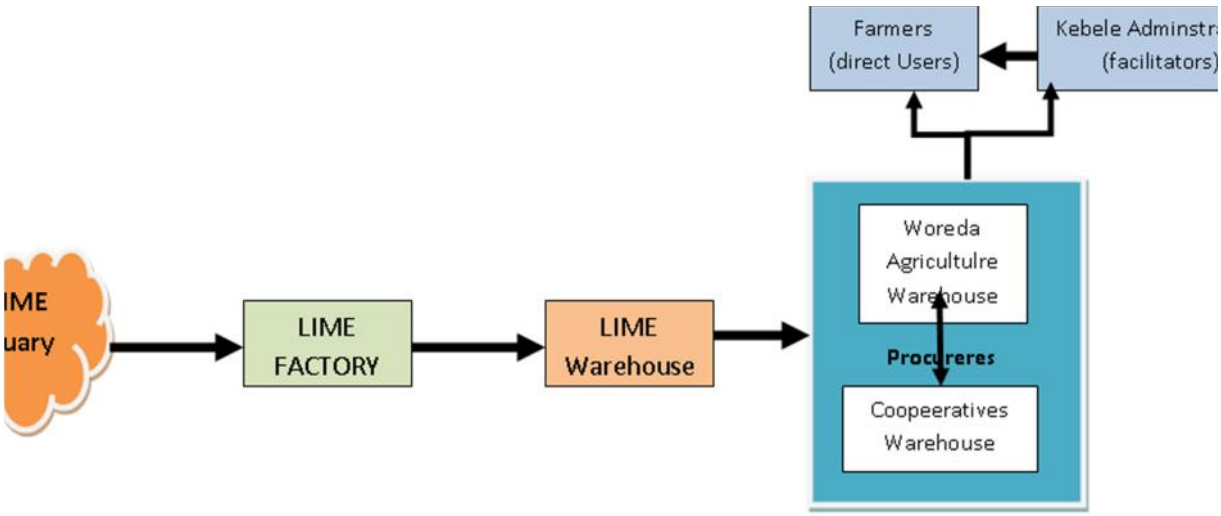


Figure 2: Guder Limestone Distribution Method Map

Regarding the characteristics of the distribution method, the result of the descriptive statistics is as follows;

Specific objective three challenges that delay limestone distribution effectiveness is measured by, dispatching procedure, poor road network, availability of lime when needed (no waiting till produced time), demand and supply on time, available functioning vehicles with driver, Limited vehicles' capacity, use of information technology for truck location and warehouse management practice. Accordingly, the mean Liker value of the indicators showed that the dispatching procedure which is about proper delivery to the right address with the proper vehicle and disciplined driver gives an average value of 3.2. The respondents also agreed on the effect of the poor road network on the delay of the distribution of lime. The average value of this variable attainment is 3.2, which is also witnessed by the FGD. The other variables used to

measure the delay were availability of lime when needed (no waiting till produced time) and demand and supply of the product in terms of time (amount). The descriptive statistics show that the first variable attained 2.89, while the latter is 2.9. According to the respondent's response, both variables are contributing to the delay of the distribution to some extent. The respondents replayed the existence of the shortage when required. The average value of this variable is 2.89. It means the respondents are not satisfied with the dispatching procedure or dissatisfied. However, they tend to satisfy and the bad road networks mean value 3.2 which was interpreted as normal.

The limited vehicle number and capacity were another two variables used to measure delay. Their Likert mean values were 2.8 & 3.05 respectively. These were interpreted as the available vehicles are in shortage; however, their caring is normal or sufficient. The additional indicators for the delay measurement were the use of technology and warehouse management practices. The result indicated the technology as 2.66 which showed the weak trucking technology use like GPS. According to the FGD instead, they use Mobile phone tracking. Regarding warehouse management practice application, the respondents answer 2.93, indicated that there is very limited management practice application. The KII revealed that management is more traditional.

Table 10. Distribution Delay indicators Mean Value by Respondents

No	Item Statistics	N	Mean	Std. Deviation
1	Dispatching procedure	94	3.20	1.08
2	The poor road network effect	94	3.20	1.32
3	Availability of lime when needed	94	2.89	1.03
4	Demand and supply on time	94	2.90	1.09
5	Availability of sufficient vehicles	94	2.80	1.06
6	Vehicle capacity shortage	94	3.05	1.12
7	Use of information technology	94	2.66	1.05
8	Applicability of Warehouse management practice	94	2.93	0.99

Source: Survey data, 2020

4.2. Inferential Analysis

Linear Regression is conducted to examine the relationship between the dependent variables of each specific objective with their independent variables. The first specific objective, distribution effectiveness as the dependent variable regressed against, strong coordination among stakeholders, demand request of customers' orders, direct product delivery, Sufficient warehouse, Modern technology, Warehouse management practice, and Warehouse management training for warehouse operators. As indicated below in Table 11, Independent variables coordination among stakeholders, demand request of customers' orders, sufficient warehouse construction, and availability of training for warehouse management are significant at 0.05 significance level. The rest is nonsignificant at a 0.05 significance level. Therefore, the researcher only considered coordination among stakeholders, demand requests, and requests of customers' orders, sufficient warehouse construction, and warehouse management training provided.

Table 11. Coefficient Table for Regression Analysis of Distribution Effectiveness

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.001	.424		.001	.999
Strong coordination among stakeholders	.353	.090	.318	3.914	.000
Demand and request of customers' order are on time	.330	.095	.309	3.479	.001
Deliver product directly	.113	.079	.125	1.426	.157
Sufficient warehouse constructed	.270	.116	.241	2.327	.022
The warehouse was supported by modern technology	.015	.093	.016	.161	.872
Warehouse management practice	.126	.119	.107	1.062	.291
Availability of warehouse management training	-. 227	.104	-. 195	-2.189	.031

Source: Survey data, 2020

The model summary as explained in the following Table 12, below, tells us that the dependent variable that is distribution effectiveness is explaining 46.8% by the independent variables. This is due to the limited number of variables. However, the finding is acceptable based on the FGD made with key informants.

Model Summary

Table 12. The Model Summary

Model	R	R Square	Adjusted R Square	Std. An error of the Estimate
1	.684	.468	.425	.88208

Source: Survey data, 2020

Table 13. The coefficient for Regression Analysis for a significant part of Distribution Effectiveness Challenges

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.256	.405		.633	.529
Strong coordination among stakeholders	.366	.090	.331	4.064	.000
Demand and request of customers order are on time	.373	.090	.349	4.152	.000
Sufficient warehouse constructed in the woreda	.369	.102	.330	3.633	.000
Warehouse management training provided	-. 208	.101	-.178	-2.058	.043

Source: Survey data, 2020

As indicated in Table 13, above the regression result of the model for warehouse management training provided is negative, which is against the theory. The accepted theory for distribution effectiveness is the more the workers trained, the more effective distribution. However, the relationship is statistically significant at the 0.05 significance level (β = -.208; P = .043 < .05) but not aligned with practice. The rest independent variables agree with the theory and experience of the distribution effectiveness. A one-unit increment of independent variables coordination among stakeholders, demand, and request of the customer's order and sufficient warehouse constructed are significant at

0.05 significance level, which increases the distribution effectiveness by 0.366, 0.373, and 0.369 respectively.

The second specific objective, distribution method used was regressed against products, safety and security monitored, FIFO procedure, time of loading-unloading, stocks renewed according to schedules, proper method to check customer satisfaction, the right place delivery, deliver the product directly from factory warehouse to Woreda warehouse, the distance of delivery and training for warehouse operators. As it is indicated below in Table 15, Independent variables, FIFO procedure, time of loading-unloading, the right place delivery, deliver the product directly from factory warehouse to Woreda warehouse, distance of delivery and training for warehouse management were significant at 0.05 significance level, and products safety and security monitored, stocks renewed according to schedules, and the proper method to check customer satisfaction were no significant at 0.05 significance, but significant at 0.10 significance level.

The model summary in the following Table 14, below, tells us that the dependent variable that is the distribution method used is explaining 68.0% by the independent variables. This represents a good fit since the rule of thumb has it that an R-square between 60% and 69% represents a good model.

Model Summary

Table 14. Model Summary of Distribution Methods Used

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.825	.680	.646	.68316

Source: Survey data, 2020

Table 15. Coefficient for Regression Analysis of Distribution Method Used

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.051	.338		-.152	.879
Monitor the safety and security of Products	.123	.066	.128	1.866	.066
FIFO Procedure	.292	.074	.293	3.965	.000
Time of loading unloading	.339	.075	.351	4.499	.000
Stocks renewed	.153	.082	.146	1.873	.065
The proper method to check customer satisfaction	-. 128	.077	-. 113	-1.657	.100
The right place delivery	-. 235	.077	-. 230	-3.050	.003
Deliver product directly from factory warehouse to Woreda warehouse	.165	.076	.164	2.171	.033
Distance of delivery	.183	.078	.178	2.366	.020
Training for warehouse management	.195	.082	.169	2.374	.020

Source: Survey data, 2020

As indicated, in Table 15, above the regression result of the model for proper methods to check customer satisfaction and the right place delivery was negative, which is against the theory. The accepted theory of distribution method used was the more proper distribution method used the more customer satisfaction to exist and the proper place delivery increases the effectiveness of the distribution system. However, the right place delivery was significant at 0.05 significant levels, and the proper method to check customer satisfaction was significant at 0.10 significant levels. The rest independent variables were agreed with the theory and experience of the distribution method used. A one-unit increment on FIFO procedure, time of loading and unloading, delivery of the product directly from the factory warehouse to Woreda warehouse, distance of delivery, and training for warehouse management increases the distribution method by 0.292, 0.339, 0.165, 0.183, and 0.195 respectively.

The third specific objective, that delay distribution effectiveness was regressed against, dispatching procedure, a poor road network, delivered quality lime, demand request, availability of functioning vehicles, Limited vehicle capacity, use of information technology for truck location, and warehouse management practice. As it is indicated below in table 17, Independent variables, dispatching procedure, sufficient vehicles with driver, Limited vehicle capacity, and poor road network sufficient were significant at 0.05, significance level. The rest is no significant at 0.05, significance level. Therefore, the researcher considered only dispatching procedure, sufficient vehicles with driver, Limited vehicle capacity, and poor road network. As it is indicated in table 17, below, the regression result of the model for dispatching procedure, sufficient vehicles with driver, Limited vehicle capacity, and poor road network were positive relations with the delay of distribution success. A one-unit increment on the dispatching procedure, availability of sufficient vehicles, Limited vehicle capacity, and solution for bad road network increase the distribution success by 0.213, 0.190, 0.258, and 0.124 respectively.

The model summary below in Table 16, tells us that the dependent variables that delay distribution effectiveness are explaining 50.6% by the independent variables.

Model Summary

Table 16. Model Summary of Delay of Distribution

Model	R	R Square	Adjusted R Square	Std. An error of the Estimate
1	.711	.506	.460	.72362

Source: Survey data, 2020

Table 17. Coefficient for Regression Analysis of Delay of Distribution

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.101	.374		-.270	.788
Dispatching procedure	.213	.088	.235	2.423	.017
Delivered quality lime	.139	.089	.145	1.565	.121
Sufficient functioning vehicles	.190	.086	.205	2.207	.030
Limited vehicles capacity	.258	.070	.293	3.700	.000
Poor road network	.124	.062	.166	1.995	.049
Demand request	.140	.082	.155	1.707	.092
Use of Information Technology	-.058	.087	-.062	-.660	.511
Warehouse management practice	.048	.093	.049	.518	.606

Source: Survey data, 2020

CHAPTER FIVE

5. Summary, Conclusions, and Recommendation

5.1. Result Summary

The purpose of the study designed to address, in general, to assess limestone distribution effectiveness, while the specific objectives, to assess the challenges that affect the limestone distribution effectiveness, to identify the distribution method and its characteristics and challenges that delay limestone distribution effectiveness in the supply chain management of Gudar limestone Factory. Accordingly, the result found discussed as detailed below:

The limestone distribution effectiveness was measured and interpreted by the seven indicators of variables based on respondent education status, Organizations, and organizational position. The analysis depicts, those who were the majority of respondents in education, Organizations, and organizations' positions were degree holders, Woreda Agriculture office staff, and experts respectively.

The distribution effectiveness analysis based on the education rated as 2.85 average values while based on the respondent's organization and organizational position analysis rated as 2.88 and 2.75. In general, the distribution effectiveness was rated with an average value of 2.83, which shows less limestone distribution effectiveness.

The regression result of the model for warehouse management training provided was negative, which is against the theory. The accepted theory for distribution effectiveness is the more the workers trained, the more effective distribution. However, the relationship is statistically significant at 0.05, but not aligned with practice.

According to FGD, Key informant discussion and physical observation indicated that the limestone distribution from the factory warehouse to the Woreda was taken as a direct distribution method and implemented by government organizations. There are no whole sealers or retailers, private sector transport between the Guder limestone Factory and the

Woreda Agriculture and the cooperatives. The Woreda Agriculture and the cooperatives procuring the limestone directly and through the kebele administration distribute to the end-users farmers.

The other anticipated result of the regression model was the response to the third objective, which are significant challenges that delay distribution effectiveness. The model results revealed that among eight explanatory variables included in a linear model, four were found significant at less than 0.05 significance level. These independent variables are dispatching procedure; sufficient vehicles with driver, Limited vehicle capacity, and poor road network sufficient were significant at 0.05, significance level. Moreover, the regression result of the model for limestone dispatching, insufficient vehicles with driver, Limited vehicle capacity, and the poor road network was positive relations with a delay of distribution effective. A one-unit increment on the dispatching procedure, the availability of sufficient vehicles, Limited vehicle capacity, and solution for poor road network increase the distribution success by 0.213, 0.190, 0.258, and 0.124 respectively.

5.2. Conclusion

This research was assessed challenges that affect the limestone distribution effectiveness in supply chain management of the Guder limestone factory.

The descriptive statistics analysis based on the education rated as 2.85 average mean values while based on the respondent's organization's and organizational position analysis rated as mean value 2.88 and 2.75. In general, the distribution effectiveness was rated with an average value of 2.83, which shows the less effective distribution.

The regression result of the model for warehouse management training provided was negative, which against the theory. The accepted theory for distribution effectiveness is the more successfully created awareness of the demand for agricultural lime among smallholder farmers and warehouse operators bring effective distribution. However, the relationship is statistically significant at the 0.05 significance level, but not aligned with practice. The independent variables such as coordination among stakeholders, demand, request of Customers' order, sufficient warehouse construction were significant at the

0.05 significance level. A one-unit increment of independent variables coordination among stakeholders' demand requests for customers' order and sufficient warehouse increases the distribution effectiveness by 0.366, 0.373, and 0.369.

Key informant discussion and physical observation suggested, according to FGD, that the calcareous delivery from the factory warehouse to the Woreda was taken as a direct method of distribution and initiated by government organizations. Private sector transport between the factory and the Woreda Agriculture office and the cooperative agency was not entirely sealers or retailers. The woreda Agriculture office and the cooperative agency that procures the commodity directly and distribute the limestone to end-user farmers through the kebele administration.

The other anticipated result of the regression section of the model is the response to the third objective, which are significant challenges that delay distribution effectiveness. These independent variables are dispatching procedure; sufficient vehicles with driver, Limited vehicle capacity, and uncomfortable road network sufficient were significant at 0.05, significance level. Moreover, the regression result of dispatching procedure, sufficient vehicles with driver, Limited vehicle capacity, and poor road network were positive relations with a delay of distribution success. A one-unit increment on the dispatching procedure, the availability of sufficient vehicles, increased Limited vehicle capacity, and solution for poor road network increases the distribution effectiveness by 0.213, 0.190, 0.258, and 0.124 respectively.

The results of the study showed that the challenges affecting the effectiveness of limestone distribution in the supply chain management of the Gudar lime factory are:- lack of cooperation between stakeholders, lack of demand fulfillment, lack of sufficient warehouse construction, lack of awarerness on inventory, and warehouse management, lack of adequate dispatch procedure; Lack of availability and carrying capacity for transport, weak road network, and lack of use of information technology to detect the location of vehicles.

5.3. Recommendation

The result of this study has shown challenges that affect the limestone distribution effectiveness in supply chain management.

Lack of attention, resource limitation challenges the effectiveness of limestone distribution. Hence, creating awareness for the Woreda agriculture office, cooperative agencies, Development agent, and smallholder farmers will improve the distribution effectiveness of limestone to farmers. Furthermore, doing this also increases the production and productivity of agriculture and improves the life and livelihood of farmers'.

The limestone distribution from the factory warehouse to the Woreda warehouse is considered a direct distribution method. Considering the demand for end-users, develop a private sector transport network, the government-supported transport sectors for effective distribution of limestone to smallholder farmers.

The study identified that uncomfortable road networks and lack of sufficient warehouse at the Woreda level and in the Guder limestone factory hinder distribution effectiveness. Hence, mobilize resources from the non-governmental organization (NGO), governmental and farmers cooperative associations construct a warehouse at the Woreda level and in the Gudar limestone factory and additionally improve the road infrastructure at Woreda level.

5.4. Limitation and Implication for Further Research

This study was limited in terms of the geographical area covered, the methodology used, variables, and resources (money, time, experience). Besides, COVID-19 events had an unexpected influence on the qualitative data collection method, FGD, KII, and observation. In general, to assessing the effectiveness of limestone distribution, I suggest further study by expanding its area coverage and the participation of interested stakeholders for future researchers.

REFERENCES

Abdenna, D., Negassa, C.W., and Tilahun, G. 2007. Inventory of Soil Acidity Status in Crop Lands of Central and Western Ethiopia. Utilization of diversity in land use systems: Sustainable and organic approaches to meet human needs.

Abel Gossaye 2017, Logistics Management Practice in Awash Bank Share Company.

ADF .2002.The F ederal Democratic R epublic of Ethiopia: Agricultural sector Review. Agricultural and Rural Development Department, AA, Ethiopia.

Aleksandra Andjelkovic and Nada Barac 2017. Analysis of Distribution Channels' Successfulness. The Case of the Retail Chains in the Republic of Serbia.:501-519.

Alice, A. & Duman, T. 2013. Comparing the Efficiency of Distribution methods in Home Appliance Industry, European Journal of Business and Social Sciences, pp, 56-57

Altiparmak F., Gen M., Lin L, and Paksoy T. 2006. A genetic algorithm for the multi-objective organizations of supply chain networks, Computer and Industrial Engineering, vol. 51, pp. 196-215,

Ambrosino D. and M.G. Scutell 2005. Distribution Network Design: New problems and related models, European Journal of Operational Research, vol. 165, pp. 610–624.

Amiri A 2006. Designing a Distribution network in a Supply chain System: Formulation and Efficient Solution Procedure, European Journal of Operational Research, vol. 171, pp. 567-576.

Andrejić, M. & Kilibarda, M. 2015. Distribution Channels Selection Using PCA-DEA Approach. International Journal of Traffic and Transport Engineering, pp, 74-81.

Anna, S., 2013. Analysis of Challenges of Medical Supply Chains in Sub-Saharan Africa Regarding Inventory Management and Transport and Distribution.

Armstrong, G., Adam, S., Denize, S., and Kotler, P. 2014. Principles of Marketing, pp 297-394

Barbie, E, 2010. The Practice of Social Research. 12th edition. USA: Belmont Wadsworth.

Bekele Shiferaw and Holden, S.T.1998.Resource Degradation and Adoption of Land Conservation Technologies in the Ethiopian highlands: A case study in And it, North Shewa.Agricultural Economics, 18:233-47

Benjaafar, S Y. Li, D. Xu, and S. Elhedhli 2008. Demand Allocation in Systems with Multiple Inventory locations and Multiple Demand Sources, Manufacturing and Service Operations Management, Vol. 10, no. 1, pp. 43–60.

Bowersox, D. J., Closs, D. J., Helferich, O. K. 1986. Logistical Management: Systems Integration of Physical Distribution, Manufacturing Support, and Materials Procurement. New York: Macmillan.

Chopra S. and Meindl P. 2010. Supply chain management, strategy, planning, and operation, 4th Ed, Pearson Education, Inc, USA, 2010.

Cochran, W. G. (1977). Sampling techniques (3rd ed.). New York: John Wiley & Sons

Demeke Alemu 2019, Factor Affecting Effectiveness of Pharmaceutical Distribution. The Case of Ethiopian Pharmaceuticals Supply Agency Addis Ababa Branch

Demirkan, H., Kauffman, R., Vaughan, J., Fill, H., Karagiannis, D., Maglio, P. 2008. Service-oriented technology and management: Perspectives on research and practice for the coming decade. Electronic Commerce Research & Applications, 7 (4), 356-376.

Dent J. 2011. Distribution channel: Understanding and managing channels to market, 2nd Ed,

Desta, Beyene.1988. Soil Science Research in Ethiopia: A Review. Proceedings of the first Soil Science Research Review Workshop, 11-14 February 1986, Addis Ababa, IAR, Addis Ababa.

Douglas M. Lambert, 1997. Supply Chain Management, Ohio State University and the University of North Florida.

Farahani R.Z. and Elahipanah M. 2008. A genetic algorithm to optimize the total cost and service level for just-in-time distribution in a supply chain, International Journal of Production Economics, vol. 111, pp.229-243.

Ferguson, B.R. 2000. Implementing supply chain management, Production, and Inventory Management Journal, March, pp. 64-7

Fugate, Brian S., John T. Mentzer, & Stank T. P. (2010). Logistics Performance: Efficiency, Effectiveness, and Differentiation: *Journal of Business Logistics 31(*1) 43-62

Graeml, A. R., &Peinado, J. (2011).Measuring Logistics Performance: the Effectiveness of Mmog/Le as Perceived by Suppliers in the Automotive Industry. Journal of Operations and Supply Chain Management, 4(1), 1 – 12

Gunasekaran A.and Kobu B. 2007. Performance measures and metrics in logistics and supply chain management: A review of recent literature (1995–2004) for research and application, International Journal of Production Research, vol. 45, no. 12, pp. 2819–2840,

Hamed T., (2016). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. International Journal of Academic Research in Management.

Handfield, R.B., Nichols, E.L., 1999. Introduction to Supply Chain Management. Prentice-Hall, New Jersey.

James W., Chilot T., Sam G., and Tadiwos Zewdie. 2018. A pilot program to rehabilitate and enhance the productivity of acid soils in Ethiopia. IFPRI, GIZ, EIAR, and CIM

Joel J., Barua, 2010. Challenges Facing Supply Chain Management in the Oil Marketing Companies in Kenya, the University of Nairobi.

Kalu A., Njoku, M. E., 2015. Effective Supply Chain Management: A Strategic tool for Profitability Enhancement in the Competitive Marketing Environment, European Journal of Business and Social Sciences, Vol. 3, No. 12,

Karkkainen M., Risku T.A, and Holmström J. 2003. Increasing customer value and decreasing distribution costs with merge-in-transit, International Journal of Physical Distribution and Logistics Management, vol. 33, no. 2, pp. 132–148,

Kotler P., Keller, and Burton, 2009. Marketing Management, Pearson Education Australia: Frenchs Forest

Kotler, P., Armstrong, G., Brown, L., and Adam, S. 2006. Marketing Management 7th Ed. Pearson Education Australia/Prentice Hall

Markus H,. Jean-Paul R., 2004. The transport geography of logistics and freight distribution, Article in Journal of Transport Geography.

McKinnon, A., 1988. Physical Distribution. In Marshall, J.N. (Ed.), Services and Uneven Development. Oxford University Press, Oxford, pp. 133–159.

Merriam, Sharan B. (1998). Qualitative research and case study applications in education (2nd ed.). San Francisco, CA: Jossey-Bass Publishers.

Nabhani F. and A. Shokri 2009. Reducing the Delivery lead time in a Food Distribution SME through the Implementation of Six Sigma Methodology, Journal of Manufacturing Technology Management, vol. 20, no. 7, pp. 957-974,

Ronald H., Ballou, 2006. The evolution and future of logistics and supply chain management, Western Reserve University.

Rosenberg, L. J. 1974. A New Approach to Distribution Conflict Management. Business Horizons, 17 (5), 67-74.

Rushton A., Croucher P., and Baker P. 2010. The Handbook of Logistics and Distribution Management, 4th ed, Kogan Page Limited, UK,

Russel R. S. and B. W. Taylor 2009. Operations Management, Creating Value Chain along the Supply Chain, 6th ed, John Willey and Sons, Inc., USA,

Sangeeta, Raja, and Nadeem Mohammad, 2004. A Handbook of Supply Chain Management for HIV/AIDS Medical Commodities.

Santosh G. Kumar and Shirisha P 2014. Transportation the Key player in Logistics Management, Journal of Business Management & Social Sciences Research, Volume 3, No.1,

Selim H. and Ozkarahan I 2008. A Supply Chain Distribution Network Design Model: An Interactive fuzzy goal programming-based solution approach. International Journal Advance Manufacture and Technology, vol. 36, pp. 401-418.

Singh, A., and Masuku, M. 2014, Sampling Techniques & Determination of Sample Size in Applied Statistics Research: International Journal of Economics, Commerce and Management United Kingdom Vol. II

Singh, R. 2016. Sales and Distribution Management: A Practice-Based Approach. 1st edition, New Delhi: Vikas Publishing House PVT Ltd.

Taye Bekele, 2008. Estimation of Lime Requirement. Training Manual for Regional Soil Testing Laboratory Heads and Technicians. National soil Testing Center, Ministry of Agriculture and Rural Development

Weiss, H.J and Gershon, M.E (2002) Production and Operation Management

Wisner T. Leong, 2012. Principles of Supply Chain Management; Balanced Approach, 3rd edition

Yin Robert K. (2014). Case study research: Design and methods. Los Angeles, CA: Sage.

Annex I: Questionnaires

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMEN

Dear Sir/Madam,

I am a postgraduate student in Addis Ababa University, School of Commerce, Program logistics and supply chain management, conducting research work on Assessment of Limestone Distribution Effectiveness, the case of Gudar Limestone Factory, West Shoa Zone.

The objective of this study is to improve the body of knowledge in the field of logistics and supply chain management with an emphasis on the assessment of limestone distribution effectiveness. It is purely an academic exercise for the partial fulfillment of a master's degree in logistics and supply chain management.

I would like to extend my deep appreciation to your organization and you for the willingness and cooperation in undertaking this valuable research. Taking part in this study you will be contributing towards alleviating the problem of the distribution system. I request your cooperation to fill and respond truthfully to the asked questions. If you have any question, you can contact me through telephone number 0929196979

Yours faithfully,

Adugna Demeke

Section1. Personal Data

For this section, I would kindly request you to indicate your response by putting a (√) mark in the corresponding boxes or in writing on the lines that follow the items.

1. Sex: Male □ Female □

2. Age Group:

19-25 □ 26 – 30 □ 31-35 □
36-40 □ 41-45 □ 46 and above □

3. Please indicate your highest level of qualification.

Certificate, □ Diploma □ BSC/BA □ MSC/MA □ Others, Specify: _____

4. Organizations you are working on currently.

_____

5. What is your current position in your organization?

_____

Section 2. Rating Scale Questions

Please rate to what extent you agree on the following assessment of the Lime Distribution Effectiveness of the Gudar Lime factory. The scale below will be applicable: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree 5 = Strongly Agree

1. Inventory and Warehouse management Effectiveness

S.No.	Measurement tools	1	2	3	4	5
1	Current storage space is sufficient for existing products & planned program expansion.					
2	In GLF, there are security tools (cameras) to control and monitor all the activities in the Factory.					
3	Lime is stored and organized to first-in, first-out (FIFO) procedures and is accessible for counting and general stock					
4	In GLF, the time taken to receive lime from the warehouse is appropriate.					
5	The time taken limestone to load and unload a truck from the warehouse and preparing for distributions are appropriate.					
6	Proper dispatching procedures should be undertaken by the Guder limestone Factory.					
7	Stocks are renewed according to the scheduled date in GLF.					
8	There are sufficient warehouses constructed in the Gudar					
9	Gudar lime factory and agriculture office warehouses are					
10	Gudar lime factory applied the best warehouse management					
11	There are sufficient warehouses constructed for primary					
12	The warehouse is supported by modern technology					
13	The warehouse provided certain essential items of equipment					
14	Warehouse management training provided according to their					
15	GLF warehouse is operated by skilled manpower.					
16	The safety of the warehouse is kept to avoid the social and					

2. Order fulfillment, Demand Management and Customer Service Effectiveness

	Measurement tools	1	2	3	4	5
1	There are strong coordination among distribution officers, store managers, and customers.					
2	GLF has information exchange mechanisms other than letter and telephone.					
3	The demand and request of customers' orders are filled on time, and upon their request and expectation.					
4	In GLF, the response time to receive an order is short.					
5	The quantity ordered by customers for the limestone-based on real utilization.					
6	In GLF, the price of limes is affordable with comparing to operational cost.					
7	In GLF, there is a well-developed tool to check customer satisfaction in Distribution activities.					

3. Transport and Distribution system

	Measurement tools	1	2	3	4	5
1	In GLF, deliver products directly from its warehouse in the woreda office warehouse.					
2	In the distribution of limestone roads, networks affect delivery.					
3	GLF is delivering the quality lime product to the customers.					
4	Limestones that are delivered to the agriculture office and the FTC are correct quality and quantities.					
5	Limestones that are delivered to the agriculture office and the FTC are at the right place.					

6	There are a sufficient number of functioning vehicles with available drivers to meet the desired distribution schedule.					
7	GLF the capacity to fulfill agriculture facility demand accurately and to deliver all the requested limestone.					
8	Vehicles are comfortable for loading-unloading according to the distance of delivery sites (short distance					
9	The average amount of time from the moment an order is received at the storage facility until the order is delivered to the agricultural sector is appropriate.					
10	They are limited vehicle capacity for lime distribution.					
11	The transportation system of the company ensures timely delivery of limestone to satisfy customer requirements on					
12	The use of information technology increases the effectiveness of limestone distribution by dictating vehicle location and its status.					

Section 3. Open-ended Questions.

1 What challenges does the GLF experience in distributing limestone concerning the following areas:
Packaging, Storage, order fulfillment, customer handling, Warehouse, and Inventory management and Transportation,

2. What are the challenges that affect the limestone distribution effectiveness of the Guder limestone factory?

3. Do you think that the challenges of distribution effectiveness of lime supply activity of the Guder limestone Factory are avoidable? If yes, please suggest the possible solutions to the challenges you listed above?

4. Which distribution channel is the most appropriate to reach the customer in time for Guder limestone factory delivery?

5. What are the causes that bring distribution delays in the supply chain of Guder limestone to deliver products to the customer sites?

Thank You