

Examining the Factors that affect coffee traceability
“The case of Ethiopia commodity exchange Jimma branch.”

**A Thesis Submitted to the School of Graduate Studies of Jimma University in
Partial Fulfillment of the Requirements for the Award of the Degree of
Master of Business Administration (MBA)**

BY:

BEYENE ALEMAYEHU



JIMMA UNIVERSITY
COLLEGE OF BUSINESS & ECONOMICS
DEPARTMENT OF MANAGEMENT

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**Examining the Factors that affect coffee traceability
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BY:

Beyene Alemayehu

Under the guidance of

Ashenaf haile (PhD)

and

Wondimu Abule



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DECLARATION

I hereby declare that this thesis entitled “*Examining the Factors that affect coffee traceability* “*The case of Ethiopia commodity exchange Jimma branch*”, has been carried out by me under the guidance and supervision of Ashenafi Haile Ph.D and Mr. Wondimu Abule

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

Researcher’s Name

Date

Signature

Beyene Alemayehu

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This is to certify that the thesis “*Examining the factors that affect coffee traceability*”
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institution for the award of any degree or diploma.

Main Adviser’s Name

Date

Signature

Dr. Ahenafi Haile

Co-Adviser’s Name

Date

Signature

Mr. Wondimu Abule

JIMMA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

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Board of Thesis Examination

Approval Sheet

Members of the Board of Examiners

External Examiner

Signature

Date

Internal Examiner

Signature

Date

Main Adviser

Signature

Date

Co-Adviser

Signature

Date

DEDICATION

I dedicate this research work to my wife Tabote Tadesse and children (Fenet and Kena)

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List of Abbreviations and Acronyms

BSE	Bovine Spongiform Encephalopathy
CFIA	<i>Canadian Food Inspection Agency</i>
(CSA)	Central Statistical Agency
ECTMDAJZ	Ethiopia coffee and tea market development authority Jimma zone
FAO	Food association organization
FMD	Food-and-Mouth Disease
GMO	Genetically modified organism
GPS	Global Positioning System
(GHG)	Green House Gases
UN	United Nations
(HACCP)	Hazard analysis and critical control points
ICT	Information Technology
IPM	Identity Preserved Model
ISO	International Organization for Standardization
MLR	Multiple linear regression
RFID	Radio frequency Identification
SPSS	Statistical Product and Service Solutions
VIF	Variable inflation factors
UML	Unified Modeling Language
WHO	World health organization

Abstract

Nowadays, traceability has become a new management principle for firms to steadily compete in the market. In recent times, the accurate and timely traceability of products and activities in the supply chain has become a new factor in agribusiness.

In order to meet consumer demands in consistent supply of top quality, safe and healthful product fully backward and forward coffee traceability supply chains from farm to end-user has become an important part of the overall quality assurance system. Accordingly traceability has introduced in many countries to reduce the uncertainties originating in the product purchasing process by providing information about the entire product process, from farm to table/ to cup in coffee case. Hence the aim of this study is to examine the factor that affect coffee traceability at Ethiopia commodity exchange Jimma branch .In this study, mixed research methods were used. Census sampling was employed since the numbers of respondents were minimal at the study areas. Both primary and secondary source of data were used. To obtain the primary data, questionnaires were prepared and distributed to all Ethiopia commodity exchange Jimma branch employees. Secondary data were collected from books, journals, past research works, official documents and the Internet. To examine factors like Nature of coffee production, supply chain complexity, environmental, organizational, legal and technological factor and how they affects coffee traceability, descriptive and inferential statistics were employed. Both regression and Pearson correlation analysis also used to see the relationship that exists between the variables. The findings of the study show as there is the existence of substantial strong relationship between independent and dependent variable. Moreover, the selected independent variables were significantly explaining the variations in the dependent variable were significance.

Based on findings, the study suggests that Ethiopia commodity exchange, Ethiopia coffee and tea market development authority exporter and suppliers association and other all stakeholders should work collaboratively to realize coffee traceability marketing system.

Keywords:-Traceability, coffee, sustainability, ECX, Regression, Quality, Transparency, certification

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CHAPTER ONE

1. Introduction

1.1 Back ground of the study

Nowadays, the distance that consumable products and apparel industry travel from producer to consumer has increased as a result of globalization. Keeping safety and quality of those products along the supply chain has become a significant role. During the last couple of decades, the credibility of the food industry was heavily challenged after a number of food crises, such as mad cow disease /Bovine Spongiform Encephalopathy/, Dioxin in chicken feed, Food-and-Mouth Disease and issues such as the use of Genetically Modified crops in foods. The outbreak of foodborne illnesses such as salmonella, campylobacter and Escherichia coli also further increase consumer concerns over the safety and quality of any consumable products (Trienekens and Zuurbier, 2008).

Furthermore, outbreak disease that could be transmitted to humans, such as the avian flu, or the presence of chemicals above acceptable limits in feed and product, can threaten both the quality and safety of products. The need to withdraw or recall products identified as unsafe has become essential to protect people from foodborne diseases (Regattieri, Gamberi, and Manzini, 2007). The control of food-related risks involves consideration of every step in the chain, from raw material to product consumption as hazards can enter at any point in the chain until the consumable products reached to the end ultimate consumer (Opara, 2003). Therefore, traceability is becomes a risk-management tool which enables food, feed and agro-products business operators or authorities to respond immediately and stay as a cornerstone of any country's food safety policy, (Regattieri, Gamberi, and Manzini, 2007).

As a consequence of consumable product's scandals and incidents, customers call for high quality of products with integrity, safety guarantees and transparency. In addition to that, traceability; transparency, sustainability and certification have been an emerging issue in the

coffee products, beef and apparel industry. Studies show that, consumers are concerned about their environment and society, and have an increasing demand for straightforward transparent about the products they are using (Bhaduri and Ha-Brookshire, 2011, Flatters and Wilmot, 2009).

In a dynamic, competitive and highly fragmented business environment, firms need to consider opportunities for tailoring their products to reach specific consumers. Traceability provides one such opportunity and defined as: “the ability to trace the history, application or location of those products which is under consideration” (Dickerson, 1999, Dyer and Ha-Brookshire, 2008). Similarly according to (Opara, 2003), traceability from consumer’s perspective helps to build trust, provided peace of mind, and increase confidence in the consumable products. Likewise for the growers, traceability is part of an overall cost-effective and quality management system that can assist in continuous improvement and minimization of the impact of safety hazards. It also facilitates in the rapid and effective recall of products, and the determination and settlement of liabilities. Traceability was firstly used in recall system of cars, aircraft and other industrial products. The EU proposed product traceability system for cattle and beef product as early as in 2000, which was the first time to put forward the traceability for food products should be taken into the legal system. Since then the scope of traceability extended to the entire food/ any consumable product and apparel industries and, even banned the import of products with no traceability and the agricultural products traceability system has been accepted by the consumers (Wang *et al.* 2007).

In recent years, traceability system in products safety management in the developed countries and some districts has a rapid development. Accordingly, European Union, the United States, Japan, Canada, New Zealand, Australia, Netherlands and other agricultural production powers has set up products supply chain traceability system, (Wang *et al.*, 2007). Likewise China started to explore agricultural products quality safety traceability system in 2002.

According to (Peres Loiseau, and Montet, 2007) the quality and safety problem of agricultural products has always been the focus of all paces of life and it impose impacts on health and life of residents. Hence with the occurrence of current frequent food safety problems, consumers need to know, whether agricultural products they are buying and using are guarantying them a well-being. In addition to that, trust affects consumers’ purchases intentions and guarantee has a

strong effect on their purchase decisions, with consumers' increasing queries about where their consumable products came from, who produced it, and what chemicals were sprayed on it, traceability or 'identity preservation became a buzzword that is now reaching other industries (Bhaduri, 2011 , Liddell and Bailey, 2001). And also, with the improvement of healthy consumption and the people living standard, consumers tend to buy agricultural products with higher security, even though their prices are likely to be doubled. Thus, some countries and regions design agricultural products traceability system to get the goal of real-time tracking, quality control and passing the safety information to consumers (Peres Loiseau, and Montet, 2007). Generally, traceability in agricultural products mainly refers to the process of production, transmission and distribution of agricultural products, collect and record related information to and from a complete information chain which help to control the quality of products and when security problem happens, and it can provide useful information to find causes (Tu and Wang, 2011).

Coffee is the single most important foreign exchange earner for Ethiopia and it accounted for 32 per cent of the total value of exports in 2011 and constitutes a significant income source for 15 million people in the workforce, (Ministry of Trade 2012).

As we are living in dynamic environments the international trade is constantly changing as consumer preferences and needs evolve. At the moment in the coffee industry, major international buyers are progressively asking for traceable coffee marketing system, up to the farmers who produced coffee products (ECX Report 2017)

Despite positive image of the country as birthplace of coffee, strong local coffee culture, genetic diversity and easy branding opportunities, diverse agro-ecology and climatic conditions, unique distinct characters of coffee quality, favorable national agriculture ecosystem for coffee development, the country, so far failed to fully capitalize its potential, this is because, of the absence of practical researches and applicability on coffee traceability in Ethiopia, which is the emerging issues at the global market today.

1.2 Background of the organization

The agricultural sector is the backbone of Ethiopia economy. Despite the progress made during the last two decades, the area is still the most strategic sector where the majority of the populations are directly or indirectly derives their livelihood. Adapting for agricultural led development strategy, the government of Ethiopia has been developing and implementing arduous initiatives to achieve the objective for the last 20 years.

The first of its kind not only in Ethiopia, but also in Africa, ECX is a new and unique partnership of market actors, the exchange's members, and by its main promoter the government of Ethiopia. ECX is a landmark in the transformation process of century old traditional agricultural marketing system in Ethiopia.

Ethiopia Commodity Exchange (ECX) began its operation as the first organized commodity market in Ethiopia April 2008 and established by Proclamation 550/2007 as a wholly state owned market institution. It's started to benefit and modernize the way Ethiopia was trading its most valuable products and other commodities. ECX was designed to improve commodity market efficiency by reducing transaction costs for all participants' (.Gabre-Madhin and Goggin 2005).

At the establishment phase, the vision of ECX was to transform Ethiopia's tradition bound agricultural marketing through creating a new marketplace that serves all market in transforming the Ethiopia economy by becoming a global commodity market of choice, however after eight years the organization revised its vision, as "To become a leading and dynamic Exchange in Africa"

ECX assures all commodity market players the security they need in the market through providing a secured and reliable end-to-end system for receiving , grading, storing and handling commodities, matching offers and bids for commodity transactions , a risk-free payment , goods delivery system to settle transactions, while a serving all fairly and efficiently.

Earlier to the establishment of ECX, the agricultural markets in Ethiopia had been characterized by high costs and high risks of transacting, and forcing much of Ethiopia isolating from the

globalization. With only one third of output reaching the market, commodity buyers and sellers tended to trade only with those they knew. Small-scale farmers, who produce 95 percent of Ethiopia's agricultural product, came to market with little information.

From December 2008 ECX replaced the old auction system for its coffee trading. Local traders bring coffee to ECX's regional offices, where ECX draw representative sample and provided grade. With regard to coffee trading, the previous supply chain of the ECX consists of smallholder and commercial farmers whose product is supplied to primary transaction centers. After initial processing, the commodity is bagged and loaded onto trucks, passes through the concerned regulatory regional offices where vouchers are issued and trucks are sealed and delivered to ECX. ECX provided grades for coffee based on its location, coffee type and grade attributes etc. A warehouse receipt is issued, for trading after the commodity deposited at its respective warehouse and GRN has created and approved electronically, accordingly the buyers receive the agreed variety, grade and volume from ECX respective warehouse.

The earlier trading system that takes place at ECX makes very difficult to the exporters and international buyers to get a traceable coffee, in contrary the quality and safety problem has always been the focus of all paces of life. Hence, consumers need to know, if agricultural products they are buying and using are guarantying them a well-being. Accordingly by understanding the inability of tracing and tracking of the coffee that traded at its trading floor so far , ECX decided to work on its limitations that claimed both by international buyers and the exporter and tried to revised its trading modality to work on the traceability, transparency, sustainability and certification as the emerging issues in the coffee products.

ECX as a dynamic exchange that rapidly and continuously respond and adopt to the competitive, turbulent and highly fragmented business world , the exchange started to implement coffee traceability to build trust, provided peace of mind, and increase confidence in coffee products that exchanged at its trade floor and pass though it system. ECX uses its own coffee traceability model which starts from the washing and hulling stations of different districts/woredas up to ECX warehouse which ends in two supply chains and the Exchange is, said to be the pioneer institute to bring the traceability issue in the Ethiopia coffee sector.

1.3 Statements of the problem

Coffee sector as agricultural products has undergone significant change during the past era like new agri-business practices, new handling and processing techniques, organized marketing platform to meet the increasing customers demand regarding to a reliable and sustainable supplying quality coffee products.

These days, the coffee products and apparel industries travels from the farm where it produced to the kitchen, in which it is consumed, is longer than ever before and claimed to guarantying the ultimate customers.

The same, consumers are giving emphasis and demanding for safety, high quality and sustainable coffee supply than ever as the product safety is a worldwide concern due to a number of product safety scandals occurred at any point of supply chain.

The structure of the supply chain that coffee pass-through can be considered as a world-class, and evolved increased fragmentation, multifaceted and multiple actors as a worldwide of agro-product supply chains. The large number of actors involved, unpredictability of supply chain and hydroscopic nature of the coffee products has heightened the need for assurance of quality and safety in relation to the products, production processes to ensure traceability and compatibility among product.

Traceability, according to the International Organization for Standardization, (ISO 9001:2000) is an assessment of products to identify the path from which a product has originated and to whom it has been supplied and consists of an interlinking chain of records between steps in a process of operation and/or between different stages in a supply chain. In view of this , traceability is the ability to identify, trace and track the whole history, distribution, location, and application of products, parts, and materials till to the end user(i.e. From farm to fork or Seed to Shelf “Farm to Table” (Raspor, 2008).

Implementing effective traceability marketing system enables agro-food businesses to better managing risks, guarantying the ultimate customers, allows a quick reaction to emergencies recalls, and withdrawals of the detected fraud product from the market. Thus, having a document and records of genuine information and traceable system about product health alongside the

entire supply chain, country of origin at any point from producer to consumer has played a significant role in assuring traceability to the worldwide concern of today's.

Regardless of published literatures on traceability at international level aiming at different agricultural products like soybean, cocoa, corns, beef and others apparel industries and as well as different research conducted on coffee both at worldwide and national level on different topics, there is a lack of research development on coffee traceability in Ethiopia. However, these days, traceability is a worldwide concern to implement and required to meet the international buyers and ultimate consumers demand regarding to safety and quality issues. As a result, in Ethiopia coffee could be said traded in non-traceable model compared to the full or true traceability concepts for the last decades.

By giving emphasis for current growing concerns of the traceability across the world, ECX as a dynamic organization which rapidly and continuously respond to the changing business environment, currently it started to implement coffee traceable marketing system. ECX uses its own traceability model which starts from the washing and hulling stations of different district up to its warehouse which ends in to two supply chains. In this regard the Exchange could be said a pioneer institute to bring the traceability issue in the Ethiopia coffee marketing system.

However, the traceability model that ECX practice completely lacks the true concept of traceability, due to the blending and mixing up of different coffee types to and from the its warehouses. The blending of coffee which originates from the diverse coffee growing districts makes the coffee to lose its original identity and information which disagreeing with the concepts of traceability that describes the "Farm to table" concepts that believed to provide the information about the product though entire supply chain at any point if the need arise. (ECX Report 2017)

Compared to the true traceability concepts, ECX lacks to address all the requirement of traceability in the coffee supply chain. Rather ECX should start its traceability setup from the coffee growers/producers instead, and should also extend its model up to the ultimate consumers. In other word, coffee marketing system takes place at Ethiopia Commodity Exchange has still did not go extra miles to meet the concepts of traceability as required and mixing of one coffee type over the other regardless of its origin, variety, growing condition, owners, grade and other is still continued from its warehouse during delivery and downstream to the different washing and

hulling station unknown to the exchange. In this regard, the coffee exporters, processors and end user (buyers) are not obtaining the necessary information about the full history of coffee product. Therefore, this research was conducted to examine the factors that affect coffee traceability in ECX marketing platform.

In order to conduct this research, the following basic research questions were presented by the researcher

1. What does the current coffee traceability practice looks like in ECX?
2. What are the main factors affecting coffee traceability?
3. What are the benefits of implementing coffee traceability?

1.4 Objectives

1.4.1 General objective

The general objective of this research is to examine the factors that affect coffee traceability in Ethiopia Commodity Exchange Jimma branch.

1.4.2 Specific objectives

This research has been tried to address the following specific objective:

- To analyze the current traceable coffee marketing system practice in ECX.
- To analyzes the main factors that affects coffee traceability.
- To analyze the benefits of implementing coffee traceability.

1.5 Significance of the Study

This study could provide a chance of broadening the skill of analyzing, interpreting and come up with a clear understanding of the factors that affects coffee traceability. The results of the study would be important to a various groups/ actors those involved in the coffee industry, such as producers, suppliers, exporters, governments, ECX, buyers and coffee roasting companies. Perfect traceable coffee marketing system is recognized as a feasible solution to ensure well-being of coffee quality, maintain sustainability and believed prevent lose in coffee sectors.

Besides to the above mentioned importance, the study result again benefits mainly the policy makers and Ethiopia commodity exchange. It also believed to aid all coffee actors, to meet international buyers demand, create market access, mitigate operational risks, ensure quality, safety and security of the commodities, and maintain sustainability of coffee supply as well. Likewise it help to better managing quality related complaints to map and document coffee value chain, to improve communication among industry players to provide increased level of transparency, to meet international market players demand and market requirements. Thereby making the country's coffee globally competitive, improve bargaining power in the international market, to provide buyers with traceable information on coffee purchased at ECX by associating each bag delivered with the respective recommended station and using the recommended technology.

The findings of the study would initiate and could be used as a platform by any concerned parties in coffee supply chain traceability who might be want to carried out further and in-depth research on the traceable coffee marketing system and expected to extended traceability concepts and implementation to other agricultural and industrial products in Ethiopia. The study has been therefore adding to the existing knowledge in the subject area and has provided scientific findings and benefit for those who would have been conducts their research studies in the same area.

The study would provide a different perspective to academicians based on a different scientific technique of analyzing traceability which the study has employed for. For those who want to develop new traceability model, the study has been serve as the existing practice in the area. They might use the findings of this study in order to develop their own model. For any interested readers of this paper, it provided them a clear understanding, the benefit and requirement of traceability.

1.6 Scope of the Study

Due to the nature and new traceability concept in Ethiopia context, resource, data manageability, time and cost constraints, this study intend to look only into the Ethiopia commodity exchange Jimma branch and regulatory bodies. Hence due to the above mentioned constraints the study has been limited to specified branch and coffee product only.

1.7 Limitation of the study

The purpose of the study was to examine the factors that affect coffee traceability at Ethiopia commodity exchange Jimma branch, which is broad in concepts and needed depth study. Traceability is a new concept that emerged recently and received an attention from all corner and helps to trace and track one step forward and one step backward of any products from **Farm to table**. The study covered only few among several factors that could affect coffee traceability, due to lack of matured concepts and practice in Ethiopia context on any products. Likewise shortage of time to cover this wide-ranged and deep concepts, and the absence of sufficient data concerning to the subject matter, and ambiguity from the responded about the concepts was the paramount challenges encountered during the study.

1.8 Organization of this paper

There are five chapters in this study. The first chapter is dealing with introduction, background of the study, background of the organizations, statements of problem, research question, objective of the study, significance and scope of the study, limitations of the research as well as the organizations of the study. The second chapter presents the theoretical literature reviewed related to traceability Chapter three covers the methods and procedures employed for the study. The research methodology outlines the research description of the study areas, design, data source and types, target population, sample size and sampling techniques, data collection instruments, reliability and validity, methods of data analysis, and ethical consideration. Chapter four outlines result and discussion. Finally, Chapter five summary, conclusions and suggests possible recommendations.

CHAPTER TWO

2. Related literature review

2.1 Traceability

Nowadays, the distance that food travels from producer to consumer has increased as a result of globalization. Therefore, keeping safety and quality along the food supply chain has become a significant challenge. During the last couple of decades, the credibility of the food industry was heavily challenged after a number of food crises, such as Bovine Spongiform Encephalopathy (BSE) or mad cow disease, Dioxin in chicken feed, Food-and-Mouth Disease (FMD) and issues such as the use of Genetically Modified (GM) crops in foods. The outbreak of foodborne illnesses such as salmonella, campylobacter and Escherichia coli O157:H7 also further increase consumer concerns over the safety and quality of food. As a consequence of food scandals and incidents, customers call for high quality food with integrity, safety guarantees and transparency. (Bertolini, Bevilacqua, & Massini, 2006, Regattieri, Gamberi, & Manzini, 2007 and Trienekens & Zuurbier, N 2008).

Traceability is known as the 'one-step-back-one-step-forward' principle and is the ability to identify the origin of food and feed ingredients and products sources, particularly when products are found to be faulty (ISO, 2007). A traceability system allows an organization to document and or to locate a product through the stages and operations involved in the manufacture, processing, distribution and handling of feed and food, from primary production to consumption. It can therefore facilitate the identification of the cause of nonconformity of a product, and improve the ability to withdraw or recall such product if necessary and prevent unsafe products from reaching the customers (ISO, 2007).

According to (Codex 2001) traceability considered as a product differentiation system and is commonly used by the food industry. Once contamination has been detected, traceability systems allow the source of a product to be identified, thereby enabling the situation to be remedied and limiting costs to total or partial product withdrawal from the market. Traceability has to be primarily viewed as a means to enhance safety in the food chain. There recent

development of traceability systems for production and market sectors has sought to translate attention from the primary concept of consumable products safety into the search for a consumer price premium. This approach appears to be becoming increasingly established in product strategies even if there seems to be no theoretical motivation in support, traceability systems do not guarantee achievement of product quality rather it simply trace from field to the fork.

International Organization for Standardization (ISO 9001:2000) defines traceability as the ability to identify and trace the history, distribution, location, and application of products, parts, and materials. Again The European Union has defined traceability with particular reference to GMO products or their derivatives. The most significant motivation was to be ready for any undesired eventuality at any stage of the chain for withdrawing the products causing a potential risk for consumers. In this case, traceability ensures the timely intervention of product withdrawal, as well as the reduction in cost in implementing withdrawal, being able to focus on withdrawing one or more brands, rather than withdrawing from the market an entire product category.

The economic literature has studied the phenomenon and functioning of traceability in various aspects. Although traceability arose for the main purpose of ensuring food safety, in an experimental market study found that, consumers have been demanding to pay a price premium for those products that clearly show the entire traceable system. (Dickinson and Bailey, 2002)

Since January 1st 2005, traceability has become mandatory for all food products to follow a procedure of traceability. The European Union issued two laws which, amongst others, provided the definitive thrust for setting traceability procedures that met the absolute priority for food safety. One of these, EC Reg. 178/2002 established the general principles and requisites of food legislation and set up the European Authority for Food Safety, establishing procedures in the ambit of food safety. The other EC Regulation, 1830/2003, concerned traceability and the labeling of GM products or their derivatives. While the objectives and guidelines for the mandatory introduction of traceability in the agro-food system are clear, the effects that this system might have on production, the distribution chain and end consumers are somewhat controversial. A recent report of the USDA (United States Department of Agriculture) concerning traceability in the USA summarizes the results from the most recent economic studies on traceability.

Furthermore, International Organization for Standardization (ISO 9000-20015) defines traceability as the ability to trace the history, application or location of an object. And within the notes: “it can relate to: the origin of materials and parts; the processing history; the distribution and location of the product or service after delivery and consumption”.

The UN Global Compact (2014) defines traceability as: The ability to identify and trace and tracking the history, distribution, location and application of products, parts and materials, to ensure the reliability of sustainability claims, in the areas of human rights, labor (including health and safety), the environment and anti-corruption. EU law refers to traceability in the food value chain: “traceability” means the ability to track any food, feed, food-producing animal or substance that has been used for consumption, through all stages of production, processing and distribution.

Traceability is a need across the sustainable value chain, allowing information to flow on demand and involving market projections, quality requirements, investment needs and real impacts & important to distinguish between traceability, and sustainability that offer some traceability and due diligence. Accordingly traceability as a distinct process and sustainability schemes as the production of products to certain standards.

Identifying risks in a supply chain can allow the chain components to seek solutions with suppliers or other stakeholders in order to solve the problem or diminish the risks. Risks have been lower using suppliers assessed or verified by a sustainability scheme.

Traceability is the ability to follow the movement of a product through the stages of production, processing, and distribution and includes both trackback and trace forward. Trackback is the ability to trace the product from the consume/retail shelf back to the farm conversely, trace forward is the ability to trace the product from the farm forward to the retail shelf /consumers. Traceability is often needed to identify the sources of food products contamination and the recipients of contaminated food in product recalls and seizures.

Due to globalization in product trade, any product chain integrity not only includes safety concerns but also origin fraud and quality concern. Consumers also demand verifiable evidence of traceability as an important criterion of product quality and safety. To tackle these requirements, there is a need for a traceability system giving information on origin, processing,

retailing and final destination of foodstuffs. (Bertolini et al., 2006, Peres, Barlet, Loiseau, & Montet 2007).

Traceability is a preventive, necessary, supplement of food and any products safety systems, which increases the efficiency of a foodstuff company, when used correctly. In practice traceability means collection, documentation, maintenance and application of information related to all processes in the supply chain, which guarantees for the consumers the information on origin and life history of a product. (Opara and Mazaud, 2001)

The agricultural sector has undergone considerable change during the past century. New farming practices as well as new handling and processing techniques have been developed to meet the increasing consumer demand for reliable and consistently safe supply of various products. Furthermore, consumers are giving emphasis to safety, high quality and sustainability of consumable products. Consumer experiences with product safety and health issues combined with an increasing demand for high quality product have resulted in an increasing interest in developing systems to aid in products traceability efforts. Traceability in the product supply chains has gained considerable importance in the past few years. (Carriquiry and Babcock, 2007, Folinas, et. al., 2006)

Various product safety and traceability laws exist in several countries. European Union's General Food Law entered into force on January 1, 2005. The law included important elements like rules on traceability and the withdrawal of dangerous food products from the market.

Under the European Union Law, "Traceability" is defined as the ability to track any food, feed, food-producing animal or substance that has been used for consumption, through all the stages of production, processing and distribution, Official Journal of the European Communities, (2002). It is a risk-management tool that allows food business operators or authorities to withdraw or recall products which have been identified as unsafe.

Traceability is a capability to monitor a specific product throughout the whole SC, allowing the identification of critical control points the hazard analysis and critical control points (HACCP) approach, can then be used to define which actions should be taken to avoid future quality problems. In any case problems to occur, a well-established traceability system allows the

companying to identify their source and to take corrective actions to avoid their reoccurrence. Juan and (Godfrey, 1999) define traceability as the ability to track the record, processing parameters and the places a product has been, storing the information in a system. (Smith at al., 2008).

The traceability of bulk agricultural products such as soybeans, corn, cocoa and sugar does not allow identifying individual batches, due to multiple processes of product aggregation and segregation. Quality control is conducted based on product volume, not on production batches. In this way, traceability is lost between different stages of the SC, making it impossible to identify the farm that provided the raw material that was used to produce these products in a specific package. An automatic monitoring system would allow the SC as a whole to improve its traceability. (Thakur; Hurburgh, 2009)

2.2 Importance of traceability in agricultural Products

Today, products safety is a worldwide concern due to a number of food and any products safety scandals. Outbreaks related to Escherichia coli, African swine fever, highly contagious diseases such as avian flu in poultry, bovine spongiform encephalopathy (BSE) and foot and mouth disease in livestock, presence of dioxin, and micro-organisms like Salmonella, nor virus, Campylobacter, Listeria, Clostridium have resulted in heightened public and private attention to food attributes. Moreover, as increasing number of people undertake international travel; these outbreaks have the potential to reach pandemic proportions (Ahmedabad, 2008)

2.3 Objectives of traceability

Firms have three primary objectives in using traceability systems: improve supply management, facilitate trace forward and track backwards for product safety and quality; and differentiate and market products with subtle or undetectable quality attributes. The benefits associated with these objectives include lower cost distribution systems, reduced recall expenses, and expanded sales of products with attributes that are difficult to discern. (Golan et al 2004). Not only just a way to improve product safety systems, traceability can also be seen as a strategic tool to improve the quality of raw materials and to improve inventory management and as a source of competitive advantages. (Viðarsson & Oetterer, 2010, Alfaro & Rábade, 2009).

From a consumer perspective, traceability helps to build trust, provided peace of mind, and increase confidence. For growers, traceability is part of an overall cost-effective and quality management system that can also assist in continuous improvement and minimization of the impact of safety hazards. It also facilitates in the rapid and effective recall of products, and the determination and settlement of liabilities. (Opara, 2003).

The control of food-related risks involves consideration of every step in the chain, from raw material to foodstuff consumption as hazards can enter to any point in the chain until the product reaches the consumer. Therefore, a good traceability management system allows for trace-back and trace-forward capabilities to any step in the supply chain, for the effective identification of products and management of recall when quality and safety standards are breached. (Opara 2003). This end to end supply chain approach has been defined in many terms such as, “Farm to Fork” (Opara, 2003, “Farm to Table” .(FAO, 2003)

2.4 Effectiveness of traceability systems

In all cases, traceability depends on the accurate collection and recording of relevant data and coordinated within the context of a food safety management system. Analytical tests (e.g. DNA tracking or forms of mass spectrometry to verify origin) may be able to perform to verify data. A traceability system is effective when any product can be completely traced across the supply chain both back wads and forwards. The information should be readily accessible in order to know what, how much and from where product/ needs to be recalled in case of product safety issues .EU requirements, (178/2002).

2.5 Benefits of traceability

Many businesses continue to view the main values of traceability as being able to provide a customer with reliable information and assurance about where their product came from and how it was produced. While this is the most readily identifiable benefit of traceability, it is not the most valuable benefit from a commercial perspective. This is partly, because its value often comes from assisting businesses to manage a situation that should not have occurred, such as a product safety recall. This benefit is easily attained by most businesses and further lessens its

value as a source of sustainable competitive advantage for businesses in today's increasingly global and hyper-competitive environment. Many government programs appear fixated on encouraging agro-food businesses to adopt traceability practices for this very reason. (Ahmedabad, 2008)

2.6 Safety and quality, concerns for food industry

Food quality, including safety, is a major concern facing the food industry today. The production and consumption of any product is central to any society and has a wide range of social, economic and in many cases environmental consequences.

Social

Food safety is an increasingly important public health issue. Outbreaks of foodborne illness can damage trade and tourism, and lead to a loss of earnings, unemployment and litigation (CAC, 2003). Globally, the incidence of foodborne diseases is increasing and international food trade is disrupted by frequent disputes over food safety and quality requirements (FAO, 2003). Unsafe food causes many acute and life-long diseases, ranging from diarrheal diseases to various forms of cancer. The World Health Organization (WHO, 2002) estimated that foodborne and waterborne diarrheal diseases taken together kill about 2.2 million people annually, 1.9 million of them children. In industrialized countries, the percentage of the population suffering from foodborne diseases each year has been reported to be up to 30%. In the United States (US), for example, around 76 million cases of foodborne diseases, resulting in 325,000 hospitalizations and 5000 deaths, are estimated to occur each year. The high prevalence of diarrheal diseases in many developing countries highlights major underlying food safety problems (WHO, 2007a).

Economic

Public and private decisions to adopt traceability systems have important economic implications. (Hobbs 2003, Golan et al. 2003)

The WHO (2002) stated that foodborne diseases not only significantly affect people's health and well-being, but they also have economic consequences for individuals, families, communities, businesses and countries. These diseases impose a substantial burden on health-care systems and markedly reduce economic productivity. There is only limited data on the economic

consequences of food contamination and foodborne disease. In 1995, studies in the US reported that the annual cost of the 12 million cases of foodborne illness caused by seven pathogens was approximately US \$6.5 billion. Recently, former U.S. Food and Drug Administration (FDA) economist Robert L. Scharff estimated the total economic impact of foodborne illness across the nation to be a combined \$152 billion annually (Scharff, 2010)

Environmental

With the growth of international trade, the environmental impact of any products supply chain has become a growing concern. The distance that food and any other products travel from the farm where it is produced to the kitchen in which it is consumed is longer than ever before. Therefore, the use of energy, resources and the emission of Green House Gases (GHG) in the entire food cycle, including production, consumption, and transportation is unavoidable. The initiatives to use carbon labeling (i.e. carbon footprints of the products) and conception of food miles (the distance that food is transported as it travels from producer to consumer) indicate that the chain needs more environmentally friendly solutions to reduce the environmental impacts such as pollution and global warming.

2.7 Technologies for traceability

Today, technology can play a vital role in reducing the cost and increasing accuracy of information associated with product traceability. A variety of tools are available to suit company budgets including traceability software, product identification and marking.

Different technologies can be used in a traceability system, such as barcodes, QR codes and RFID. Barcodes can be defined as information codified in one dimension, with intervals in between colors with different reflectivity (black and white). These are useful to improve the speed of inserting information in a system, but they do not contain information about the product itself. (Pavlidis; Swarts; Wang, 1990)

The QR codes were developed in Japan in 1994, and are currently used in logistics, industrial operations and sales activities. Each symbol consists of a codification region and a series of standard procedures, facilitating the location, size and inclination of the code in relation to the reader.(Liu; Yang; Liu, 2008)

The RFID technology consists of tags with information about a specific product that are automatically read, without the need of visual contact between the tag and the reader. The data is then inserted in a computer system, preferably in the web, and can be viewed by different SC agents. Another important advantage of this technology is that it allows reading multiple tags at the same time, improving the process of monitoring multiple batches. (Silva et al, 2013, Metzner; Cugnoasca; Silva, 2014). RFID technology follows first, the objects that have been identified, such as boxes, pallets and containers receive a tag containing information about the product and the location. These tags consist of a microchip and an antenna. When the tags are in the vicinity of a reader, they are activated, and provide the information contained in them. This information is then sent to a gateway that has been sending it to the web. (Kelepouris, Pramataris and Doukadis , 2007)

2.8 Traceability model

There are three main models how traceability trace sustainability claims. These models offer different approaches to tracking a claim and assuring it at each point in the supply chain. The three models are Product Segregation, Mass Balance, and Book and Claim. They are differentiated by the extent to which certified and non-certified materials are permitted to mix, as well as by claims that can be attached to the final product.

Models with less stringent controls around the handling of certified and non-certified materials are less complex and thus less expensive. However, wherever possible, the type of certification and the model of traceability used should depend on the sustainability claims and the materials being traced rather than the cost of implementing the model. Product segregation is best suited and should be prioritized, when possible, if there is a risk of being involved in human rights or labor abuses when sourcing a certain commodity. The Mass Balance and Book and Claim models are open to criticism for commodities where Product Segregation is available.

2.9 Product Segregation

The Product Segregation model implies that certified materials and products are physically separated from non-certified materials and products at each stage along the value chain. This ensures that certified and non-certified materials and products are not mixed and that the end product comes from a certified source. At the end, consumers know that 100 per cent of their products consist of certified materials.

There are two segregation models to traceability: Bulk Commodity and Identity Preserved (IP).

2.9.1 Bulk Commodity

The segregation model of Bulk Commodity separates certified from non-certified materials but allows mixing of certified materials from different producers. All producers must comply with the certification standards.

2.9.2 Identity Preservation

The Segregation model of Identity Preservation (IP) requires segregation of the certified material from the non-certified material and doesn't allow mixing of certified materials throughout the supply chain to provide traceability from a specific plantation or primary processor to the final users. The IP model enables the traceability of products back to the originating farm, forest or production site.

The IP model is sometimes criticized for being cost and resource intensive and requiring advanced technology since all material sources must be strictly separated controlled and monitored at each stage of the supply chain. Companies must know all their suppliers and collect and verify data at all levels throughout the supply chain.

2.9.3 Mass Balance

With the Mass Balance model, certified and non-certified materials can be mixed. However, the exact volume of certified material entering the value chain must be controlled and an equivalent volume of the certified product leaving the value chain can be sold as certified.

This is common for products and commodities where segregation is very difficult or impossible to achieve, such as for cocoa, cotton, sugar and tea. Customers may not know whether their specific share of the product contains certified or non-certified materials or a mixture of both. Claims of “product contains x per cent of certified ingredients” can be made

2.9.4 Book and Claim

The Book and Claim model is very different from the two models discussed above and does not seek to have traceability at each stage in the supply chain. Instead, this model relies on the link between the volumes of the certified material produced at the beginning of the supply chain and the amount of certified product purchased at the end of the value chain.

In the Book and Claim model, a company can obtain sustainability certificates for the volume of certified materials that it puts into the supply chain. Certified and non-certified materials flow freely throughout the supply chain. Sustainability certificates are bought via a trading platform and can be issued by an independent body.

2.10 Bulk commodity supply chain

Agricultural supply chains are unique in the sense that they include many different commodities that are grown in different regions at different time periods of the year, and are transported through different modes. Agricultural commodities have different end uses such as food, feed, industrial and energy and are relatively homogenous. They are transported and stored in bulk quantities which range from hundreds to several thousand metric tons. (Nardi et. al., 2007)

2.11 Tracking and tracing

The terms “tracking” and “tracing” are very commonly used to describe traceability. Tracking (forward) is the ability to follow the downstream path of a particular trade unit in the supply chain, while, tracing (backward) is the ability to identify the origin of the products used in a particular trade unit. Thus, tracking is a top down approach and tracing is a bottom-up approach. Both, tracking and tracing play a very important role in the overall supply chain traceability. According to (Van Dorp, 2002) tracking and tracing provides the visibility to where work is at all times and its disposition and a tracking function creates a historical record by means of recorded identification that allows for the traceability of components and the usage of each end product. A good traceability system should have the capability of performing both functions efficiently.)Laux 2007) demonstrated that tracing (backward) was harder than tracking (forward) for an elevator handling commodity grain.

Some early research focuses on the importance of traceability for firms and gave several reasons why traceability should be considered a source of competitive advantage for firms. Traceability can open opportunities for firms to improve their product quality. (Florence and Queree, 1993). Traceability used in an active way indicates the use of tracking information to optimize and control processes that must be seen as a tool for managing quality information through the entire supply chain. (Jansen-Vullers et al., 2003).

Besides food producers and processors, consumers mostly gain hidden benefits from traceability that include effective achievement of safety and an increased effectiveness of recall in case of emergencies FSA, (2002). Product safety is the most important motivation for traceability. Food manufacturers develop and adopt internal traceability systems and traceability chains mainly to improve food safety, since traceability can be seen as a subsystem and its presence is essential to the management of food and product quality (Peri, 2002). Traceability is an essential tool for ensuring both production and product quality .(Becker, 2000; Wall, 1994)

Moe (1998) showed that a good traceability system can provide several competitive advantages that include improvement in process control, better use of raw materials by linking the end product and raw material data, avoiding the mixing of high quality and low-quality raw materials and easier quality auditing process.

The traceability of food is an emerging issue in many developed countries. After facing serious food safety incidents, including mad cow disease, consumers have become increasingly concerned with the quality and safety of the food they eat. Consumers would like to acquire sufficient information in order to make informed shopping decisions about food; however, they are unable to do so in most cases because information asymmetry exists between buyers and sellers. This asymmetry is considered to be the consumers' perceived risk. Bauer (1967, p.24) noted that "consumer behavior involves risk in the sense that any action of a consumer has been produce consequences that one cannot anticipate with anything approximating certainty, and some of which are likely to be unpleasant." He also suggested that consumers develop decision-making strategies and ways of reducing perceived risk

According to the Food Standards Agency, "the basic characteristics of the traceability system are identification of units/batches of all ingredients and products, information on when and where they are moved or transformed, and a system linking these data." Traceability should prohibit missing information in the product chain and keep the product from losing its identity. The product traceability system can also provide detailed information on product production, processing, transfer, and distribution, such as the birthplace of animals, feeding, medication, date of sale, slaughtering information, and other supply chain-related information. For firms, the primary objectives of traceability systems include supply chain improvement, easier tracing of product and quality differentiation and firms determine the necessary amount of information, scope of coverage, and degree of assurance of their traceability systems, depending on the process and objective .(Golan et al. 2004)

Worldwide, consumers have shown concern about food safety due to the break out of mad cow disease. Food deficiencies such as the bovine spongiform encephalopathy (BSE) crisis or the dioxin crisis can cause death. According to the UK Food Standard Agency, a survey found that 75% of consumers are concerned about food safety. In addition, food sales have dropped dramatically, demonstrating that damaged food impacts not only the physical health of consumers but also the commercial health of the firms . (-Vullers et al. 2003) , due to the fact that consumers' risk perception of food is closely related to food purchasing patterns. In Europe, shortly after the BSE crisis in 2000, beef consumption fell significantly. For example, France lost 40%; Germany, 60%; Italy, 42%; and Portugal, 30% of its beef sales .(Agra Europe 2001; Ana

and José 2007). Also the mixture of various risks related to human health, the environment, future generations, animal welfare, and moral concerns have led to consumers' negative perception towards genetically-modified foods , (Miles et al. 2005). Legislative acts have been carried out concerning food safety, including the “General Food Law Regulation EU (2002) of the EU, which came into effect in January 2005, and the US Bioterrorism Act (FDA 2002), which has been in effect since December 2003. (Gunnar and Fremme 2007).

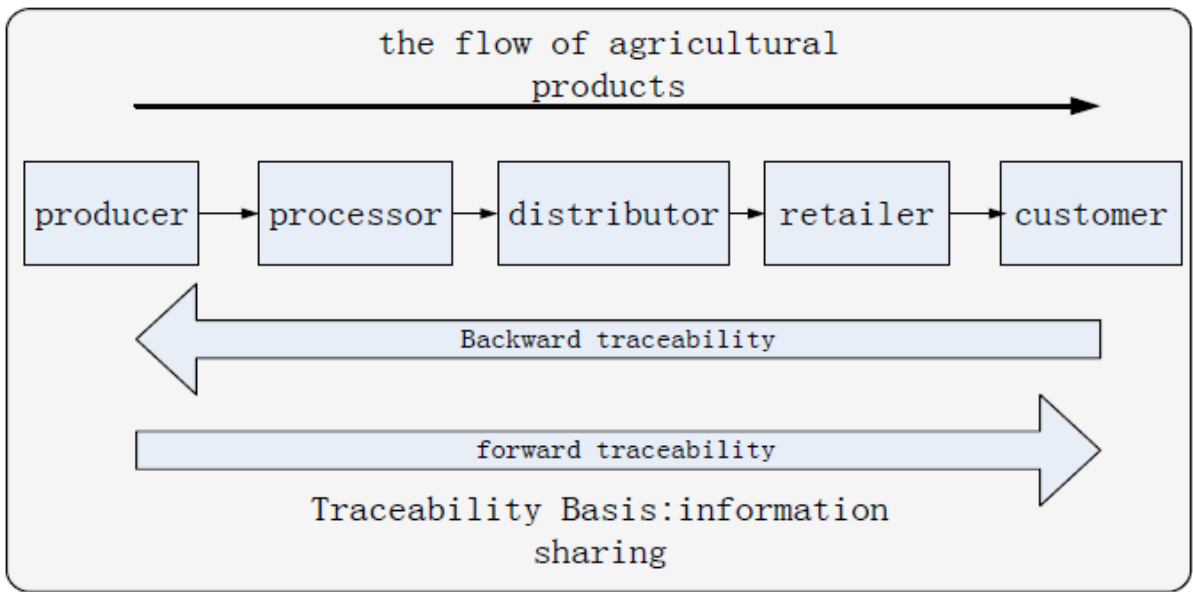


Fig 2.1 Coffee products circulation in traceability Adv. J. Food Sci. Technol., 2013

2.12 Supply chain traceability

According to (ISO, 22005) product traceability standard requires that each company know who their immediate supplier is and to whom the product is being sent, on the principle of one up and one-down. It states that food safety is the joint responsibility of all the actors involved. International Organization for Standardization, (ISO,2007). Thus, all the actors involved in the food supply chain are required to store necessary information related to the food product that link inputs with outputs, so that when demanded, the information can be provided to the food inspection authorities on a timely basis. For effective supply chain operations, the activities of all partners in the supply chain must be synchronized.

This synchronization can be achieved only by implementation of a system that facilitates information sharing on various activities that add value along the supply chain and the coordination between internal and external partners within the chain. (Jamson et al., 2004; Gunasekaran and Ngai, 2004). The general Food Law, Official Journal of European Communities, (2002) requires chain traceability systems. The guidance on the implementation of EC Food Law Regulation Article 18 (Guide 178/2002) declares that “it is in the logic of Article 18 that a certain level of internal traceability would be put in place by food business operator.

Chain traceability refers to the exchange of product information between different actors in a food value chain. Traceability systems can be set up to increase transparency in the supply chains (Meuwissen et al., 2003). McKean (2001) stated that the information must be transferred throughout the chain and properly identified to the appropriate food products.

2.13 Supply chains complexity

The combination of globalization and CP companies’ continual effort to drive down costs as well as increase responsiveness has created complex supply chains.

The result is that companies now engage numerous supply chain partners in several geographical locations (both domestic and international), which make CP companies increasingly exposed to new sources of supply that are out of their control. As a result, the burden on CP companies to affirm product quality and safety is enhanced.

2.14 The impacts of supply chain on traceability

Traceability implies the flow of information about one or more attributes along the supply chain. The control of information is often an instrument of strategic competition, as most firms have been only disclose private information if it benefits them. The more broad, precise, and deep the system of traceability is, the easier it has been to spot an individual producer or processor and hold it responsible for a hazard. In such cases the value of anonymity is lost. Hence there is some reluctance by producers and processors to join a traceability system. On the other hand public authorities may desire to have a very transparent supply chain, where information on a set of food safety attributes is widely shared along the chain and with authorities.

Clearly there is a potential conflict between what authorities and firms dealing directly with consumers would like to know about the products and those producing them are to be disclosed. Since there is a value to information, competition develops not only between firms at the same level of the supply chain but also between firms at different levels or among different supply chains according to the amount of information provided to consumers.

A central economic question in supply chains is who bears the cost and who reaps the benefits of traceability. In most beef supply chains there are differences in market power among the firms and information on food safety attributes is subject to moral hazard and adverse selection. When governments mandate traceability systems, the question is not only whether consumers want to pay for it through prices or taxes but also to whom that money has been be paid. The design of traceability systems is affected by relationships established along supply chains; the relative power of participants; the breadth, depth, and precision needed; and the value consumers give to the information provided. All these factors also play an important role in the distribution of the benefits and costs of traceability

2.15 Goal of effective traceability

Effective traceability systems benefit businesses and entire sectors from a production, marketing, and value chain management perspective. The following benefits should be considered the goals of a well-designed traceability system.(Samarasinghe et al.2009).

Market benefits: Traceability is essential to the survival of business in regulated markets.

Food products need to be labeled or identified to facilitate their origins and contents to the consumer. This has been become the norm in supermarkets as new traceability regulations are implemented.

Quality and safety management: Businesses can use traceability to respond strategically to consumers' increasing concerns about the potential risks posed by a food safety issue or a product's integrity being compromised.

An effective traceability system strengthens the food safety management capabilities of any business.

Reduced cost of production: When traceability is viewed as an outcome of possessing an effective ICT system, businesses are able to monitor performance and communicate more effectively than otherwise possible. The involved businesses are able to make more informed management decisions, minimize the resources invested in non-value adding activities, and reduce waste efforts along the entire value chain. Harmonizing traceability systems and requirements also enables businesses to reduce their costs, often while simultaneously increasing revenue.

Product recall: Product recalls tend to be bad news. But companies that successfully manage a recall can turn the bad news into a good news story by containing the crisis. A critical ingredient in effective management of a crisis is visibility — this means reliable and accurate information about a company's affected products and any associated food safety data. More than that, transparent traceability systems allow a company to provide the assurance needed to restore consumer and market confidence

Traceability systems help firms isolate the source and extent of safety or quality – control problems. Firms have an incentive to invest in traceability systems because they help minimize the production and distribution of unsafe or poor quality products, which in turn minimizes the potential for bad publicity, liability and recalls. (Golan et al., 2004). Gledhill proposes that meat processors can minimize risk by proactively adopting more stringent standards relative to "life cycle traceability" of their products; such trace back offers a strategic advantage that can greatly reduce costs in the event of a product recall and reinforce the confidence of customers and consumers in the strength and integrity of a company's products and brands. Domestic and export customers, to protect their investment in "own brands", are demanding that their suppliers trace back food product to source-of-origin,(Smith et al., 2005).

2.16 Requirements of the traceability system

According to (Folinas et. al. 2006), an integrated traceability system must be able to file and communicate information regarding product quality, origin, and consumer safety. In order to design an efficient commodity traceability system, the first step is to define the usage requirements for the products supply chain. A system-level approach is used to develop models for implementing the traceability system. One of the most important goals of defining system

requirements is to have synchronization among the requirements of all actors involved. (Miller, 2003).

Record breeding practices: The seed company would record the seed development practices used in the traceability system. For example: genetically modified, organic practices, etc.

Record farming practices: The farmer would record the farming practices used for a specific crop in the system. The data such as the seed variety used, date of planting, chemical application, harvesting, etc. would be recorded. The information such as organic practices would be recorded for specialty crops.

Record handling and storage practices: The supply chain actors should be able to record the handling and storage practices used by them in the system.

Record processing practices: The processor should be able to record the processing practices used in the system. Depending on the process and final product, this may include the cooking temperature, holding time, ingredients added, etc.

Authenticate claims: The system users (supply chain actors) should be able to authenticate their claims based on the data stored in the system. For example, on request, the system should be able to provide data to support organic farming or processing practices.

Comply with food safety regulations: Using the traceability system, within the time requirements provided, the users should be able to provide data to show that their production or processing practices comply with the food safety regulations. For example, a processor must be able to show that the processing conditions used to manufacture a product (temperature, holding time, etc) are in compliance with the food safety regulations. This data must be recorded in the traceability system and provided on demand by regulatory authorities.

Protect integrity of brand name: The system users should be able to protect the integrity of their brand name by using the data stored in the traceability system. If the processor claims that their products are organic, there must be data recorded and available to back that claim.

Document chain of custody: On request, the traceability system should be able to provide information about a specific trade unit that would document the chain of custody of that unit. In

case of a food safety emergency, it is very important to know where a particular trade unit is in the supply chain at a given time

2.17 Traceability through information exchange

Although IDEF0 models are good at providing an initial view of activity decomposition, it is incapable of modeling information process flows which is due to the lack of time dependency input. Dorador and Young, (2000). So, there is a need for models to capture the sequence of processes and information flows in a system. Many lot activities take place at various points in the grain supply chain, as described below.

Movement: Grain is moved from one actor in the supply chain to another. For example, farmer sells the grain to an elevator. In an elevator, grain is often moved internally from one storage bin to another due to storage space or other quality constraints.

Aggregation: A grain lot is aggregated with other lots. For example, when an elevator ships the grain to a river terminal, depending on the buyer specification, the outgoing grain lot might come from several different storage bins. So, an outgoing grain lot may contain grain from several storage bins at the elevator.

Segregation: An incoming grain lot is divided into many different grain lots.

Incoming grain at an elevator purchased from a farmer is considered as one lot. This grain lot might be divided and assigned to a several different storage bins rather than one bin. This leads to segregation of an incoming grain lot.

Storage: A grain lot can be stored for a certain period of time causing a change in its physical or chemical properties. For example, moisture content could change during storage.

Transformation: A grain lot or a part of it can be used as an ingredient to produce another product.

Destruction: A grain lot or a part of it can be destroyed during a processing operation for various reasons similarly, the food industry has to constantly adapt according to their business needs. If the elevator company deals with specialty grain, then it is a business requirement for them to

segregate the specialty grain from other grains. The business need in turn stems from the customer needs or preferences. Thus, the regulatory need, business need and the customer preferences are categorized as the model inputs. The traceability system should be developed in compliance with any regulatory requirements

2.18 Coffee and agricultural commercialization

Smallholders cultivate over 95% of the total agricultural land. The average smallholder cultivates less than one hectare of arable land, and consumes more than 65% of total production within the household. In many parts of the country, market participation of smallholder family farms (measured either in terms of per capita market share, the volume of farm output supplied to markets or their profit motive) is limited. Agricultural markets are fragmented and not well integrated into a wider market system, which increases transaction costs and reduces farmers' incentives to produce for the market. Government policy - or the lack of it – has contributed to this general characteristic of the smallholder agricultural sector in Ethiopia. Agricultural commercialization was not high on the policy agenda until recently, as government rather prioritized ensuring food security and poverty reduction at household level. (EEA, 2006).

Many factors have contributed to the commercialization of smallholder agriculture. It started as farmers and village communities were incorporated into wider economic networks and political units, often in close relation with the development of infrastructure, expansion of long-distance trade and state formation and government intervention. Other factors that have contributed to the commercialization of agriculture include variation in ecological conditions which stimulated some degree of specialization and favored exchange, the external demand for foodstuff in urban and food deficit areas, migration of people, government policies and technological innovations which facilitated surplus production (Hinderink and Sterkenburg, 1987).

2.18 Conceptual framework

In this study the different factors that affect coffee traceability has analyzed. Based on the literature review and others factors the researcher formulated the following research model.

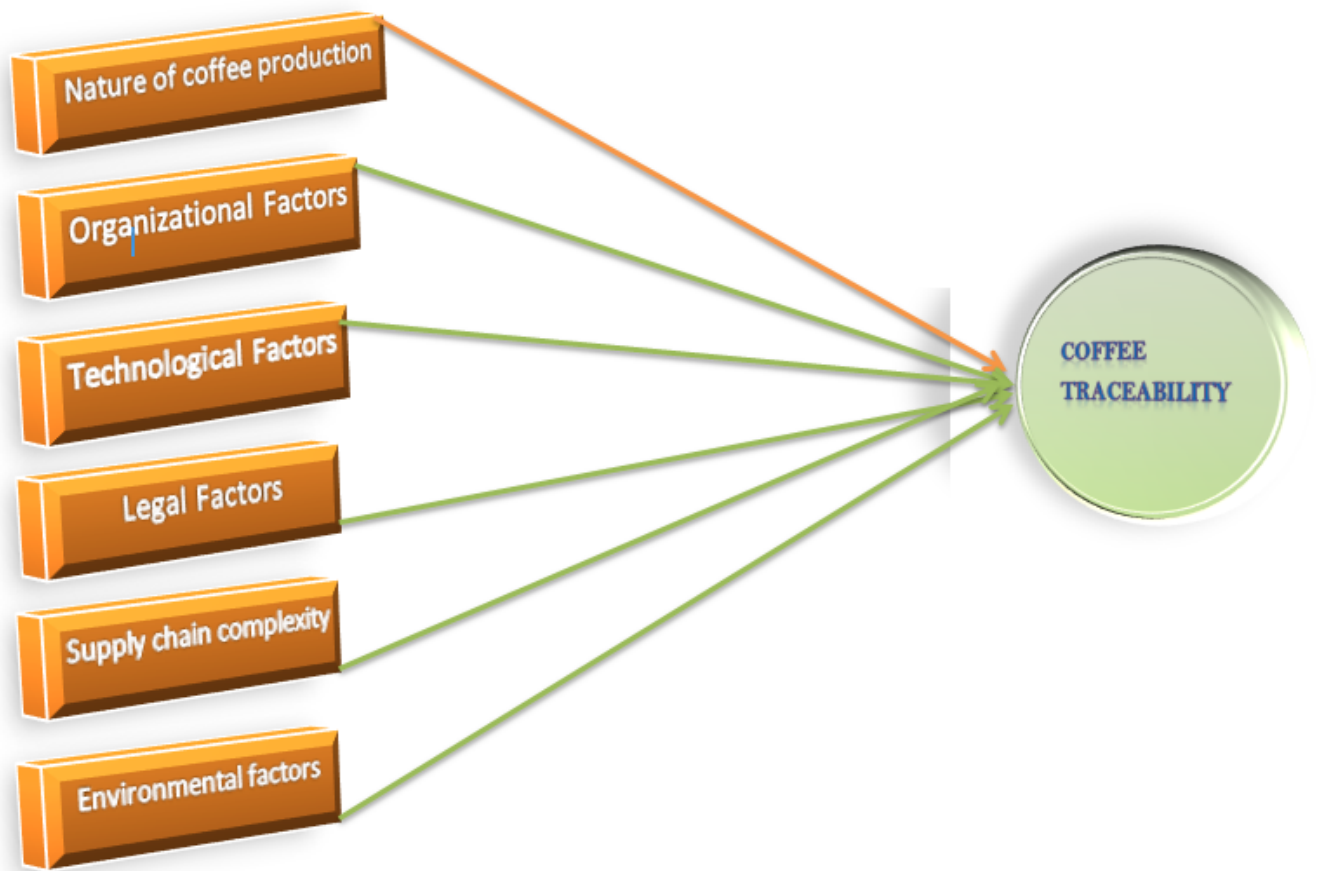


Figure2. 2: *Conceptual framework*

Source Developed by researcher from reviewed literature, 2018

CHAPTER THREE

3. Research Methodology

This chapter has explained the conceptual framework and methodological approach used in this study. The chapter also presents a description of the study area, research design, types and sources of data used, the sampling procedures, and sample size and tools of data analysis that has been in the study.

3.1 Descriptions of the study area

The study was conducted on Ethiopia commodity exchange Jimma Branch that is located in Oromia National Regional State of Jimma city. The city is found at a distance of 325 Km from Addis Ababa capital city of Ethiopia. Jimma is one of the reform towns in the region and has a city administration, municipality and 13 PAs.

Its astronomical location is 7° 4' North Latitude and 36° 5' East Longitude. The Central Statistical Agency (CSA) reported that 26,743 tons of coffee was produced in Jimma zone in the year ending 2005 E.C, based on inspection records from the Ethiopia Coffee & Tea development and marketing authority and the coffee has supplied to ECX Jimma branch accordingly. This represents 23.2% of the Region's output and 11.8% of national output,

Based on the 2007 Census conducted by the CSA, Jimma has a population density of 159.69. While 137,668 or 11.31% are urban inhabitants, a further 858 or 0.03% are pastoralists. The three largest ethnic groups reported in Jimma were the Oromo (87.6%), the Amhara (4.05%) and the Yem (3.12%); all other ethnic groups made up 5.23% of the population. Oromiffa is spoken as a first language by 90.43% and 5.33% spoke Amharic; the remaining 4.24% spoke all other primary languages reported. The majority of the inhabitants were Muslim, with 85.65% of the population having reported they practiced that belief, while 11.18% of the population practiced Ethiopia Orthodox Christianity and 2.97% professed Protestantism .(*Form Jimma city profile Based on the 2007 Census conducted by the CSA*)

3.2 Research Design

Research design is the basic frame work which provides guidelines for whole research. The choice of research design depends on the type, depth and extent of the issue under the study. According to Kothari (2004), research design refers to the arrangement of conditions for collection and analysis of data in a manner that it aims to combine significance to research purpose with economy in the perspective. Since the purpose of the study is to examine the factors that affect/hinder coffee traceability at Ethiopia commodity exchange Jimma branch, this research employed both quantitative and qualitative approach in order to address the research questions. The benefit of applying this method is that the method taken into consideration the overall picture in a way that the only one approach (method) cannot meet the goal.

Furthermore, the researcher adopted descriptive research design. Descriptive research is a fact finding enquiry or investigation. It simply describes the current state of affairs as it is. In this research design, the researcher can only report what happened in the past and what is happening in the present, but cannot predict accurately what will happen in the future as the researcher has no control over the variables.

Likewise explanatory research design was adopted to analyze and explain the influence of different factors that could affect coffee traceability. The research variables include dependent (coffee traceability) and different independent variables which represent traceability (Nature of coffee production, supply chain complexity, environmental, organizational, legal and Technological factors).

3.3 Data source and types

In this study, both primary and secondary data sources were employed to obtain reliable information about the factors that hinder coffee traceability.

3.4 Target population

A target population is the entire group of people to which a researcher intends the results of a study to apply. Aron & Coups, (2008). Therefore, the target population of this study remained to Ethiopia commodity exchange Jimma branch employees. The population of this study hasn't includes all the exchange's members all around the nations due to limitation of resources such as time and money.

3.5 Sample size

This study covered only few among several factors that affect coffee traceability. This is due to lack of full-fledged concepts regarding the subject matter and its practice in Ethiopia context and shortage of time to cover this wide-ranged and deep concepts. Based on the information obtained from Ethiopia commodity exchange Jimma branch, there are 120 employees who have been working at the branch and census sampling has employed for Ethiopia commodity exchanges Jimma branch and believed as this gave complete picture about the issue under study.

3.6 Method of data collection

Zikmund, (2003) defines data collection tools as an instrument that used to collect information for research that to be conducted or the methods employed to collect research data. According to, Cooper & Schindler, (2006), the choice of the methods to use is, influenced by the nature of the problem and the availability of the resource (time and money). In order to ensure the validity and reliability of the information from respondents, self-monitored questionnaires and structured interviews was employed as the necessary instruments for the study.

3.6.1 Primary data

These were the key informants for information that employed to collect the primary data. Questionnaires were developed and distributed to the entire employees of Ethiopia commodity exchange Jimma branch who worked at different position and departments and structured interviews for ECTMDAJZ and higher officials of the exchange was prepared and conducted as well. The questions used in the questionnaire were open ended and five-point likert scale type. The reason for using questionnaire was to gathered responses in a standardized way, to make the study more objective, certainly which is more than interviews. Generally it is relatively quick to collect information using a questionnaire. Potentially, the information that has been collected from the employees is believed to be cost effective, easy to analyze and reduces bias as the self-monitored questioner has employed. Before distributing the questionnaire, the researcher has contacted the respondents and clarifies the purpose of the instrument and made a brief discussion on how to fill the instrument on the correct way, since the traceability concept is new and

beginning in Ethiopia context. Accordingly, the questionnaire had distributed hand to hand to the respondents. To reduce the error the researcher has badly follow up and clarified the unclear area of the instrument before collection to the respondents

3.6.1.1 Questionnaire

In an attempt to collect data, questionnaires were prepared by the researcher and used as main source of data gathering instrument. The items were prepared in accordance with the designed objectives and basic questions to be answered in the study concerning the factors that affecting coffee traceability at Ethiopia commodity exchange Jimma branch .The first part of the questionnaire was about the respondents' demographic characteristics which comprised of role of the respondent, departments, sex, age, responsibilities and experience to be answered by the respondents from the given options. Items in the parts two reflect major elements of traceability which were used to rate different variables items that affect coffee traceability. These were presented in seven tables with five possible factors presented to be rated by the respondents from strongly disagree to strongly agree. Finally, the respondents were given a chance to state other possible factors that hinders school leadership effectiveness.

3.6.1.2 Interview

In addition to the questionnaire, semi- structured interview has been conducted with key officials of the exchanges and some of Ethiopia coffee and tea marketing development authority Jimma Zonal office. Semi- structured interviews were used as the researcher wants to investigate deeply into a topic and to understand thoroughly the answers provided.

The aim of the interviews were to investigated and acquired a clear understanding about traceability as general and factor that affecting coffee traceability at Ethiopia commodity exchange Jimma branch so far and to check how the higher official of the exchange and policy maker perceive traceability and identified the bottlenecks as wells . For the purposes of the study, five higher officials of the exchange and Ethiopia coffee and tea marketing development authority Jimma zonal office were interviewed each. The interviews were made by researcher in accordance with the objectives of the study and the basic questions rose in the statement of the problem. Interview guidelines were prepared by the student researcher and it was conducted and

filled with the officials. According to Drew, Hardman and Hart (1996:174), the advantage of the interview techniques is that it enables the participants to enlighten the researcher about unfamiliar aspects of the setting and situation.

3.6.2 Secondary data

Secondary data has been compiled from files, pamphlets, office manuals, circulars and policy papers that believed to provide appropriate and viable information about traceability. Besides, variety of books, published and/or unpublished government documents, literatures, websites, reports and newsletters was reviewed to make the study fruitful.

3.7 Reliability and Validity of the Instrument

The reliability of instruments measures the consistency of instruments. (Creswell 2009) considers the reliability of the instruments as the degree of consistency that the instruments or procedure demonstrates. In order to determine the reliability of a measure one needs to test for both consistency and stability using Cronbach's alpha reliability coefficient to test for the consistency of scale. The Cronbach's alpha reliability coefficient values range from 0 to 1 with the higher (the closer the coefficient is to one coefficients) indicating a higher internal consistency reliability and therefore a better measuring instrument (Sekaran 2000).

To confirm validity of the instruments, the instruments were developed and pilot study was carried out on coffee suppliers, exporters, cooperatives and unions and farmers of Jimma zone which was not included in the sample of the study. It was administered to select respondents from top list of 5 each (suppliers, coffee farmers, exporter's, cooperative and union) and discussion with the Jimma zone Ethiopia coffee and tea market development authority also held. The pilot test provides an advance opportunity for the investigator to check the questionnaires and to minimize errors due to improper design of instruments, such as problems of wording or sequence. (Adams et al. 2007).

The pilot-test was conducted to test the validity and reliability of the content. Before conducting the pilot-test, respondents were oriented about the objectives of the pilot-study, how to fill out the items, evaluate and give feedback regarding the relevant items. To this end, draft

questionnaires were distributed and filled out by the population selected for the pilot study. After the dispatched questionnaires were returned back, necessary modifications were made for those questionnaires that need adjustments for the main research.

To check the reliability and validity of the questionnaires, Cronbach’s alpha reliability test was calculated after the pilot test was conducted. All items were carefully entered in to SPSS version 20 and the average result found from all the respondent respondents were (0.869).

Table3. 1: Summary of Reliability Test on Scale Items

No	Subscales	No of items	Cronbach Alpha
1	Current coffee traceability	12	0.863
2	Nature of coffee Production	9	0.869
3	Supply Chain Complexity	8	0.862
4	Environmental Factors	6	0.851
5	Organizational Factors	8	0.881
6	Legal Factors	4	0.912
7	Technological Factors	5	0.842
Average Reliability result		52	0.869

Cronbach’s alpha coefficient normally ranges between 0 and 1. George and Mallery (2003) provide the following rules of thumb: “_ > 0.9 – Excellent, _ > 0.8 – Good, _ > 0.7 – Acceptable, _ > 0.6 – Questionable, _ > 0.5 – Poor and _ < 0.5 – Unacceptable”. It is noted that an alpha of (0.869) is reasonable good to use the question for the research.

3.8 Data Processing and Analysis

Both primary and secondary data were analyzed using qualitative and quantitative methods. Data analysis was made through a combination of both descriptive and inferential statistics. Questionnaires were first collected, edited, coded and entered into computer software named Statistical Product and Service Solutions – SPSS version 20 (Package for Social Sciences).

Then the edited data coded and arranged in to suitable categories, so that they were organized and classified into groups having a similar characteristic that makes the information ready for analysis. Data processing has employed two phases, data clean-up and data reduction. During data clean-up the collected raw data has edited to detect anomalies, errors and omissions in responses and checked that as the questions were answered accurately and uniformly.

3.8.1 Descriptive Analysis

The descriptive statistics such as percentage, frequency, charts and graphs were used to analyze data obtained through close-ended questionnaire regarding to the factors affecting coffee traceability at Ethiopia commodity exchange Jimma branch.

3.8.2 Inferential Analysis

According to Sekaran (2000:401), inferential statistics allow to assume from the data through analysis the relationship between two or more variables and how several independent variables might explain dependent variable. The following inferential statistical methods were used in this study.

Pearson Correlation Coefficient

The study was aimed at examining the factors that affect coffee traceability at Ethiopia commodity exchange Jimma branch and the researcher thought as Pearson correlation helps to show the relationship between the studied variables to measures the “linear association” between two variables i.e. the independent and dependent variables”. Hair et al.(2008).

According to Duncan C. and Dennis H. (2004), correlation coefficient can range from -1 to +1. The value of -1 represents a perfect negative correlation while a value of +1 represents a perfect positive correlation. A value of 0 correlations represents no relationship among the variables. According to, Pallant, (2010), these types of model assumed to provides a clue of directions, positive when one variable increases and so do the other one or negative when one variable increases and the other one decrease

Linear Regression Analysis

Besides to the person correlation, to show the extent to which independent variable affect the dependent variable multiple linear regression analysis was employed to investigating the association in which the effects of two or more independent variables on a single, dependent variable has been be studied simultaneously , (Zikmund et al. 2010).

It is also used to understand by how much each independent variable (Nature of coffee production, supply chain complexity, organizational factors, legal factors, technological factors and Environmental factors) to explain the dependent variable (coffee traceability).

Linear regression is a method of estimating or predicting a value on some dependent variable given the values of one or more independent variables. In this study multiple linear regressions was employed. (John Adams, et al., 2007:198).

3.9 Model Specification and Study Variables

The equation of regression in this study is generally built on two sets of variables, namely dependent variable (coffee traceability) and independent variables (Nature of coffee production, Supply chain complexity, Environmental factors, organizational factors, legal factors and technological factors). The basic objective of using regression equation in this study is to make the study more effective in describing, understanding and predicting the stated variables as well.

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \epsilon$$

Where:

Y is the outcome or dependent variable (coffee traceability)

X₁= Nature of coffee production, X₂=supply chain complexity, X₃= Environment, X₄= organization, X₅= Legal, X₆= Technology are variables and ϵ = standard error.

β_0 is the intercept term- constant which would be equal to the mean if all slope coefficients are 0.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$, are the coefficients associated with each independent variable and measures the change in the mean value of Y, per unit change in their respective independent variables.

3.10 Ethical consideration

Ethics refer to norms governing human conduct which have a significant impact on human welfare. Ethics in research has to do with the responsibility of researchers to be honest and respectful to all individuals who are affected by the research studies or reports of the results of the studies .Gravetter & Forzano, (2006). Ethical consideration plays a role in all research studies and all researchers must be aware of it. Therefore the researcher communicated with ECX Jimma branch legally. The purpose of the study was made clear for all participants. Any communication with the concerned bodies were accomplished at their voluntarily agreement without harming and threatening their personal and institutional wellbeing. The identity of the respondent was kept confidential too.

CHAPTER FOUR

4. Result and discussion

4.1. Introduction

This chapter deals with presentations, discussions and interpretations of the data collected through questionnaire and interview. The main objective of the study is to examine the factors that affecting coffee traceability at Ethiopia Commodity Exchange Jimma branch. Questionnaires and interviews were the tools selected and SPSS was used throughout to analyze the data. In this chapter, both descriptive and inferential data analysis and procedures were used. The data analysis follows the phases discussed in chapter three (under research design and analysis methods). The first phase involves editing, coding and the tabulation of data. This assisted in identifying any anomalies in the responses and the assignment of numerical values to the responses in order to continue with the analysis.

The data was then checked for possible erroneous entries and corrections made appropriately for any problem detected respected to the collected questioner. The data were entered by using SPSS version 20. To facilitate ease in conducting analyses, the results of the descriptive analyses are presented first, followed by the inferential (statistical) analysis as how far, the exchanges members at Jimma branch were an aware on the factors that hinder traceable coffee marketing system. Data were collected from the employees of ECX Jimma branch. One hundred twenty questionnaires were distributed across ECX Jimma branch office employees and all were completed and retrieved successfully, representing 100% response rate which is deemed impressive considering the short time given to these respondents and the new concepts of the subject matters. After coding and checking for accuracy of the data, all the questionnaires were found useful for the study.

Moreover, the results of Pearson's correlation coefficient and regressions were analyzed. Below are the presentations of the details of the responses.

4.2 Demographic Profile of Respondents

The tables, graphs and charts that are presented in this section deals with socio- demographic profiles of the respondent such as gender, age, marital status, educational background, position, departments and service years of the respondents.

4.2.1. Gender of the respondent

As it is depicted in the figure below, the majority of the respondents 66.67% were men whereas women respondents were 33.33%.

The result clearly shows that the employees of the organization have constitute more of men and almost twice that of female employees

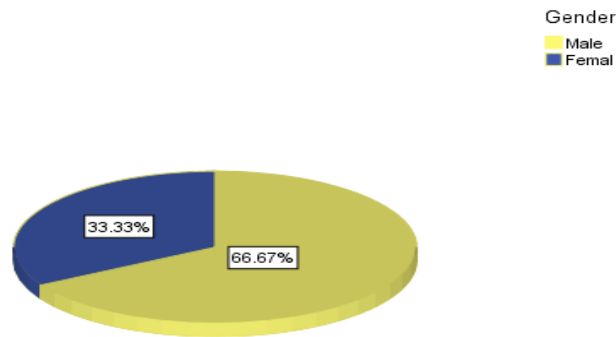
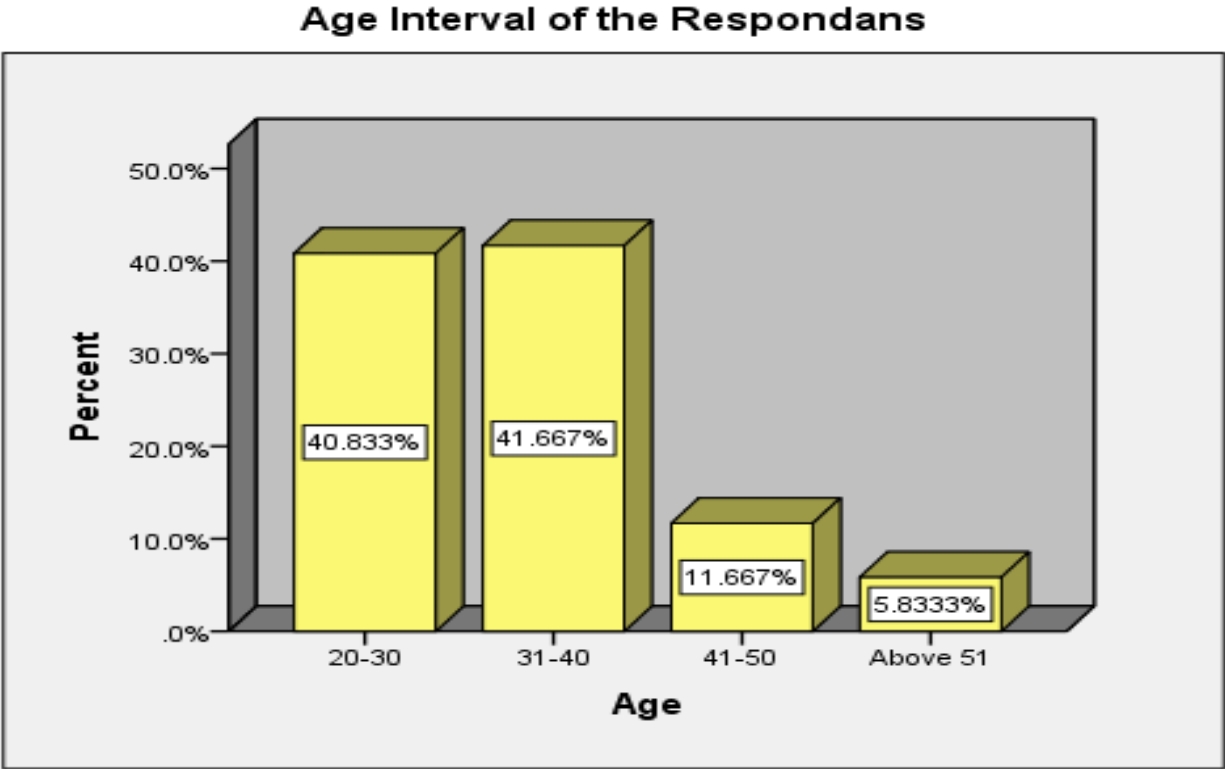


Figure4. 1: Gender of the respondent

4.2.2 Age of the Respondents

As shown here in below graph the majority of the respondents, 41.7% were aged between 31-40 years and followed by 40.8% aged interval of 20-30 years, 11.7% were aged between 41-50 Years, and 5.8% of the respondents are aged above 50 years respectively. This shows that the majority of respondents are found between ages of 20 to 40 years and the remaining were

included in the age interval of 41 to 51 and above. Accordingly the exchange is said to be composed with the mixture of youth and moderately old aged employees in which they are considered as active work force and ready to act when comfortable situation is set for, as they are in youthful age.



Source: Survey data, 2018

Figure4. 2: Age of Respondent

4.2.3 Marital Status of the Respondent

With regards to the marital status of the respondents, as depicted in the table below, majority of the respondents are married comprising 55.8%, in the same manner 44.2% of the respondents are unmarried.

This is due to the fact that, most of the aged and experienced employees stayed at the exchanges and fresh university graduates join to it, implying that the exchange could retain its experienced employees reasonably.

Table4. 1: Marital status of the respondent

Marital status			
S.N		Frequency	Percent
1	Single	53	44.2
2	Married	67	55.8
Total		120	100

Source: Survey data, 2018

4.2.4. Education Level and service years of the respondents

The educational levels and service years of the respondents are presented here in below table. As one can see from the below table, bachelor holders are larger in number 55.8 % followed by diploma holders 23.3% , while certificate graduates were 18.3% whereas, masters holder are the least from the respondent which constitutes 2.5% only. As it has been shown herewith, all the exchange’s employees were educated and this indicated that the respondents have hand a vital contribution for the validity and reliability of the responses they have given for the questionnaires. Besides the level of education is considered as it is important for this dynamic exchange’ as the qualified and educated person has thought to increase intrinsic motivation and behaviors, and individual acts in responsiveness and the greater possibility that the exchange would be successfully to accomplish it objective, hence the researcher realized that as the exchange is a dynamic, and composed of intellectual workforce who used to contributes a lot for its forward success.

Service year is one of the organizational variables which measure the length of the service year of employees in certain organizations.

As it is illustrated in table below the majority of the respondents worked at the organization for nine years and above, comprising 42.5 % of the total respondents and 34.2 % had been stayed with organization for 5 to 8 years, whereas only 13.3% were worked in ECX Jimma Branch for 3

to 5 years. Among the respondent 10% were worked with the exchange's not more than 1 to 3 years which constitute very few numbers of the respondents. As the result showed that most of the responded has stayed with the exchange and has long lasting working experience and supposed that this has greater contribution and made the study fruitful as they had good understanding about the study areas and the subject matters as well.

Table4. 2: Educational background and service year of the respondent

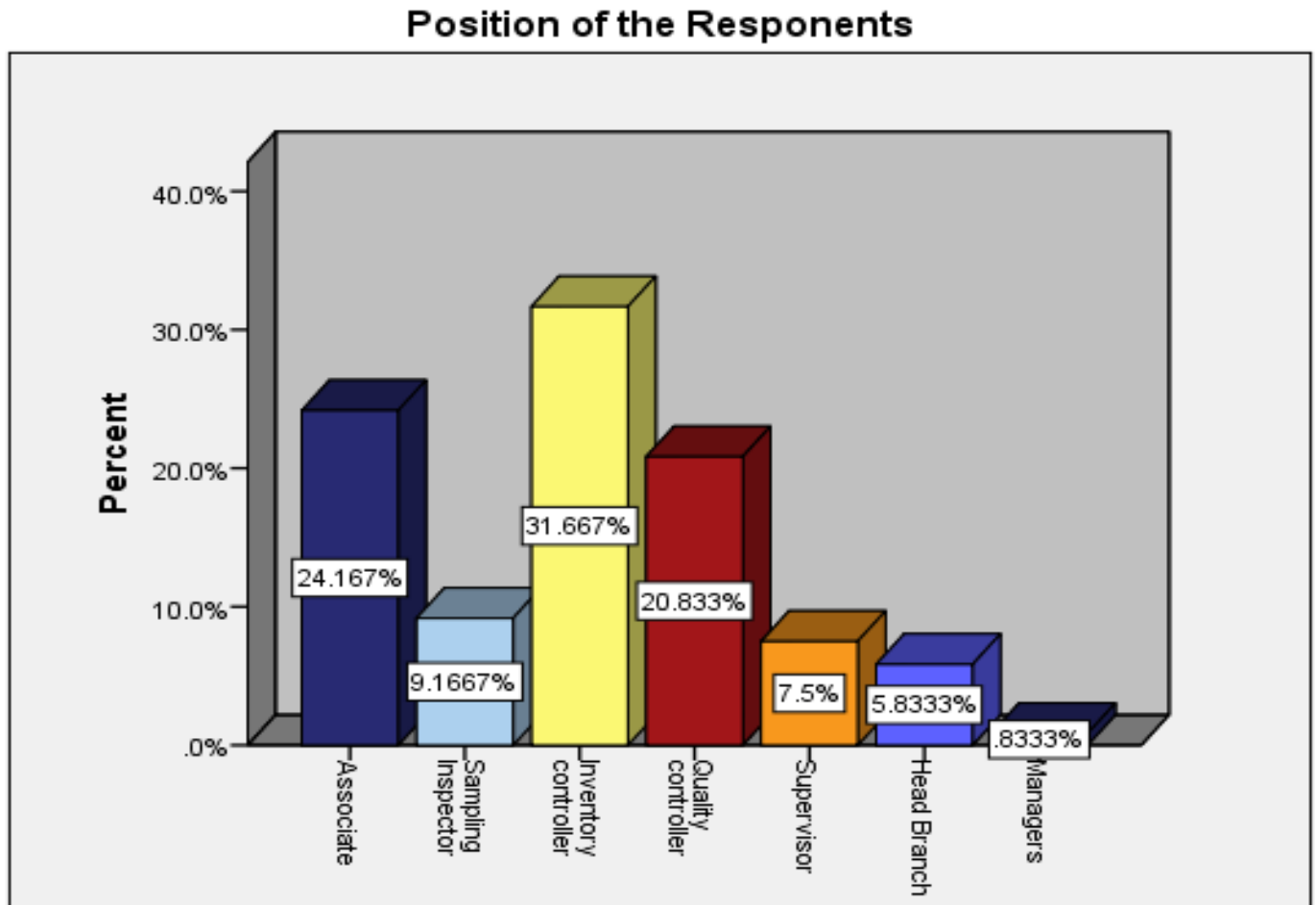
	Education	Frequency	Percent
Educational level	Certificated	22	18.3
	Diploma	28	23.3
	BA Degree	67	55.8
	MBA/MSc/MA	3	2.5
	Total	120	100
Service year	1-3 Years	12	10.
	3+-5years	16	13.3
	5+-8years	41	34.2
	Above 9 years	51	42.5
	Total	120	100

Source: Survey data, 2018

4.2.6 Position of the Respondent

As the result shown in below charts 31.7 % of the respondents were inventory controller and 24.2% and 20.82% of them were held a potions of associate and quality controller respectively and also 9.12 % and 7.5% of sampling inspector's and 5.83 % and 0.86% Branch head and manager respectively. As the result shows that all the respondents are highly related with the subject matter and or most of the time they have been working on coffee issues and recently with coffee traceability as all of them are dealing with coffee from their day to day activities.

These directly indicate that the respondents have had great contribution for the success of the study.



Source: Survey data, 2018

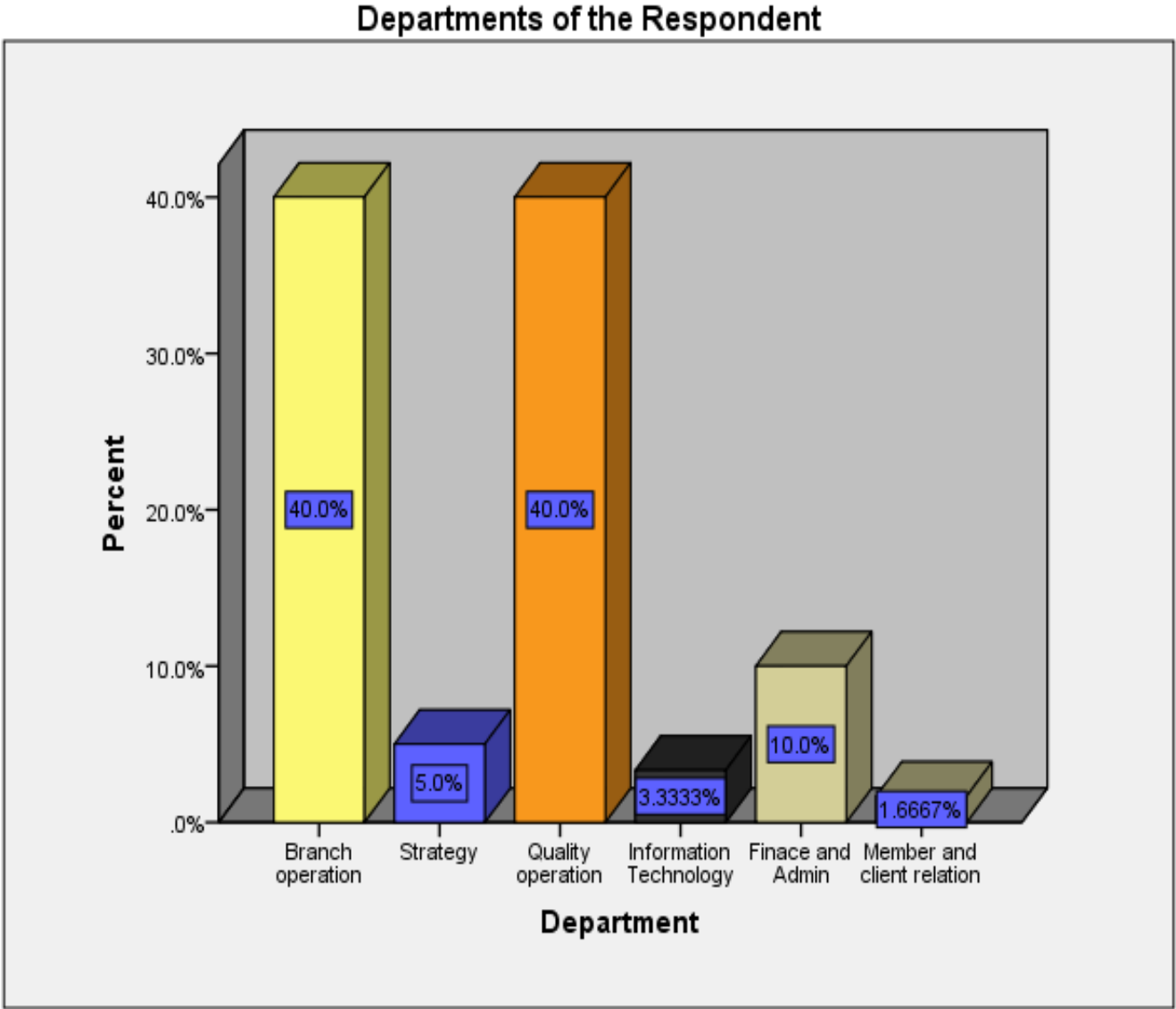
Figure4. 3: Position of the respondent

4.2.7. Department of the respondent

As the result shows in the below bar graph 80% the respondents were enrolled both at branch and quality operation division and 10% of the respondent were from Fiancé and Administration.

The rest 5%, 3.33 % and 1.67% were participated from Strategy, information technology and member and client relation respectively. As the result showed that all the responds are highly related with the subject matter and or most of the time they dealt with coffee and recently working on coffee traceability. In this facts hopefully the reliability and validity of the response has insured as they gave their response responsibly and somewhat they have had understanding

about the concepts of the study areas. Accordingly, the respondents have had abundant contribution for the success of the study to meet the objectives as they equipped with good knowledge of coffee and have known how about the backgrounds of the study areas.



Source: Survey data, 2018

Figure4. 4: Departments of the respondent

4.3 Factor affecting coffee traceability

Table4. 3: Current coffee traceability practice at ECX

Respondents were asked different questions regarding the factor that affecting coffee traceability at Ethiopia commodity exchange Jimma branch. Their responses are organized one by one and Presented as follows

Factors		SD	D	N	A	SA
In its current coffee traceability practice, ECX lacks to meets its customer demand and requirements.	Freq.	1	2		36	81
	%	0.8	1.7		30	67.5
In its current coffee treatability practice, ECX lacks to maintain sustainable coffee supply throughout.	Freq.	3	5	2	26	84
	%	2.5	4.2	1.7	21.6	70
In its current coffee traceability practice, ECX lacks to meet global standard and marketing demands.	Freq.	6	10	2	18	84
	%	5	8.3	1.7	15	70
In its current coffee traceability practice, ECX lacks to enhance effective communication from farm to end consumer.	Freq.	4	7	2	28	79
	%	3.3	5.8	1.7	23.4	65.8
In its current coffee traceability practice, ECX couldn't recognize as its suppliers mix different coffee types back to the washing /hulling station.	Freq.	2	5	2	31	80
	%	1.7	4.2	1.7	25.7	66.7
In its current coffee traceability practice, ECX deposit each supplier's coffee separately based on Identity preserved.	Freq.			2	35	83
	%			1.7	29.2	69.2
In its current coffee traceability practice, ECX delivery each client's coffee, separately to the buyers/exporter from its warehouse maintained the IP model.	Freq.	80	38	2		
	%	66.7	31.7	1.7		
In its current coffee traceability practice, ECX lacks to build trust and loyalty among the stockholders.	Freq.	6	9	2	25	78
	%	5	7.5	1.7	20.8	65
In its current coffee traceability practice, ECX load altogether different client's coffee, coffee grade.	Freq.			2	47	71
	%			1.7	39.2	59.2
In its current coffee traceability practice, ECX provided better decision identifying through tracking and tracing product problem and notify the consumers immediately.	Freq.	82	26	2	7	3
	%	68.2	21.7	1.7	5.8	2.5
In its current coffee traceability practice, ECX lacks to describe the entire history of coffee products from farm to ultimate consumer.	Freq.			2	35	83
	%			1.7	29.1	69.2
In its current coffee traceability practice ECX lacks to enhance brand promotion, product differentiation, product recalls.	Freq.			2	27	91
	%			1.7	22.5	75.8

As shown in the above table 4.3, the respondents were asked different questions related to the current coffee traceability practice at Ethiopia commodity exchange Jimma Branch which raises different issues and practices. One of the questions was asked as whether ECX lacks to meet its customers demand and requirements in its current coffee traceability practice. As a result, out of the total respondents, 67.5% and 30 % were strongly agreed and agreed, about the problem respectively. As the results indicated that, almost all the respondents i.e. 97.5 % agreed on the problem. Therefore, it may be concluded the current coffee traceability practice has missed to meet its customer demands and condition as per the requirements which is the current world wide concern as if any products entering to the global market should fulfill the global standards and should meet the customer demand as well . The second question asked was “In its current coffee traceability practice, ECX lacks to maintain sustainable coffee supply throughout. Accordingly out of the total respondents 70% were strongly agreed and 21.6 % agreed on the problem. Here, in the same manner the majority of the respondent i.e. 91.6% agreed on the statement while the remaining of the respondents was neutral and disagreeing for statements. Hence the result indicated that the majority of respondents confirmed that ECX lacks to maintain sustainable supply throughout which is vital component in coffee products and sustainable supply of coffee is very demandable with the foreign buyers as confirmed from the interview results of higher exchanges official and Ethiopia coffee and teas market development authority. The third question is about “In its current coffee traceability practice, ECX lacks to meet global standard and marketing demands”. In respect to these queries 70 Percent, 15 Percent of the respondents, strongly agreed and agreed, respectively. From this the researchers concluded that majority of the respondents i.e. 85% have agreed that ECX lack to meet the global standards and market demand in respect to its current coffee traceability practice, while the rest of the respondents were neutral and disagreeing to the issues. The fourth question is “In its current coffee traceability practice, ECX lacks to enhance effective communication from farm to end consumer”. Out of the total respondents, 65.8% and 23.4 % were strongly agreed and agreed, about the problem supported by the majority of the respondents i.e. 89.2 percent. The fifth question is about “In its current coffee traceability practice, ECX deposit each supplier’s coffee separately based on identity preserved” Accordingly the statement was supported by majority of the respondents and out of the total respondents, 69.2% and 29.2 % strongly agreed and agreed, about the problem respectively. Accordingly almost all of the respondents 98.4 percent had agreed

as the exchange deposit each of its customers coffee based on its identity preserved model which is recommendable to maintain traceability, the deposited commodity show the track only up to the washing /hulling station of different supplies at different districts which contradicts the principle farm or field to table concept in traceability. The sixth questions which stated that “In its current coffee traceability practice, ECX delivery each client’s coffee, separately to the buyers/exporter from its warehouse maintained the IP model, was not supported equivalently with that of the preceding question. Accordingly out of the total respondent 66.7 percent and 31.7 percent were strongly disagreed and disagree respectively. Therefore the idea has not supported the problem and accounts for 98.4% of the respondent. From this the researcher concluded that the exchange did not maintain traceability during it deliver commodity from its respective warehouse. For the statement that asks, in its current coffee traceability practice, ECX lacks to build trust and loyalty among the stockholder is supported by most of the respondents. Out of the total respondents, 65% and 20.8 % were strongly agreed and agreed, about the problem. Majority of the responded i.e. 85.8 percent supported the ideas that ECX lacks to build trust and loyalty among its stockholder while the remaining respondents were disagreeing with the problem, likewise the exchanges unexploited to satisfy and maintain the trust of its customer in maintaining full traceability practice that the customers and the world demands nowadays . Regarding to the statement, in its current coffee traceability practice, ECX load different clients coffee and coffee grade altogether has supported by majority of the respondents. Accordingly, out of the total respondent 59.2% and 39.2% has supported as strongly agree and agree respectively. From this one can conclude that the exchange has used to deliver its deferent clients coffee altogether at lump sum which violated traceability concepts. For the question that stated in its current coffee traceability practice, ECX provided better decision for the identified problem through tracking and tracing product and notify the consumers immediately has not supported by the respondent, and from the total of the respondent 68.2% and 21.2% has respond strongly disagreeing and disagree respectively. From this the researcher concluded that ECX could not have a well-established means to follows ups down an up about the coffee product and did not taken any measuring action for any coffee quality disputed by any coffee makers. Regarding the question in its current coffee traceability practice, ECX lacks to describe the entire history of coffee products from farm to ultimate consumer has agreed by most of the respondent by 69.2 percent and 29.1 percent strongly agree and agree respectively.

The last one supported by most of the respondent as ECX lack to the enhance brand promotion, product differentiation; product recalls if any unsafe product detected though its current coffee traceability practice. However this was the main target of implementing coffee traceability as the interview result showed, the interviewed higher official and Ethiopia coffee and tea marketing development authority was confirmed as if we have implemented the completed coffee traceability it would important for branding the coffee products and strengthening the product differentiation as well.

Table4. 4: Nature of coffee production as a factor

Factors		SD	D	N	A	SA
Most of the coffee farmers in Ethiopia lack advanced technology and mechanization for their coffee cultivation.	Freq	4	6	6	33	41
	%	3.3	5	5	27.5	59.2
Most of the coffee produced in Ethiopia is characterized by traditional and primitive way of production.	Freq	2	4	1	25	88
	%	1.7	3.3	0.8	20.8	73.3
Most of the coffee produced in Ethiopia is characterized as geographically scattered and cultivated by small holder farmers.	Freq		2	1	26	91
	%		1.7	0.8	21.7	75.8
Ethiopia coffee farmers lacks to produce and supply the lot that complies with ECX mandates to their buyer at the primary market.	Freq	3	7	6	37	67
	%	2.5	5.9	5	30.8	55.8
Ethiopia coffee farmers lacks to use diary book to register their field data (i.e. yield per hectare ,coffee Varsity, sources of seed, farm size, date of plantation, ecological location etc.) .	Freq	1	3	2	45	69
	%	0.8	2.5	1.7	37.5	57.5
Ethiopia coffee production characterized by different coffee variety within the same plot.	Freq		1	2	38	79
	%		0.8	1.7	31.7	61.8
Most of Ethiopia coffee framers lack to distinguish the types of coffee they cultivate (Garden, Farm, Forest, Semi forest)	Freq	6	5	7	35	67
	%	5	4.17	5.8	29.23	55.8
As coffee production yield is insignificant for small scale farmers they sale their coffee for many buyers and lack sustainable supplying for a single buyer.	Freq	1	2		37	80
	%	0.8	1.7		30.8	66.7
Ethiopia Coffee farmers used technology and productivities/fertilizer, pesticide, chemicals and well-known their supplies.	Freq	31	64	7	12	6
	%	25.8	53.3	5.8	10	5

As shown in the above table 4.4, the respondents were asked different questions related to the nature of coffee production practice. One of the questions asked were most of the coffee farmers in Ethiopia lacks advanced technology and mechanization for their coffee cultivation. As a result shows, out of the total respondents, 59.2 % and 27.5 % were strongly agreed and agreed, about the problem respectively. As the results indicated majority of the respondents i.e. 86.7 % were agreed on the problem. While the remaining respondents were disagreeing to the ideas raised. For the questions requested as most of the coffee produced in Ethiopia is characterized by traditional and primitive way of production has supported largely equivalently to the preceding questions. Hence out of the total respondent 73.8 % and 20.8 % were strongly agreed and agreed about the problem respectively which is account for the total of the responded that's agreed with the ideas i.e. 94.6 percent.

Therefore, it could be concluded that the nature of coffee agronomy in Ethiopia is carry out in the back ward and primitive techniques practice and still is unexploited using advanced technology and mechanizations which is total hindering the coffee traceability.

Regarding to the question most of the coffee produced in Ethiopia is characterized as geographically scattered and cultivated by small scale farmers, was highly supported by the respondents. Accordingly, out of the total respondents 75.8 percent and 21.7 percent were strongly agreed and agreed about the problem respectively. Hence out the total respondent the ideas supported and agreed by 97.5 %. As the interview result obtained shows both from the Ethiopia coffee and tea marketing development authority Jimma zone Jimma zone Jimma zonal office Jimma zone office and ECX higher official the coffee framers has badly scatter and small scale framer in their natures and cannot picked significant amount of products from their farms and this is stayed and recognized as the major bottleneck for not implementing competes coffee traceability in ECX.

Regarding to the problem that stated as, Ethiopia coffee farmers lacks to produce and supply the lot that complies with ECX mandates to their buyer at the primary market was also supported by majority of the respondents. Out of the total respondent 55.8% and 30.8 % were strongly agreed and agreed to the problem respectively. However the remaining was neutral and disagreeing to the problem as seen in the table above. For the question that asks Ethiopia coffee farmers lacks to use diary book to register their field data (i.e. yield per hectare ,coffee verity, sources of seed, farm size, date of plantation, ecological location etc.) was supported almost all by the

respondent and out of the total respondent 57.5 % and 37.5% were strongly agreed and agreed by the responded to the problem and supported by 95% as the farmer not used any of their farm data.

Regarding to the question Ethiopia coffee production characterized by different coffee variety within the same plot was the respondents support highly the ideas as once can found different coffee variety within the same coffee pilots. This is supported by larger number of respondents and out of the total respondent 61.8% and 31.7% strongly agreed and agreed respectively and from the respondent 93.5% were supported and agreed to the problems.

For the question asking that most of Ethiopia coffee framers lack to distinguish the types of coffee they cultivate (Garden, Farm, Forest, Semi forest) supported by the majority of the respondent. Out of the total respondent 55.8 % and 29.23 were strongly agreed and agreed to the problem respectively which accounts for 85.03% of the total respondents. While the other were neutral and disagreed to the ideas raised here. Finally for the questions that sated coffee production yield is lesser in amount for small scale farmers as the result they sale their coffee for many buyers and lack sustainable supplying for a single buyer, was supported by the majority of the respondent and out of the total responded 66.7% and 30.8 % were strongly agreed and agreed about the problem respectively and the reaming were agreeing to the problem.

Generally the result obtained from the interview supported that, most of the Ethiopia coffee farmers are smallholder and geographically very scattered in their very nature and lack to use advance technology and mechanization for their farm. In the same manner the farmers didn't practice any recordkeeping regarding to their farm history which is considers as one of the vital elements in implementing traceability and helps to know every data and information regarding to the farm size, types of coffee product cultivated, agro ecological location and the owner of the products.

Hence the interview results indicating and confirmed the absence of good coffee agronomy /production practices. This contradicts the agricultural practice with respect to product traceability which represents the ability to identify the farm where the product was grown and sources of input used, as well as the ability to conduct full backward and forward tracking to determine the specific location and life history in the supply chain by means of records which is pre requested of the foreign buyer nowadays as confirmed by the higher official of the exchanges. The data such as the seed variety used, date of planting, chemical application,

harvesting, etc. would be recorded. Accordingly as the result obtained for the office of Ethiopia coffee and tea market and development authority this has been easy to implemented with coffee grower registered as an investor of coffee and cooperatives and union as they have larger frame size and harvested significant amount coffee relatively to the small scale framers and can send to abroad without mixing the coffee with other which is very promising and encouraging to work on it in maintaining coffee traceability.

Table4. 5: Supply chain complexity as a factor

Factors		SD	D	N	A	SA
ECX lacks to ensured chain traceability for coffee actors that help to retrieve the information they demand.	Freq.	3	4	2	36	75
	%	2.5	3.3	1.7	30	62.5
ECX lacks to ensure coffee traceability from washing station to ultimate consumer using tracking and tracing complete coffee history through well-established chain traceability.	Freq.	2	3	2	40	73
	%	1.7	2.5	1.7	33.3	60.8
ECX lacks well-established chain traceability to crosscheck and control over the coffee delivered from its warehouse whether the exporters mixing before sending to foreign buyers.	Freq.	3	5	3	41	68
	%	2.5	4.2	2.5	34.2	56.6
ECX suppliers do not know whether ECX deliver their coffee by mixing with other suppliers coffee products	Freq.	5	8	7	48	52
	%	4.2	6.7	5.8	40	43.3
ECX ever receive a claim for coffee quality that delivered from its warehouse by coffee buyer through chain traceability.	Freq.	64	54	1	1	
	%	53.3	45	0.8	0.8	
Coffee supply chain traceability is highly fragmented and diversified.	Freq.	2	2		20	96
	%	1.7	1.7		16.7	80
Traceability system that ECX implemented lacks to establish more and frequent contacts with supply chain members.	Freq.		3	4	17	96
	%		2.5	3.3	14.2	80
Lack of integrated supply chain traceability from one end to another makes difficult in maintain smooth communication from one end to the other.	Freq.		2	3	37	78
	%		1.7	2.5	30.8	68

As shown in the above table 4.5, the respondents were asked different questions related to the supply chain complex. Among the items, ECX lacks to ensured chain traceability for coffee actors that help to retrieve the information they demand were supported by the majority of the respondent. Accordingly, out of the total respondents 62.5 % and 30% were strongly agreed and

agreed about the problem respectively and the remaining respondents were neutral and disagreed to the problem. In the same manner for the question that asked, ECX lacks to ensure coffee traceability from washing station to ultimate consumer using tracking and tracing, in respect to coffee history through well-established chain traceability has supported by the majority of the respondents. Out of the total respondents 60.8 percent and 33.3 percent were strongly agree and agree about the statements respectively while the remaining were not supported and disagreeing and neutral to the problem.

Regarding to the problem that states as ECX lacks well-established chain traceability to crosscheck and control over the coffee delivered from its warehouse whether the exporters mixing before sending to foreign buyers has supported by the majority of the respondents. Out of the total respondent 56.6% and 34.2 % were strongly agreed and agreed about the problem and constitutes 90.8% were supported the idea and the remaining were disagreeing to the ideas. For the question ECX suppliers do not know whether ECX deliver their coffee by mixing with other suppliers coffee products has also supported by the majority of the respondent as indicated in the above table. Out of the total respondents 43.3% and 40% were strongly agreed and agree to the problem respectively. The majority of the respondents which constitutes for 83.3% have supported the ideas and the remaining were neutral and disagreed about the problem.

The respondents were asked as coffee supply chain traceability is highly fragmented and diversified and as a result chain traceability problem occurs. Accordingly 80% and 16.6 % of the respondent were strongly agreed and agreed respectively on the issue, while the remaining respondent i.e 3.4% were not agreed to the issues, hence out of the total responded 96.6% of the respondent that could be said almost all agrees to the issued raised. In the same manner the respondents were asked as if coffee traceability system that ECX implemented lacks to establish more and frequent contacts with supply chain members consequently 80% of the respondents strongly agreed and 14.2% have agreed, while small number of respondents disagreed to the issue. The respondents were asked yet again as the lack of integrated supply chain traceability from one end to another makes difficult in maintain smooth communication from one end to the other as a result could one of chain traceability problem. Accordingly 68% and 30.8% of them strongly agreed and agreed respectively on the issue while the remaining respondent were not agreed to the issues, hence out of the total responded 98.8% of the respondent agrees to the issued raised.

In general careful analysis from interview conducted with the ECX higher official and the Ethiopia coffee and teas marketing development Jimma zone has indicates the existence of poor implementation of an integrated chain traceability which must be taken into consideration by the all the members. the interviewer confirmed as it could be difficult for companies to trace each and every step in the journey of a given product unless otherwise the supply chain traceability is well established and come in to practice among the supply members with full responsibility of all . accordingly the interviewer suggested that had it been maintained chain traceability would identifies the path from which a product has originated and to whom it has been supplied and consists of an inter-linking chain of records between steps in a process operation and/or between different stages in a supply chain. However, this is total missed at ECX as the result showed above and the chain traceability is highly fragmented and diversifies and confirmed by the interview as one of the major bottlenecks for coffee traceability execution.

Table4. 6: Environmental factors

Factors		SD	D	N	A	SA
Consumable product safety is an increasingly important public health issue and foodborne illness can damage trade and lead to a loss of earnings, unemployment and litigation for the environment.	Freq	5	19	12	38	46
	%	4.2	15.8	10	31.7	38.3
With the growth of international trade, the environmental impacts of products throughout supply chain have become a key concern to implementing effective traceability and need eco-friendly cooperation.	Freq		8	12	44	56
	%		6.7	10	36.7	46.7
The distance that food travels from the farm where it is produced to the kitchen in which it is consumed is longer than ever before and has environmental impact.	Freq			5	28	87
	%			4.2	23.3	72.5
Coffee production and marketing system affected by the absence of environmental friendship and solutions to reduce the environmental impacts such as pollution and global warming.	Freq			8	38	74
	%			6.7	31.7	61.7
To implement effective traceability the awareness of the societal all across the supply chain is very critical and need friendly cooperation.	Freq			3	28	89
	%			2.5	23.3	74.2
Coffee traceability is affected by ecological location and topography that the coffee growing in.	Freq		1	2	41	78
	%		0.8	1.7	34.2	63.3

The above table showed that the summary response of environmental factor that affect coffee traceability. Accordingly the response with respect to consumable product safety is an increasingly important public health issue and foodborne disease can damage trade and lead to a loss of earnings. Unemployment and litigation for the environment shows that the majority of the respondents 38.3% strongly agreed and the other 31.7% also agreed on the issue whereas only 4.2% strongly disagreed and the other 15.8% also disagreed with the issue. The remaining 10% of the respondents became neutral.

Regarding the second question which focuses on the growth of international trade, the environmental impacts on products throughout supply chain have become a key concern to implement effective traceability and need eco-friendly cooperation, 46.7% and 36.7% of the respondents showed strongly agree and agree respectively. To the contrary, none and only 6.7% of the respondents have rated their level of agreements as strongly disagree and disagree respectively while the remaining 10% of the respondents have a neutral response.

With respect to the other environmental factor which focus on whether the distance that consumable travels from the farm where it is produced to the kitchen in which it is consumed is longer than ever before and has environmental impact, 72.5% of the respondents strongly agreed and 23.3% have also shown that they agree as if it could be a factor. In the same manner with respect to the other question which deals with the coffee production and marketing system affected by the absence of environmental friendship and solutions to reduce the environmental impacts such as pollution and global warming, the majority of them: 61% and 31.7 % of the respondents agreed as if it could be another environmental factor that hinder the coffee traceability in the organization. In the other way with respect to awareness of the societal all across the supply chain is very critical and need friendly cooperation similarly 74.2% and 23.3 % of the respondents showed their level of agreements as agreed strongly and agree respectively. Finally, the other environmental factor question that focus on coffee traceability is affected by ecological location and topography that the coffee growing in is strongly agreed and agreed with the percentage of respondents of 63.3% and 34.2% respectively. Generally it is observed from the above summary table majority of the respondents showed their agreement as if the above environmental factors could be the causes that affect the coffee traceability.

As discussed and supported by the interviews several actors with different systems and requirements contribute across international borders and make more complex the environment and require the engagement and collaboration of actors along sides with the entire supply chain to trace a product’s history and from end to end though collaboration and having a common understanding about a subject matter. The collaborations need to be a trusted, well-governed by the independent body and that all actors would have a confidence in, and maintains the relationship at every step in the supply chain and global alignment/ collaboration, driven by multi-stakeholder, is the key to success in traceability as per the response of the higher official

Table4. 7: Organizational Factors

Factors		SD	D	N	A	SA
Definition of system and structural design of coffee traceability is fully understood across the exchanges.	Freq.	55	48	5	6	6
	%	45.8	40	4.2	5	5
Implementing coffee traceability required high investment cots.	Freq.	6	11	9	51	43
	%	5	9.2	7.5	42.5	35.8
Lack of qualified employees to execute coffee traceability	Freq.	42	67	5	4	2
	%	35	55.8	4.2	3.3	1.7
Lack of ability to integrate the existing marketing system with that of the new modality/traceability.	Freq.	4	3	2	41	70
	%	3.3	2.5	1.7	34.5	58.3
Lack of resource to provide training and awareness for the coffee actor’s requirements of implementing traceability.	Freq.		2	3	45	70
	%		1.7	2.5	37.5	58.3
Lack of sufficient infrastructure to implement complete traceability.	Freq.	3	3	2	34	78
	%	2.5	2.5	1.7	28.3	65
Low commitment and motivation with the exchange’s employee in supporting traceability execution.	Freq.	3	1	2	25	89
	%	2.5	0.8	1.7	20.8	74.2
Lack of clear and well developed standard traceable coffee marketing system.	Freq.	2	1	2	42	73
	%	1.7	0.8	1.7	35	60.8

As shown on the above table questions related to organizational factors that might affect coffee traceability, so that the respondents rate their level of agreement to each and every point.

Accordingly with respect definition of system and structural design of coffee traceability is fully understood across the exchanges was not supported by the respondents. Out of the total respondent 45.8% and 40% of the respondents showed their agreement as strongly disagree and disagree respectively while the remaining 4.2 %, and 5% were show their level of agreement as neutral and agree to the issue respectively.

On the same manner, implementing coffee traceability required high investment costs. 35.8% and 42.5% of the respondents have shown their agreements as if it could be a cost for the execution of coffee traceability while the remaining respondent were not support about the problem and disagreed and neutral for the issues with the percentage of 7.5%, 9.2% and 5% respectively. Regarding to the question asked for, the organizations lack qualified employees to execute coffee traceability, majority of the respondent hasn't support about the problem and out of the total respondents 55.8% and 35% were strongly disagree and disagree about the problems respectively while the remaining 4.2% 3.3 % and 1.7% gave their response as neutral and agree and strongly agree respectively. Accordingly out of the total respondents 90.8 % of the respondent has disagreed to the idea that implies the exchange has no problem of qualified employees. On top of that, the respondents were requested the question like ECX lacks the ability to integrate the existing internal operational system with that of the new modality/traceability. Accordingly the majority of the respondent has supported the question. Out of the total respondent 58.3% and 34.5 has strongly agree and agree to the problems respectively while the remaining respondent disagree to the problems.

Similarly, ECX lacks resource to provide training and awareness for the coffee actor's for the requirements of implementing traceability. 58.3% and 37.5 % of the respondents have shown their agreements while the remaining respondents were not supported the problem and disagreed and neutral for the issues, hence the majority i.e. 95.8% has agreed the existence of the problems.

Regarding to the question asked that ECX Lacks sufficient infrastructure to implement complete traceability has supported mostly by the respondent and out of the total responded 65% and 28.3% was strongly agreed and agreed about the problems respectively and 93.3% supported the issue and the remaining respondent were neutral , disagree and strongly disagree to the issues as 1.7% 2.5% and 2.5% respectively.

With regard to the question for low commitment and motivation with the exchange's employee in supporting traceability execution, most of the respondents were agreed with the issue,

accordingly out of the total respondents 74.2% and 20.8% were strongly agreed and agreed about the problem respectively which consists for 95% and the remaining 5% were neutral and disagreed to the problem. Finally for the question asked that ECX lacks clear and well developed standard for traceable coffee marketing system has supported by majority of the respondents. Accordingly out of the total respondents 60.8% and 35% has strongly agreed and agreed for the problems respectively which constitutes 95.8% for the total respondents while the remaining has neutral and disagrees to the problem.

On top of the above questionnaires results of the interview conducted with higher official confirmed as the organization lacks most of the requirement to implement the coffee traceability marketing system. Infrastructure including many components that have a vital contribution for the implementation of the coffee traceability marketing system, like advanced technology, standardized warehouse. In the same manners the interview analysis showed the organization has a problem of the warehouse shortages and lack good standardized storage and confirmed that the organization has deposited the coffee grade for each supplier separately to maintain identity preserved model, that require large space serve the customer as per the requirements. In addition the result showed above for the question asked for “definitions of system and structural design of coffee traceability is fully understood across the exchanges “has poorly rated by the respondent that implies the lesser understanding of the employee for the implementation of the program, hence the organization has to do more in providing long and short term training to its employees to have had a good understanding about the traceability in the meantime lack of resources are highly supported by the respondent that the organization need to improve the above bottle necks that supported by the majority of the respondent.

Table4. 8: Legal factors

Factors		SD	D	N	A	SA
Lack of well-established legal frameworks for coffee traceability.	Freq.	1	3	4	47	65
	%	0.8	2.5	3.3	39.2	54.2
Lack of legislation for tracking & tracing of coffee though the entire coffee supply chain traceability.	Freq.	3	6	4	43	64
	%	2.5	5	3.4	35.8	53.3
Lack of governing rule and regulations that allows well-organized information exchange and availability to competent authorities.	Freq.	1	3	4	38	74
	%	0.8	2.5	3.3	31.7	61.7
Lack of regulations that prohibited the coffee actors, not to mixing different coffee types and origin altogether.	Freq.	6	4	4	41	69
	%	5	3.3	3.3	34.2	57.5

The above table indicates that questions related to legal factors that might affect coffee traceability so that the respondents rate their level of agreement to each and every point. Accordingly with respect to lack of availability of well-established legal frameworks for coffee traceability, 54.2% and 39.2% of the respondents showed their agreement as strongly and agree respectively while the other minimal number of respondents 0.8% and 2.5% disagreed. On the same manner, regarding the other legal factor which deal with the lack of legislation for tracking & tracing of coffee in the entire coffee supply chain traceability 53.3% and 35.8% of the respondents have shown their agreements as if it could be a factor for the maintenance of coffee traceability . The respondents were also asked to what extent they the lack of governing rule and regulations that allows well-organized information exchange and availability to competent authorities could be a legal factor. Accordingly 61.7% and 31.7% of them strongly agreed and agreed respectively on the issue. They were asked as if lack of regulations that prohibited the coffee actors, not to mixing different coffee types and origin altogether could be the other legal factor. In the same manner 57.5% of the respondents strongly agreed and 34.2% have agreed while only small number of respondents i.e. 5% and 3.3% disagreed to the issue that it can't be a factor. From the above response it can be understood that since the majority of the respondents rated as if those legal factors could affect the coffee traceability.

Generally, the research result on legal factor variable revealed the absence of well-established, organized governing rule and regulation which supports the implementations of coffee traceability marketing system. Here as it can be understood, the organization by itself deliver the commodity that has been deposited separately on identity preserved model with other client commodity which violates the traceability concept and this show that the absence of governing rule in and out to prohibit mixing up of different coffee grade and types altogether regardless of their origin and agro ecology location. This also confirmed by the Ethiopia coffee and tea market development authority Jimma zonal office and exchanges higher officials. They both confirmed that at country level there is gap in governing rules and regulation that supports coffee traceability from end to end.

Table4. 9: Technological Factor

Factors		SD	D	N	A	SA
Lack of well-established technology for implementing coffee traceability (i.e. products identification technology)	Freq.	1	4	2	18	95
	%	0.8	3.3	1.7	15	79.2
Lack of technologies for online tracking, tracing monitoring, information exchange and retrieval over web	Freq.	3	7	5	16	89
	%	2.5	5.8	4.2	13.3	74.2
Lack of location based technologies (i.e. GPS) identification technologies (like Bar code, RFID)	Freq.		1	5	21	93
	%		0.8	4.2	17.5	77.5
Technology that used for recording -field- layout data segments to shorten supply chain traceability has maintained.	Freq.	70	30	5	8	7
	%	58.2	25	4.2	6.7	5.9
Lack of standardized and structured information exchange like price ticker to update its supplier the daily coffee prices in national and globally wise.	Freq.	3	5	2	50	60
	%	2.5	4.2	1.7	41.6	50

The above table presented questions related to technological factors that might affect coffee traceability so that the respondents rate their level of agreement to each and every point. Accordingly with respect to lack of well-established technology for implementing coffee traceability (i.e. products identification technology), 79.2% and 15% of the respondents showed

their agreement as strongly agree and agree respectively while the other minimal number of respondents was neutral and disagreed to the problem. On the same manner, regarding the other technological factor which deals with the lack of technologies for online tracking, tracing monitoring, information exchange and retrieval over web 74.2% and 13.3% of the respondents have shown their agreements as it could be a factor for the execution of coffee traceability while the remaining respondents were not support about the problem and disagreed and neutral for the question. The respondents were also asked to what extent the lack of location based technologies (i.e. GPS) identification technologies (like Bar code, RFID) could be a technological factor. Accordingly 77.5% and 17.5% of them strongly agreed and agreed respectively on the issue. They were also asked whether technology that used for recording -field- layout data segments to shorten supply chain traceability has maintained for complete coffee traceability. In the same manner 58.2% of the respondents strongly disagreed and 25% have disagreed while only small number of respondents were neutral and disagree to the ideas and weren't supported.

Regarding to the last question for ECX lacks standardized and structured information exchange for price ticker to update its supplier the daily coffee prices in national and globally wise were supported by the majority of the respondents. Out of the total respondent 50% and 41.6 were supported strongly agree and disagree for the problem respectively while the remaining 8.4% has not supported by the respondents.

While the interviews conducted with target groups they argued that it needs to work on the technology to implement coffee traceability and confirm that it needs current coffee traceability extensively relay on paper works and even this lack consistence among the different coffee supply chain though it was believed by the interviews as the traceability concept is new for Ethiopia contexts. Hence they confirmed as traceability is more concern with the extensive utilization of technology that helps to exchange the information about the product among the member from end to end. Accordingly they confirmed as traceability couldn't come in to practical without the use of the advanced technology as it dealt with the world class, however as the finding in above tables depicts and supported by interview as ECX lack this vital element that help for the executions of coffee traceability.

4.4 The overall analysis of Pearson's Product Moment Correlation Coefficient

According to, Hair et al., (2008) The Pearson correlations help to calculate a measure of relationships between the independent and dependent variables and indicate the strength of relationships between the studied variables and help to measures the “linear association” between two metric variables”

According to Leedy and Ormond (2010), correlation is the statistical process which discovers whether two or more variables are associated with one another. The Pearson product-moment correlation coefficient, r ; is the most frequently used measure of association and the basis of many multivariate calculations (Correlation coefficients take on values between -1 and +1, ranging from being negatively correlated (-1) to uncorrelated (0) to positively correlated (+1).

According to, Pallant, (2010), these types of model assumed to provides a clue for directions, positive when one variable increases and so do the other one or negative when one variable increases and the other one decrease.

Table4. 10 : Pearson’s product Moment correlation coefficient of all variables

Variables		Coffee Traceability
Nature of Coffee production	Pearson Correlation	.789^{**}
	Sig. (2-tailed)	.000
Chain traceability complex	Pearson Correlation	.756^{**}
	Sig. (2-tailed)	.000
Environmental Factor	Pearson Correlation	.738^{**}
	Sig. (2-tailed)	.000
Organizational Factor	Pearson Correlation	.876^{**}
	Sig. (2-tailed)	.000
Legal Factor	Pearson Correlation	.621^{**}
	Sig. (2-tailed)	.000
Technological Factors	Pearson Correlation	.464^{**}
	Sig. (2-tailed)	.000
Coffee Traceability	Pearson Correlation	1
	Sig. (2-tailed)	

** Correlation is significance at the 0.01level (2 tailed)

Source: Survey data, 2018

- ❖ Correlation analysis between nature of coffee production and coffee traceability. Pearson correlation test was conducted to see the degree of relationship between the independent variable i.e. Coffee traceability. According to the result indicated in Table 4.10 above, there is significant correlation between nature of coffee production and coffee traceability. ($r=0.789$ with p value of .000).
- ❖ Correlation analysis between supply chain complexity and coffee traceability. The results of the correlation between these variables are shown as there is significant correlation between supply chain complexity and coffee traceability. Hence coffee traceability have strong positives relationship ($r=0.756$ with p value of .000).
- ❖ Correlation analysis between environmental factors and coffee traceability for Pearson correlation test was conducted to see the degree of relationship between the independent variable i.e. Coffee traceability. The result shown as there is significant correlation between environmental factors and coffee traceability and have strong positives relationship ($r=0.738$ with p value of .000).
- ❖ Correlation analysis between organization and coffee traceability. Pearson correlation test was conducted to see the degree of relationship between the dependent variable i.e. Coffee traceability. The result of correlation between these variables is shown in Table 4.10 above and indicates as there is significant correlation between organizational factors and coffee traceability. In other words, coffee traceability have tough positives relationship ($r=.876$ with p value of .000).
- ❖ In the same manner correlation analysis between legal factors and coffee traceability, test was conducted and the results shown in Table4.10 above. The result shows there is strong positive relationship between legal factors and coffee traceability with ($r=.621$ and p value of 0.00).
- ❖ Correlation analysis between technological factors and coffee traceability, for these variables Pearson correlation test was conducted and the results shown in Table4.10 above. The results shows as there is positive relationship between technological factors and coffee traceability($r=0.464$ and p value of 0.00).

From the overall Pearson's correlation analyses result shown above, the researcher realized that all the predictors have a positive and strong correlation with the coffee traceability. In other words the independent variables which are studied in this research are strongly determinant factors for coffee traceability.

4.5 Regression Analysis

Besides to the descriptive analysis and person correlation, to show the extent to which the independent variable affect the dependent variable the multiple linear regression analysis was employed to investigate the association in which the effects of two or more independent variables on a single interval scaled dependent variable has been be studied simultaneously , Zikmund et al., (2010).

It is also used to understand by how much each independent variable (Nature of coffee production, supply chain complexity, organizational factors, legal factors, technological factors and environmental factors) explains the dependent variable coffee traceability

The findings are presented below:

4.6 Model Summary

The model summary of regression analysis between independent variables of (Nature of coffee production, supply chain complexity, environmental factors, and organizational factors, legal and technological factors and the dependent variable coffee traceability) has shown in table 4.11 below . This findings show that the factors studied in this study affect the implementation of coffee traceability up to 87.9% as indicated by the adjusted R Square. Thus, 87.9%, of the variances in coffee treatability can be explained by combined effect of the predictor/independent variables. The remaining variances on the dependent variable could be explained by other explanatory variables not included in this study.

4.7 ANOVA Analysis

As shown in table 4.11 ANOVA (Analysis of Variance) of regression analysis between six independent variables which includes Nature of coffee production, supply chain complexity,

environmental factors, and organizational factors, legal and technological factors in respect to dependent variable of coffee traceability. From the analysis of variance the result shows positive and significance for all values of the variables in this model summary as shown herewith. This is therefore, given F statistic of 145.683 and a probability value of 0.000 (i.e. F=145.683, P value = 0.000). The probability value of (0.000) shows that there is a very low possibility that the statement “overall regression model was insignificant” Hence, the overall regression model was significant and gives a logical support to the study model.

Table4. 11: Coefficient of Regression, model summary and ANOVA

Models	Unstandardize d Coefficients		Standard ized Coeffie nts	t	Sig.	R Square	Adjusted R Square	F	
	B	Std. Error	Beta						
1	(Constant)	.720	.170		.886	.879	.886	.879	145.683
	Nature of coffee production	.231	.043	.249	5.320	.000			
	Supply chain complex	.188	.056	.162	3.333	.001			
	Environmental Factor	.120	.043	.131	2.808	.006			
	Organizational Factor	.306	.045	.401	6.760	.000			
	Legal Factor	.098	.040	.102	2.484	.014			
	Technological Factors	.085	.025	.120	3.337	.001			

Source: Survey data, 2018

Predicted traceability score = 0.720 + 0.231 (Nature of coffee production) + 0.188 (supply chain complexity) 0.120 (Environmental Factors) + 0.306(Organizational Factors) + 0.098 (Legal Factors) + .085 (technology)

The Table 4.11 revealed that, the correlation between the observed value coffee traceability and the optimal linear combination of the independent variables (Nature of coffee production, supply chain complexity, environmental factors, and organizational factors, legal and technological factors). The findings from the study showed that all the variables were significant as their significance values were less than 0.05. From the model, taking all independent variables/factors constant at zero, coffee traceability had an autonomous value of 0.720

The data findings also showed that a unit increase in Nature of coffee production would leads to an increase in coffee traceability by 0.231. A unit improved in supply chain complexity status would have an effect and leads to an increase to coffee traceability by 0.188. In same manner while, a unit increased in Environmental Factors leads to increase coffee traceability by 0.120 and a unit increased in organizational factors leads to increase the coffee traceability by 0.306, a unit increase in legal factors leads to increase coffee traceability by 0.098, and a unit increase in technological factors leads to increase coffee traceability by .085.

Generally, this regression model shows how much each predictor variables contributed to the outcome value. As we can find here with the organizational factors has the highest values which pointed out that if the organization improved its internal weakness and try to solve the underprovided one's currently and fulfill all the requirement, coffee traceability would maintained. This is followed by the nature of coffee production practiced currently by Ethiopian coffee farmers. As the result showed that most of the coffee farmers are geographically scattered and small holder in their very nature and missed to use diary book to register their field data history (i.e. yield per hectare ,coffee variety, sources of seed, farm size, date of plantation, ecological location etc.) which is very vital element in maintaining completet traceability, hence the concerned body or policy maker especially Ethiopia coffee and tea marketing development authority should give due attention to solve the problem as far as the completed traceability had benefice both for the individual and country wise.

4.8 Assumptions of Multiple Linear Regressions

MLR allows a more sophisticated exploration of the interrelationship among a set of variables. It can be used to address a variety of research questions and indicate how well a set of variables are

able to predict a particular outcome Pallant, (2005). In the context of this study, the researcher employed the standard multiple linear regression. In standard multiple linear regression, all independent variables are entered into the regression equation at once.

The assumptions of MR tested with SPSS and identified as primary concern in this research include; sample size, multi-collinearity, normality, linearity and homoscedasticity. Detailed definitions, descriptions and interpretations of these assumptions as discussed below.

4.8.1 Sample size

A sample must represent well the characteristics of the population. With small sample size, one may obtain a result that does not generalize to the target population. If results do not generalize to other samples, then they are of little scientific value. Most researchers tend to use Tabachnick and Fidell (2007) formula for calculating sample size requirements for multiple regressions. These authors took into account the number of independent variables preferably to use census sampling as the population of the study organization is not significant and small in number. Hence, the assumption on sample size requirements for multiple regressions was met by the researcher before analyses.

4.8.2 Multi-collinearity Test

Collinearity (also called multi-collinearity) refers to the assumption that the independent variables are uncorrelated Darlington, 1968; Keith, (2006). The researcher is able to interpret regression coefficients as the effects of the independent variables on the dependent variable when collinearity is low Keith, (2006). This means that we can make inferences about the causes and effects of variables reliably. Multi-collinearity occurs when several independent variables correlate at high levels with one another, or when one independent variable is a near linear combination of other independent variables Keith, (2006). Tolerance levels for correlations range from zero (no independence) to one (completely independent) Keith, (2006). The VIF is an index of the tolerance. When a predictor variable has a strong linear association with other predictor variables, the associated VIF is large and is evidence of multi-collinearity Shieh, (2010). The rule of thumb for a large VIF value is ten Keith, (2006); Shieh, (2010). Small values for tolerance and large VIF values show the presence of multi-collinearity Keith, (2006). Based on

the above assumptions the researcher performed multi-collinearity test to check the dependency of predictor variables with one another and the fitness of the model. As indicated in the table below, there is no existence of multi-collinearity problem among the explanatory variables as tolerance values are greater than 0.1 and VIF values less than 10.

Table4. 12: Collinearity Statistics

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Nature of coffee Production	.452	2.157
	Supply Chain Complexity	.442	2.328
	Environmental Factors	.465	2.135
	Organizational Factors	.262	3.469
	Legal Factors	.539	1.678
	Technological Factors	.778	1.285

SPSS result of 2018

4.8.3 Normality

Normality refers to the normal distributions of the residuals about the predicted dependent variable scores. This assumption is based on the shape of normal distribution and gives the researcher knowledge about what values to expect Keith, (2006). Normality tests are used to determine whether a data set is well-modeled by a normal distribution or not, or to compute how likely an underlying random variable is to be normally distributed Gujarati, (2009). Normality can be checked through histograms of the standardized residuals Stevens, (2009). Histograms are bar graphs of the residuals with a superimposed normal curve that show distribution. As depicted in the figure below; which is an example of a histogram with a normal distribution from the SPSS software, there is no normality problem on the data used for this study.

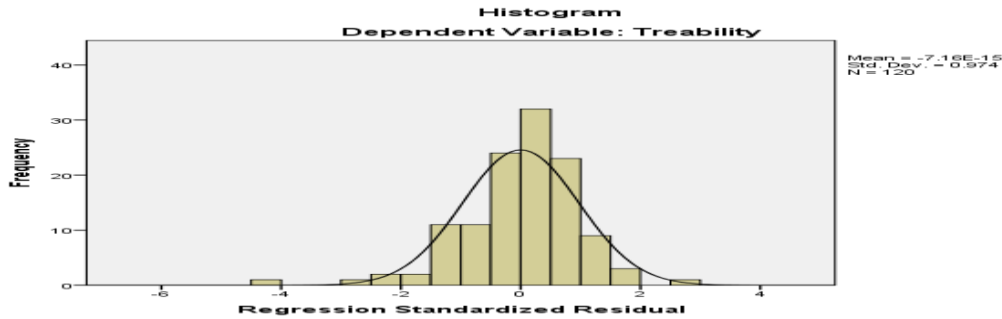


Figure4. 5: Histogram

4.8.4 Linearity

Linearity has the residuals should having a straight-line relationship with predicted dependent variable scores. It describes the dependent variable as a linear function of the predictor variables. Multiple regressions can accurately estimate the relationship between dependent and independent variables when the relationship is linear in nature. If the relationship between the dependent and independent variables is not linear, the results of the regression analysis have been under- or over- estimates the true relationship of the variables Osborne & Waters, (2002). According to Stevens (2009), linearity can be best checked by normal p-plot residual. As shown in the figure below, the relationship between the dependent and independent variables is linear. Hence, no linearity problem on the data used for this study

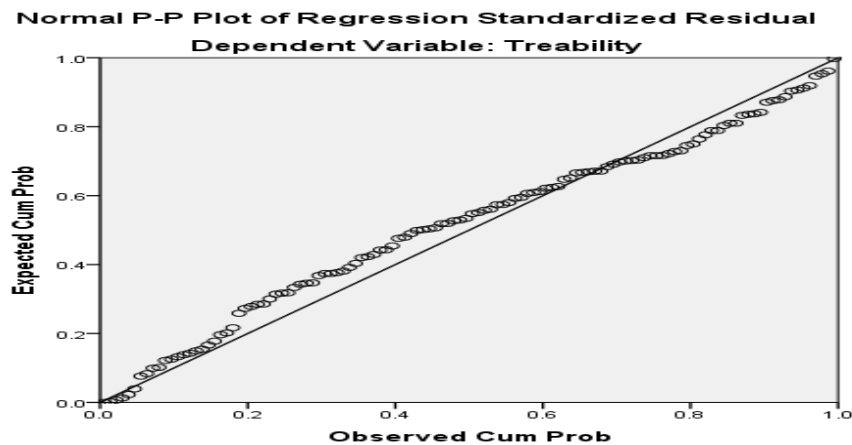


Figure4. 6: Normal P-P plot

4.8.5 Homoscedasticity

The assumption of homoscedasticity refers to equal variance of errors across all levels of the independent variables (Osborne & Waters, 2002). This means that researchers assume that errors are spread out consistently between the variables. Statistical software scatter plots of residuals with independent variables are the method for examining this assumption (Keith, 2006). Ideally, residuals are randomly scattered around zero providing even distribution (Osborne & Waters, 2002). To check this assumption scatter plot was generated for the model. As shown in the figure below, the error variance is constant since most scattered plot attributes are around zero and near to the horizontal line. Therefore, there is no violation of homoscedasticity assumption in this study.

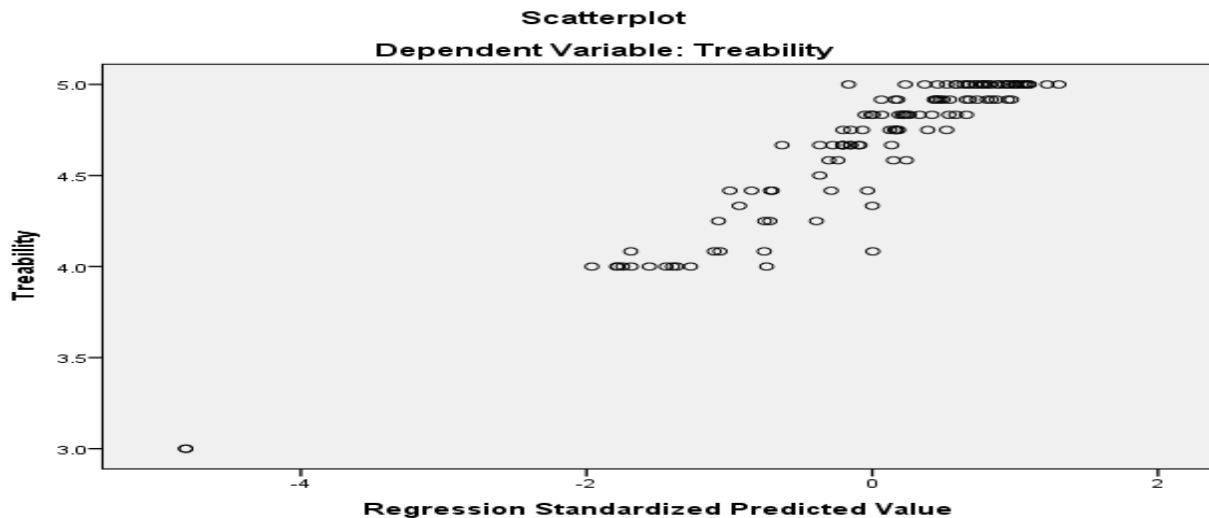


Figure4. 7: Scatterplot

4.6 Discussion

Despite positive image of the country as birthplace of coffee, a strong local coffee culture, genetic diversity and easy branding opportunities, diverse agro-ecology and climatic conditions, unique and distinct characters of coffee quality, a favorable national agriculture ecosystem for coffee development, Ethiopia, failed to fully capitalize its potential and as a result couldn't be competent enough and fully implemented the coffee traceability that is the emerging issues of the world markets nowadays. In the same manners coffee's global value chains are quickly transforming because of shifts in demands and an increasing emphasis on product differentiation in importing countries. Ponte (2002); Daviron and Ponte (2005).

Though Ethiopia commodity exchange found as a pioneer organization in implementing coffee traceability which is the emerging issues for the world market now days, the organization lack to implement the true traceability which shows the entire path about the products history as research finding shows. Thus the organization started its traceability set up form washing/hulling station of different clients and districts and ends to its respective warehouses. In this regard the organization used to deposit its customer's coffee separately on identity preserved model at its warehouse which is recommendable for traceability. However, it delivers all together the different customer coffee which is contradicting each other and violated the concepts of traceability as well.

Likewise the agricultural products traceability mainly refers the process of the production, transmission and distribution of the products, collect and record related information to form a complete information chain for products which help control the quality of agricultural products and when security problem happens, it can provide useful information to find causes. Tu and Wang, (2011). However, this is totally missed in the current coffee traceability practice at ECX.

Moreover, the coffee traceability challenges, including the limited improvement in productivity, inconsistency in coffee quality and supply, poor agricultural practices and absence of technology and mechanization for modern farm , less attention to the branding of differentiated coffees, long and complex supply chain and lack of integration among the stockholder towards the execution of coffee traceability and lack of access to advanced technology and well stabilised legal

frameworks, lack of collaborative environmental supports and organization deficiency were found the main bottleneck among others to implemented the coffee traceability.

Nature of coffee production is also the main challenges in implementing coffee traceability as far as the framers were characterized as small size and geographically scattered. According to Tefera (20013) Smallholder farmers produce 95 % of Ethiopia's coffee. However their yearly yield is not significant and complied with the lot size that ECX authorized. In this regards the farmer forced to supply by mixing different coffee types and origin to many buyers and lack their consistence in maintaining the sustainable coffee supply as well. In the same manner the agronomic practice found poor's and the farmers not even use any record keeping about the history of the product they supplied to the markets and cannot identify if need arise to whom they supplied and what types of coffee product they cultivated, however this is the prerequisite of the coffee traceability. Furthermore this process is appropriately can be executed by the growers who are very few in number but have large farm size compared to the small scale farmers and traceability can be implemented by growers as well as the cooperative and unions as the interview result shows from the Ethiopia coffee market and development authority Jimma zone.

Among the five key variables studded that could affect coffee traceability; the supply chain complexity is the major from the other factors. It means the coffee supply chain contains a number of stages, and at each stage the main actors deal with many problems and should have recorded keep about the follows of the products. The chain traceability current in practice has highly fragmented and diversified and makes difficult the implementation of traceability, there is a lack of integration among the supply chain members.

According to Donnelly et al., (2009); Schwägele, (2005), in order to be able to track and trace products throughout the supply chain, all the stockholder and business operators must maintain relevant information from the suppliers and keep track of all products and their transformation through all stages of production and then pass this information to the next link in the supply chain. In the same manners, Senneset et al. (2007) state that in order to achieve chain traceability, the identities of traceable units must be recorded at reception and shipping, and that internal traceability requires recording of all transformations during the production process.

To implement the coffee traceability the utilization of advanced technology has optimal among the others, Nowadays the modern agriculture is highly knowledge-intensive and increasingly information-driven. With declining terms of trade affecting agriculture and other industries, technological innovations are necessary to reduce transaction costs and facilitate the production and consistent supply of top quality, safe and traceable products to meet consumer demands by providing the required information in respective to the products on real time.

Farmers, processors, marketers, handlers, consumers, governments and the general public and stakeholder have interests in the safety and cost-effectiveness of global agro-products supply chains. Hence to implement traceable agricultural supply chains, technological innovations are needed for product identification, process and environmental characterization, information capture, analysis, storage and transmission, as well as overall system integration. Which is total missed at the current coffee traceability practiced at ECX and could be said all the entire supply chain members has been using manual recorded as per the interview result shows. According to, Moe, (1998). In order to implement traceability from the concept into action, traceability must be managed by setting up a traceability system, which can keep tracking of product routes and the selected data for further use.

Traceability is the ability of using the registered marks to trace products history, status of use, location, similar products and activities. The traceability system will become the new standard for the international trade.

Generally the implementation of good traceability required the existence of well-established legal frameworks that govern all the stockholders in the coffee supply chain. Especially prohibiting mixing of different coffee quality altogether, however this missed at Ethiopia commodity exchange context. In the same manner the organizational factors has also the determinant factor in implementing coffee traceability and need to be strengthen.

CHAPTER FIVE

5. Summary, Conclusion and Recommendation

5.1 Summary

Despite the vital role of traceability for competitive advantages , building trust and loyalty among the stockholders, retain sustainable coffee supply , improve information and efficiency, meeting global standards and marketing demand, rising price for traceable products, heighten documentation and record keeping, escalating customer satisfaction and requirements, growth brand promotion, product differentiation and effective product recalls, yet the practice is undeveloped in Ethiopia context.

Therefore this study was conducted aimed at examining the factor that affects coffee traceability at Ethiopia commodity exchange Jimma branch based on the questionnaires consisting of 120 employees and semi-structured interviews with some selected exchange's higher officials and Ethiopia coffee and tea marketing development authority Jimma zonal office hence the result of the study were summarized shortly.

- ❖ With regard to the academic qualification, bachelor holders found more in number 55.8 % followed by diploma graduated 23.3% while certificate graduates were 18.3% and also master degree holders has been found the least of all the respondent with 2.5%. Accordingly it could be said that all the exchange's employees were qualified have hand a vital contribution for the success of the study and the organization has composed of qualified employees as well.
- ❖ Regarding to demographic variables of the respondents, the majority of the them 66.67% were men whereas women respondents were 33.33%
- ❖ Regarding to the ages of the respondent majority of the respondents, 41.7% are aged between 31-40 years and followed by 40.8% which aged between 20-30years, while the

reaming were found above 41 years . Accordingly the exchange said to have composition of youth and moderately old age employees.

- ❖ A service year is one the organizational variable which is measured by the length of the service year of the employees in certain organizations, accordingly the majority of the employees is above nine years and has stayed with the exchange for a long.
- ❖ Regarding the current coffee traceability practiced at Ethiopia commodity exchange Jimma branch, as the finding showed based on their severity questions, the result indicates below average and poor practices. From this the researcher found that the current practice of traceability revealed, as it lacks integration between all stockholders. Likewise the finding shows that the exchange deposited each of its suppliers coffee products based on its identity preserved model to maintaining traceability, however it lacks consistency during delivery of the products from its warehouse to the buyers. Hence the exchange deliver differed clients coffee altogether with other clients coffee which contradict each other's and violated the concepts of true traceability. In the same manner, the exchanged could not identify whether its client would mix different coffee types and grade altogether backward to the washing and hulling station as well.
- ❖ Regarding to the nature of coffee production variable, the dimension has indicating the absence of good agronomy practice in general. The statement 'Most of the coffee produced in Ethiopia is characterized by geographically scattered and cultivated by small holder farmers' has highest percentage score 97.5% which was almost supported by the entire respondent as the problem exist and this followed by the item that stated "Ethiopia coffee farmers use diary book to register their field data (i.e. yield per hectare, coffee variety, sources of seed, farm size, date of plantation, agro-ecological location etc.) This implies that, most of the farmers are smallholder and geographically very scattered in their very nature and lack to use advanced technology and mechanization for their farm, especially the farmers haven't practice any recordkeeping regarding to their farm practice and this is one of the bottle neck among many to hinder coffee traceability. Furthermore this contradicts and hinders the agricultural practice with respect to product, traceability which represents the ability to identify the farm where it grown and sources of input materials, as well as the ability to conduct full backward and forward tracking to determine the specific location and life history in the supply chain by

means of records. “Seed to Shelf” principles, Morris & Young, (2000). According to the interview and extensive idea shared regarding to the nature of coffee production with Ethiopia coffee and tea marketing development Jimma zonal office they raised as traceability can be applied with the grower and cooperative and unions who do have a large farm size and not mixing their coffee to the other coffee types as they can earn maximum yield compared to the small scale farmer and the cooperative and union has demarked geographical location as per their nearness which is a promising indicator for future traceability implementation.

- ❖ Regarding to the supply chain complexity variables, the result showed as the total percentage score showed the absence of good practices of supply chain that integrated all the actors. According to the interview results the current traceability in practice is facing challenges as the supply chain lacks well established that come in to practice. As result the current chain traceability couldn't able to identify the path from which a product has originated and to whom it has been supplied correctly, and lacks an inter-linking chain records between different stages in a supply chain. Besides as per the interview results this also the greatest challenges for implementing the full coffee traceability. From this, the researcher concluded that effective chain traceability totally missed at ECX as the chain traceability is highly fragmented and diversifies and this also one among the other major bottleneck for implementing coffee traceability at the exchanges.
- ❖ Regarding the perceptions of the respondents towards the organizational factors, the analysis of the study indicates that all items under the dimension positively perceived by the respondent that indicated the deficiency of most of the item requested under the variable. The item score indicates for ‘Lack of sufficient infrastructure to implement complete coffee traceability’ and “lack of clear and well developed standard for coffee traceability ” has supported by the majority of the respondents the ‘definition of system and structural design of coffee traceability is fully understood across the exchanges.’ was poorly supported relatively and this isn't because of the lack of qualified employees as a showed in the analysis rather it is because of lack of training both in short and long terms as supported by interviews from the higher official. As the concept is new and absence of widely ranged treatability practice in Ethiopia context the internal staff, societal and other stockholder need training and awareness about traceability. In general

the research results showed that the organization lacks most of the requirement which is vital to implement coffee traceability marketing system. Infrastructure which included so many elements as the interview result, that has a vital contribution for the implementation of the coffee traceability, like advanced technology which missed to extended from the organization to others in integrating end to end, standardized warehouse which accommodate all the suppliers' commodity as required. As organization used to deposit graded coffee for each supplier separately to maintain identity preserved model, which need large space to use and serve the customer as per the requirements. Lack of resource was also highly supported by the respondent that the organization need to do to improve these all bottlenecks that supported by the majority of the respondents. The organization need to work with multiple actors in different systems and requirements that contribute for engagement and collaboration along the entire supply chain to trace a product's history from end to end though collaboration by developing mutual understanding about a subject matter.

- ❖ Similarly for legal factor, all items were positively perceived by the respondents and indicate the absence of well-established, organized governing rule and regulation which supports the implementations of coffee traceability. Consequently this supported by the interview from Ethiopia coffee and tea marketing development authority of Jimma zonal office. Here the finding shows that the organization by itself delivers the commodity that has been deposited separately by Identity preserved model with other client's commodity which violates the traceability concept. From this confirmation one can concluded that lack of governing rule in and out which prohibit mixing up of different coffee grade and types altogether regardless of their origin, owners and agro ecology location which needs due attentions of the policy maker. This should begin from the root level of supply chain traceability and effected thought the chain starting from the farm where coffee produced and should extended to the end consumer as per the responses of Ethiopia coffee and tea market development authority of Jimma zone interviews. According to the interview result shows, it is impossible to implement coffee traceability without the existence of well-established and standardized legal frameworks that protects the bleeding and mixing up of different coffee types and quality. Traceability can only be achieved successfully if it is built upon standards that enable interdependently among uncut supply chain and

meets the core legislative and business need to trace back and track forward at any point along the whole length of the supply chain. (GS1, 2009),

- ❖ Regarding the technological factors, the overall percentage, indicates that absence of well-established technology which support coffee traceability implementation despite of its major contribution for traceability implementation. As the interview result showed that most of the supply chain members perform their activities on paper based and lacks the automated technology either to provide information regarding to their product or to capture information they demanding from other side. However as the finding in analysis parts showed ECX lack this vital element that helps for the executions of coffee traceability. According to, Tu and Wang, (2011) technology is the main factors for the execution traceability and mainly refers in the process of the production, transmission and distribution of agricultural products, collect and record related information to form a complete information which help to control the quality of the products and when security problem happens, it can provide useful information to find causes.
- ❖ The correlation analysis was undertaken to test the relationship between independent variables (Nature of coffee production, Supply Chain Complexity, Environmental Factors Organizational Factors, Legal and Technological Factors) and dependent variables (Coffee traceability). Accordingly the research result of Pearson product-moment correlation indicates positive and significant relationship among all the independent and dependent variables was found.

Accordingly, the result shows that there is significant and positive correlation between nature of coffee production and coffee traceability with ($r=0.789$ with p value of $.000$) and there is significant and positive correlation between Supply chain complexity and coffee traceability. Hence coffee traceability have strong positives relationship with SCC ($r=0.756$ with p value of $.000$). And also the result analysis indicates as there is significant correlation between environmental factors and coffee traceability and coffee traceability have strong positives relationship ($r=0.738$ with p value of $.000$). The finding also shows as organizational factors and coffee traceability have very strong positives relationship among the others ($r=0.876$ with p value of $.000$). Legal factors and coffee traceability have positive correlation with ($r=0.621$ and p value of 0.00) and the

relationship between technological factors and coffee traceability has lesser positive correlation with ($r= 0.464$ and p value of 0.00) compared to the other variables.

From the overall Pearson's correlation analyses result we conclude that all the predictors have a positive and strong correlation with the coffee traceability. For that reason the independent variables which are studied in this research are strongly determinant factors for implementing coffee traceability in the study area.

Regression result of this study shows the impact of individual independent variables to the dependent variable. Accordingly, all independent variables (Nature of coffee production, Supply Chain Complexity Environmental Factors Organizational Factors Legal Factors Technological Factors) are significant with p value of < 0.05 at 95% confident level. These findings show that the factors studied in this study affect the coffee traceability at Ethiopia commodity exchange Jimma branch up to 87.9% as indicated by the adjusted R Square.

5.2 Conclusion

Traceability is an information system. It helps achieving product traceability by correctly identifying, accurately recording and effectively communicating product information. The world is a dynamic in its very nature and need to adapt the changes environments accordingly. Nowadays demand for information along the coffee supply chain has increased and has been set higher requirements for well-structured traceability systems. By the fact of that, the distance that coffee product travels from producer to consumer has increased as a result of globalization in coffee trade and this products safety is a worldwide concern due to a number of product safety scandals throughout the supply chain. The large number of player's , unpredictability of risk involved at any stage of supply chain and the hydroscopic nature of coffee has heightened the need for assurance of quality and safety in relation to coffee production processes in order to ensure traceability and compatibility among coffee products safety measures. Therefore, traceability is emerging as a new index of quality and sustainability basis for trade in the future. As a result many countries in the world has started mandating for the products entering to their country, as it should maintaining traceability system and coffee is one of the world class products

next to petroleum and need to maintain the chain traceability to meet world demands accordingly.

Traceability, according to the International Organization for Standardization (ISO 9001:2000), is an assessment of products to identify the path from which a product has originated and to whom it has been supplied consisting an interlinking chain of records between steps in a process operation and/or between different stages in a supply chain. Accordingly, traceability is the ability to identify and trace the whole history, distribution, location, and application of products, parts, and materials till to the end user/i.e. from farm to fork/ Seed to Shelf. Morris & Young, (2000), “Field to Plate” Opara & Mazaud, (2001)

By giving emphasis for current growing concerns in traceable products across the world, ECX started to implement coffee traceable marketing system recently. However the organization uses its own traceability model which starts from the washing and hulling stations of different district up to its warehouse which ends in to two supply chains and in this regard the Exchange could be said a pioneer institute to bring the traceability issue in the Ethiopia coffee marketing system.

However, the traceability model that ECX practiced completely lacks the true concept of tractability, due to the blending and mixing up of different coffee types to and from the its respective warehouses. The blending of coffee which originates from the diverse coffee growing districts makes the coffee to lose its original identity and information which disagreeing with the concepts of traceability that describes the “Farm to table” concepts and believed to provide the information about the product though the entire supply chain at any point if the need arise. Hence compared to the true traceability concepts, ECX lacks to address all the requirement of traceability in the coffee supply chain. Rather ECX should start its traceability setup from the coffee growers/producers instead, and should also extend its model up to the ultimate consumers. In other word, coffee traceability practice at Ethiopia Commodity Exchange has still did not go extra miles to meet the concepts of traceability as required and mixing of one coffee type over the other regardless of its origin, growing condition, owners, grade and other is still continued from its warehouse during delivery and downstream to the different washing and hulling station is unknown to the exchange. In this regard, the coffee exporters, processors and end user (buyers) are not obtaining the necessary information about the full history of coffee product as per their request.

Currently, though traceability is increasingly required and highly demandable, it is found as a challenging to achieve full chain traceability as the need arise and unless otherwise, well-established global integration made. For developing country, the massive scale of coffee trade and the predominantly small size plantation (small scale farmers) which is categorized under the nature of coffee production and poor agronomic practice, lacks of infrastructure and advanced technology, lack of well-established and integrated chain traceability and legal frameworks, absence of environmental collaboration and incapability of the organization to tracing coffee back to the farm level is still main challenging in implementing coffee traceability . Hence tracing all coffee is still a long way off for Ethiopia as the finding of these variables depicts.

Despite of these challenges, customer demand for real time information about the coffee they buy. Furthermore it has been be taken as one of the competitive advantaged for the product to markets. The emergence of traceability in agricultural products supply is the outgrowth of a long line of developments in improving coffee quality and safety management. Weakening in consumer confidence has been exacerbated by the introduction of genetically modified organisms, plants and animals into human through the products they are using in their day to day life.

From a consumer perspective, implementing traceability system helps to build trust, provided peace of mind, and increase confidence in the products and makes advantages products industry in marketing.

The agricultural sector has undergone considerable change during the past century. Like new farming practices as well as new handling and processing techniques have been developed to meet the increasing consumer demand for reliable and consistently safe supply of various coffee products but the traceability practice is new and not adopted for any agricultural and industry products in Ethiopia context as required. Likewise, consumers especially the buyers are giving emphasis to safety, high quality and sustainability supplies of coffee product.

The law included important elements like rules on traceability and the withdrawal of dangerous consumable products from the market. Under the European Union Law “Traceability” is defined as the ability to track any food, feed, food-producing animal or substance that has been be used for consumption, through all the stages of production, processing and distribution (Official Journal of the European Communities, 2002).

Implementation of a coffee traceability system in Ethiopia is very complex task. Several problems exist at different stages throughout the supply chain. Coffee lots are often blended to meet buyer specifications and lot identity is not maintained as most of the coffee farmers are geographical scattered and small scale and harvested below lots that authorized by ECX. The internal coffee movements, handling and processing activities often go unrecorded though out. In order to achieve traceability goals along the coffee supply chain, the actors should focus both on internal recordkeeping and chain traceability. Each supply chain actor should determine their traceability plan based on the driving factors like the regulatory need, business need and the customer preferences. In order to implement traceability from the concept into action, traceability must be managed by setting up a traceability system, which can keep tracking of product routes and the selected data for further use. This required an integrated database establishment and management that could be used to implement traceability system by each actor in the supply chain. All coffee lot information should be recorded in a centralized database system and only relevant lot/batch information should be passed on to the next link in the supply chain. Additional information should be used and handled by the authorized body (such as regulatory body particularly Ethiopia coffee and Tea marketing development authority, Ethiopia commodity exchange authority, Ministry of trade, supplier and exports association as well). In respect to technologies, barcode should be manufactured together with jute bag that used for coffee handling packages. This should be made under the supervision of Ministry of Trade with the collaboration of Ethiopia commodity exchange, as the exchange well-known the just bags that meet the standards to handle coffee product. A barcode is an optical machine-readable representation of data, which manifests data of the object property to which it attached and provides a rapid, accurate, and low cost approach to encode information which can be easily read by electronic readers. The presence of the barcode has improved the efficiency of handling process along the supply chain and made great contribution to traceability. The implementation should be followed by the local government's particular Ethiopia coffee and tea development authority at each coffee producer's district level while the coffee dispatched there and a close follow-up and supervision should be made on its effective utilization. Likewise, it is recommendable to manufacture the pre-numbered barcode and distributing for each coffee supplier by registering the sequence of the numbers and by giving an awareness how to use.

Accordingly to, Connolly, (2005) , Mehrjerdi, (2010) the barcode is automatic, high reading speed, precise technology provides simpler, more economical, and accurate traceability systems. Maintain coffee traceability marketing in Ethiopia would have a vital benefit for the different actors mainly for Farmer/producer suppliers, Exports, international buyers and as well organization /ECX in such a way that:

Suppliers

- Create transparency in ECX operation – sampling & grading
- Create better quality assurance, as it permits tracing back
- Build confidence in ECX system
- Safety and guarantee to their coffee
- Can easily get product history/documentation
- Opportunity to sell more coffee
- Benefit from the multidimensional advantages created by the market

Exporters

- Opens up more opportunity
- Create confidence in ECX system
- Easy tracing mechanism of coffee quality dispute
- Help to meet foreign market demand
- Easily access to a product's history
- Access to data and reports regarding products
- Guarantees the quality and safety of the product
- Get traceability certification

International buyers

- Meets their demand
- Easily access to a product's history and information
- Confirms the sustainability of the product on the market
- Encourage interested international market players to invest sustainable coffee

Ethiopia Commodity Exchange (ECX)

Improved inventory, quality management and control

Easy tracing mechanism of coffee quality disputes

Easily access to a product's history

Increase transparency and tracking

Better customer service

The results of this study might contribute the following to the organization and other stockholders. It can provide facts and figures that may be used by the managements of the organization, practitioners, consultants, policy makers and academicians for understanding coffee traceability marketing system. A number of limitations were identified during the courses of this study such as the absence of matured concept of traceability and lack of similar research done in the country was another limitation of the study. Therefore the research paves the way to other research opportunity in another organization and different topics out of our country to see the factor that affects coffee traceability marketing system.

5.3 Recommendation

- ❖ It is well established that foods and food components may significantly impact human health. Until recently, the overall safety and wholesomeness of foods have been established based exclusively on nutritional, microbiological and toxicological considerations. Recommendations have been mainly aimed at preventing nutrient deficiency and at avoiding microbiological and chemical intoxications. Nowadays, it has been increasingly acknowledged that under specific conditions, certain food constituents could provide consumers with physiological benefits beyond basic nutritional functions. Therefore, the overall evaluation of the impact of foods and food constituents on human health should consider all possible aspects, including potential nutritional, beneficial and adverse effects, despite the fact mentioned above and as coffee production and producing countries are increasing at increasing rate in the world maintain coffee tractability. In the same manner for Ethiopia is not optional way rather it is mandatory to be best competitive in the world market in addition as nowadays consumers of coffee are

becoming more of their health sensitive , depicted below recommendation are given in maintaining coffee traceability.

- ❖ It is recommended that the organization had better to continue focusing on the areas in which it is doing well and find ways to improve those areas it is doing worse/poor.
- ❖ Lack of most of the requirement which is vital to implement the coffee traceability has been found at the organization. Lack of infrastructure that have a vigorous contribution for the implementation of the coffee traceability, like advanced technology which missed to extend from the organization to other chain in integrated way through supply chain traceability from one end to another. In the same manner lack of standardized warehouse which accommodate all the suppliers coffee were found that should need an attention from all corners and the organization should established and work jointly with the governments for the availability of these resources .
- ❖ The organization has recommended to execution activity like depositing and delivering of coffee deposited at its respective warehouse in respect to the coffee grade, types and owner for each supplier separately, maintaining identity preserved model. Obviously these activities required a large space to use and to serve the customer as per the requirements. Hence the exchanges need to build extra and standardized stores which accommodate these all commodity.
- ❖ In same manner descriptions of system and structural design for coffee traceability is fully understood across the exchanges fellows has poorly rated by the respondent which implies the lesser understanding of the employee regarding to the implementation of the program. Hence the organization should demonstrate its concern relating to afford related training and development both for its employees and stockholders as well.
- ❖ Regarding to the supply chain trails the current coffee traceability lack an integrated and collaborated chain system and highly fragments and diversified. This is therefore, in order to implement traceability from the concept into action, the organization need to arrange and manage the system in collaboration with the other stockholder in setting up a traceability system which can keep tracking of product routes and the selected data for further use.
- ❖ The current traceability implemented has been using extensive paper works and need to replace by advanced technology which can make automating the information exchanges

among the entire supply chain. Accordingly using for barcode technology has recommended which is economical and easy relative to other device and the organization has recommended to do more with ministry of science and technology and ATA(Agricultural transformation agency) for further exploitation for the appropriate technology to be used rather than the recommended one.

- ❖ Regarding to the nature of coffee production the Ethiopia coffee farmers lack to use their diary book to register their field history data (i.e. yield per hectare, coffee variety, sources of seed, farm size, date of plantation, agro-ecological location etc.) and other. This is therefore my recommendation should goes to Ethiopia Coffee and tea marketing development authority, despite the small scale and geographical scatter farmers in Ethiopia context its mandatory to have the history of coffee produced that should answer question like by Whom? , when? , where? , to whom? , how? , what types? , haw much? and other by restraining their location according to their closeness. Furthermore this should have to be practiced by coffee growers and union and cooperatives that have large farm size relative for the small scale farmer.
- ❖ The organizations should be transparent for its customer in and out and provided awareness as it would deliver deferent clients altogether with others client commodity.
- ❖ Having well established legal frameworks has no choice for implementing complete coffee traceability from end to end and that can prohibited all coffee maker not to mix different coffee types. In this, manner the concerned body like Ethiopia commodity exchange, Ethiopia coffee and tea marketing development authority, Ethiopia coffee exchanges authority and misty of trade exporter and suppliers association should work all together to established workable legal frameworks regarding coffee traceability.
- ❖ Regarding to environmental factor the organization should work in collaborating with the environmental protection and institution and other societal in maintaining complete and safe traceability and the surrounding. This might reduce pollution that can affect traceability and rise the understanding of the societal for the executions of complete coffee traceability.
- ❖ Regarding to the benefit of implementing coffee traceability the organizational and government body like Ethiopia coffee and tea market development authority, Ministry of trade supplier sand export association should provide an awareness to the actors from end to end especially to Farmer , suppliers , exporters , buyers and academician ,

consultants should dedicated increase promotional works regarding to the implementation of complete coffee traceability.

- ❖ Generally the organization has to reconsider majority of the variables stated in theses study and ready to take any remedied action accordingly.

5.4. Further research

Traceability for coffee marketing system is an interesting area for future research and development as its worldwide concerns. Since the benefits of traceability for sustainable coffee supply, mitigating risks , increasing stock holder intimacy and fulfilling the international demand and others can still be increased, there are many possibilities that future research can be done within this area to seize this opportunity in relation to coffee and other industrial and agricultural products .

Apart from benefits of traceability for sustainability, quality management, increasing market access, prices and brand promotion, establishing well integrated supply chain, database and technology and legal frameworks can also be considered as an area for future research. Since the way that traceability is implemented and managed has been largely affect the performance of traceability, traceability could be implemented in an effective way and there is a lack of comprehensive understanding from end to end across the entire stockholder and academic research about identifying/distinguishing the potential benefits that traceability can contribute till know in Ethiopia context.

In most recent researches on traceability, we couldn't get any matured ideas in our country an deed to do more emphasize on the optimization of the traceability system that should be adopted in order to effectively deal with complete traceability. Karlsen et al. (2011) also suggest that finding of optimal level on the scale of traceability should be conducted. Costs and benefits of traceability perceived by different actors is also an issue to be discussed. Mai et al., (2010)

In terms of coffee traceability for its sustainable implementation, the authors suggest that quantitative empirical studies should be conducted in each part of a coffee supply chain separately as well as the holistic view. These can be done in order to quantify effects for coffee marketing system and to optimize usage of traceability. The quantification is suggested to be made by measuring total monetary effects of focal firms, governments, country images trader

and policy maker and the ECX, while considering all sustainability dimensions. For example, in case of a coffee product deficiency, it has to be taken in to account how much financial loss has been created such as a penalty from a government, cost of prosecution from consumers, or scarcity of the products due to devastatingly use of these resources. Costs from these factors can be compared with the implementations of coffee traceability.

As country wide having strategy for implementing traceability for agricultural and other industrial products is another interesting area to conduct a research since traceability said to be null as strategic issue in national wise to create value for each dimension in implementing traceability.

Finally, researches on a unified view of benefits of traceability for sustainable implementations of coffee traceability by each actor in every dimension, especially for actors in economic dimension, should be done in order to raise the awareness of the importance on traceability to optimize benefits of traceability across all the stockholders.

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Appendix A, Questioner

JIMMA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF MANAGEMENT
MBA PROGRAM

Questionnaire for Ethiopia Commodity Exchange Jimma branch Employees

My Name is Beyene Alemayehu and I'm MBA- student at Jimma University Business and Economics College, Department of Management. I am carrying out a research on "*Examining the factors that affects coffee traceability in case of Ethiopia commodity exchanges Jimma Branches*".

You are one of the respondents selected to participate in this study. Please assist me in giving correct and complete information to present representative finding regarding traceability. Your participation is entirely voluntary. Your active participation in the research and your honest feedback to the questionnaires has been help to achieve the objective.

Finally, I confirm you that the information that you share with me has been be highly confidential and only used for the academic purpose. You are not required to indicate your name.

Thank you in advance for your kind cooperation and dedicating your valuable time

Part I: Employee demographic Profile and questionnaire

Please (✓) the below box which directly concern you

1.1 Gender:

A. Male

B. Female

1.2 Age:

- 1. Below 20
- 2. 20-30
- 3. 31- 40
- 4. 41- 50
- 5. 51 & above

1.3 Marital Status.

- A. Single
- B. Married
- C. Divorced
- D. widowed

1.4 Education levels

- A. Certificate
- B. Diploma
- C. BA degree
- D. MBA/MSC/MA

1.5 If your education level is not included in the above levels, please write the highest grade level you have completed.....

1.6 Service Years in ECX:

- A.) 1-3 Years
- B.) 3+ to 5 Years
- C.) 5+ to 8 Years
- D.) above 9 Years

1.7 Your current position in the organization

- A.) Associate
- B.) Sampling inspector
- C.) Head branch
- D.) Manager
- E.) supervisory

- F.) quality controller
- G.) Inventory controlled
- H.) officer
- I.) D/officers

1.8 Please put the (✓) the department you are working

Department		
1.8.1	Branch operations division	
1.8.2	Strategy division	
1.8.3	Quality operation division	
1.8.4	Information technology	
1.8.5	Finance and Admin	
1.8.6	Infrastructure	
1.8.7	Member and client relations	
1.8.8	Product & market development	

Part II: Main Research Questions

Please see instructions below.

1. Please read the questions carefully and indicate your answer on the space provided according to your choice by putting (✓) sign in the box provided for all close-ended questions.
2. Read the question carefully and write your response in brief on the blank space provided for open-ended questions.
3. Rank statements according to their impact on the issue stated thereof.

Note: Indicate your answer by choosing from: 5=Strongly Agree, 4=Agree, 3=Neutral 2=Disagree, 1=strongly Disagree by putting (X) in the box for the statement that best represents your view

S.N	Research statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree	Strongly Agree
I.	The current coffee traceability Practice					
1	In its current coffee traceability practice, ECX lacks to meets its customer demand and requirements.					
2	In its current coffee treatability practice, ECX lacks to maintain sustainable coffee supply chain throughout.					
3	In its current coffee traceability practice, ECX lacks to meet global standard and marketing demands.					
4	In its current coffee traceability practice, ECX lacks to enhance effective communication from farm to end consumer.					
5	In its current coffee traceability practice, ECX couldn't recognize as its suppliers mix different coffee types back to the washing /hulling station.					
6	In its current coffee traceability practice, ECX deposit each supplier's coffee separately based on Identity preserved.					
7	In its current coffee traceability practice, ECX delivery each client's coffee, separately to the buyers/exporter from its warehouse maintained the IP model.					
8	In its current coffee traceability practice, ECX lacks to build trust and loyalty among the stockholders.					
9	In its current coffee traceability practice, ECX load altogether different client's coffee, coffee grade.					
10	In its current coffee traceability, ECX provided better decision for identified problem through tracking and tracing product.					
11	In its current traceability practice, ECX lacks to describe the entire history of coffee products from farm to ultimate consumer.					
12	In its current coffee traceability practice ECX lacks to enhance brand promotion, product differentiation, product recalls.					

II.	Nature of coffee production	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree	Strongly Agree
1	Most of the coffee farmers in Ethiopia lack advanced technology and mechanization for their coffee cultivation.					
2	Most of the coffee produced in Ethiopia is characterized by traditional and primitive way of production.					
3	Most of the coffee produced in Ethiopia is characterized as geographically scattered and cultivated by small holder farmers.					
4	Ethiopia coffee farmers lacks to produce and supply the lot that complies with ECX mandates to their buyer at the primary market.					
5	Most of Ethiopia coffee framers lack to distinguish the types of coffee they cultivate (Garden, Farm, Forest, Semi forest)					
6	Ethiopia coffee production characterized by different coffee variety within the same plot.					
7	Ethiopia coffee farmers use diary book to register their field data (i.e. yield per hectare ,coffee variety, sources of seed, farm size, date of plantation, ecological location etc.).					
8	As coffee production yield is insignificant farmer's sale their coffee for many buyers and lack consistent and sustainable.					
9	Ethiopia Coffee farmers used productivities/fertilizer, pesticide, chemicals and well known their supplies.					
III.	Supply chain traceability complex	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree	Strongly Agree
1	ECX lacks to ensured chain traceability for coffee actors.					
	ECX lacks to ensure coffee traceability from washing station to ultimate consumer through well-established chain traceability.					
3.	ECX maintain well-established chain traceability to crosscheck and control over the coffee delivered from its warehouse whether the exporters mixing before sending to foreign buyers.					

4.	ECX suppliers well-known as ECX deliver their coffee together with other suppliers coffee products and can trace it through supply chain traceability.					
5.	ECX often receive a claim for coffee quality that delivered from its warehouse by coffee buyer through chain traceability.					
6.	Coffee supply chain traceability is highly fragmented and diversified.					
7.	Traceability system that ECX implemented establishes more and frequent contacts with supply chain traceable members.					
8.	ECX lack to integrated supply chain traceability from one end to another.					
IV.	Environmental Factors	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree	Strongly Agree
1.	Consumable product safety is an increasingly important public health issue and foodborne illness can damage trade and lead to a loss of earnings, unemployment and litigation for the environment.					
2.	With the growth of international trade, the environmental impacts of products throughout supply chain have become a key concern to implementing effective traceability and need eco-friendly cooperation.					
3.	The distance that food travels from the farm where it is produced to the kitchen in which it is consumed is longer than ever before and has environmental impact.					
4.	Coffee production and marketing system affected by the absence of environmental friendship and solutions to reduce the environmental impacts such as pollution and global warming.					
5.	To implement effective traceability the awareness of the societal all across the supply chain is very critical and need friendly cooperation.					
6.	Coffee traceability is affected by ecological location and topography that the coffee growing in.					

V.	Organizational Factors	Strongly Disagree (1)	Disagree (2)	Neutral (3)		
1.	Definition of system and structural design of coffee traceability is fully understood across the exchanges.					
2.	Implementing coffee traceability demand high investment costs.					
3.	Availability of qualified employees to execute coffee traceability					
4.	Lack of ability to integrate the existing marketing system with that of the new modality/traceability.					
5.	Lack of resource to provide training and awareness for the coffee actor's requirements of implementing traceability.					
6.	Lack of sufficient infrastructure to implement complete traceability.					
7.	Low commitment and motivation with the exchange's employee in supporting traceability execution.					
8.	Lack of clear and well developed standard traceable coffee marketing system.					
VI.	Legal Factor	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree	Strongly Agree
1	Lack of well-established legal frameworks for coffee traceability.					
2	Lack legislation for tracking & tracing of coffee though the entire coffee supply chain traceability.					
3	Lack of governing rule and regulations that allows well-organized information exchange and availability to competent authorities.					
4	Lack of regulations that prohibited the coffee actors, not to mixing different coffee types and origin altogether.					
VII.	Technological Factor	Strongly Disagree	Disagree (2)	Neutral (3)	Agree	Strongly Agree

		e (1)				
1.	Lack of well-established technology for implementing coffee traceability (i.e products identification)					
2.	Lack of technologies (for online tracking, tracing monitoring, information exchange and retrieval over web).					
3.	Lack of location based technologies (i.e. GPS) identification technologies (like Bar code, RFID)					
4.	Technology that used for recording -field- layout data segments to shorten supply chain traceability has maintained.					
5.	Lack of standardized and structured information exchange like price ticker to update its supplier the daily coffee prices in national and globally wise.					

SEMI STRUCTURED INTERVIEW

1. What do you think the benefit of implementing traceability by your organization?
2. What is the importance of implementing traceability for your organization?
3. What internal and external challenge did your organization faces with regard to implementing traceable coffee marketing system?
4. What is the problem that the farmer and coffee makers encounter not to implement coffee traceability
5. What do you subjected for the execution of trues coffee traceability in our country context
6. Do you think that the current coffee production practice is in use of technology and mechanization? If not what do you think as the solution?
7. Does the current coffee traceability in practice have supported with the well-established legal frameworks? If not what do you recommendation?
8. What will be your solution for the problems that you listed above?