St Mary University
SCHOOL OF GRADUATE STUDIES

THE EFFECT OF RISK MANAGEMENT PRACTICES ON PRODUCTIVITY: PERSPECTIVE FROM GOVERNMENT ON VARIOUS MALT BARLEY PROJECTS

BY

Mekias Belhu

ID No: SGS/0280/2013A

Advisor: Dejene Mamo (PhD)

December, 2022
Addis Ababa, Ethiopia

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APPROVED BY:

_____	_____	_____
Chair person, Department of Graduate Committee	Signature	Date
_____	_____	_____
Advisor	Signature	Date
_____	_____	_____
Examiner, Internal	Signature	Date
_____	_____	_____
Examiner, External	Signature	Date

DECLARATION

I, Mekias Belhu, the undersigned person declare that the thesis entitled "The *Effect of Risk Management Practices on Productivity: Perspective from Government on Various Malt Barley Projects*" is my original and submitted for the award of Master of Art Degree in Project Management, St. Mary University at Addis Ababa and it hasn't been presented for the award of any other degree. Under this study, fellowship of other similar titles of any other university or institution of all sources of material used for the study has been appropriately acknowledged and notice.

Mekias Belhu	_____	_____
Candidate	Signature	Date

CERTIFICATION

This is to certify that Mr. Mekias Belhu has properly completed his research work entitled "*The Effect of Risk Management Practices on Productivity: Perspective from Government on Various Malt Barley Projects*" with my guidance through the time. In my recommendation, her task is appropriate to be submitted as a partial fulfillment requirement for the award of Degree in Project Management.

Research Advisor

Dejene Mamo (PhD)

Signature and Date

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ATA	Agriculture Transformation Agency
BIF	Business Innovation Facility
CREATE	Community Revenue Enhancement through Agricultural Technology Extension
EIAR	Ethiopian Institute of Agricultural Research
EUCORD	European Cooperative for Rural Development
GDP	Gross Domestic product
GMF	Gondar Malt Factory
HIV	Antiretroviral Treatment
OACC	Oromia Agricultural Commercialization Cluster
PMI	Project Management Institute
RM	Risk management
SF)	Stall Feeding
SPSS	Statistical Package for Social Sciences
UNHCR	United Nations Higher Commission for Refugees
USDA	U.S. Department of Agriculture

ABSTRACT

Managing risks and uncertainties in the agriculture sector is crucial as it affects productivity and other sectors of the economy. The target population for this study was 420 employees of appropriate government staffs from selected federal government offices in Addis Ababa. It employed 178 sampled respondents to investigate the effect of risk management practices on productivity based on government perspective on various malt barley projects in Ethiopia. Multivariate regression diagnostic tests were also carried out. Questionnaires were self-administered and were dropped and picked up closely after respondents were done filling them out. The data collected was then presented using tables and figures. Statistical Package for Social Sciences (SPSS) software was used to analyze the data. The findings reveal that the most significant malt barley productivity are innovativeness, diversification, saving and contract farming. Among them, contract farming is an essential risk management strategy for malt barley production in Ethiopia. Thus, the study concluded that consequences in malt barley improvement will be facilitated by innovativeness, diversification, saving and contract farming. Finally, this study recommends: malt enhancement projects should mainly focused on contract farming and stakeholders may continually provide risk management awareness program and they may include risk management strategies in their projects.

Keywords: Productivity, Malt Barley Projects, Risk Management Practices

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

The progressively more mobile world is characterized by improbability and volatility (source). When we know the probability of basic negative outcomes, we face risk. Risk plays a crucial role in every business. Over the past decade, the risks in agriculture have received more attention from both academic and policy-making communities (Novickyt, 2019). Risk often uses different risk management strategies because it is an extremely risky sector (source). It is usually indicated that the major risks faced by producers are categorized into five forms, such as production, marketing, financial, human capital, and environmental risk (Mehedi, Liu, Zeraibi, Swati, Rashid, Feiyu, and Man, 2020).

Global climate change has become a significant concern over the last few decades and is one of the most influential sources of production risk (Novickyt, 2019). For example, production uncertainty in crop enterprises is caused by variations in weather (drought, excess moisture, hail, freezing, and flooding) and by disease, crop insects, and other biological pests (Raza, Ganesh, Mariam, and Muhammad, 2015). Farmers have little to do against extreme natural hazards like floods, droughts, cyclones, storm surges, hail storms, etc. Farmers have little to do against such natural calamities and they are mostly uncertain. The concern about risk in agriculture should be left not only to farmers but also to the whole society, as the risk-averse nature of farmers may result in misallocation of resources that reduce overall welfare. Even if the farmer is risk neutral (Ullah, Shivakoti, and Zulfiqar, 2016), the presence of risk could have an impact on production decisions due to its impact on expected marginal productivity when randomness occurs inside the production or cost functions.

Managing risks and uncertainties in the agriculture sector is crucial as it affects productivity and other sectors of the economy (Novickyt, 2019). It is important for farmers to recognize and manage production risk since production is the main source of revenue for agricultural producers. The vagueness concerning outcomes that involve some adversity or loss that negatively affects individual well-being is normally associated with the idea of risk (Hou, Wu and Hou, 2020). Regarding natural catastrophes—for example, floods, droughts, heavy rains,

hailstorms, etc.—produce uncertainties for farmers about their production. So, throughout the world, climate change is an alarming concern. During the 20th century, the average global temperature increased by 0.8 ^{0}C over land and 0.5^{0}C at sea due to global warming. Predominantly, underdeveloped countries like Ethiopia, with their long history of exposure to and responses to crises as well as their extensive engagements with the international community are prime candidates for consideration of these lines of inquiry. The humanitarian response in Ethiopia is orchestrated by several relief organizations that vary not only in size, wide geographic coverage, and affiliation type, but also by event type, as natural hazards are not the only threats that socially vulnerable citizens have to deal with since the armed conflict began over 70 years ago. The number of disasters is also increasing, with 65 percent of the population and assets located in areas vulnerable to two or more natural hazards, and more than 10.5 million people affected by large-scale disasters (UNHCR, 2022).

Accordingly, current agriculture production, particularly for barley, has been decreased, and farmers use diverse traditional recipes that are prepared from barley and the strong barley consumption habits of the population to indicate the importance of the crop in Ethiopia. It accounts for over 60% of the total volume of food intake of the people in the highlands of Ethiopia. Furthermore, barley straw is an excellent source of animal feed, particularly during the dry season, and it is an excellent material for thatching roofs and bedding. Barley is ideally suited for malting for three main reasons: high enzymatic activity; a protective hull for the germinating seedling and use in filtration; and the firm texture of the steeped kernel. The share of malted barley production is, however, quite low (about 20%) (Ministry of Agriculture, 2022).

Because agriculture is heavily reliant on climate change, inter-annual production variations in different regions can disrupt the ecosystem (Ullah et al., 2016). For example, Ethiopia faces several effects of climate change caused by global warming that will exacerbate the environmental, socioeconomic, and demographic pressures (Novickyt, 2019). This change has directed to increase flooding, vulnerability to hurricanes and storm surges, increased drought, reduced freshwater supply and higher extreme temperatures. Thus, it needs adopting a risk management strategy can help alleviate risks before they occur. It can also lessen the impact on the government's fiscal balance, particularly at catastrophic levels, by reducing the need for inflated and frequently poorly targeted post-shock humanitarian relief to affected communities. Moreover, a well-thought-out ex ante risk management strategy facilitates expedient resource

mobilization when risk events occur. In agriculture, ex ante planning can assist farmers in getting back into production more quickly by using formerly recognized delivery channels (World Bank, 2016).

Thus, agricultural risk should not be perceived only by farmer perspectives but also be identified as a warning for government planning and controlling the country's economic benefits. In addition, since the agricultural sector is correlated with different sectors (industry) of the economy, the risk management for this sector is crucial for industrial development via productivity (Hou et al., 2020). Thus, this study investigated the effect of risk management practices on productivity based on a government perspective on various malt barley projects.

1.2 Background of Malt Barley Projects in Ethiopia

1.2.1 Nature and Level of Malt Barley and associated Projects in Ethiopia

Since more than 4.5 million smallholder farmers grow barley in Ethiopia with one of the lowest yields in the world, making it a national priority, the collaboration between HEINEKEN, EIAR, and ATA was shaped to address the problem. The malt barley projects were also refined as the demand for healthy food and malt beverages is increasing, thus providing expanding livelihood opportunities for Ethiopian farmers and East African economies. Ethiopia is the largest producer of barley in Sub-Saharan Africa, and this crop is important for smallholder farmers. Barley is significant in terms of the lives and livelihoods of small farmers. Post-harvest crop production estimates of 20,454,206.03825 for the 2021/22 millet season were followed by post-harvest cropland area estimates of 799,127.85 hectares of land (8.8% of total cereal area) for barley cultivation. More than 20 million quintals of barley were produced, accounting for 7% of total cereal production in the country. Barley, particularly malt barley, has an agriculture industry transformation benefit and its importance is rapidly growing in terms of production, potential for poverty reduction, as well as for the country's coffers and the current balance of payment situation, while barley is not among the top cereal crops in Ethiopia. Ethiopia produces mostly food barley, with an estimated 80 percent share, and is severely lacking in malt barley. Barley is a key ingredient in staple foods (e.g., Injera, Porridge, and Bread) and local drinks (e.g., Tella and Besso), in addition to its use for malting and animal feed. The net import bill for malt barley has been registered as birr 503,926,344.00, or 173,904 tons in 2022. Given the country's balance

of payment situation in recent years, this is an alarming trend (Ministry of Agriculture, 2022; Tarekegn, 2016).

1.2.2 Malted Barley Initiative Projects

Ethiopia is not only the main producer but also the major consumer of barley and numerous barley products in Africa south of the Sahara (SSA). The malt barley value chain in Ethiopia shows that it is characteristically a chain for the malt barley that goes to industries and does not capture the malt barley that goes to the food and food industries. The structure of malt processing in Ethiopia has been shifting. Assela Malt Factory (AMF) was the only malting factory in the country and carried out both domestic and international procurement of malt barley until 2013. The factory appreciated monopsony power (one buyer but many sellers) over the malt barley sellers and, consequently, enjoyed some price setting power in the domestic market (Ministry of Agriculture, 2022).

The entry of new market players—HEINEKEN and DIAGEO—and a new malt factory, Gondar Malt, led to competition in the sector. With the current malt barley demand (high price) and the extensive adoption of the new HEINEKEN varieties, malt barley is realized as a commercial crop rather than for consumption, especially in the Arsi, West Arsi, and Bale areas. Heineken Ethiopia recently introduced a Nucleus or model farmers' approach) and it is playing a key role in the aggregation and marketing of malt barley in the study areas (Tarekegn, 2016).

According to the Business Innovation Facility (BIF) (2018), Diageo was the first to introduce a contract farming model as part of a broader domestic procurement initiative in 2012, followed by Heineken and Dashen. Each model provides a package of support to smallholders so as to become better or more reliable suppliers of malted barley. Diageo's and Dashen's models emphasize collaboration with cooperatives as key intermediaries, while Heineken's focuses on relationships with larger, lead farmers. Gondar Malt Factory (GMF) was established in 2013 by TIRET, a regional development group that also owns Dashen Breweries, with a capacity to process 16,000 MT of malt annually. GMF is primarily focused on supplying Dashen, which has two breweries in Debrebrehan and Gondar; it does not sell to other breweries.

Heineken started a contract farming scheme based around large lead farmers using a matching grant from the Dutch government for a four-year program (2013–2017). Prior to rolling out its

program, Heineken performed field trials over a 2-3 year period to determine the seed varieties most suitable for the targeted growing regions, working with the Ethiopian Agricultural Research Centre to get a license to introduce "Traveler. The Dutch and the Ethiopian governments are progressively working together in PPPs to strengthen their relations and to achieve more developmental impact. The Dutch Ministry of Foreign Trade and Development Cooperation has been cooperating with Heineken on the CREATE project (Community Revenue Enhancement through Agricultural Technology Extension) since 2013. This PPP also involves two Ethiopian government institutes, which are the Agricultural Transformation Agency (ATA) and the Ethiopian Institute of Agricultural Research (EIAR), and the nongovernmental organization (NGO), the European Cooperative for Rural Development (EUCORD). The project makes use of contract farming and aims to increase food security, improve the livelihoods of smallholder farmers, and reduce reliance on imports by developing local barley production and connecting farmers to Heineken's supply chain in Ethiopia. The program started with 3,000 farmers and the number of participating farmers stands at 10,000, with plans to expand to 65,000 farmers in 2022. Heineken credits its achievement in introducing the Traveler to collaboration with regional research and multiplication enterprises, specifically Oromia Seed Enterprise, Holeta Research Centre, and Ethiopia Seed Enterprise (Heineken, 2022).

1.3 Statement of the Problem

Without the practice for risk reduction, the farmers' profit can decline because of improper decisions in risk management. Moreover, unsuitable risk management choices can cause potential asset sales, diminishing savings and reducing employment (Hou et al., 2020). Because of inefficiency in i risk management practices, farmers are obliged to reduce their investment for risk reduction, which may unpleasantly affect their production. So, the adoption of an appropriate risk management strategy is essential for farmers to reduce the adverse effects. Contract farming, diversification, and precautionary savings are considered as mostly practiced among several strategies (Ullah et al., 2016).

There are critical issues and challenges affecting Ethiopian competitiveness and sustainability as agriculture productivity. Ethiopian agriculture particularly small farmers in Ethiopia have had difficult times over the years (Tarekegn, 2016). Zewdie and Adamu (2020) described

performance in agriculture for continued period as erratic and the economic crisis in only made inbound agriculture business more challenging. This has resulted to frequent production advisories and it has brought down the agriculture sector in Ethiopia to its lowest point ever. Accordingly, three main brewery factories (Heineken, BGI, and Dashen Breweries) employed or practiced one type of risk management strategy, which had different contract farming practices. Even if Tarekegn's (2016) study revealed that the new varieties introduced by HEINEKEN in collaboration with ATA and EIAR have revolutionized the malt barley sector in terms of enhancing productivity and quality of malt barley and increasing the income of farmers, farmers put in place their own mechanisms of balancing production for market and for consumption. Sandra (2016) found Ethiopian malt barley PPP projects using contract farming can have a short-term positive developmental impact on the livelihood and food security of local farmers. In addition, the Business Innovation Facility (BIF) (2018) called on key stakeholders to develop a roadmap on how to increase productivity in the seed system to deliver varieties that increase smallholder yields and quality and strengthened contract farming design and operation to improve access to productivity-enhancing production inputs and improve quality.

As per the preliminary interview with experts in the Ministry of Agriculture, from existing situations, as their (Ethiopian breweries') contract farming varies accordingly, their risk situation, risk reduction, and risk sharing are also varied. Risk-sharing is considered the main cause at the time of establishing the contract. However, usually the quantity and price of products are fixed. Here, predetermined crop prices or dues provide the scope to reduce the highest risk. Although contract farming is proficiently performed, it reduces risk and uncertainty more than buying and selling on the open market (Hou et al., 2020).

A few researchers like Novickyt (2019) also reflect that cooperative farming associations can share different risks and mitigate the threats compared with relevant contracts and propose that contracts would be a powerful alternative for sharing risk. As per the preliminary interview of this study, the majority of the interview responses indicated that farmers have also been struggling to develop their income situation in order to reduce risks, such as expanding income from different external sources rather than agricultural activities. Due to their education level, there is low wage employment in rural enterprises, transportation management, construction services, agro-processing, shop-keeping, small and medium-scale trading, and contract services

in Ethiopia. Moreover, Ethiopian farmers poorly practiced precautionary savings as a self-insuring approach to reducing risk (Tarekegn, 2016).

When analyzing the effect of agricultural risk management on productivity, Mehedi et al. (2020) suggest multiple risk management tools are often used. It is common practice in agriculture to use multiple risk management tools (rather than one) for managing risks. However, previous studies like Ullah et al. (2016) focused only on the influencing factors of a single risk management tool adoption rather than recognizing the probability of simultaneous adoption and the potential relevance of the adoption decision. They only focused on the adoption of one or two risk management tools, such as contract farming and adopting on-farm and off-farm diversification independently, while others focused on both diversifications focused on precautionary savings adoption. However, little literature has been found on the simultaneous adoption of different risk management tools; for example, Tarekegn (2016) addressed the role of smallholder farmers in the import substitution and deployment of malt barley technologies by Zewdie and Adamu. (2020). Thus, this study investigated the effect of risk management practices on productivity in Ethiopia.

1.4 General Objective of the Study

1.4.1 Main Objective of the Study

- The general objective of the study investigated the effect of risk management practices on productivity based on government perspective on various malt barley projects in Ethiopia.

1.4.2 Specific Objectives

More specifically, the research aims: -

1. To determine the effect of innovation on malt barley productivity.
2. To investigate the effect of diversification on malt barley productivity.
3. To examine the effect of precautionary savings on malt barley productivity.
4. To examine the effect of contract farming on malt barley productivity.

1.5 Research Questions

The research attempted to answer the following questions. These were: -

1. How innovation does affect on malt barley productivity?
2. What is the effect of diversification on malt barley productivity?
3. What is the effect of precautionary savings on malt barley productivity?
4. How does contract farming affect malt barley productivity?

1.6 Significance of the Study

The significance of the study is mainly finding out the effect of risk management practices on productivity based on government perspective on various malt barley projects in Ethiopia. This study also gave an understanding of the relationship between risk management practices and productivity. This study will be significant to agriculture firms, the general public, breweries, professionals, agronomists, students, and the government as it offers valuable contributions from both a theoretical and practical perspective. Theoretically, it contributes to the overall consideration of risk management practices and their effect on agricultural productivity.

The study enables firms in the agriculture sector in Ethiopia to improve their risk management requests and it practical implementation and to assume efficient farm risk strategies to improve farmers' productivity through the risk management processes. This enables the farmers, breweries, and agriculture firms to perform better and to grow their farms, businesses, and maintain a competitive advantage and will make Ethiopia the most preferred global malt barley supply.

Apart from farmers and breweries, the study benefits beer consumers, international malt buyers, and communities, both local and international, through improved malt barley production and supply, as well as better risk management. This helps to superior agriculture production, product supplies, and managing agriculture commodities. The study aids in the application of industrial linkage in marketing terms, as well as in providing information for managers, traders, and corporations to think outside the box by differentiating all of their applications and activities and reaching consumers through various supply chain processes.

The study helps to the government and policy makers in setting regulations on agriculture, particularly main grain production, agriculture industry transformation, and the easy supply of raw materials in Ethiopia through government support, agriculture monitoring and control, safeguarding agriculture productivity, and allocating and preserving natural resources of the country. The study guides the government and policymakers on the importance of addressing the barriers and challenges that hinder adoption of relational agricultural marketing, usage of technology, and farm productivity offerings in order to enhance their adoption in other sectors and their overall contribution to the economy.

Lastly, the study adds to the existing body of knowledge on risk management practices to benefit researchers and academicians and aid further research on risk management in the agriculture supply chain processes, agriculture sector, and industrial transformation. To the researchers and scholars, the study is a valuable addition to the prevailing knowledge and provides a platform for more investigation into the relationship between risk practices and productivity, agriculture-industry transformation, vertical linkage, supply chain success, quality product offerings, and other strategies implemented by various stakeholders.

1.7 Scope of the Study

The scope of the study was limited conceptually, geographically, and methodologically, which is described as follows. The study's geographical scope was limited to only the federal government's monitoring and controlling perspective on applying risk management practices on mal barley productivity in Addis Ababa. Regarding the conceptual scope, though different factors affect the effectiveness of risk management practices, the researcher was forced to consider only the four main risk management practices, namely innovation, diversification, savings, and contract farming, in the link between risk management practices and agricultural productivity.

This study reviewed and analyzed the practices of risk management and agricultural productivity of the surveyed projects using descriptive statistical techniques like frequency, percentage, mean and standard deviation. It also summarized as well as described the response of participants. The effect of risk management practices on agricultural productivity was analyzed via inferential statistical techniques such as correlation matrix and multiple linear regression analysis. A mixed

or qualitative and quantitative research approach was also used in order to gather the intended data from the sample population.

1.8 Limitations of the Study

The researcher encountered quite a number of challenges related to the research and most particularly during the process of data collection. Due to inadequate resources, the researcher conducted this research under constraints of finances and therefore collected data from Addis Ababa. Some respondents were biased while giving information due to reasons such as victimization in the event the research findings turned sour. Lack of cooperation is undoubtedly the greatest challenge that was witnessed by the researcher. Respondents were naturally suspicious and uneasy when directed to cooperate in a study that they were not aware of its consequence. To further calm and set at ease the respondents, the researcher explained the nature of the study and its intended purpose and that it was purely an academic undertaking and that information divulged would be held in confidentiality by the researcher.

1.9 Operational Definition

The following key terms of the study:

- **An innovation** - is an idea, behaviour, or object that is perceived as new by its audience. Any innovation goes through several stages before it becomes adopted (Tarekegn, 2016).

- **Contract farming** - a corresponding contract between the buyer and the seller of agricultural production, which creates an agreement for the production and sale of agricultural products (Hou et al., 2020).

- **Diversification -** can be understood as the rearrangement of agricultural production resources, such as land, capital, agricultural machinery and shares of others (Mehedi et al., 2020)

- **Precautionary savings** - comprise the accumulation of liquid and semi-liquid assets in the form of livestock, cash, crop stocks, farm and household equipment and other useful assets (Mehedi et al., 2020).

1.10 Organization of the Paper

This study is organized into five chapters. Chapter one concerns the introduction, which includes the following: background of the study; statement of the problem; general and specific objectives; research questions; significance of the study; scope of the study; limitations of the study; and organization of the study. Chapter Two includes a review of literature and it contains a review of existing literature written on the practices of risk management and agricultural productivity. Chapter three is about research methodology. It consists of research design, research approach, sources of data collection, methods of data collection, and data analysis. Chapters four and five present major findings, general conclusions, and possible recommendations for the problems that are drawn from the results of the data analysis, and final results, as well as further studies in the area, are discussed in Chapters four and five.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.1 Introduction

The chapter is organized as theoretical literature, empirical literature research hypotheses, and the conceptual framework of the research. It also evaluates both theoretical and empirical studies on the practices of risk management and agricultural productivity. A literature review shows that several studies on this topic have been conducted in which each of them has looked over the subject of relationship quality from a special insight and has examined it in different aspects, and the following are some of them.

2.2 Theoretical Literature review

2.1.1 Concept of Risk Management and Productivity

2.1.1.1 Concept of Risk

It is important to understand relevant concepts before they can be managed or knowledge about them can be developed. Therefore, this part describes the theoretical rationale of the task risk and risk management and reviews discussions on transport sector risks. Therefore, this part will start the theoretical analysis with sections on defining risk, uncertainty, risk management, and its corresponding features.

Risk is well defined as an effect of uncertainty on aims and is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence. Uncertainty is defined as a lack of information, understanding, or knowledge about an event, its consequences, or likelihood (Hou et al., 2020).A task risk is an uncertain event or condition that, if it occurs, will cause a positive or negative effect on one or more task aims such as scope, schedule, cost, and quality (Project Management Institute [PMI], 2013). Here, risk is seen as an exposure to the consequences of uncertainty, and in a project context, it is the chance of something happening that will have an impact upon objectives. It includes the possibility of loss or gain, or variation from a desired or planned

outcome, as a consequence of the uncertainty associated with following a particular course of action.

Tomas (2016) described risk as a deviation from the desired or expected outcome of a set of circumstances due to a state of information deficiency. Since risk is related to uncertainty as described above, the chance of events happening is uncertain as well. Therefore, to be able to quantify risk, probability was introduced, which expresses the chance of events happening at a number between 0 and 1. PMI (2013) further analysed that positive and negative risks are commonly referred to as opportunities and threats. In addition, a task may be accepted if the risks are within tolerances and are in balance with the rewards that may be gained by taking the risks, while positive risks that offer opportunities within the limits of risk tolerances may be pursued in order to generate enhanced value. Risk is an umbrella term, with two varieties: opportunity, which is a risk with positive effects; and threat, which is a risk with negative effects. On the other hand, uncertainty is the overarching term, with two varieties: risk referring exclusively to a threat, i.e. an uncertainty with negative effects, and opportunity, which is an uncertainty with positive effects.

The same probability-impact scheme is presented in a table by PMI (2013) to show the impacts of a negative risk event, while impact definitions can be developed for opportunities in a similar way, in the four major task objectives, namely; cost, time, scope, and quality. It identifies four levels of the impact of a negative risk event on task objectives based on their severity. A negative risk event can have a very low, low, moderate, high, or very high impact on project objectives, each having their own implications for the organization based on the damage they cause to important task parameters. Risk is a combination of likelihood or probability of occurrence, and the impact if it does.

PMI (2013) further discussed that organizations perceive risk as the effect of uncertainty on tasks and organizational objectives. Organizations and stakeholders are willing to accept varying degrees of risk depending on their risk attitude. The risk attitudes of both the organization and the stakeholders may be influenced by a number of factors, which are broadly classified into three themes, including risk appetite, which is the degree of uncertainty an entity is willing to take on in anticipation of a reward; risk tolerance, which is the degree, amount, or volume of risk that an organization or individual will withstand; and risk threshold, which refers to measures of

the level of uncertainty or the level of impact at which a stakeholder may have a specific interest. Below that risk threshold, the organization will accept the risk. Above that risk threshold, the organization will not tolerate the risk. According to Tomas (2016), any given risk event may fall under one of the four above-drawn quadrants of high impact but unlikely to occur, low impact and unlikely to occur, low impact and likely to occur, or high impact and likely to occur. A task with new and emerging technology will have a high-complexity rating and a correspondingly high risk. The more complex the technology, the more resources the project manager typically needs to meet project goals and each of those resources could face unexpected problems.

2.1.1.2 Risk Management

According to the PMI (2013), project risk management is one of the nine most critical parts of project commissioning indicating a strong relationship between managing risks and a project success. It also defined risk management as a systematic process of conducting risk management planning, identification, analysis, response planning, and controlling risk on a project having an objective of increasing the likelihood and impact of positive events, and decrease the likelihood and impact of negative events in the project. A good RM procedure will support better decision-making concerning risk, as there will be a better understanding of the risks, how these risks will affect the project and the responses to these risks if they should occur. Risk management is set of coordinated activities to direct and control an organization with regard to risk (Tomas, 2016).

Iqbal, Ping, Abid, Muhammad and Rizwan (2016) reflected that the practice of risk management will involve identifying precautionary measures to avoid a risk or to reduce its consequence, establishing contingency plans to deal with risks if they should occur, initiating more investigations to reduce uncertainty through better information, considering risk transfer to insurers, considering risk allocation in contracts and setting contingencies in cost estimates, float in programs and tolerances or 'space' in performance specifications. It was also stated that the project organization and its senior management, internal &external clients and task managers are the major beneficiaries of the risk analysis and management practice. Task risk analysis and management is a continuous process that can be started at almost any stage in the life-cycle of a task and can be continued until the costs of using it are greater than the potential benefits to be

gained. As time progresses, the effectiveness of using risk analysis and management tend to diminish, therefore it is most beneficial to use it in the earlier stages of project (Tomas, 2016).

2.1.1.3 The Concept of Productivity

Productivity is defined in terms of exploitation of resources, like material and labour. In humble terms, productivity is the ratio of output to input. Productivity is thoroughly associated with quality, technology and profitability. Productivity can be measured at firm level, at industry level, at national level and at international level. Productivity can be treated as a multidimensional phenomenon. The modern dynamic concept of productivity looks at productivity as what may be called "productivity flywheel" (Iqbal et al., 2016). The productivity is strengthened by competition. Competition leads to higher productivity, higher productivity results in better value for customers, and this result in higher share of market for the organization, which results in still keener competition. Productivity thus forms a cycle, relating to design and products to satisfy customer needs, leading to improved quality of life, higher competition i.e. need for having still higher goals and higher share of market, and thereby leading to still better designs (Hamdy, (2017). Therefore, there is a tough stress on productivity improvement in competitive business environment. Productivity can be better-quality by controlling inputs, improving process so that the same input yields higher output, and by improvement of technology. These aspects are discussed in more detail in the lesson on Productivity Management.

2.1.1.4 Concept of Agricultural Productivity

During the early years of agricultural reform, the growth of output was an unsuitable indicator of improvement progress. Once the short- to medium-term negative production effects of market liberalization have diminished but it upholds that in the long run, as well as short run, output is an inappropriate performance indicator. Relatively, growth in productivity— output per unit of input used in production—is the single best measure of reform progress. A way to argue this point is to examine how agricultural production could increase in the future in transition economies, and in specific how productivity growth and output are linked and related (Economic Research Service/USDA, 2018).

One technique the transition economies could raise agricultural production is by accepting policies that reverse the market-driven contraction occasioning from market liberalization. These policies might include higher budget subsidies to the agricultural sector, greater state control over prices (for both inputs and output), which would be set to agricultural producers' advantage, and more trade restrictions. Such policies, though, would be wholly inconsistent with market reform. Any resulting rise in output would therefore be a measure not of the progress of reform but of its negation. Consequently, the main reason output is a flawed indicator of reform progress in agriculture is that one could not easily determine whether any growth was the result of effective market consistent reform policies or anti-reform policies (Novickytė, 2019).

One might argue that production could be enthused by higher GDP growth that raised consumer income, thereby boosting demand for foodstuffs. Higher demand for food would increase prices for producers, thereby motivating more output. Some high-level officials in transition economies have argued that demand-stimulating GDP growth is agriculture's best hope for an output rebound. This argument holds, though, only for countries largely insulated from the world market. If a country is generally free-trading and its domestic market is well-integrated into the world market, world prices determine its domestic prices, independent of the level of domestic demand. If a country were a net importer of a certain foodstuff, an increase in domestic demand for the good from growing consumer income would be satisfied by additional imports, not additional domestic production. If a country were a net exporter of the good, higher consumer demand would reduce exports, leaving domestic output unchanged. The main way to raise agricultural output consistent with a market-driven and free-trading economy would be through positive supply-side developments. Farm-level changes could shoot productivity growth in three general ways. The first way would be simply to shed unproductive inputs, particularly labour. The agricultural labour force in virtually all transition economies is inefficiently large, as shown by the fact that agriculture's share in the total labour force is much higher than agriculture's share in GDP. Labour intensive agricultural productivity growth—excess labour moving out of agriculture to new employment— expands output not in agriculture, but in the industries to which the labour moves (Economic Research Service/USDA, 2018).

Productivity growth can also be measured for each specific input used in production. However, the analysis of productivity growth for individual inputs must be handled with care, particularly

with transition economies. During transition, the measured productivity of agricultural intermediate inputs, such as fertilizer, fuel, and machinery, has risen, in many cases substantially. On the other hand, the productivity of labour and land (as measured by yields) in general has dropped. The main reason for these developments is not that major changes have been made in the system of production that make intermediate inputs more productive and labour and land less so. Rather, the large increase in real prices for agricultural intermediate inputs following price liberalization has caused the use of these inputs by farms to fall to a greater degree than output. Measured productivity for these more barely used inputs has thereby increased (Novickytė, 2019)...

2.1.2 Theoretical Framework

This study is anchored on three theories namely, relational contracting theory, agency theory, and stakeholders theory.

2.1.2.1 Relational Contracting Theory

This is chiefly entrenched in contract law that applies to the legal rights of exchange parties and guides the planning and conduct of exchange. Relational contracting theory has provided a rich conceptual framework that is able to capture the dimensions and dynamics that underlie the nature of exchange relationships as well as the belief structures and activities that are essential for fruitful exchange relationships. Since a pure reliance on the mechanism of law can be costly in terms of both resources and time, and since unexpected conditions can affect the exchange relationship, extra-legal governance methods are required. Thus, the concept of contract has been defined very broadly as a relationship between exchange parties who expect to sustain this relationship into the future (Endang and Widiyanti, 2016).

Therefore, this study is very important for this study as relational contracting framework describes types of contract in terms of the norms that are expectations about behaviour that are at least incompletely shared by a group of decision-makers. These differ in content and general orientation and may relate to particular kinds of behaviour. A general property of relational norms is their prescription of behaviours that are aimed at maintaining a relationship and their rejection of behaviours that promote individual goal seeking.

2.1.2.2 Agency Theory

Agency theory originates to understand the separation between ownership and control in large corporations. It indicated that the firm can be viewed as a nexus or network of contracts, implicit and explicit, among numerous parties or stakeholders, such as shareholders, bondholders, employees, and society at large. In modern corporations the shareholders (principals) are extensively dispersed and they are not normally involved in the day to day operations and management of their companies rather they hire mangers (agent) to manage the corporation on behalf of them. The separation of ownership from management provides the context for the functioning of the agency theory. In the agency theory, the interests of stakeholders are not always aligned. Agency problems occur when the interests of agents are not aligned with those of principals. Depending on the parties involved in conflicts, agency problems can be categorized as: managerial agency or managerialism (between stockholders and management); debt agency (between stockholders and bondholders); social agency (between private and public sectors); and political agency (between agents of the public sector and the rest of society or taxpayers). The agency theory is about management risk and is therefore beneficial to this study.

2.1.2.3 Stakeholders Theory

The Stakeholder theory was entrenched to incorporate corporate accountability to a broad range of stakeholders. It was argued that the stakeholder theory is derived from a combination of the sociological and organizational disciplines. Indeed, stakeholder theory is less of a formal unified theory and more of a broad research tradition, incorporating philosophy, ethics, political theory, economics, law and organizational science. This theory focuses on managerial decision making and the interests of all stakeholders have intrinsic value, and no sets of interests are assumed to dominate the others. Agriculture sector is entails dealing with people mainly people including farmers, consumers, producers and industrials. The stakeholder theory is therefore important as taking care of the stakeholder need is key strategy for the performance of the sector. The stakeholder theory is derived from a combination of the sociological and organizational disciplines. Indeed, stakeholder theory is less of a formal unified theory and more of a broad research tradition, incorporating philosophy, ethics, political theory, economics, law and organizational science.

2.1.3 The Relationship between Risk Management Practices and Productivity

Emily and Miller (2018) stated that productivity and Risk Management focuses on the farms' commodities, conservation and crop insurance programs that govern the complex interactions between large-scale production agriculture, the risks presented by both weather and market volatility, and natural resources protection. It aligns production with the stewardship of resources like water, the health and productive capacity of soils, and the vitality of rural communities. Productivity sits at the nexus between the land's capacity to sustain crops and animals over the long term, and the livelihood of the producers who make their living off the land. Risk management, on the other hand, addresses the potential to invest in resilient agricultural systems that reduce both on-farm financial risk and broader natural resource concerns.

Production, marketing, financial, institutional and human risks exist on most farms. They are often interconnected. The ability to repay debts relies on levels of production and the prices received for produce sold. Supporting of production depends on the ability to borrow capital and the ability of the lender to supply capital in time. The different types of risk often need to be well-thought-out together. Human risk refers to the risks to the farmstead business affected by illness or death and the personal condition of the farm family. Accidents, illness and death can disrupt farm performance. In numerous countries labor immigration away from rural areas is a common occurrence (David, 2013).

Migration can cause labor shortages for the farm. Political and social discontent can also limit labor availability. The prevalent of HIV/AIDS has had a thoughtful influence on labor availability and productivity in some areas. When farmers plant their crop or obligate resources to raise livestock they cannot be certain whether they will have enough labor to manage the farm enterprises. Notwithstanding of the basis of risk, the degree of riskiness of an action depends, in part, on the ability to predict what will happen in the future. If farmers are able to understand and predict the patterns and trends throughout the year, the changes that occur may not be so risky (Economic Research Service/USDA, 018). The relative importance of the different sources of risk depends on the nature and circumstances of the individual farmer and the farm household. This includes the resource base of the farm, its physical location, the enterprise combinations chosen, the specific production processes practiced by the farm family and the attitude of the

farmer towards risk. Farmers producing under rain-fed conditions may see drought as the greatest risk. Farmers producing high-value produce may find price fluctuations to be their greatest risk (David, 2013).

2.1.3.1 Innovation

Research and pilot initiatives are investments in the future, building the knowledge and experience that allows for innovative policy to scale and adapt across time and geographies. In particular, the farm can authorize research and pilot programs to improve long-term productivity and risk management within country's agriculture, with a focus on investments in soil health, resilient agronomic systems and natural resources conservation (Economic Research Service/USDA, 018). Research and pilot programs best address situations where there is evidence that certain farming practices further goals or lead to desired outcomes, but uncertainties remain about the nature or magnitude of these benefits. It is mentioned as research funding when a lack of data hampers efforts to adequately assess the costs and benefits of certain farming practices, or when there is insufficient understanding of interactions between incentives to develop policy that promotes good practices. On the other hand, the section recommends pilot projects when there is sufficient information to identify beneficial practices but barriers such as conflicting public or private incentives prevent farmers from achieving widespread adoption. Pilot programs are also called for when more work is required to identify the best policy mechanism to promote those practices (Emily and Miller, 2018). Therefore, innovation is part of the key construct of productivity according to them.

- **H_1: Innovation has a positive significant effect on agriculture productivity in in Ethiopia**

2.1.3.2 Diversification

Diversification spreads risk and is an effective risk management strategy because not all farm enterprises and operations are likely to be affected in the same way by changing situations. Some techniques include: managing multiple farm enterprises together at any one time (or in the same season); engaging in the same farm enterprise in different physical locations; engaging in the same farm enterprise over consecutive periods of time (or seasons); generating income from off-

farm activities. It may include managing multiple enterprises together at any one time (or in the same season). There are many forms of this kind of risk management strategy. For example, farmers concerned that their normal crop may fail because of pests may decide to produce more than one crop (i.e. multiple enterprises) over the same season. They will choose crops that are more resistant to pests and diseases (David, 2013).

From an agricultural viewpoint, Mehedi et al., (2020) stated that diversification can be understood as the rearrangement of agricultural production resources, such as land, capital, agricultural machinery and shares of others. Agricultural diversification endeavors to diversify risk by generating a large number of earning sources that is divided into on-farm diversification and off-farm diversification. On-farm diversification is the redeployment of agro-production resources; it can also include organic beef production, poultry production, etc. On-farm income diversification is an approach to reduce the variation of income and risk of farmers through diversified farming or agricultural initiatives. It seems the concurrent production of different crops or the allocation of land to other crops or other agricultural products. Furthermore, if farmers are seeking income changes or managing other financial risks associated with agriculture, then it can be described as off-farm income diversification. In general, farm labor used in different non-farm activities participation with the aim of rising household income and reducing risk effects.

- **H_2: Diversification has a positive and significant effect on agriculture productivity in Ethiopia**

2.1.3.3 Saving

Farmers also practiced precautionary savings as a self-insuring approach to reducing risk. It comprises to accumulate the liquid asset, semi-liquid asset and fixed asset, along with the resources in the form of money, crop portfolios, livestock, agricultural apparatuses and extra beneficial resources. Repeatedly, these are widely practiced by small growers as ex ante shock-absorbing approaches. Moreover, age, schooling, family size, income and microcredit are some significant determinants that separately influence farmers' risk attitudes (Mehedi et al., 2020). A farmer may select to accept feed-saving technology to hedge against weather risk. The adoption of new technologies continuously contains a degree of risk and uncertainty concerning

the effect of this input on the distribution of farmers' profits. Vagueness associated with the adoption of new technology includes the perceived riskiness of future farm yield after adoption and production uncertainty related to farming itself.

A proper analysis of farmers' production decisions is supposed to account for production risk and farmer's risk attitude. The introduction of self-feeding is believed to be a risk-reducing and feed saving technology, the adoption rate has remained slow and low in the region (Hadush, 2019). Precautionary saving is a kind of saving (non-expenditure of part of income) generated when future income is uncertain. Due to the incompleteness of the insurance market, the preventive motivation to delay consumption and savings during this period has increased. Accordingly, people will not be capable of insuring contrary to the bad state of the economy in the upcoming time. It can be expected that if the bad state is understood, they will make lesser incomes (Mehedi et al., 2020).

In avoiding the adversative effect of future income variations and retaining a smooth consumption path, they established a precautionary reserve, named precautionary savings, through less consumption in the existing period, and resorting to it if the bad state is understood in the upcoming time. Precautionary savings comprise the accumulation of liquid and semi-liquid assets in the form of livestock, cash, crop stocks, farm and household equipment and other useful assets (Mehedi et al., 2020).

- **H_3: Precautionary Saving has a positive and significant effect on agriculture productivity in Ethiopia**

2.1.3.4 Contract Farming

Mehedi et al., (2020) defined contract farming as a corresponding contract between the buyer and the seller of agricultural production, which creates an agreement for the production and sale of agricultural products. Contracts may be different from existing situations, however usually; the quantity and price of products are fixed. Risk-sharing is considered as the main cause at the time of establishing the contract. Here, preset fees provide the scope to reduce the highest risk. Although contract farming is adeptly performed, it reduces risk and uncertainty rather than buying and selling on the open market. Few researchers also consider that cooperative farming

association can share different risks and mitigate the threats compared with relevant contracts and propose that contract would be a powerful alternative for sharing risk.

Contract farming offers a better-quality relationship among growers, sellers and all other facilitators involving with the value chain process (David, 2013). Though there are many practices in contract farming. In developing countries, buyers usually provide contract farmers with all agricultural inputs (machinery, seeds and fertilizers) on a credit basis. Through this project, contract farmers benefit from training in the best fertilizer use and planting methods, obtain high-quality investment and reasonable production funds and provide a safe market for their products. This prearrangement always requires the buyer to provide a certain degree of production support by providing input and technical advice. This preparation is based on the farmers' obligation to provide specific commodities according to the quantity and quality standards dogged by the buyers and the company's commitment to support farmers' production and purchase of commodities. Usually, the farmer granted with the buyer to sell the whole production at present market price with standard market quality (Novickytė, 2019).

- **H_4: Contract Farming has a positive and significant on agriculture productivity in Ethiopia**

2.3 Empirical Literature Review

2.3.1 Studies across the Globe

Aditya, Ashok and Gudbrand (2022) examined the effect of risk reduction strategies (diversification, risk reducing instruments, and GAPs) on onion grower's productivity in India. They used semi-parametric SPSC model show observation-specific values; density plots and means estimates show significant positive impacts of risk reducing strategies on productivity. Among risk reducing strategies considered, adoption of GAP has highest impact on productivity, indicates that farmers, perhaps intend mitigating risk of failure, lower sales, or lower quality through adoption of GAP—which help them to increase productivity in high value crops. However, the significance of risk reducing strategies is not apparent to all farmers. The study also shows the heterogeneous impacts across quintiles. Specifically, the bottom quintile farmers experienced negative productivity linked with RI and GAP—probably because the intended

standard maintenance or quality enhancement on high value crop probably not substantiated to increase productivity for very small growers. Together, input elasticity's and RTS results suggest that high value crop like onion growers can reduce their cost of production, specifically per unit material costs and labor, by increasing the scale of their farming operations.

Mehedi et al., (2020) investigated the risk management strategies to cope catastrophic risks in agriculture in the case of contract farming, diversification and precautionary savings. They used a stratified random sampling method was used to survey 350 maize farmers in four different agro-ecological regions in Bangladesh. Using the multivariate model, this study explored the possible correlation between farmers' perceptions of catastrophic risks and their attitudes towards risk sources—as well as the possible correlation between contract farming, diversification and precautionary savings as risk management strategies. The results confirm the relevance of risk management adoption decisions and reveal that the use of one risk management tool may simultaneously influence the use of another risk management tool. In addition, the research results also show that age, education level, extension experience, monthly household income, farming areas, land ownership and risk aversion nature are the most important factors that affect the adoption of risk management strategies. The research results provide further explanation and information and provide a platform for decision-makers to predict appropriate risk management strategies.

The modernization process of Chinese agriculture has modeled new challenges to agriculture economic management. Nevertheless, existing studies focus on financial and ecological and environmental risks of agriculture economic management while lacking the necessary attention to other types of agricultural economic management. Therefore, Yan (2022) first proposed that the risk of agricultural economic management is of five types—economic, social, political, cultural, and ecological and environmental risks—and further clarify the interactions among the five risk types. Given that the five types of risks are nested with each other, they adopted a multivariate statistical algorithm based on complex network theory to scientifically evaluate the risk management of agriculture economy. The results show the applicability of the algorithm to risk clustering analysis and risk coefficient estimation. This study concluded with the corresponding theoretical and practical implications. This study adopted a factor analysis technique based on complex network theory and empirically tests the applicability of this multivariate statistical calculation method. The study showed that the risks in agricultural and

forestry economic management is of a complex network structure and the assessment of risks cannot be cut simply from the evaluation of each dimension; however, the intrinsic network structure of risks must be considered comprehensively to produce correct estimation results.

Raza et al. (2015) investigated farmers' decisions of adopting risk management tools (diversification, savings and credit) and examined the impacts of various factors on farmers' risk management decisions. The study was carried out in four districts of Khyber Pakhtunkhwa province in Pakistan. Multivariate model is used to assess the impacts of independent variables on farmers' decisions of adopting Diversification, Precautionary Savings and Credit to manage farm risk keeping in view the potential for simultaneous adoptions of these risk management tools. The results propose that the decisions of adopting risk management tools are correlated and the adoption of one risk management tool induce farmers to adopt other risk management tool(s) at the same time. Additionally, the risk management tools adoption decisions are affected by variety of factors including farm and farm household characteristics, farmers' perceptions of catastrophic risk sources, their attitude towards risk and their access to information and credit sources.

2.3.2 Empirical Studies in Africa

Collins-Sowah and Henning (2019) employed empirical data from a nationally representative farm household survey in Senegal and evaluated the effect of different risk management strategies employed by farm households on agriculture income and dispersions around incomes. They attained this by employing a Multinomial Endogenous Switching Regression model and a Moment-Based Approach. They find mix results of the impact of risk management on agriculture incomes. The use of risk mitigation and transfer significantly reduces agriculture incomes while risk coping strategies significantly increases agriculture incomes. Risk mitigation strategies were observed to be associated with opportunity costs relating to income loss and likely inefficient resource allocations. On the contrary, the reduced agricultural incomes observed with the use of risk transfer might be related moral hazard problems such that insurance policy holders do not take care or expend less effort in their production activities. They also find that risk management strategies significantly reduce dispersions around agriculture incomes with risk transfer producing the largest effect. Furthermore, the effect of risk transfer strategies on dispersions around agriculture incomes is reduced when combine with other strategies. For the other risk

management strategies, we find that when used in combinations, the dispersion reduction effect is greatly enhanced.

Cleo (2013) examined the effects of barley cultivation on small holder farmers in Eastern Uganda. The study explored whether and in what ways barley farmers in Kapchorwa, Bukwa, and Kween Districts, in eastern Uganda, benefit from selling their produce to Nile Breweries and Uganda Breweries. It pays particular attention to the breweries' intended effects on respondents' incomes, expenditures, and access to credit, as well as the potential unintended consequences of barley production on respondents' alcohol consumption and environmental stewardship. The study employed both on narratives and on econometric analysis to draw conclusions about the effect of breweries' demand for raw materials on domestic small-holders.

2.3.3 Studies found in Ethiopia

Tarekegn (2016) assessed the excelling role of smallholder farmers in the import substitution and industrialization of Ethiopia. It found that the productivity and quality of barley sourced from smallholders is by far greater than that of the large farms that are engaged in malt barley production. It was found out that regardless of the contract they have about 58% of the respondents store their barley for more than two months. The reasons dispatched in this study were included saving mechanisms (sell when cash is required), guessing/waiting for better price, wait the planting season to sell as seed with higher price and keep for food security/consumption until make sure that the next season looks ok. Therefore, the companies pushing for strict delivery time hardly work in the study area. Contract enforcement is hardly available especially with individual farmers. This study employed purposive sampling and both quantitative and qualitative data was collected. Its sample survey was conducted with 150 smallholders located in the three zones – Bale, Arsi and West Arsi. Focus group discussions and key informant interviews were also held with Breweries, Maltsters, Bureau of agriculture, ATA/OACC, private organizations, MFIs and NGOs who are active in supporting the malt barley value chain in the study area. The study found out that the mean productivity per hectare for all malt barley varieties in the three zones is 39 quintals as opposed to 18.7 quintals per hectare in 2013 which is 109% increase. The local malting capacity covers only 35% of the total national malt consumption during this study and the remaining 65% is import. Local malt barley is 15% more expensive than imported malt barley and local malt is 11% expensive than imported malt. The

study found out that almost 99% of the local malt barley is sourced from smallholders and still there is huge potential to use smallholder farmers to realize self-sufficiency

Business Innovation Facility (BIF) (2018) investigated the malting barley market in Ethiopia and assessed the Ethiopia's malting barley market system, including a review of the contract farming models used by some brewers. It recognized opportunities for interventions that would sustainably benefit large numbers of smallholder malting barley farmers. The study found that the most significant constraints included that low returns for smallholders, which is a function of poor productivity and low prices; inadequate seed supply of higher-yielding seed varieties; inadequate capacity in malting (which is being partially addressed through new investment) and lack of a consistent supply of quality barley for malting.

Sandra (2016) examined the impact of the CREATE project on the livelihood and food security of local smallholders who have been inserted in the malt barley value chain of Heineken in Ethiopia. The CREATE project was set up as a public-private partnership and makes use of contract farming. The study was conducted in Addis Ababa and Arsi and used a mixed-method approach including interviews, focus group discussions, stakeholder analysis, value chain analysis, and a survey, which was completed by 148 smallholder farmers. It is seen that farmers firstly experienced a shift from market governance to a captive network, offering on the one hand price certainty and a guaranteed buyer, but limiting on the other hand the farmer's freedom to directly act and react to market demand. The results further show that short-term effects on livelihood and food security are positive. Farmers experienced in particular an increase in social and human capital. In terms of food security, farmers stated to have access to a more variety food basket and can now consume three meals instead of two. It was however seen that contract farming has a certain degree of exclusiveness since better-resourced farmers tend to capture the, contracts, leaving poorer farmers out of the project. In addition, the contractual agreements transferred the production from the lead firm to cooperatives, which in turn put a smaller risk in the hands of farmers. Concerns are also raised about the long-term effects since the value chain is rather weak since most nodes are currently controlled and supported by one actor, which is Heineken itself. In addition, the majority of farmers are dependent on a single buyer to sell their malt barley to, which is Heineken as well. Looking at environmental issues, the new seeds are high maintenance, disease sensitive, and input intensive varieties. Much chemicals and fertilizer

are needed in order to grow these seeds, which might lead to harmful side effects on the environment in the long run (Environment, 2015).

2.4 Research Gap

Several studies only focused on the bottlenecks and challenges within the smallholder value chain and broader market, particularly for barley in Ethiopia. For example, the Business Innovation Facility (BIF) (2018) identified and implemented new approaches to doubling barley farmer productivity, and Cleo (2013) attempted to resolve the challenges of breweries' competition for raw materials. Sandra (2016) recognized specific breweries' requirements and biases and proposed a basis for further research on contract farming in developing countries. Additionally, this study suggested future research should be executed completely independent from the lead firm. This study also committed the same bias as it was involved in one way of risk strategies, namely contract farming that showed that a control group should ideally refer to farmers who supply the same commodity to precisely the same markets and for the same purpose.

The World Bank (2016) highlighted that effective risk management typically requires a combination of measures, some designed to remove underlying constraints and others designed to address risk directly. In addition, Tarekegn (2016) suggested that focus should be given to smallholders to enhance their production and productivity, modernize the marketing system, and the government needs to incentivize breweries to build a sustainable and competitive malt barley value chain. Previous research, on the other hand, has been heavily involved in production risk, the frequency of shock, and household incomes; for example, Hadush (2019) sought to determine what factors influence the adoption of such improved feeding practices, and Collins-Sowah and Henning (2019) assessed the effect of different risk management strategies used by farm households on agriculture income and income dispersion.

The above mentioned studies ignored the role of risk strategies that are aimed at generating greater security for the farmer. However, it is for the farmer to decide if the benefits gained outweigh the direct or implied cost of the strategy. Furthermore, according to David (2013), a risk management strategy to cover one risk may increase another. To take the best example in this regard, a farmer who decides to diversify his crop to cover production risks. The choice of

crops could increase marketing risks because, although the new crop is likely to be profitable, there may be a higher risk of price fluctuations. Thus, this study will apply a combined risk management strategy or use various types of risk strategies together to develop a broad range of strategies that take into account the advantages and disadvantages (benefits and costs) of each risk management option individually and in combination.

In the agency theory, the benefits and interest of stakeholders are not continuously united. Agency problems occur when the interests of agents are not aligned with those of principals. Depending on the parties involved in conflicts, agency problems can be categorized as: managerial agency or managerialism (between stockholders and management); debt agency (between stockholders and bondholders); social agency (between private and public sectors); and political agency (between agents of the public sector and the rest of society or taxpayers). The agency theory is about management risk and is therefore beneficial to this study. Unlike agency theory in which the managers are working and serving the stakeholders, stakeholder theorists suggest that managers in organizations have a network of relationships to serve the like of the suppliers, employees and business partners. It argued that this group of network is important other than owner manager employee relationship as in agency theory. Agriculture sector or industrial transformation is involves dealing with people mainly tourists and customers. The stakeholder theory is therefore important as taking care of the stakeholder need is key strategy for the performance of the agriculture industrial transformation.

Thus, the present study is to assess the impacts of independent variables like innovation, diversification, precautionary savings, and contract farming on productivity. It helps to manage farm risk, keeping in mind the potential for simultaneous adoptions of these risk management tools. Most importantly, there is little study regarding this issue that has been done in Ethiopia. In order to fill this knowledge gap, the current research is intended to explore government perspectives based on different monitoring farm features, farmer risk perceptions, and risk attitudes for the adoption of risk management tools to prevent risk rise under various projects. This is done with the help of a multivariate regression model.

2.5 Conceptual Framework

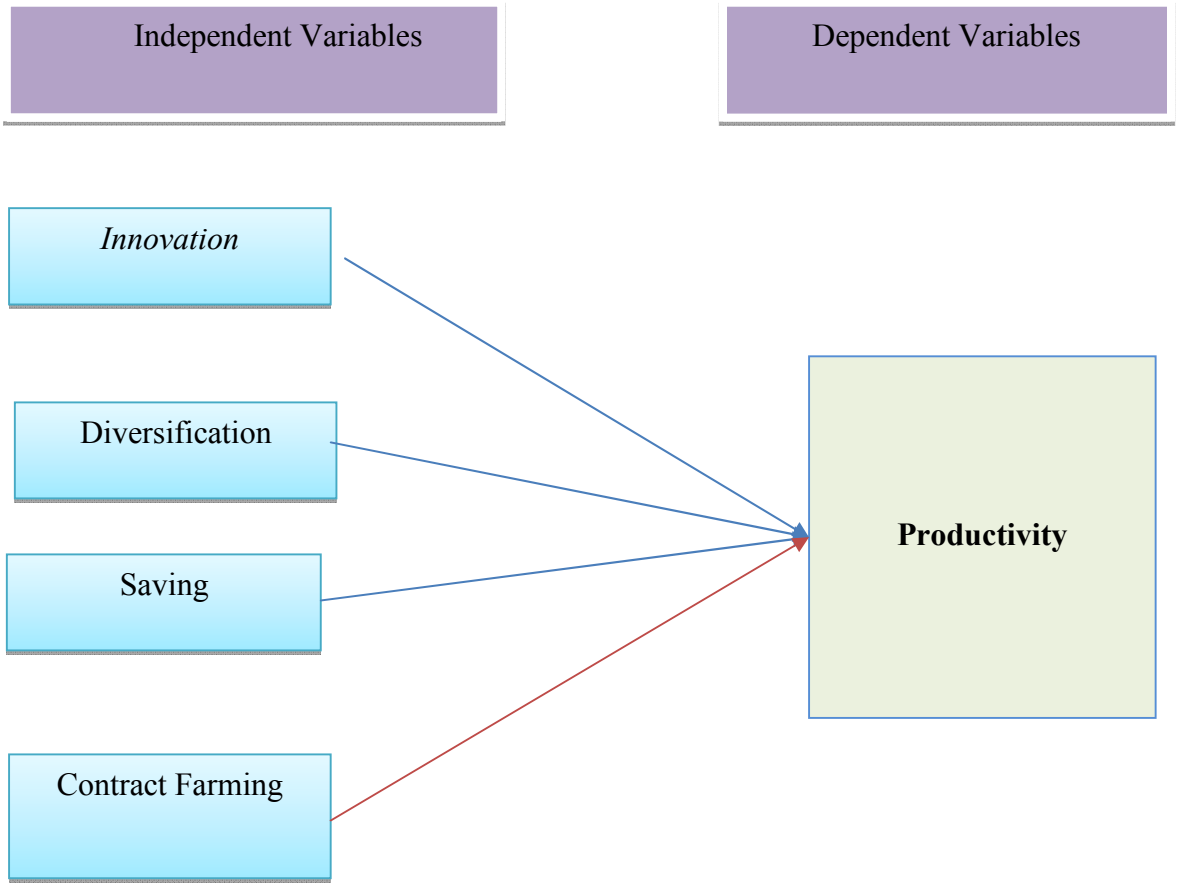


Figure 1 Conceptual Framework of the Study

Source : Aditya et al., (2022) and Mehedi et al., (2020)

This study investigated the effect of risk management practices on productivity. This conceptual framework was adapted from Aditya et al., (2022), who examined the effect of risk reduction strategies (diversification, risk reducing instruments, and GAPs) on productivity. Further, Mehedi et al., (2020) investigated the risk management strategies to cope catastrophic risks in agriculture in the case of contract farming, diversification and precautionary savings. The results approve the relevance of risk management adoption decisions and reveal that the use of one risk management tool may simultaneously influence productivity.

Farmers face various production and climatic risks in high-value crop production. As risk-averse agents, farmers use different risk-reducing measures, ranging from traditional risk management

practices to the adoption of market-based insurance programs. In productivity estimation under a risky environment in high value crop production, production risk needs to be accounted for in the production function. In the conventional risk and productivity analyses, where riskiness is modeled as the variance of the error term of the production function, risk is treated as ex-post. However, they argued that farmers do not know whether negative shocks occurred at the beginning of the crop or production season. Thus, they suggested that crop decisions are made when there is anticipation of uncertainty about outcomes (but not actual occurrence)—ex-ante risk. In that, risk is likely to change production innovation or technology (as a shifter) and then ex-post output is affected that way and a number of risk management strategies of high-value crop growers, broadly under diversification, use of risk-reducing instruments and pre-and post-crop practices. Some specific pre-and post-crop practices (good agricultural practices, contract farming, savings, and so on) as risk management strategies are unquestionably important in high value crops because growers strive to meet national mandates, standard practices, and regulations that fit into value chains of national and export-oriented production to ensure sales and prices. It consists of four independent variables (innovation, diversification, savings, and contract farming) and a dependent variable for productivity.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1Introduction

This part of the study presents the research method and approach along with its sampling and data analysis methods. It also presents its primary and secondary sources, data collection methods such as questionnaires and interviews, including ethical consideration and test instruments.

3.2 Research Methodology

There are three types of research approaches stated in research methods, such as quantitative, qualitative, and mixed, where one of them is not better than the others. It all depends on how the researcher wants to do research study. Assuming the three approaches, there is some consideration a researcher needs to give attention to which approach to use: the research problem, the personal experiences of the researcher, and the audience for whom the research report is written (Kothari, 2019).

Accordingly, to better comprehend the attitudes and perceptions of the government monitoring team towards the existing relationship risk management practices of agricultural productivity, the researcher purely uses both quantitative and qualitative research approaches in order to gather the intended data from the sample population. This study found and determinate response to the research questions about the current state of government monitoring teams' perceptions and attitudes in agricultural productivity towards the relationship risk management practices of malt barley production. More specifically, for collecting data from the representative samples, survey research design was used. This study was a survey research method, which is a systematic research method for collecting data from a representative sample of individuals using instruments composed of closed-ended and open-ended questions. The key goal of survey research is to collect data and describe the behaviors, thoughts, and attitudes of a representative sample of individuals at a given point in time and place. It was used to collect data for correlational research studies, experimental studies, and quasi-experimental studies. In quantitative research, sampling is the process of randomly selecting a subset of a population to

represent the entire population to which one wishes to generalize. Thus, the overriding consideration is how representative the target population is of the larger population in terms of certain characteristics.

3.3 Research Design

In general, explanatory and descriptive research designs were employed in this study. This is because, according to descriptive research designs, they aim to answer research questions about the current state of agriculture risk management affairs, identify factors that affect productivity and relationships among them, and create a detailed quantitative description of phenomena. Therefore, it provides a snapshot of the feelings, opinions, practices, thoughts, preferences, attitudes, or behaviors of a sample of people, as they exist at a given time and a given place. For example, measuring the attitudes of the selected respondents toward adapting to new technologies is an example of a research question that can be carried out using descriptive survey research design (Creswell, 2014).

A correlational research design was used to describe and assess the magnitude and degree of existing relationships between the study variables innovation, contract farming, diversification, savings, and productivity. Therefore, correlational research involves collecting data from a sample of individuals or objects to determine the degree of the relationships between two or more variables, with the possibility of making predictions based on these relationships. This study also used the most common statistical methods for prediction purposes, which are simple and multiple regression analyses. The significance of correlational research stems from the fact that many complex and sophisticated statistical analyses are based on correlational data. This study employed both descriptive and explanatory research design.

3.4 Sample Frame

The population of this study was comprised of all Federal government agriculture monitoring teams for the studied malt barley production in Ethiopia. Therefore, the researcher targeted and considered selected federal offices to obtain the list of the farmers' productivity based on 2018–2022 production data.

3.5Population and Sampling

3.5.1 Target Population

The target population for this study was 420 employees of nominated government staffs from selected federal government offices in Addis Ababa. This employees were closely and directly working with the malt barley projects in Ethiopia.

3.5.2 Sample Size Determination

The sample size is a term used in research study for defining the number of subjects included in a sample size. The sample size for a study needs to be estimated at the time the study is proposed; too large a sample is unnecessary and unethical, and too small a sample is unscientific and also unethical (Chittaranjan, 2020). Geoffrey and Gay (2019) also put the general rules are helpful in determining sample size: the larger the population size, the smaller the percentage of the population required getting a representative sample. For smaller populations, say, N = 100 or fewer, there is little point in sampling; survey the entire population. If the population size is around 500 (give or take 100), 50% should be sampled. However, the sample size was determined for the survey as per the sampling technique based on the following formula specifically a known formula called Yamane (1973): The formula is presented below:

$$n=N/(1+〖N(e)〗^2)$$

$$n= 420/(1+〖420\ (0.05)〗^2)$$

$$= 205$$

Where n = the sample size

N = size of population

e = the level of accuracy (e = 0.05)

Out of the total population, this study was 205 sample size and to get sample proportion the researcher uses the following formula:

$$nh = (Nh / N) * n$$

Where; nh is the sample size for stratum h i.e. respective branches; Nh the population size for stratum h i.e. respective branches; N is the total population size; n is the total sample size. The following table depicts the proportion of the sample size for each branch.

Table 1 Sample Size Determination

Organizations	Target population	Proportion 205/420	Sample size
Ministry of Agriculture	75	0.48809524	37
Ethiopian Agriculture Research Institute	84	0.48809524	41
Ministry of Industry and Industrial Institution	39	0.48809524	19
Agricultural Transformation Agency (ATA) and Central Statistics Authority	125	0.48809524	61
Ministry of Trade and Ministry of Finance	97	0.48809524	47
Total	**420**		**205**

Source: Survey result, 2022

3.5.3 Sampling Techniques

3.5.3.1 Sampling Technique for Survey

The sampling designs are basically of two types these are non-probability sampling and probability sampling (Kothari, 2019). Among the selected federal government offices found in Addis Ababa, only eight (8) federal organizations was selected for this study using randomly sampling methods from targeted population. The selection of the eight (8) federal organizations was checked based on proximity for data collection, and the willingness of seven (7) federal organizations executives to cooperate for data collection by communicating with their regional offices and their experts.

In addition the researcher stratified based on the federal government offices categories of each

government office to select the most trained and experienced expert for the purpose of determining fact and good information on the relationship risk practices of the surveyed malt barley production based on the questionnaire. These federal government offices and experts of were categorized as repetitive and higher field involvement and connection with farmers. But for the purpose of the study the researcher selected respondents. They had a good relationship and communications with farmers because these groups are high number of years in agriculture operation and higher linking with farmers. From the total sample population the number of respondents to be included from each selected federal government offices was decided based on proportion of experts found at each group federal government office is calculated from each government office of selected group. Finally to get the decided number of sample respondents the researcher used the selected respondents from each federal government offices to be asked to fill the questionnaire using random sampling method.

3.5.3.2 Sampling Technique for Interview

For the purpose of this study the researcher used non-probability sampling of purposeful sampling methods to select the sampling from the available population. As of non-probability sampling, this district was purposely chosen 15 individuals from Heinekn and Dashen Brweries, selected individuals who were closely working in malt barley projects from Federal institutions found in Addis Ababa. They were selected based on their agriculture productivity monitoring and controlling scheme, having various controlling tools and having large physical monitoring capacity.

3.6 Data Type and Source

The researcher used predominantly primary data. Primary data was collected via a semi-structured and structured questionnaire to get adequate and reliable information. The data type was also both quantitative and qualitative type. The other form of data collection was based on interview-based on that a structured interview to enable face-to-face discussion with the respondents. Data was collected through a field survey of federal government offices in selected Addis Ababa. In conducting this study, the researcher basically made use of primary data types for making analysis and interpretation of the study results.

3.7Data Collection Instrument

The data collection instrument which was used in this study was close-ended five Point Likert-scale questionnaires to determine the perception of federal government experts towards risk practices as well as malt barley productivity. The questionnaire consisted of two parts. The first part was the demographic profile which helped the researcher to identify the participants' gender, age, educational background, monthly income, occupation and length of farmers' relationship with the farmers. The second part consisted of various items which aided the researcher to investigate each determinant factor that reflects the perception level of respondents towards the relationship risk management practices and productivity. In the questionnaire items to be completed by the respondents to measure the construct dimensions are adopted from previous studies. It will be was adapted from Sandra (2016) studied on the impact of the CREATE project on the livelihood and food security of contracted smallholders in Ethiopia, Malt Barley and Tarekegn (2016) assessed the role of smallholder farmers. The questions was prepared using a five point Likert scale (Likert, 1932) such that scale 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree & 5 = Strongly Agree. Respondents were inquired to indicate their level of agreement/disagreement for each of the questions provided.

3.8 Data Collection Methods

Primary quantitative data were collected through self-administered five point Likert-scale (Likert, 1932) questionnaires filled by the existing experts of federal government offices located in Addis Ababa. Using a rule of thumb, if high rate of return is the main goal, then face-to-face or telephone surveys are the optimal choices, while mail surveys are the obvious choice when cost is an issue. Although a variety of methods for administering surveys are available, the most popular are face-to-face, telephone, and mail. In general, each of these methods has its own advantages and disadvantages. The table below helps to understand the data collection method in this study.

Table 2 Data Collection Method

Type (Strata)	Category	Methods
Employees	Questionnaire	Face-To-Face
		Email
	Interview	
Project Heineken and Dashen Brewery	Local	Face-To-Face
	International	Telephone
Farmers	Local	Telephone

As indicated by Geoffrey and Gay (2019) using a rule of thumb, if high rate of return is the main goal, then face-to-face or telephone surveys are the optimal choices, while mail surveys are the obvious choice when cost is an issue. The major thought for the researcher in deciding on the form of survey administration is response rate versus cost.

3.9Data Collection Procedure

Prior to data collection, the researcher sought the consent of the project department in from the university, St Mary University. The researcher further enquired for clearance from the respective government offices and projects to be allowed to collect the data. The research questionnaires were afterwards distributed to the various respondents by the researcher himself and two data collectors. The questionnaire was issued to respondents as they visited the working offices and service halls, they were required to fill and the questionnaire retrieved before they left the hall. This enhanced the response rate since there was no case of unreturned questionnaires.

3.10 Data Analysis Method

3.10.1 Data Entry

The data obtained from the survey was analyzed by using descriptive statistics; statistical package for social science (SPSS) version 25.0 Software. Statistical Package for Social Sciences (SPSS), data analysis software, was used to analyze the quantitative data.

3.10.2 Descriptive Analysis

Data analysis is a process used to make sense of the collected raw data. Descriptive statistics allow the researchers to present the data acquired in a structured, accurate and summarized manner. Briefly, the most frequently used descriptive statistics are the mean, which indicates the average performance of a group on a measure of some variable, and the standard deviation, which indicates the spread of a set of scores around the mean-that is, whether the scores are relatively close together and clustered around the mean or widely spread out around the mean (Geoffrey and Gay, 2019). Descriptive statistics such as arithmetic mean, frequency distribution, standard deviation and percentages were used to assess the demographic profile of the respondents to make the analysis more meaningful, clear and easily interpretable.

3.10.3 Inferential Analysis

Inferential statistics is related to data analysis techniques for determining how likely it is that results obtained from a sample or samples are the sa1ne results that would have been obtained for the entire population (Geoffrey and Gay, 2019). It helps researchers make calculated inferences based on information obtained from a limited number of research participants. Inferential analysis (regression and correlation) was employed to analyze quantitative data obtained from the distributed questionnaire of risk practices affecting productivity.

As correlation, a quantitative measure of the degree of correspondence between two or more variables- risk practices factors and productivity. It used correlation coefficient - a decimal number between - 1.00 and + 1.00 that indicates the degree to which two variables are related. From inferential statistical techniques, the relationship between independent and dependent variables in the context of malt barley projects were examined and it was measured using p-values .05 as cut-off. As this study has four independent variables that was measured or observed, the more likely it is to explain the outcomes of the dependent variables. Multivariate statistical analyses tell us how much of the variance found in the outcome variable is attributed to the independent variables.

3.10.4 Study Model

The empirical model to be used in the study to test the effect of risk management practices on productivity was presented as follows:

$$\mathbf{Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e_i}$$

Where:

Y = Productivity

$\boldsymbol{\alpha}$ = The constant

$\boldsymbol{\beta_1 - \beta_4}$ =Coefficients of independent variables

X_1 = Innovation

X_2 = Diversification

X_3 = Saving

X_4 = Contract Farming

e= error

3.10.5 Model Assumptions

The following analytical tests were carried out to ensure that the data suits the basic assumptions of classical linear regression model and this assumption was adapted from (Kothari, 2019).

- **Normality:** To check the normality, descriptive statistics was used. A normal distribution is not skewed and is defined to have a coefficient of kurtosis of. Normality is defined as the "shape of the data distribution or an individual metric variable and its correspondence to the normal distribution, which is the benchmark for statistical methods - the threshold is – 2 to 2 or below 3
- **Heteroscedasticity** – It means that error terms do not have a constant variance. If heteroscedasticity occur, the estimators of the ordinary leastsquare method are inefficient and hypothesis testing is no longer reliable or valid as it underestimated the variances and standard errors.
- **Multicollinearity**: any correlation coefficient above 0.7 could cause a serious multi collinearity problem leading to inefficient estimation and less reliable results – the acceptable range of Variance Inflation Factor (VIF) below 5 or 10

3.11 Data Reliability and Validity

3.11.1 Validity

Validity is the degree to which a measure accurately represents what it is supposed to. It is concerned with how well the concept is defined by the measure. Validity is important in all forms of research and in all types of tests and measures (Kothari, 2019). It is best thought of in terms of degree: highly valid, moderately valid, and generally invalid. Validation begins with an understanding of the interpretation(s) to be made from the selected tests or instruments. It then requires the collection of sources of evidence to support the desired interpretation (Geoffrey and Gay, 2019). Therefore, this study addressed using agriculture and industrial experts and validity through the review of literature and adapting instruments developed by well-known authors and also used in the previous researches.

3.11.2 Pretesting Study

A pretesting survey was conducted on 10 respondents from government offices and research centres prior to administrating the questionnaire to the selected sample size. The pretesting was conducted to check if the questionnaire is clear, easy to understand and straightforward to ensure that the respondents could answer the questions with no difficulty. Based on the feedback from the pretesting survey, necessary changes were made on the questionnaire before administering to the selected sample size.

3.11.3 Reliability

The researcher conducted reliability test to measure the consistency of the study measurement for each item of constructs using Cronbach's Alpha (α) value. Reliability estimates the consistency of the measurement or more simply, the degree to which an instrument measures the same way each time it is used under the same conditions with the same subjects. Reliability is essentially about consistency (Kothari, 2019). That is if we measure something many times and the result is the same, then we can say that our measurement instrument is reliable.

Table 3 Reliability Statistics Test Results

Variables	Cronbach's Alpha	N of Items
Productivity	.884	8
Innovation	.893	5
Diversification	.810	5
Saving	.806	5
Contract Farming	.821	5

Source: Survey result, 2022

Cronbach's alpha coefficient is the most popular and commonly applicable technique to estimate reliability or internal consistency of assessments and questionnaires in the behavioral sciences.

3.12 Ethical Considerations

There were certain ethical protocols that were followed by the researcher. The first was asked explicit consent from the respondents. This ensured that their participation to the study is not out of their own desire. The researcher warranted that the respondents are aware of the objectives of the research and their contribution to its completion. Research is the collection of information and material that is provided to the researcher on the basis of trust and confidentiality, and it is vital that the participant's feelings, interests and rights are protected at all times. The study maintained the organizations policy in relation to any intellectual property rights of the organization. Regarding privacy of the respondents, their responses were strictly confidential and were only used for academic purposes. It cannot be ethical to access some confidential documents of the organization. So, the organizations code of ethics taken in to account without significantly compromising the findings of the study. Concerning references, all the materials and sources are properly acknowledged. One other ethical measure which was exercised by the

researcher is treating the respondents with respect and courtesy. Following the above ethical considerations, the researcher motivated and initiate the respondents to be at ease and more likely to give honest responses to the items of the questionnaire.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Response Rate

This study collated primary data from sampled respondents in the study area or public institutions perspective towards malt productivity and risk issues in Addis Ababa.

Table 4 Response Rate

Organizations	Distributed Questionnaire	Returned	Response Rate
Ministry of Agriculture	37	32	86%
Ethiopian Agriculture Research Institute	41	36	88%
Ministry of Industry and Industrial Institution	19	16	84%
Agricultural Transformation Agency (ATA) and Central Statistics Authority	61	53	87%
Ministry of Trade and Ministry of Finance	47	41	87%
Total	**205**	**178**	**87%**

Source: Survey result, 2022

The data shows that 205 questionnaires were distributed to the sampled respondents. This study found that 178 questionnaires were returned filled properly with the rate of 87 %. Based on this response rate the next analysis is carried out.

4.2 Respondents Socio Economic Characteristics

This part presents the respondents' profile about their education, gender, age, education level, involvement in the study are and other related issues that related to this study. The details are presented in Table 5.

Table 5 Respondents Demographic Characteristics

Variables (Categories)		N	%
Gender	Female	45	25.3
	Male	133	74.7
Age (in years)	18-29	59	33.1
	30-40	49	27.5
	41-50	40	22.5
	above 51	30	16.9
Education	High school	-	-
	Diploma	16	9.0
	Degree	136	76.4
	Masters Above	26	14.6
Know in the agriculture monitoring, research, project participation and supervision	1 – 3 years	18	10.1
	4 – 7 years	94	52.8
	8-10 years	33	18.5
	11– 15years	33	18.5
	above 16 years	-	-
Length of working in Malt Production, monitoring research etc.	Below 1 year	31	17.4
	1-5 years	50	28.1
	6-10 years	69	38.8
	11-20 years	28	15.7
	Above 20 years	-	-

(Survey Result, 2022)

Before analysing the collected data, the research participants' background information at different level has been shown throughout the above table.

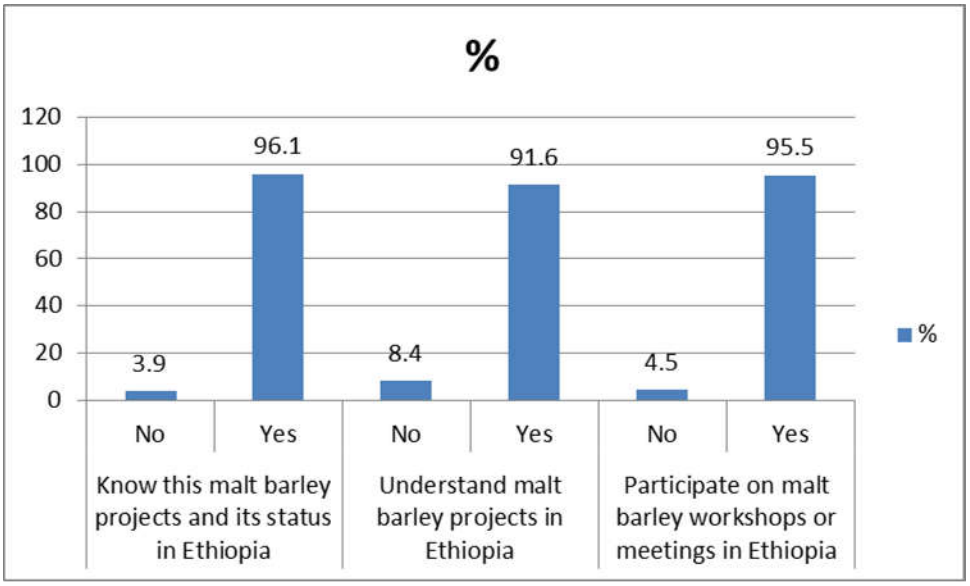
The study found that, among the 178 employees of the surveyed organizations 25.3 %, i.e., 45 individual employees were female and the majority of the study participants or 74.7 %, i.e., 133 individuals were male (Table 4). The results indicate that the two genders were not adequately represented in the study since there is male respondents was more than the two-thirds. This shows that there are more male employees in public institutions particularly in specific sectors like agriculture.

Table 5 also displays that the lower most age of the respondents that was 18 years and the highest being 65 years. Out of 178 employees of these selected organizations' respondents that was surveyed, only 50 individuals, i.e., 33.1 percent of the respondents were within the age of less than 29. Out of the total the sampled respondents, 27.5 percent (49 employees' respondents) for the age group of 30 to 40 years of age, and 22.5 % the respondents were between 41 to 50 ages at the same time as 16.9 % of the sampled respondents were involved in the study that fell more than that of aged 51.

Regarding education level of the participants, no respondent was included who had high school completed or below and 9 % of respondents had a colleague diploma. In this study, the majority of the research respondents (76.4%) had a first degree and 14.6 % of respondents had a master's degree. This suggests that the majority of the employees obtained enough education to response this research questions. This study also found that 10.1 % of the sampled employees were working less than three years and 52.8 % worked about four to seven years out of the surveyed organizations. In this study, 28.1 % of the sampled employees were working less than five years in Malt production, monitoring research etc. and 38.8 % worked about six to ten years working in the malt related issues. This implies that these employees have well experienced in agriculture sector, malt barley projects and agriculture production and similar trainings and research activities; it shows they have known this sector very well. Generally, their demographic profile of the respondents presented that all respondents in this research were well educated; they have had a good working experience to handle the study questionnaire and to inform the risk and malt productivity issues and its factors. It shows that there were proficient and talented to respond the questionnaire and to provide pertinent data for this study. This exhibits and well illustrates that

the respondents are able to answer the provided questions about risk and productivity to achieve this study objectives.

4.3 Understanding Ethiopian Malt Production by Respondents



(Survey Result, 2022)

Figure 3.12Respondents' understating about Ethiopian Malt production

This study also found that 96.1 % of the sampled employees knew this malt barley projects and its status in Ethiopia and 91.6 % understood malt barley projects in Ethiopia. In this study, 95.5 % of the sampled employees participated on malt barley workshops or meetings in Ethiopia. One of the respondents indicated that

> *Malt Barley production has gained a great focus from various institutions including government, private and public enterprise as well as international funding organizations. The majority of the projects aimed to substantially increase the commercial sourcing of malt barley from smallholder farmers in Ethiopia substituting the current reliance on imports. These projects have aimed to enhance widespread productivity intensifications amongst malt barley farmers and the realization of Ethiopia's potential as a regionally competitive malt barley producer.*

This shows that the sampled employees knew in advance about malt risk management practices due to their nature of work, education level and taken various training in the subject area. One of the experts from international funding project stated that

> *''On top of smoothing access to credit, international and national transitions have arranged several awareness establishment training basically for model farmers and important government stakeholders on the issue of access to loan for marketing agricultural inputs and outputs. Various projects have organized several training preparations that have cleared the loan policy of cooperative and micro-finance institutions. ''*

This help to understand the cropping season farmers must make decisions about what crops to plant, and what seeding rates and fertilizer levels to use. Parallel to enhancing the awareness of stakeholders, government and private institution projects are thoughtful to learn the experience of international organizations and local means, especially in Oromia and Amhara Region, on how they are working with smallholder farmers in accessing credit services from financial institutions using their agricultural assets as collateral. With this regards, so far International organization and Heineken have:

- Underwritten to malt barley value chain particular financing solution studied by IFC team in providing necessary inputs and mapping pertinent stakeholders to the topic.
- Carried board three micro-finances which were aggressively working with the project in providing loan for smallholder farmers
- Ongoing discussion at community for local level Lobby dialogue on the issue of access to finance using rural assets as collateral
- Through a lot of development concerning payments to farmers by deploying more FTE and directing digital payments with HelloCash technologies

The produce and prices obtained will not be known with inevitability for several months, or even several years in the case of perennial crops and livestock. To achieve the goal of malt barely market transformation, such projects have played significant role in recognizing the issues in the

malt barley value chain and could be resolved by malt barley value chain platform and concerned bodies at higher levels.

4.4 The Level of Risk Management Practices

The response analysis was conducted by descriptive statistics such as mean and standard deviation. In this study, descriptive statistics helps to enables us to present the data in a more meaningful way, which allows simpler interpretation of the data. Aditya et al., (2022) was taken as a benchmark mean scores rating. They studied on similar area and used mean scores as 4.51-5.00 excellent or very serious challenge, 3.51-4.50 very good or challenge, 2.51-3.50 average or moderate, 1.51-2.50 fair and 1.00-1.50 is poor.

4.4.1 Innovation

Respondents were asked to rate their opinion about risk management practices, the condition required to risk management practices to understand the sector. The finding from the analysis is presented in Table 6.

Table 6 Responses on Innovation

Variable (Items)	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean
	N	%	N	%	N	%	N	%	N	%	
Ethiopian farmers are innovative in developing malt barley products.	16	9%	9	5%	9	5%	86	48%	58	33%	3.907
Ethiopian farmers use local technology to develop their malt barley production.	14	8%	16	9%	12	7%	73	41%	63	35%	3.87
There is technological improvement by Ethiopian farmers in developing their malt barley production.	15	8%	18	10%	14	8%	74	42%	57	32%	3.787
Ethiopian farmers have innovative partners for malt barley development.	20	11%	15	8%	7	4%	75	42%	61	34%	3.796
Malt barley farmers are benefited by innovative training for malt barley development.	17	10%	13	7%	9	5%	76	43%	63	35%	3.873
Grand Mean 3.84 sd .931											

(Survey Result, 2022)

Results from Table 6 shows that all the mean score value was found. Specifically, the mean score 3.84 was rated as challenge or good category; the respondents were in agreement that this sector (malt productivity and its associated risks) somewhat properly searches for obtaining innovative practices. This is a sign of the respondents' agreement on the various statements on innovative risk practices of the surveyed malt sector. One of the experts showed that

> *''These projects have attempted to conduct reassessments of farmers and farmer organizations based on the reassessment findings, offer additional training and coaching where needed. In addition, the projects investigate innovative ICT-based channels to complement and reinforce face-to-face training and coaching. Further, these projects aimed to conduct production cost analyses of supply chains (malt barley, potatoes and canola) to better understand the business case.''*

In the same way, Novickytė (2019) stated that new challenges (climate, market and political conditions) and technology innovation will significantly change the process of risk evaluation. In this study, the standard deviation values were less than two which is a small standard deviation and therefore suggests that respondents had similar opinions.

The majority of the respondents strongly agreed (mean 3.907) that that Ethiopian farmers used innovative in developing malt barley products. This is directly linked with this sector (Malt) is supported by international companies to enhance the sector productivity. The other responses were scored around 3.7 to 3.8 mean scores that showed Ethiopian farmers use local technology to develop their malt barley production. There is technological improvement by Ethiopian farmers in developing their malt barley production. Ethiopian farmers have innovative partners for malt barley development. Malt barley farmers are benefited by innovative training for malt barley development. Supposedly, these farmers are attracting on new risk innovative practices in this sector on a timely basis, farmers involved in sufficient numbers, and with appropriate technology, and encouraging them to apply for the presented risk issues. This implies that the solutions scenario involved strong actions directed toward introducing innovative technology and improving agricultural practices. Yan (2022) stated that ''the cost of removing production capacity requires subsidies for fallowing, subsidies for credit guarantee costs, and subsidies for science and technology innovation''.

4.4.2 Diversification

Respondents were asked to rate their opinion about diversification risk practices, the condition required to understand the benefited by government programs for promoting crop diversification, diversifying their earning sources, use a diversification strategy and improve farmers' living standards. The finding from the analysis is presented in Table 7.

Table 7 Responses on Lack of Technology Diversification

Variable (Items)	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean
	N	%	N	%	N	%	N	%	N	%	
Benefited by government programs for promoting crop diversification	15	8%	25	14%	11	6%	73	41%	54	30%	3.71
Increased by diversifying their earning sources (non-agricultural occupation or small enterprise).	15	8%	28	16%	7	4%	68	38%	60	34%	3.73
Use a diversification strategy.	10	6%	21	12%	10	6%	65	37%	72	40%	3.90
Helps malt barley farmers improve their living standards.	32	18%	23	13%	8	5%	59	33%	56	32%	3.47
Malt barley farmers believe diversification is important because it is associated with a variety of risks.	29	16%	9	5%	10	6%	67	38%	63	35%	3.71
Grand Mean 3.704 sd .978											

(Survey Result, 2022)

Results in Table 7 shows that all the grand mean score value was 3.704 that were rated as agree or very good; the respondents were in agreement that Ethiopian farmers had a good risk management practices particularly on technology diversification organization. Due to the participation of government and international organizations, farmers have used modern risk management practices or technology diversification to ensure the optimal utilization of risk management in malt production process through capacity building particularly awareness campaign and trainings. This is a sign of the respondents' agreement on the various statements on technology diversification. By the same token, the standard deviation values were less than two which is a small standard deviation and therefore suggests that respondents had similar

opinions. This combines the risk management responsibilities yields to enhance malt productivity via several governmental and international organizations initiatives: using all of the risk resources to create strategic capability in malt production.

Table 7 designated that the lowest mean (3.47) showed that rural income diversification does not that much help malt barley farmers improve their living standards by increasing income and reducing vulnerability risks. However, the highest mean score (3.9) showed that malt barley farmers use a diversification strategy with the aim of financial risk reduction. One other hand, interview sessions stated that

> *''These projects hold raw materials diversification devices based on conducting diagnostic studies of alternative raw materials for use by breweries. Projects are commissioning trails alternative raw materials (Example – cassava, Maize grits, wheat, sugar and Rice. They also propose initiate the value chain for alternative raw materials and aimed to conduct diagnostic studies once every year by means of undertaking at least 2 trails of the alternative raw materials and pledging at least one value chain. ''*

This also implies that Malt barley farmers are benefited by government programs for promoting crop diversification through appropriate seed fertilizer and irrigation technologies. Malt barley farmers' incomes are increased by diversifying their earning sources (non-agricultural occupation or small enterprise). This helps to know that the malt barley sector create the ultimate farmers expertise and advance their working abilities. It calls for further trains the farmers to develop their professional skills and training is linked with the preparedness of the farmers. This implies that there is an effective malt barley knowledge management in this agriculture sector on Ethiopia that trend to be overturned and requires those with information to become skilled farmer who ensure that others in the firm know what they know. These projects use mainly trainings that emphasis on possible variation instruments to climate change and the prominence of crop diversifications and crop rotation on building production flexibility. An effective sector has been developed based on operative training and development program. This is to certify that every trainers or farmers has a change to increase their performance through training in every given evaluation period.

4.4.3 Contract Farming

Contract farming is about market price information available, regularly collected and of good quality, the costs and benefits and the terms of the contract understood and others. Thus, sampled rrespondents were asked to rate their opinion about this risk practices and the finding from the analysis is presented in Table 8.

Table 8 Responses on Poor Economic Contract Farming

Variable (Items)	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean
	N	%	N	%	N	%	N	%	N	%	
Contract farming to enhance their productivity.	12	7%	20	11%	5	3%	87	49%	54	30%	3.846
Use contracts to enhance their productivity.	9	5%	21	12%	6	3%	83	47%	59	33%	3.908
Helps malt farmers enhance their productivity	10	6%	23	13%	6	3%	77	43%	62	35%	3.888
Helps to be more productive.	11	6%	18	10%	8	5%	81	46%	60	34%	3.904
Helps malt farmers enhance their productivity.	13	7%	15	8%	9	5%	84	47%	57	32%	3.882
Grand Mean 3.88 sd 1.058											

(Survey Result, 2022)

Table 8 shows that all the mean score values were greater than 3.882 and less than 3.908. This is a sign of the respondents' agreement on the various statements on contract farming risk management practices. Likewise, the standard deviation values were less than two which is a small standard deviation and therefore suggests that respondents had similar opinions. Specially, the grand mean score 3.88 was rated as very good; the respondents were in agreement that this sector properly applied contract farming. In addition, an expert exhibited that

Contract farming and out cultivators arrangements are being widespread in Ethiopia. Such methods are presented as a route through which farmers can involve in agribusiness and commercial agriculture. By the way, in Ethiopia, we had a couple of endeavored models of commercialization in Economic Growth Corridors and large scale commercial farm initiatives with limited success stories.

Contract farming is used as a useful risk management strategy to reduce transaction costs and effectively manage productivity efficiency or profitability. Weather derivatives can be a helpful tool to manage non-catastrophic weather risk in agriculture, but the effectiveness of this type of derivatives differs between crops, geographical locations, and time periods (Novickytė, 2019). In Ethiopia, it is following strategies, plans and programs anticipating agricultural transformation by employing mechanisms such as agricultural commercialization groups, contract farming and out growers schemes on selected commodities as agribusiness incubation approaches in the potential areas of the country (Ministry of Agriculture, 2022). The highest mean score (3.908) shows that malt barley farmers use contracts between the buyer and the seller to enhance their productivity. One of the interview respondents stated that

Growers technical supporting is these projects' purposes to improvement the productivity and production of malt barley producers particularly poor farmers; particularly on crop rotation, land preparation, improve seed usage, fertilizers, method of planting, depth of seed, post-harvest handling, quality, marketing and etc.

In addition, this study found that malt barley farmers benefit from contract farming to enhance their productivity. This helps to reduce risk and uncertainty rather than buying and selling on the open market. Emily and Miller (2018) also considered that cooperative farming association can share different risks and mitigate the threats compared with relevant contracts and propose that contract would be a powerful alternative for sharing risk. This study found that perquisite for malt production Contract farming helps malt farmers enhances their productivity. Creating a better-quality relationship among malt barley farmers helps to be more productive. Under the supervision of actual actions and with the support of the buyer's input, the farmer's plant crops help malt farmers enhance their productivity.

4.4.4 Saving

Table 9 depicted statistics of saving as risk management practices carried out by the surveyed sector and the perceived outcome of these practices from the viewpoint of employees. The grand mean and each item mean value has been computed as indicated below.

Table 9 Responses on Saving

Variable (Items)	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean
	N	%	N	%	N	%	N	%	N	%	
As malt barley farmers save money (non-expenditure of part of income) as future income is uncertain, they become productive.	7	4%	33	19%	17	10%	68	38%	53	30%	3.715
Malt barley farmers' personal saving motivation helps them to be more productive.	14	8%	22	12%	14	8%	84	47%	44	25%	3.687
Malt barley farmers' personal indemnify or protection reasons help to be more productive.	13	7%	23	13%	12	7%	84	47%	46	26%	3.71
Malt barley farmers' personal avoidance of the adversative effect of future income variations helps them to be more productive.	11	6%	29	16%	16	9%	71	40%	51	29%	3.689
Malt barley farmers commonly use aftershock mechanisms to help them be more productive.	4	5%	15	18%	11	13%	34	41%	19	23%	3.594
Grand Mean 3.68 sd 1.058											

Survey result, 2022

Regarding the saving as risk management practices, results in the above table show that all the mean score values were greater than 3.59 and less than 3.71. This is a sign of the respondents' agreement on the various statements on saving as risk management practices. Similarly, the standard deviation values were less than two which is a small standard deviation and therefore suggests that respondents had similar opinions. Specially, the grand mean score 3.68 was rated as very good; the respondents were in agreement that the saving as risk management practices in malt production sector was high. One of the research field consultants stated that

Saving has been a good practice in Ethiopians particularly in rural areas. People assume this practice is important so that farmers can pay for future plans and emergencies. Of course, thinking about the future is very important when it comes of farmers the meaning is vast. Traditionally, Ethiopians say that they do not need to think about the upcoming time or events as God will take care of the future. But some have to do their best to get what you want before saying that God will take care of it. The majority of Ethiopians trust God will take care of the forthcoming similarly consider that they should not maximum the number of children they have. Ethiopian express as God will watch out of their children.

This means that farmers have had greatly take care of their resources economically and they have attempted avoid extravagant purchases. This does not mean that it is not important to look after household items so that they last a long time. The highest mean (3.71) shows that as malt barley farmers save money (non-expenditure of part of income) as future income is uncertain, they become productive. In addition, this study found that malt barley farmers' personal indemnify or protection reasons help to be more productive. When farmers have adequate confidence in each other there is scope for them to work together informally as a producer group in order to reduce some of the risks associated with credit mobilization, the purchase of inputs and marketing. Groups for credit and marketing determinants can produce economies of scale in input procurement, loan administration and marketing of produce; capital accumulation through savings and credit mobilization and timely delivery of services (Hadush, 2019). Moreover, this study found that malt barley farmers' personal avoidance of the adversative effect of future income variations helps them to be more productive. Malt barley farmers' personal saving motivation helps them to be more productive. This shows the positive aspects of saving as risk management practices included savings in transaction costs for mobilization of capital

4.5 Magnitude of t Productivity

As pervasive and permanent fixtures of agricultural landscapes, risks are costly and if unchecked breeds uncertainty, stifle agricultural investments and impose ex ante barriers to the use of technologies, which in turn affect agricultural productivity and economic growth. Yield volatility

and price volatility are by far the two most important risks faced by farmers which are projected to rise due to climate change. Additionally, agricultural risks potentially limits access to finance, increases the likelihood of farmers defaulting on loans and this restrains agriculture productivity (Hou, et al., 2020). Table 10 depicted statistics of productivity carried out by the surveyed sector from the perspective of sampled employees. The grand mean and each item mean value has been computed as indicated below.

Table 10 Responses on Prodctivity

Variable (Items)	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean
	N	%	N	%	N	%	N	%	N	%	
Malt barley farmers have obtained more products per hectare since 2018.	18	10%	8	5%	9	5%	55	31%	88	49%	4.05
Malt barley farmers have presented a "new" idea to improve barley outcomes, work processes, etc.	16	9%	8	5%	10	6%	64	36%	80	45%	4.03
Malt barley farmers have been rewarded for presenting a new idea.	18	10%	8	5%	9	5%	69	39%	74	42%	3.98
Malt barley farmers are able to achieve the targets that the government set.	14	8%	13	7%	3	2%	62	35%	86	48%	4.08
Malt barley farmers are able to achieve the targets that they set—personal goals.	11	6%	14	8%	8	5%	57	32%	88	49%	4.11
The government recognizes malt barley farmers who take on challenging production tasks.	28	16%	17	10%	2	1%	53	30%	78	44%	3.76
Malt barley farmers align production with the stewardship of resources like water, health, and the strength of rural communities.	32	18%	17	10%	3	2%	37	21%	89	50%	3.76
Malt barley farmers align production with the productive capacity of soils.	22	12%	13	7%	2	1%	54	30%	87	49%	3.96
Grand Mean 3.97 sd .866											

Survey result, 2022

Regarding the assessment of malt production productivity in Ethiopia, results in the Table 10 shows that all the mean score values were greater than 3.76 and less than 4.11. This is a sign of

the respondents' somewhat agreement on the various statements on malt barley productivity in agriculture sector in Ethiopia. Correspondingly, the standard deviation values were less than two which is a small standard deviation and therefore suggests that respondents had similar opinions. Specially, the grand mean score 3.97 was rated as very good; the respondents were in agreement that the malt barley productivity are associated with high attendance of labor, frequently higher farmer production and status changes.

The highest mean score (4.11) shows that malt barley farmers are able to achieve the targets that they set—personal goals. This can be confirmed by means of farmers productivity or shift-share analysis, which shows that Ethiopia's malt barley productivity growth is largely the result of the "within effect," i.e., efficiency improvement within individual farmer efforts. The other highest mean score (4.08) shows that malt barley farmers are able to achieve the targets that the government set. That outcome is comfortable, but the relative contribution of within effect released increasingly over time. The third highest mean scores show malt barley farmers have obtained more products per hectare since 2018. In addition, this shows that malt barley farmers have presented a "new" idea to improve barley outcomes, work processes, etc. This shows that malt barley productivity is well stimulated in Ethiopia. Besides, productivity can—and should—be additionally much enhanced by the "shift effect," in which labour is allowed to move freely from traditional sectors plagued by labour surplus to globally competitive modern sectors with increasing labour demand. The shift effect did increase productivity in Ethiopia, but the effect was not as extensive as that commonly observed in high-performing economies. Ethiopia's labour mobility is limited, partly because the modern industrial sector is still young and hence does not absorb so much labour, and partly because significant ethnic and cultural barriers exist between rural and urban areas and among regional states.

In addition, this study found that malt barley farmers have been rewarded for presenting a new idea. The government recognizes malt barley farmers who take on challenging production tasks. Malt barley farmers align production with the stewardship of resources like water, health, and the strength of rural communities. Malt barley farmers align production with the productive capacity of soils. Ethiopia's malt and other agriculture production productivity and wages are both lower than those of China, Kenya, Vietnam, Indonesia, Malaysia and Sri Lanka. Some international firms complain that Ethiopian wages are low but labour productivity is even lower. To attract

high Ethiopia quality production, low wage advantage alone is not sufficient; labour productivity must rise far above the current level. Furthermore, political demands often push up wages (including the minimum wage) without attaining equivalent labour productivity growth. Minimum wage settings must be based on economic data and scientific reasoning, not on whose voice is loudest.

4.6 Effect of Risk Management Practices on Productivity

4.6.1 Correlation Analysis

A Pearson's Product Moment Correlation test was conducted to establish the strength of the relationship between the variables. The findings are presented in the above table.

Table 11 Correlation Analysis (N=178)

Correlations						
		Innovation	**Diversification**	**Saving**	**Contract Farming**	**Productivity**
Innovation	Pearson Correlation	1	.469**	.264**	.481**	***.533****
	Sig. (2-tailed)		.000	.000	.000	***.000***
Diversification	Pearson Correlation		1	.270**	.520**	***.537****
	Sig. (2-tailed)			.000	.000	***.000***
Saving	Pearson Correlation			1	.387**	***.527****
	Sig. (2-tailed)				.000	***.000***
Contract Farming	Pearson Correlation				1	***.550****
	Sig. (2-tailed)					***.000***
Productivity	Pearson Correlation					***1***
	Sig. (2-tailed)					

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

Survey result, 2022

Contrasting the multiple regression analysis, simple correlation analysis attempts to quantify the direction of association between two variables and r is a dimensionless quantity; that is, r it has no units of measurement of factors of malt barley productivity (r is a pure number without any unit).

Using correlational analysis, this study found that there exists a moderate positive relationship between innovative risk management practices and malt barley productivity, r (***0.533***; .000); $P \leq 0.05$; thus, the relationship is statistically significant or Sig. (2-tailed) .000 with correlation is significant at the 0.01 level (2-tailed). In line with this study, Mehedi et al., (2020) stated that innovative risk management practices have positive relationship with Malt barley productivity.

This study engaged in correlational analysis and it found that there is a substantial association or relationship between technology diversification risk management practices and (**r=.537; .000**) and Malt barley productivity in malt sector (Sig. (2-tailed) .000 with correlation is significant at the 0.01 level (2-tailed). Like this study, Iqbal et al., (2016) found that it has positive relationship with malt barley productivity. This means that farmers have adapted optimum cultural practices, fertilizer requirement and crop pest management options were recommended for malt barley especially for potential barley producing areas (Aditya et al, 2022).

This study employed correlational analysis and it found that there also occurs a moderate positive relationship between saving risk management practices and malt barley productivity, r (**0.527; .000**); $P \leq 0.05$; thus, the relationship is significant statistically. In proportion to this study, Mehedi et al., (2020) found that saving risk management practices has positive relationship with malt barley productivity.

Finally, this study found that there exists a positive relationship between contract farming and malt barley productivity, r **(.550; .000**); $P \leq 0.05$; thus, the relationship is statistically significant or Sig. (2-tailed) .000 with correlation is significant at the 0.01 level (2-tailed) using correlational analysis. In line with this study, Iqbal et al., (2016)) perceived still effects of contract farming on malt barley productivity remain one of the greatest that farmers uses this risk management practices cross the globe (Aditya et al, 2022). Moreover, enhanced productivity can be achieved if contract farming via awareness and good skills of education and training, productivity can be

highly executed, expected farm quality, work location, the type of work to be done, and having greatest harvest.

4.6.2 Multiple Regression Analysis

4.6.2.1 Assumptions and Diagnostic Test

The assumption test was done based on theoretical and empirical multiple regression concepts and results of multiple regression analysis.

Table 12 Summary of Collinearity Statistics

Model		Collinearity Statistics	
		Tolerance	**VIF**
1	(Constant)		
	Innovation	.699	***1.431***
	Diversification	.665	***1.504***
	Saving	.839	***1.191***
	Contract Farming	.611	***1.636***

Source: Survey result, 2022

High efforts have been conducted to test normality, multicollinearity and test for average value of the error term are found in above table (Table 12). The test results show that the normality, Multicollinearity and test for average value of the error term were met the assumptions of regression analysis. Problem may arise when two or more predictor variables are correlated (John, Hafiz, Robert and David, 2007). Variance inflation factor (VIF) detects multi collinearity by measuring the degree to which the variance has been inflated. A VIF greater than 5 is thought to signal harmful multi collinearity as suggested. The VIF was checked in all the analysis which is not a cause of concern that indicated that a VIF greater than 5 is a cause of concern.

Normality Test

It is recalled that an assumption of linear regression is that the error terms are normally distributed. That is $\varepsilon \sim$ Normal(0, $\sigma 2$). To assess this assumption, we will use the residuals to look at: histograms, normal quantile-quantile (qq) plots, and Wilk-Shapiro test. This study used

histogram (See Figure 5) that shows the response variable Y is bimodal that due to the strong influence of the dichotomous predictor variable X.

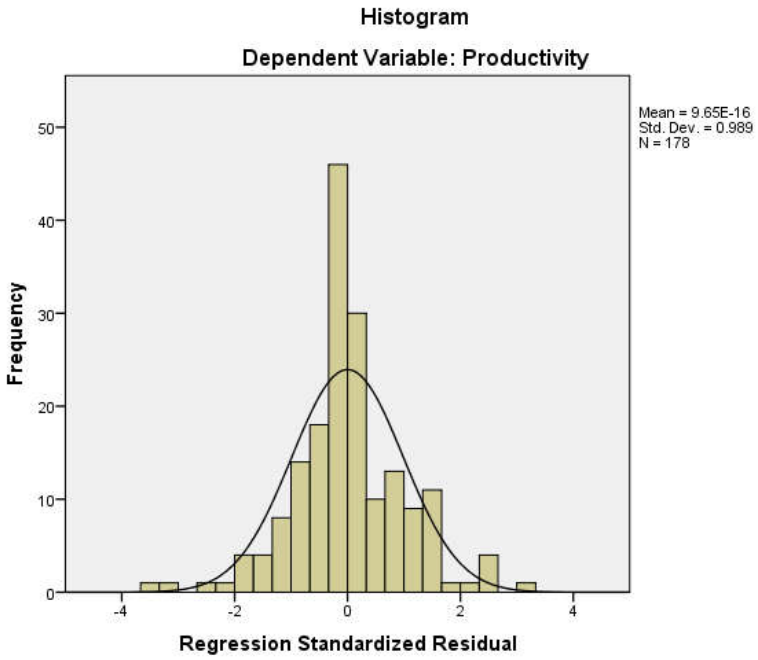


Figure 2 Histogram

Source: Survey result, 2022

From the finding on the histogram test on normality, the study found that significance in both test were less than 0.05 which is leads to the rejection of the null hypothesis that that data on the all variables were not normally distributed this is an indication that data on the variables were normally distributed. Normality test helps to determine how likely it is for a random variable underlying the data set to be normally distributed (John et al., 2007). The result of Skewness showed the asymmetry of the probability distribution of a random variable about its mean. It represents the amount and the direction of skew. On the other hand, Kurtosis result test confirmed the height and sharpness of the central peak relative to that of a standard bell curve. The figure above shows a bell-shaped distribution of the residuals. X-axis shows the residuals, whereas Y-axis represents the density of the data set. Consequently this histogram plot confirms the normality test results from the two tests in this study.

Test the errors for a zero mean and for normality. To do this, one can look at a normal probability plot (normal P-P plot in SPSS) of the residuals (see Figure 15). (The residuals are the observed values minus the fitted values.)

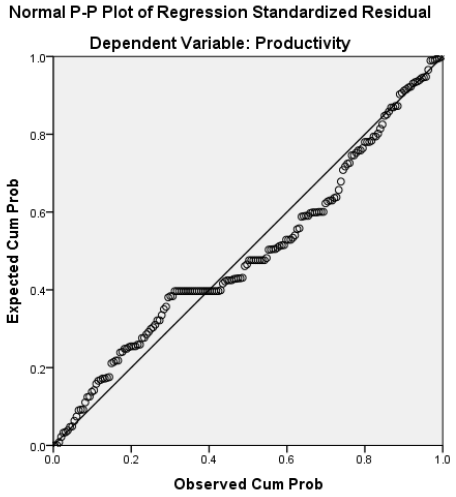


Figure 3 Normal P-P Plot

Source: Survey result, 2022

The mean value of response variable (Y) is a straight line function of the independent variables, X' A violation of this assumption may indicate that there is a non-linear relationship between the response and explanatory variables (John et al., 2007). In consequence, the linear regression model may not be applicable or fitted to the data under consideration. Therefore, the graph above displays that the regression can run.

4.6.2.2 Multiple Regression Test Results

Table 13 Regression Test Results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	***.729[a]***	***.532***	***.521***	***.599***

a. Predictors: (Constant), Contract Farming , Saving , Innovation , Diversification

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	70.547	4	17.637	49.146	.000[b]
	Residual	62.084	173	.359		
	Total	132.631	177			

a. Dependent Variable: Productivity

b. Predictors: (Constant), Contract Farming , Saving , Innovation , Diversification

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	*.641*	.243		2.640	.009
	Innovation	***.230***	.058	.247	3.975	***.000***
	Diversification	***.209***	.056	.238	3.736	***.000***
	Saving	***.269***	.046	.328	5.777	***.000***
	Contract Farming	***.172***	.063	.181	2.714	***.007***

a. Dependent Variable: Productivity

Source: Survey result, 2022

Model Summary

The above table depicts the result of multiple regression test and its measurement is made by inferring the value of R^2 to explain the magnitude of the effect of the independent variable on the dependent variable- malt productivity in Ethiopia. Here below demonstrated are the linear regression of four independent variables and malt productivity in Ethiopia. As showing in the above table, the overall bundle of determinant factors of the six independent variables were 53.2 % (R^2 = .532) explained the malt productivity in Ethiopia. This suggests that 53.2 % of malt barley productivity in depends on the given four independent variables while the remaining 46.8 % is determined by other unaccounted factors in this study.

ANOVA

This table displays the result F= 49.146, it can be established that the combination of determinant factor have positive effect on malt barley productivity which is statistically significant. As a consequence, this study rejects the null hypothesis. For t-tests and ANOVA, it is discoursed that there is an assumption that the dependent variable is normally distributed in the population. More accurately, ordinary least squares regression (and therefore the statistical tests it subsumes), assume that the residuals, or the conditional values of the dependent variable, are normally distributed. In other words, after this study applied predictors to account for the variance in Y in the regression model, the assumption states that the residual values are normally distributed in the population.

Coefficients

From the above multiple regression table, this study found similar results as there is a positive and significant effect of innovative risk management practices (B=.230, .0001) and malt barley productivity. In line with this study, Mehedi et al., (2020) perceived it has positive effect on Malt barley productivity and this study found that a direct relationship between innovative risk management practices on malt barley productivity. On the basis of this statistic, the study concludes that there is positive relationship between innovative risk management practices and malt barley productivity in Ethiopia.

The table above shows that the coefficient of technology diversification is 0.209. The beta coefficient for training is 0.209. This infers that a unit increase in technology diversification will result in 20.9 % upsurge in technology diversification of malt barley production in Ethiopia. It implies a direct relationship between technology diversification and sig value 0.0001. On the basis of this statistic, the study concludes that there is significant positive relationship between technology diversification and malt barley production in Ethiopia. According to Novickytė (2019), the most essential malt barley production factor is technology diversification. Technology is essential to develop the farmers' capabilities in malt barley production.

Table above illustrates that coefficient of saving as risk management practices is 0.269. The beta coefficient for saving as risk management practices is 0.269. This infers that a unit increase in

saving will result in 26.9 % increase in malt barley productivity and it has a direct relationship between it and malt barley productivity (.0001). On the basis of this statistics, the study therefore concludes that there is significant positive relationship between saving as risk management practices and Malt barley productivity. Raza et al., (2015) and Mehedi et al., (2020) also found that it has a positive relationship with productivity. Novickytė (2019) also stated that the explanations forwarded are it is saving mechanisms (sell when cash is required), speculating/waiting for better price, wait the planting season to sell as seed with higher price and keep for food security/consumption until make sure that the next season looks ok. Hence, the companies insistent for stringent delivery time hardly work in the study area. Contract enforcement is hardly available especially with individual farmers.

The table above shows that the coefficient of contract farming is 0.172. The beta coefficient for training is 0.172. The standard B value also found as .328 which is the highest among another vales. This infers that a unit increase in contract farming will result in 17.2 % upsurge in malt barley productivity in Ethiopia. This shows that malt productivity can be achieved via contract farming in Ethiopia. It implies a direct relationship between contract farming and malt barley productivity and sig value 0.07. On the basis of this statistic, the study concludes that there is significant positive relationship between contract farming and malt barley productivity in Ethiopia. According to Hadush (2019) and Mehedi et al., (2020) the most essential for enhancing malt barley productivity in Ethiopia is contract farming.

4.7 Qualitative Analysis

The first interview guideline focused on risk management practices of malt barley farmers and associated projects in Ethiopia in terms of innovation, diversification, contract farming and saving. The majority of the interview responses state that the presence of multinational companies and their associated projects aroused out of the development in best malt barley risk management practices, many projects have changed or embarked on a process of changing their core production system in order to gain the benefits of implementing enveloped solutions built on modern project based agriculture enhancement system. The owners of the projects have changed their core strategic agriculture think, training, farmers communications; however the process of implementing projects are faced with various risks. Due to the nature of the

agriculture business mainly associated with many farmers' their own and family life which is very sensitive, complex and vulnerable to deception, risk is an important variable which should be handled with a lot of care and due diligence. Therefore, agriculture or farmers based projects are need for risk management to identify the risks, analyze the risks and propose ways of mitigating and managing the risks to ensure the system changeover project is successful from the risk aspect. One of the farmers indicated that

> *There is a need for a great support intending to undergo a core farming production change and to effectively manage our potential, we fear and hesitate project activities eventually. We fear mandatory food safety and quality standards to meet breweries requirements in markets that has added to the high unit transaction, compliance and marketing costs confronting individual farmers who trade small quantities*

Of course, under these conditions, firms and farmers have an incentive to involve in interactive contracts to bulk up volumes traded and to reduce the uncertainty that increases transaction costs and diminishes investment in value-adding assets (Mehedi et al., 2020). On other expert indicated that

> *I have seen several risks that prevent ensuring the success of the project. The success of the project should be measured by schedule, cost and quality attainment.*

Addisu (2018) state that transaction costs are influenced by the characteristics of the transaction, product and environment within which transactions occur. These are asset specificity, frequency and uncertainty as the three most important characteristics of transactions that alter the cost of engaging in an exchange. Farmer's experiences very high transaction costs when engaged in informal markets in developing countries where quantity, quality and regularity in delivery are unpredictable due to high levels of environmental and behavioral risk. The next main issues discussed in the interview sessions of this study involved around the risk management practices in malt barley in Ethiopia. The majority of them indicated that contract farming arrangement and out grower farming is widely working in Ethiopia as representations of commercialization

alternative to large scale farms that displace stallholder farmers from their areas farms. One expert indicated that

> *Even if malt barley contract farming is a new phenomenon to Ethiopia, there are several achievements are amusingly recorded in scaling out and up the innovations towards new potential areas and other commodities. Of course, such kind of issues may be rest on on a number of factors including physical, socioeconomic and policy factors.*

Scaling-out and scaling-up of contract farming are important for both the firm and farmers. For breweries, scaling-out as well as scaling-up is significant to procure all prerequisite volumes of malt barley from local sources to use its handling capacity, infrastructure and manpower. Scaling-out and scaling-up however have their own advantages and disadvantages. Scaling-out spreads supply risk, while scaling-up may increase it. Some of the risks that were significant determinants of participation in Ethiopia included lack of commercialized agricultural experience, absence of participation in cooperatives, land endowments and associated problems, working capital, number of days that farmers do not work for cultural reasons, level of entrepreneurial and backward business skills, and bad attitude towards work. In regard to the productivity trends of malt barley production in Ethiopia, one expert indicated that

> *There are strong forecasts of malt barley subsector development in Ethiopia. For example, clusters of malt barley production under laid out in Oromia and Amhara Regions. These clusters imagine making annual revenues to increase extensively through local sales of malt barley grain.*

This shows that Ethiopia achieves import substitution of malt barley products that mainly processing happening within the cluster and through contractual agreements with processors. This helps to increase increments in productivity and value added by large farms compared to earlier land uses, a important argument in this discussion rotates around local spillover effects. However, Addisu (2018) stated that there is little or no information on effects of participation in malt barley contract farming scheme or the commercialization of malt barley in Ethiopia. Tarekegn (2016) maintained these critics as particularly if land is made available below its true value, investment promotion policies may attract risk-takers who fail to benefit locals and

generate negative spillovers, e.g. by controlling factor markets or intruding on land or water resources to which they have no right. Devotees trust that, through discovery of agro ecological suitability and demonstration effects, newly established large farms can deliver locals with access to innovative technology, credit, input, or labor markets and thus make positive spillovers, similar to other forms of foreign direct investment (FDI). Actually, the argument that public subsides, up to the net present value of the stream of spillover benefits generated, may be justified provides the raison discourage for agricultural investment promotion agencies all over the globe.

Participates of risk management practices positively affects malt barley productivity. Mehedi et al., (2020) assured that there is a quickly growing body of literature that forms positive effects of contract farming schemes, for instance income growth, increased farm productivity, creation of employment opportunities, female empowerment and poverty reduction. However, Addisu (2018) stated neither contract farming schemes nor commercialization of smallholder agriculture can be frictionless processes; which suggests cannot be panacea for all sorts of agricultural production systems. Similarly, along the operation of malt barley contract farming arrangement or malt barley commercialization, the following challenges have been acknowledged.

- Lack of capable of consistently producing products that meet the breweries or other customer's expectations.
- Malt Barley are the result of good harvesting, weather conditions and planning activities or processes that transform inputs into outputs and the quality of products are directly related to the quality of the process that produces them. Therefore, this study found that there is lack of product quality improvement necessitates process quality improvement.
- Systematic and structured engagement of brokers, marketers, government officials, breweries and local traders
- Undistinguishable relation between government, commercial investors, breweries, unions and their respective member cooperatives
- Vague association between primary unions, cooperatives and their respective member farmers

Project related problems were identified as

- Projects are not official disclosed and public discussions and participation are weak and feeble
- Projects are not compromised sound business practice, it becomes important, as shown in several projects in Ethiopia, there is lack of project research and development in the area
- Projects are rapidly fabricated and react quickly and to insure rapid decision-making, lines of communication are long between all levels of the project owners
- The majority of exports do not have a project knowledge that is the most available at the source of the problem, and projects is confined them by decision-making authority and responsibility.
- Lack of meaningful data particularly agriculture production data in terms of cultivate land and annual production as well as there is unavailability of reliable production (pre and post-harvest) data has greatly influence the project estimation and implementation (some of the data are mixed up, for example the central Statistics authority data has been mixed up malt barley and barley for food yearly production data
- Malt Barley production data has been entirely inconsistent – vary from institution to institutions or differ from researches to researches

4.8 Discussion

4.8.1 Innovation

This study applied a Pearson correlation analysis, results demonstrated that the relationship between innovation and tested the influence barley productivity in Ethiopia by applying multiple regression analysis. Using correlational analysis, this study found that there exists a moderate positive relationship between innovative risk management practices and malt barley productivity, r (***0.533***; .000); $P \leq 0.05$; thus, the relationship is statistically significant or Sig. (2-tailed) .000 with correlation is significant at the 0.01 level (2-tailed). Further, the findings of the regression analysis displays that there is a positive and significant effect of innovative risk management practices (B=.230, .0001) and malt barley productivity. In line with this study, Mehedi et al.,

(2020) stated that innovative risk management practices have positive relationship with Malt barley productivity. Once again, the innovation based risk practices were held to be significant.

4.8.2 Diversification

This study employed person correlation analysis, this study established the relationship between technologies based diversification and malt barley productivity and tested its influence on malt barley productivity in Ethiopia by applying multiple regression analysis. As result, the result of the regression analysis shows that there is a substantial association or relationship between technology diversification risk management practices and (**r=.537; .000**) and Malt barley productivity in malt sector (Sig. (2-tailed) .000 with correlation is significant at the 0.01 level (2-tailed). Additionally, this study found that 20.9 % upsurge in technology diversification of malt barley production in Ethiopia. It implies a direct significant effect of technology diversification has on malt barley production [Sig value 0.0001].

In line with this study, Iqbal et al., (2016) found that it has significant positive association with productivity. Further, Novickytė (2019) stated that technology diversification enhance malt barley production. Onoh et al., (2020) stated that the technology diversification as risk management in this sector therefore puts them in a strong position to embolden productivity. Their fear of farmer's production security is also very high as their problems solved during the project finalizing stages, which significantly increases malt barley productivity.

4.8.3 Saving

Using correlation analysis, this study established the relationship between saving as rick management **and** Malt barley productivity and verified the influence of saving as rick management on malt barley productivity in Ethiopia by applying multiple regression analysis. Then, the result of the regression analysis displays that there also occurs a moderate positive relationship between saving risk management practices and malt barley productivity, r (**0.527; .000**); $P \leq 0.05$; thus, the relationship is significant statistically. The multiple regression output also demonstrates that coefficient of saving as risk management practices is 0.269. This infers that a unit increase in saving will result in 26.9 % increase in malt barley productivity and it has a direct relationship between it and malt barley productivity (.0001). In line with this study, Mehedi et al., (2020) found that saving has positive relationship with productivity. On the basis

of inferential statistics, the study therefore concludes that there is significant positive relationship between it and malt barley productivity.

4.8.4 Contract Farming

This study established the relationship between contract farming and productivity using correlation analysis and confirmed its influence on malt barley productivity in Ethiopia by relating multiple regression analysis. As a consequence, the result of the analysis displays that there exists a positive relationship between contract farming and malt barley productivity, r **(.550; .000**); $P \leq 0.05$; thus, the relationship is statistically significant or Sig. (2-tailed) .000 with correlation is significant at the 0.01 level (2-tailed) using correlational analyses. Moreover, enhanced productivity can be achieved if contract farming as the multivariate regression analysis table shows that the coefficient of contract farming is 0.172. The beta coefficient for training is 0.172. This supposes that a unit increase in contract farming will result in 17.2 % upsurge in malt barley productivity in Ethiopia. It implies a direct relationship between contract farming and malt barley productivity and sig value 0.07. On the basis of this statistic, the study concludes that there is significant positive relationship between contract farming and malt barley productivity in Ethiopia. According to Mehedi et al., (2020) the most essential for enhancing malt barley productivity in Ethiopia is contract farming. In line with this study, Iqbal et al., (2016)) perceived still effects of contract farming on malt barley productivity remain one of the greatest that farmers uses this risk management practices cross the globe (Riya and Adavi, 2013).

Table 14 Summary of Hypothesis Testing

Variable (Hypothesis)		***r***	***B***	***Sig.***
Innovation	H_1: Innovation has a positive significant effect on agriculture productivity in industrial transformation in Ethiopia	.533**	***.230***	***.0001***
Diversification	H_2: Diversification has a positive and significant effect on agriculture productivity in industrial transformation in Ethiopia	.537**	***.209***	***.0001***

Saving	H_3: Precautionary Saving has a positive and significant effect on agriculture productivity in industrial transformation in Ethiopia	.527**	***.269***	***.0001***
Contract Farming	H_4: Contract Farming has a positive and significant on agriculture productivity in industrial transformation in Ethiopia	.550**	***.172***	***.007***

CHAPTER FIVE

CONCLUSIONs AND RECOMMENDATIONS

5.1 Introduction

This chapter gives a summary of the findings, conclusions and policy recommendations pinched after analysing data in chapter four. Conclusions have been drawn from the research and recommendations derived in respect to examining the risk management practices factors affecting malt barley productivity in Ethiopia. This part of the study presents closing chapter of the study which includes summary of findings, conclusion and appropriate recommendations regarding the study findings.

5.2 Summary of Major Findings

Using descriptive and explanatory research design, this study found that

- Contract Farming highly enhance malt barley productivity in Ethiopia
- There exists a moderate positive relationship between innovative risk management practices and malt barley productivity, r (***0.533***; .000); P ≤ 0.05 and a positive and significant effect of innovative risk management practices (Sig. =.0001) and malt barley productivity.
- There is a substantial association or relationship between technology diversification risk management practices and (**r=.537; .000**) and Malt barley productivity and a direct significant effect of technology diversification on malt barley production [Sig value 0.0001].
- There also occurs a moderate positive relationship between saving risk management practices and malt barley productivity, r (**0.527; .000**); P ≤ 0.05; thus, the relationship is significant statistically and it has a direct relationship between it and malt barley productivity (Sig. = .0001).
- The result of the analysis displays that there exists a positive relationship between contract farming and malt barley productivity, r **(.550; .000**); P ≤ 0.05; thus, the

relationship is statistically significant or Sig. (2-tailed) .000 and it has a significant effect on mal barley productivity (Sig. = .007).

5.3 Conclusions

In malt barley production, government and international organizations supported farmers to practice different risk management strategies. It was found that the largest farmers in the malt barley producing areas of Ethiopia accept several risk management strategies instantaneously. Alternatively, this study noticed the relationship between the risk management practices and their choice of f risk management strategies and the probability of adopting multiple risk management strategies at the same time. Therefore, the results of the study confirm the correlation between risk management practices and malt barley production in Ethiopia.

In risk management, using more abundant information and probability analysis method can better understand risk management. Thus, this study comes to concluded that innovative risk management practices highly enhance malt barley productivity in Ethiopia.

It is necessary proper management of farm productivity variability on malt barley production sites will minimize productivity losses and should be emphasized by farmers. Therefore, this study derives to conclude that malt barley productivity will be developed through technology diversification.

The possible results of choosing depending on food safety and poverty are beyond the objectives of this study. As a result, this study emanates to conclude that saving risk management practices helps to develop malt barley productivity in Ethiopia.

The low productivity in farmers has been one of the causes of cost and time overruns in agriculture productivity. Productivity is particularly important, especially in developing countries, where most of the agriculture production continues to be done automatically. Thus, this study comes to concluded that contract farming is exclusively and highly needed to improve malt barley productivity in Ethiopia.

5.4 Recommendations

- The Ethiopia government and other concerned international and local companies should take the necessary steps to improve people's awareness about contract farming as a key risk-reduction strategy through advanced extension services and pilot different training courses and use the simultaneous risk management strategy to stabilize farmers' income.
- The study recommends that it needs productivity improvement strategy that will enhance the malt sector in the study area and the national economy.
- The study commends that it needs to enhance capacity building by exploiting both qualified malt barley experts as well as project experts to train professional based on training needs assessment and public product production improvement projects should give due consideration to training and development undertakings, create constructive environment for planning and implementation of overall programs, and consider technology, saving and innovative as a legitimate and valued project activity
- Organizations should increase farmers' wellbeing and their production conditions so as to rip benefits of a well-trained farmers and agriculture extension workers as the research findings also exhibited that performance appraisal relates positively with malt barley productivity.
- Risk management strategy practices should be interconnected with Ethiopian economic and development overall strategy (strategic economic transformation plan) as the countries policies and foreign investment opportunities will have direct effects on a farmers' productivity. This study suggests that economic and development must "fit" strategically with the mission of malt barley production projects.
- The study recommends that improved risk management practice is a potent productivity improvement strategy that will enhance the malt sector in the study area and the national economy.
- Mal Barley production stakeholders also need to be taken into account to enhance productivity. Some of these elements may include
    - ✓ Recruits the right farmers, project staffs or agriculture extension workers to do the work or provide training to enhance the skills and competencies of the workers.

- ✓ Take innovative, motivational or supervisory measures to improve farmers and agriculture as well as project employee morale. For example, linking pay to performance; ensuring that compensation, benefits, security, and working conditions are all at least adequate; and expanding employment to include challenges, variety, comprehensiveness, and self-regulation.
- ✓ Utilize project scheduling techniques such as Computer-Aided Production and Logistics Project Management to optimize the time of related malt barley activities and ensure that the work, tools, and materials allow continuous task execution to minimize workforce inactivity.

5.5 Implications

The malt barley risk management practices mainly involved various arrangement practical as driver of smallholder commercialization vehicle of firm farmer integration and agricultural transformation in the country. This means that stakeholders should mainly focus on various arrangements that is due to the fact that risk management system is an emerging institutional innovation in linking farmers. This risk management practice helps farmers and manufactures to reliable market, open access to inputs, technology and advisory services that lead to enhanced productivity, production and savings. Specially, malt barley risk management scheme is an innovative platform enhancing public private partnership, building farmers' confidences and attracting investors that the malting industry managed to secure highest share of the requirement from local sources. Supported farmers take a maximum higher price for malt barley than non-supported food barley producer complements due to high yielding varieties productivity improvement from same small plot of land, similarly malt factories are incorporated and furthering from processing local raw material.

5.6 Recommendations for Future Research

This study suggests that upcoming scholars should find a large population of individual farmers, governmental and international organizations projects, private as well as public firms to determine whether the results can be generalized. The study proposes that a similar study to be done in all agriculture production projects in Ethiopia for the purposes of benchmarking and

further research attainment. This would allow for generalization of study findings. Future research can reveal the important role of these choices with the wide-ranging welfare of farmers.

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Appendix

Appendix I : Questionnaire in English

ST MARY UNIVERSITY

SCHOOL OF GRADUATE STUDIES

Dear Respondents:

My Name is Mekias belhu, I and a postgraduate student of St Mary University in Addis Ababa. I would like to express my intense indebtedness for your plentiful time, truthful and quick response. This thesis entitled "*The Effect of Risk Management Practices on Productivity: Perspective from Government on Various Malt Barley''*. This questionnaire is intended to gather primary data on this research study and its purpose of the study is to fulfill a thesis requirement for the partial fulfillments of Master of Arts in project Management at St Mary University in Addis Ababa.

Your genuine responses for the questions are very important for the success of completing this study. All information collected through the questionnaire will be used only for the purpose of the study and will be kept confidential. And thus, I would like to thank you in advance for your kindly cooperation. Please, note that participation in this research is entirely voluntary.

For further information, please contact Mikias @ +251910 60 31 67

Best Regards,

Mekias

Part-I: Questions Related to Demographic Factors (General information)

Direction: This part of the questionnaire asks your personal information. Please, respond to each question by putting a tick (✓) mark that represents your personal profile.

1. Gender: Female □ Male □

2. Age: 18-29 □ 30-40 □ 40-50 □ above 51 □

3. Educational level High school □ Diploma □ Degree □ Masters Above□

4. How long did you know in the agriculture monitoring, research, project participation and supervision?

   1 – 3 years [ ] 4 – 7 years [ ] 8-10 years [ ]

   11 – 15years [ ] above 16 years [ ]

5. Length of working in Malt Production, monitoring research etc

   ☐ Below 1 year ☐ 1-5 years 6-10 years ☐ 11-20 years ☐ Above 20 years ☐

6. Do you know this malt barley projects and its status in Ethiopia?

   a) Yes ( )

   b) No ( )

7. Do you understand malt barley projects in Ethiopia?

   a) Yes ( )

   b) No ( )

8. Do you participate on malt barley workshops or meetings in Ethiopia?

   a) Yes ( )

   b) No ( )

Part-II: Main Questions Related to the Study

Direction: This part of the questionnaire intends to find your perception towards risk practices and malt barley productivity. please circle the number which reflects your perception. Please put tick mark (✓) & rate the following questions from **"Strongly Disagree"** to **"Strongly Agree"** . In responding the under listed questions please consider 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree. Put a tick mark (√) in their respective box.

Constructs		Corresponding Items	Measuring Scale				
			1	2	3	4	5
Innovation	INNOV1	Ethiopian farmers are innovative in developing malt barley products.					
	INNOV2	Ethiopian farmers use local technology to develop their malt barley production.					
	INNOV3	There is technological improvement by Ethiopian farmers in developing their malt barley production.					
	INNOV4	Ethiopian farmers have innovative partners for malt barley development.					
	INNOV5	Malt barley farmers are benefited by innovative training for malt barley development.					
Diversification	DIVE1	Malt barley farmers are benefited by government programs for promoting crop diversification through appropriate seed fertilizer and irrigation technologies.					
	DIVE2	Malt barley farmers' incomes are increased by diversifying their earning sources (non-agricultural occupation or small enterprise).					
	DIVE3	With the aim of financial risk reduction, malt barley farmers use a diversification strategy.					
	DIVE4	By increasing income and reducing vulnerability risks, rural income diversification helps malt barley farmers improve their living standards.					
	DIVE5	Malt barley farmers believe diversification is important because it is associated with a variety of risks.					
Contract Far.	COFAR1	Malt barley farmers benefit from contract farming to enhance their productivity.					

	COFAR2	Malt barley farmers use contracts between the buyer and the seller to enhance their productivity.					
	COFAR3	Perquisite for malt production Contract farming helps malt farmers enhances their productivity.					
	COFAR4	Creating a better-quality relationship among malt barley farmers helps to be more productive.					
	COFAR5	Under the supervision of actual actions and with the support of the buyer's input, the farmer's plant crops help malt farmers enhance their productivity.					
Savings	SAV1	As malt barley farmers save money (non-expenditure of part of income) as future income is uncertain, they become productive.					
	SAV2	Malt barley farmers' personal saving motivation helps them to be more productive.					
	SAV3	Malt barley farmers' personal indemnify or protection reasons help to be more productive.					
	SAV4	Malt barley farmers' personal avoidance of the adversative effect of future income variations helps them to be more productive.					
	SAV5	Malt barley farmers commonly use aftershock mechanisms to help them be more productive.					
Productivity	PROD1	Malt barley farmers have obtained more products per hectare since 2018.					
	PROD2	Malt barley farmers have presented a "new" idea to improve barley outcomes, work processes, etc.					
	PROD3	Malt barley farmers have been rewarded for presenting a new idea.					
	PROD4	Malt barley farmers are able to achieve the targets that the government set.					
	PROD5	Malt barley farmers are able to achieve the targets that they set—personal goals.					

	PROD6	The government recognizes malt barley farmers who take on challenging production tasks.					
	PROD7	Malt barley farmers align production with the stewardship of resources like water, health, and the strength of rural communities.					
	PROD8	Malt barley farmers align production with the productive capacity of soils.					

Do you think there is a need for upgrading malt barley farmer's innovativeness? How?

_____

_____

Do you think there is a need for upgrading malt barley farmer's saving and diversification methods? How?

_____

_____

_____

Do you think there is a need for enhancing productivity of malt farmers? How?

_____

_____

_____

Please suggest on how to improve risk management practices and malt barley productivity in Ethiopia

_____

_____

_____

Thank you again for your cooperation and finalizing the questionnaire!!

Annex II – Interview Checklist

Greetings!

Dear Interviewee, please note that I am conducting a research study on' *The Effect of Risk Management Practices on Productivity: Perspective from Government on Various Malt Barley''*. I have few questions regarding this study.

Can I proceed?

Thank you!

1- How would you describe your risk management practices of malt barley farmers and associated projects in Ethiopia in terms of innovation, diversification, contract farming and saving?

……

……

2- What are the risk management practices in malt barley in Ethiopia?

……

……

3- What are the productivity trends of malt barley production in Ethiopia?

……

……

4- Do you think that risk management practices affects malt barley productivity? If yes how?

……

……

5- Please suggest on how to improve risk management practices and malt barley productivity in Ethiopia.

……

……

Thank You!