VALUE CHAIN ANALYSIS OF THE COMMUNITY-BASED HARICOT BEAN SEED PRODUCTION: THE CASE OF BILATE ZURIA AND GIMBO DISTRICTS OF ETHIOPIA

MSc. THESIS

YISHAK SHITAYE BANTA

HAWASSA UNIVERSITY, HAWASSA, ETHIOPIA

NOVEMBER, 2023

VALUE CHAIN ANALYSIS OF THE COMMUNITY-BASED HARICOT BEAN SEED PRODUCTION: THE CASE OF BILATE ZURIA AND GIMBO DISTRICTS OF ETHIOPIA

YISHAK SHITAYE BANTA (BSc)

SUPERVISOR

ANBES TENAYE (PhD Candidate)

A THESIS SUBMITTED TO THE SCHOOL OF ENVIRONMENT, GENDER AND DEVELOPMENT STUDIES, COLLEGE OF AGRICULTURE, SCHOOL OF GRADUATE STUDIES, HAWASSA UNIVERSITY, HAWASSA, ETHIOPIA

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THEDEGREE OF MASTER OF SCIENCE IN AGRICULTURE (SPECIALIZATION: AGRICULTURAL ECONOMICS)

NOVEMBER, 2023

ADVISORS' APPROVAL SHEET

SCHOOL OF GRADUATE STUDIES

ADVISORS' APPROVAL SHEET

This is to certify that the thesis entitled "Value Chain Analysis of the Community-based Haricot Bean Seed Production: The Case of Bilate Zuria and Gimbo Districts of Ethiopia" submitted in partial fulfilment of the requirements for the degree of Master of Science with specialization in Agricultural Economics, in the Graduate Program of the Faculty of Environment, Gender, and Development studies, College of Agriculture, has been carried out by Yishak Shitaye Banta, ID No. GPAgEcR/0009/14, under my supervision. Therefore, I recommend that the student fulfil the requirements and hereby submit the thesis to the department.

_____	_____	_____
Name of Advisor	Signature	Date

HAWASSA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

EXAMINERS' APPROVAL SHEET

We, the undersigned members of the Board of Examiners of the final open defence by Yishak Shitaye Banta, have read and evaluated his thesis entitled "Value Chain Analysis of the Community-based Haricot Bean Seed Production: The Case of Bilate Zuria and Gimbo Districts of Ethiopia" and have examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfilment of the requirements for the Master of Science in Agricultural Economics.

_____	_____	_____
Name of Major Advisor	Signature	Date
_____	_____	_____
Name of Internal Examiner	Signature	Date
_____	_____	_____
Name of Chairperson	Signature	Date
_____	_____	_____
Name of External Examiner	Signature	Date
_____	_____	_____
SGS Approval	Signature	Date

Final approval and acceptance of the thesis/dissertation is contingent upon the submission of the final copy of the dissertation to the School of Graduate Studies (SGS) through the Department/School Graduate Committee (DGC/SGC) of the candidate's department.

Stamp of SGS Date: _____

ACKNOWLEDGEMENTS

First and foremost, I give glory to God as it is only by His grace and power that this achievement was possible. His superfluous grace has made this a reality in my life, and for that, I am ever grateful.

I extend my sincerest gratitude to my advisor, Anbes Tenaye (PhD Candidate), for his support and valuable feedback throughout my research work, from proposal development to completion. I am also grateful to Zerhun Ganewo (Assi. Professor), Mrs. Biruktait Teferi and Mr. Tirusew Teshale for facilitating my application for the Ethiopia Netherlands Seed Partnership Project research fund grant. The financial assistance provided by the Ethiopia Netherlands Seed Partnership Project was instrumental to the successful completion of my research work, and I am appreciative of their contributions. I would also like to express my thanks to Mrs. Ansha Yusufe for her coordination efforts, which were valuable in many ways.

I express my appreciation to South West Agricultural Research Institute and Bonga Agricultural Research Center for their leave of absence and sponsorship of my study time. I thank Mr. Zelalem Abate (Associate researcher), for his moral support. I am also grateful to my friend, Daniel Sente, for his encouragement and financial support. My thanks go to Tsegaye Dussie, for his cooperation in data collection in Bilate Zuria district. I express my appreciation to Mr. Addisu Haile,the facilitator in Kuti Kebele, and enumerators Ms. Kassech Belachew and Ms. Tadelech Alemayehu. I extend my gratitude to Mr. Lalima Bushura, Mr. Dawit Wolde, and Kassuhun for their cooperation (Bilate Zuria district). I also want to thank Sidama Elto Cooperative Union, especially Mr. Abebayehu Asfaw, Head of the Marketing Department, Kayo Coop, Bilate Zuria District Office of Agriculture and Gimbo District Office of Agriculture, and Coop office in Bilate Zuria. I express my gratitude to Kassa Tarekegn (Associate Researcher, and PhD Candidate), for his support.

Last but not least, my acknowledgement will not do justice if I fail to mention the farmers and stakeholders who took part in the survey work. I would like to thank them all for sharing their precious time with me. While I am unable to mention the names of every one of them, I am grateful to all who helped me complete my thesis work.

DEDICATION

I dedicate this thesis to two exceptional people who have had a significant impact on my life. Firstly, I offer it as a memorial to **Dr. Bishop Teklemariam Gezahegn**, the spiritual father of millions in the Apostolic Church of Ethiopia. As one of his spiritual children, I offer this thesis as a testament to my father in faith passed away on June 21, 2022, at the age of 85.

Secondly, I dedicate this thesis to my beloved mother, **Zenebech Dama**. Her unwavering support and many sacrifices played a critical role in helping me achieve this outstanding scholarly accomplishment.

STATEMENT OF AUTHOR

I affirm that this thesis is the result of my independent research, and I have duly acknowledged all sources of materials utilized in its development. This thesis has been submitted as a partial fulfilment of the requirements for the MSc degree in agriculture, specializing in Agricultural Economics, at Hawassa University. It has been deposited at the University Library, ensuring its availability to borrowers following library regulations. I solemnly declare that this thesis should not be submitted to any institution to obtain any academic degree, diploma, or certificate. Limited quotations from this thesis are permissible without seeking special permission. However, in all other cases, authorization must be obtained from the authors.

Name: Yishak Shitaye Banta **Signature:** _____

Date of Submission: _____

Place: College of Agriculture, Hawassa University, Hawassa

Faculty: Environment, Gender and Development Studies.

ABBREVIATIONS

AGP-II	Agricultural Research Program-II
ArARC	Arbaminch Agricultural Research Center
BARC	Bonga Agricultural Research Center
BZDOA	Bilate Zuria District Office of Agriculture
CALM	Climate Action through Landscape Management
CBO	Cooperative Bank of Oromia
CBSP	Community-Based Seed Production
CSA	Central Statistics Authority
DOA	District Office of Agriculture
EEO	Ethiopian Economic Outlook
ENSP	Ethiopia Netherlands Seed Partnership
FAO	Food and Agricultural Organization
FGDs	Focus Group Discussions
GDOA	Gimbo District Office Agriculture
KIIs	Key Informant Interviews
KZANRD	Kaffa Zone Agricultural and Natural Resource Development
m.a.s.l	Meter Above Sea Level
MFI	Micro-Finance Institutions
NGO	Non-Governmental Organization
OLS	Ordinary Least Square
RARIs	Regional Agricultural Research Institutes
SARI	South Agricultural Research Institute
SECU	Sidama Elto Cooperatives Union
SHA	Self Help Africa
SNNPRS	Southern Nations, Nationalities and Peoples' Regional State
SNV	Netherland Development Organization
SRBOA	Sidama Region Bureau of Agriculture
SRSQA	Sidama Region Seed Quality Authority
SWARI	South West Agricultural Research Institute
SWRBOA	South West Region Bureau of Agriculture
UNIDO	United Nations Industrial Development Organization

TABLE OF CONTENTS **PAGE**

ACKNOWLEDGEMENTS ..... **i**

DEDICATION ..... **ii**

STATEMENT OF AUTHOR ..... **iii**

ABBREVIATIONS ..... **iv**

LIST OF TABLES ..... **viii**

LIST OF FIGURES ..... **ix**

LIST OF TABLES IN THE APPENDICES ..... **x**

ABSTRACT ..... **xi**

1. INTRODUCTION **1**

1.1. Background of the study 1

1.2. Statement of the problem 3

1.3. Objectives of the Study 5

1.3.1. The general objective 5

1.3.2. Specific objectives 5

1.4. Research Questions 5

1.5. Scope and Limitation of the Study 5

1.6. Significance of the study 6

1.7. Organization of the Thesis 6

2. LITERATURE REVIEW **7**

2.1. Definitions of basic concepts in the study 7

2.2. Theoretical Review 9

2.2.1. Understanding the concept of Value chain 9

2.2.2. Value chain Analysis 9

2.2.3. Dimensions of Value chain analysis 10

2.3. Pulse Crops in Ethiopia 12

2.4. Haricot Bean Production in Ethiopia 12

2.5. The Seed System in Ethiopia 13

2.5.1. Formal seed production and delivery system in Ethiopia 13

2.5.2. The informal system of seed production and delivery in Ethiopia 13

2.5.3. Community-based seed system in Ethiopia 14
2.6. Analytical Framework of the study 14
2.6.1. Mapping the value chain 14
2.6.2. Analyzing how benefits are allocated throughout the value chain 15
2.6.3. Value chain governance and coordination 15
2.6.4. Upgrading Value Chain 16
2.6.5. Multiple Linear Regression Model 16
2.7. Determinant Factors for market supply 17
2.7.1. Factors affecting haricot bean seed market supply 17
2.8. Conceptual Framework of the Study 19
3. RESEARCH METHODOLOGY 21
3.1. Description of the Study Area 21
3.1.1. Bilate Zuria District 21
3.1.2. Gimbo District 22
3.2. Research design 24
3.3. Reliability Analysis 24
3.4. Types of Data and Sources 24
3.5. Sampling procedure and Sample size 25
3.6. Methods of data collection 28
3.7. Methods of Data Analysis 28
3.7.1. Descriptive statistical analysis 28
3.7.2. Value chain analysis 29
3.7.3. Analysis of cost and market margin 29
3.7.4. Econometric analysis 30
3.8. Dependent and independent variables definition 32
3.8.1. Dependent variable 32
3.8.2. Definition of the variables and their a priori expectation 32
4. RESULT AND DISCUSSIONS 37
4.1. Descriptive Results 37
4.1.1. Demographic, socioeconomic, and institutional factors of the respondents 37
4.1.2. Seed production, distribution, and marketing overview 40
4.1.3. Primary sources of income for respondents 42
4.2. Description of Haricot bean Seed Traders and Final-users 42

4.2.1. Household characteristics of sampled seed traders 42
4.2.2. Price setting strategies of traders for haricot bean seed purchasing 43
4.2.3. Initial and working capital of haricot bean seed traders 44
4.2.4. Household characteristics of final-users (seed consumers) 45
4.3. Main Haricot Bean Seed Value Chain Actors and Functions 46
4.3.1. Primary value chain actors and their functions 46
4.3.2. Support service providers and their roles in haricot bean seed production 49
4.3.3. Extension services and quality verification 51
4.3.4. Financial services 51
4.3.5. Value chain governance 52
4.3.6. Map of haricot bean seed value chain 53
4.4. Performance Analysis of Haricot bean seed 54
4.4.1. The marketing channels for haricot bean seed in the Bilate Zuria district 54
4.4.2. Production costs of Haricot bean seed in Bilate Zuria district 55
4.4.3. Marketing costs in Bilate Zuria district 56
4.3.4. Distribution of benefits in Haricot bean seed value chain actors 57
4.4.5. The marketing channels for haricot bean seed in the Gimbo district 59
4.4.6. Production costs of haricot bean seed in Gimbo district 61
4.4.7. Marketing costs of haricot bean seed in Gimbo district 61
4.4.8. Distribution of benefit among haricot bean seed value chain actors 62
4.5. Econometrics Analysis 64
4.5.1. The determinant factors affecting haricot bean seed market supply 64
4.6. The major Opportunities and Constraints 73
4.6.1. Opportunities of production and marketing 73
4.6.2. Constraints of production and marketing 74
5. SUMMARY, CONCLUSION AND RECOMMENDATIONS 77
5.1. Summary 77
5.2. Conclusion 78
5.3. Recommendations 79
6. REFERENCES 80
7. APPENDICES 90

LIST OF TABLES

TABLES **PAGE**

Table 2.1: Governance structures in the value chain 11
Table 3.2: Reliability Statistics 24
Table 3.3: The sample size of the study kebeles and the number of households..... 27
Table 3.4: Distribution of representative sample 28
Table 3.5: Summary of Research Methodology 30
Table 3.6: Description of independent variable and hypothesis in the MLR model..... 36
Table 4.7: Demographic and institutional characteristics of sample households 38
Table 4.8: Demographic, socioeconomic, & institutional characteristics of respondents ... 39
Table 4.9: The primary sources of income for the respondents' households 42
Table 4.10: Socio-demographic characteristics of sample haricot bean seed traders 43
Table 4.11: Time of haricot bean seed purchasing and price setting strategies 44
Table 4.12: Initial, current working capital and credit source of haricot bean seed traders. 45
Table 4.13: Seed consumer's demographic characteristics..... 46
Table 4.14: Haricot bean seed value chain supporters and their functions 50
Table 4.15: Source of credit by sample households..... 52
Table 4.16: Production costs per quintal of haricot bean seed in Bilate Zuria district 56
Table 4.17: Marketing costs of haricot bean seed by birr per quintal 57
Table 4.18: Marketing margin of haricot bean seed value chain in Bilate Zuria district 59
Table 4.19: Production costs per quintal of haricot bean seed in Gimbo district 61
Table 4.20: Marketing costs of haricot bean seed in Gimbo district 62
Table 4.21: Marketing margin of haricot bean seed value chain in Gimbo district..... 63
Table 4.22: Regression results of factors affecting haricot bean seed supply in the market 66

LIST OF FIGURES

FIGURES **PAGE**

Figure 2.1: Depicts the typical stages of a value chain 9
Figure 2.2: Conceptual frame work of the study..... 20
Figure 3.3: Bilate Zuria district Study area..... 23
Figure 3.4: Gimbo district Study area 23
Figure 4.5: Varieties produced and marketing of seed in Bilate Zuria and Gimbo Districts41
Figure 4.6: Map of haricot bean seed value chain in Bilate Zuria, and Gimbo districts..... 53
Figure 4.7: Haricot bean seed marketing channel in Bilate Zuria District..... 55
Figure 4.8: Haricot bean seed marketing channel in Gimbo District..... 60

LIST OF TABLES IN THE APPENDICES

APPENDICES **PAGE**

Appendix Table 1: Livestock conversion factors.....90

Appendix Table 2: Test for Multicollinearity of the explanatory variables.....90

Appendix Table 3: Tests for heteroskedasticity (estat hettest) 91

Appendix Table 4: Ramsey specification-error test for omitted variables (estat ovtest).....91

Appendix Table 5: ANOVA table for F-statistic 91

Appendix Table 6: Major Constraints for seed producers 92

Appendix Table 7: Major marketing constraints of haricot bean seed producers..... 92

Appendix 2: Questionnaires for different stakeholders 92

ABSTRACT

The Haricot bean (Phaseolus vulgaris L.) is an important legume crop in Ethiopia, as it serves as the main cash crop and provides the least expensive protein source for farmers in many of the lowlands and midlands of the country. The main objective of this research was to analyze the value chain of haricot bean seed production in the Bilate Zuria and Gimbo districts of southern Ethiopia. The study aimed to identify the actors involved in community-based seed production, their roles, and the overall structure of the value chain. To gather data, cross- sectional surveys and multi-stage sampling techniques were used. Primary data was collected from 228 seed producers, 12 collectors, 2 cooperatives, one union, and 16 seed final-users. Secondary data was collected from district agriculture offices, articles, theses, and unpublished resources. Descriptive statistics, marketing margin, and multiple linear regression models were used to analyze the primary data. The key actors are input suppliers, seed-producing farmers, collectors, cooperatives, unions, and final seed users. The value chain activities include input supply, seed production, marketing, and final use. In the Blate Zuria district, local traders received the highest profit margin of 1058.57 birrs per quintal, indicating the need for intervention to increase the net profit share of producers. The gross marketing margin results showed that producers in the Bilate Zuria and Gimbo districts had the highest share in channels IV and III, respectively. This suggests thatthese channels provide producers with a better share of the value created. In the OLS regression model, among the 15 identified independent variables, the quantity of seed produced and market information were positively significant at the $p < 0.01$ level. Education was positively significant and family size was negatively significant at the $p < 0.05$ level. Additionally, distance and credit access were found to be significant at the $p < 0.1$ level. In the Gimbo district, age, experience, land size, quantity produced, livestock owned, membership, extension contact, and market information had a positive effect, while distance had a negative effect. The major constraints at the production level were high input prices, late delivery of inputs, shortage of improved seed, pest prevalence, and rainfall scarcity in Bilate district, and excessive rainfall in Gimbo district. Marketing-related constraints include weak market linkage, low prices at harvest time in Gimbo, insufficient handling, poor seed quality, and a lack of storage centers. Government support and growing demand for seeds were identified as major opportunities in the study areas. Therefore, the government should focus on direct marketing, while research centers and universities should prioritize breeding, pre-extension, and capacity building training. Additionally, non-governmental organizations, such as the AGP-II and CALM projects, should address physical capacity and production as well as marketing-related constraints at different levels to further enhance the seed production and distribution processes.

Keywords: Bilate Zuria, Community-based seed, Gimbo, Haricot bean, OLS regression

1. INTRODUCTION

1.1. Background of the study

Ethiopia, an agrarian country, relies heavily on crop and livestock production as a major economic activity. With agriculture contributing around 50% to the GDP, 85% to the total export value, and supporting over 80% of livelihoods (EEO, 2022), it plays a crucial role in the country's economy. In this context, the production and utilization of vital inputs like fertilizer, improved seeds, and farm equipment have a significant impact on increasing crop productivity and are essential for the growth of the agricultural sector.

Haricot bean is a significant pulse crop globally, particularly in Ethiopia. It is the top-ranked pulse crop worldwide and the second after the Faba bean in Ethiopia. The crop is mainly cultivated in areas between 1400-2000 m.a.s.l. Major production regions include East Hararghe, West Wellega, East Shewa, West Arsi, Sidama, Wolayita, Wollo, and East Gojam (Ephrem, 2016; CSA, 2021/22). According to CSA (2021/22), pulses covered 13.75 hectares of crop area and contributed to 9.66 quintals of grain production. Red haricot beans accounted for 14.36% of the crop grain area, while white haricot beans accounted for 5.87%. The grain production from red and white haricot beans was 13.02% and 5.42% of the total, respectively (CSA, 2021/22). However, despite their area coverage, the national average yield for red and white haricot beans is low, at 17.13 quintals per hectare and 17.42 quintals per hectare, respectively (CSA, 2021/22).

The integration of the value chain approach into the global economy has led to substantial economic growth and income opportunities for producers (UNIDO, 2009). Organizing agriculture along the value chain framework improves efficiency in the agricultural sector (Anjani Kumar *et al.*, 2011). Value chain research identifies key actors, their roles, opportunities, constraints, and economic benefits for producers and consumers (Gedefaw, 2022). The integration of producers and consumers in the haricot bean seed market has a significant contribution for both parties. Value chain analysis breaks the gap between farmers and consumers, minimizing intermediaries and maximizing profit. Quality seed is a critical factor for successful crop production (Kassa and Merkine, 2020), playing a significant role in agriculture. However, the production of improved varieties of Haricot bean by most farmers is limited due to various factors, including insufficient seed

production, limited availability of quality improved seeds, lack of credit, late delivery, poor extension services, poor linkages between different actors in the seed supply system, and the socio-economic conditions of farmers. Moreover, Seifu *et al.* (2022) pointed out that the formal seed system covers only around 30% of the seed supply. The primary obstacles impeding seed access are untimely delivery and inadequate supply of improved varieties (Dawit, 2010).

In Ethiopia, the seed system is classified into three categories: formal, informal, and community-based. There is a greater emphasis on community-based seed production, which is owned and managed by farmers for commercial purposes, with support from NGOs and research centers (Eshetu *et al.,* 2005). However, despite its development, it faces various challenges, including limited availability of quality improved seeds, lack of credit, late delivery, poor extension services, poor linkages between different actors in the seed supply system, and socio-economic conditions (Sisay *et al.,* 2017).

The Sidama and South West National Regional States have suitable conditions for haricot bean production, including seed production. Consequently, the Agriculture Development Bureau has identified Bilate Zuria district and Gimbo district as potential areas for haricot bean seed production. However, due to the high demand for improved varieties in these districts, most farmers heavily rely on informal seed sources. Efforts have been made to address this issue by supplying Certified-1 (C1) seeds to selected seed farmers in the Bilate Zuria district through Sidama Elto Union and in the Gimbo district through Bonga Agricultural Research Center with the support of the AGP-II project (GDOA, 2021).

Several studies (Andaregie, A., Astatkie, T., and Teshome, F., 2021; Beyene, T., Mulugeta, W., and Merra, T., 2020; Worako, T. K., 2019; Bokansa, G., 2018) have conducted the involvement of actors in the haricot bean value chain, particularly in terms of marketing participation. However, despite these findings, there is still a lack of research conducted at the community-based level specifically focusing on haricot bean seed production in study areas (BZDOA, 2021; GDOA, 2021). The primary motivation behind this study was to gain a deeper understandingof the underlying reasons for the existing gap in haricot bean seed production and its subsequent supply to the market at the community-based level. Therefore, this study aimed to fill

this research gap by documenting previously unstudied information in the area. To achieve this, the study investigated the actors involved in community-based seed production, analyzed the costs incurred by seed producers and assessed their performance. The study also examined the factors that influence the supply of seeds to the market and identified both the major opportunities and constraints in the districts.

1.2. Statement of the problem

Pulses, such as the haricot bean in Africa, have always been a significant part of the human diet (Zebire and Gelgelo, 2019). They have been incorporated into traditional diets worldwide for thousands of years. The haricot bean, in particular, is known for its high levels of carbohydrates and calcium, making it a valuable source of nutrition (Zebire and Gelgelo, 2019). According to Zebire and Gelgelo (2019), Haricot bean is referred to as "a poor man's meat" due to its high protein content.

However, community-based haricot bean seed production in Ethiopia is facing various constraints (Abebe and Alemu, 2017). Although the government has made efforts to involve private entities and unions in seed multiplication, the gap has not been fully bridged. Currently, less than 10% of the seed demand is met with quality seed, with the majority sourced from farmers' seeds or the local market (Walsh *et al.,* 2015). To address this issue, the government is actively seeking solutions, and farmers' seed multiplication cooperative unions are making advancements and marketing efforts (Walsh *et al.,* 2015). The primary objective is to improve farmers' access to enhanced crop varieties, especially in challenging agro-ecologies.

Bilate Zuria district and Gimbo district both possess significant potential for haricot bean production, including seed production (BZDOA, 2021; GDOA, 2021). This potential has led smallholder farmers to diversify from subsistence production to more market-oriented and higher-value commodities (BZDOA, 2021). However, the success of agricultural development in these districts relies on the presence of an effective input supply system, production support system, and marketing strategies. The seed supply system and marketing in Ethiopia, in general, and in the study areas specifically, are weak and inefficient (BZDOA, 2021; GDOA, 2021).

According to Kassa and Merkine (2020), seed is a fundamental input in agriculture, yet the supply of certified grain legume crop seeds in Ethiopia is less than 5% (Zewdie *et al.,*

2008). Additionally, most farmers have not adopted an improved variety of haricot beans (Bokansa, 2018). Several reasons contribute to this, including insufficient seed production and marketing systems, lack of credit, late delivery of seeds, low performance of extension services, poor linkage between different actors in the seed supply system, and farmers' socio-economic situation (Ferris and Kaganzi, 2008; Zewdie *et al.*, 2009). Furthermore, the parastatal seed production and distribution system, controlled by the government, has often proven to be ineffective (Zewdie *et al.*, 2009).

According to Behl *et al* (2019), if the produced seed is not demanded by zones/districts, it becomes a cost for the producer, which becomes a serious challenge for farmers' cooperative seed multiplication unions. Both Bilate Zuria and Gimbo districts are facing challenges in seed production and marketing systems, leading to limited availability of quality haricot bean seeds and late delivery of inputs. This results in an imbalance between the demand and supply of improved haricot bean seeds. Additionally, there is a lack of supply, poor linkages among actors, and inadequate marketing systems in the study areas. Profit motives drive most producers, but the inappropriate marketing system hinders their success. To establish a well-functioning community-based seed value chain, it is crucial to improve the input supply system, production, and marketing systems, as well as enhance farmers' participation in seed supply to the market.

Furthermore, farmers involved in community-based seed production face challenges such as the lack of an efficient market, limited physical capacity, and the absence of proper internal regulation mechanisms. The situation was made even worse by the fact that there was no proper distribution channel in place. Additionally, there is a lack of documentation regarding key actors, costs incurred by seed-producing farmers, factors influencing the supply to the market, and untapped opportunities and constraints in seed production. These challenges, along with low competitiveness, limited market linkages, and inability to offer premium prices, negatively affected the yield and supply of haricot bean seed in Bilate Zuria and Gimbo districts. On the other hand, these issues also have negative impacts on smallholder farmers and their benefits. Moreover, there is a lack of research on the community-based seed value chain. Therefore, this study aims to identify actors, margins, determining factors, and constraints and opportunities in the seed value chain.

1.3. Objectives of the Study

1.3.1. The general objective

The general objective of this study is a value chain analysis of community-based haricot bean seed production

1.3.2. Specific objectives

1. To identify and maps haricot bean seed value chainactors, roles and linkage.
2. To analyse marketing margin of community-based haricot bean seed production.
3. To identify factors affecting market supply of haricot bean seed producers.
4. To assess the major constraints and opportunities of the community-based haricot bean seed value chain.

1.4. Research Questions

1. Who are the actors involved in the haricot bean seed value chain, their roles and linkages?
2. What is the marketing margin of community-based haricot bean seed production?
3. What are the factors that affect the market supply by haricot bean seed producers?
4. What are the major constraints and opportunities of the community-based haricot bean seed value chain?

1.5. Scope and Limitation of the Study

The scope of a study typically refers to the boundaries of the research, or what the study will cover. In several developing countries, research has revealed that farmers hesitate to provide precise details on factors like farm size, age, profit, etc. This reluctance is attributed to the fact that taxes and other development contributions are allocated among them based on these factors. The limitations that exist in this study cannot be ignored. While other regions in the country produce community-based haricot bean

seed, expanding the scope of this study to include them may yield even more significant insights that could inform the entire Country.

One major limitation of this study was the unavailability of the secondary database on haricot bean seed production and marketing activities. Hence, this report relies mainly on the primary information generated from survey questionnaires.

1.6. Significance of the study

Market-oriented seed production is intended to enable producers to increase their supply to market. If seed producers, traders, end users and all the value chain participants are provided with relevant information within the value chain they would be encouraged in their activities and perhaps required to restrain these activities that harm the value chain effectiveness and strengthen the coordination between the community-based seed value chain actors and supporters. It would also give information for concerned government bodies to know the constraints and opportunities for further improvement of the intervention toenhance seed production, productivity and market supply of pulse crop seed by linking producers with input suppliers and end users. Therefore, this study is important in the studyareas to uncover the gaps and provide a baseline for further research.

1.7. Organization of the Thesis

The organization of the thesis is as follows. Chapter one presents the introduction part which contains the background, statement of the problem, objectives of the study, research questions, scope and limitation, and finally significance of the study. Chapter two presents a review of the literature on haricot bean seed value chain analysis from different sources. A description of the study areas under research methodologies is presented in chapter three. In chapter four, descriptive, value chain and econometric results are presented and discussed in detail. Chapter five summarizes the main findings of the study and draws conclusions and recommendations. It also includes implications for further research for the future. Lastly, chapter six includes a list of the various sources utilized in this study, such as books, research reports, and papers.

2. LITERATURE REVIEW

This chapter presents some basic ideas that were used in this study. The main goal was to carefully analyze previous studies and their relevance to the objectives of this survey. By doing so, the theoretical ideas and real-life evidence from these studies will help us better understand the topic. Additionally, this section also explains the conceptual framework used to study the Haricot bean seed value chain in the Bilate Zuria and Gimbo districts.

2.1. Definitions of basic concepts in the study

Community-based seed production (CBSP): entails farmers who reside in a specific geographic area and are involved in the production of seed for food crops. The term "community" refers to individuals within a defined boundary or with shared interests (Sperling *et al.,* 2014). It is essential to grasp the stakeholders, their collective agendas, and the mechanisms of engagement for effective implementation of CBSP. Within the community-based framework of CBSP, and according to the researchers' definition, these farmers are recognized as integral members of a local-level seed production and management system, which is owned by farmers.

Haricot bean seed value chain: The Haricot bean seed value chain encompasses the activities and services involved in the production, collection, and distribution of haricot bean seed. This includes input supply, farming, local collection, and reaching the end-user. The value chain approach recognizes that value is added to the product at each stage. In developing the Haricot bean seed value chain sector, it is important to address the challenges and opportunities faced by stakeholders and businesses at different levels of the value chain (Zakic *et al.*, 2018).

Marketing channel: Normally, a marketing channel is a business structure of interdependent organizations that reaches from the initial point to the consumer with the purpose of moving products to their final destination (Porral and Stanton, 2017).

Marketing chain: A marketing chain is used to define the various links that connect all of the individuals and transactions involved in the transportation of agricultural goods from the farm to the consumer; agricultural items and products go up the chain, while money flows down the chain (Lundy *et al,* 2014). It is the path one should take from the point of origin to the end destination for utilization.

Market margin: Margin is useful descriptive statistic when it used to show how the consumer's price is divided among participants at different levels of marketing system (Mendoza, 1995). There are two ways of defining market margins that are also referred to as vertical price spreads. Accordingly, market margin is defined as the price difference between two marketing stages (consumers, producers). And the second definition is the cost of the services provided through the marketing channel.

Mapping: in mapping a chain, one creates a visual representation of the connections between businesses in value chains as well as other market players. In its simplest form it is merely a flow diagram. Knowing about the different levels in a value chain is also a precondition for identifying bottlenecks that are preventing the achievement of certain targets drawing a value chain map is only a tool, and an aid to illustrate and perhaps simplify the complexities of sectors and their value chains (Matthiasand and Tapera, 2009).

Linkage: refers to the relationship and interaction between farmers, seed multipliers, and seed bank actors. Solomon (2017) emphasizes that the generation of technology is not the ultimate goal, but rather its effective utilization by end-users. This requires the presence of effective linkages among the actors within the value chain. The linkages between actors in the value chain and the information system play a crucial role in facilitating the efficient flow of technology and information between research, extension services, and farmers (Solomon, 2017).

Value chain network structure: It is essential to consider both the structure and dynamics of the value chain. The structure involves all individuals and firms involved in adding value and facilitating the movement of the product towards the end markets. The dynamics of the value chain pertain to the determinants of individual and firm behavior and how they impact the functioning of the chain. The major structural factors of the value chain encompass end-markets, the business enabling environment, vertical and horizontal linkages, and supporting markets (USAID, 2006).

2.2. Theoretical Review

2.2.1. Understanding the concept of the Value chain

The concept of the "value chain" was first introduced by Porter (1985) to describe the complete set of activities involved in bringing a product or service from its design phase to production, distribution, consumption, and final disposal. In addition to this perspective, Gereffi (1994) defines the value chain by considering the actors involved, input-output relationships, as well as the territorial and technical structures. Gereffi *et al.* (2003) further expand on this concept by describing the global value chain as a means of analyzing the integration of global production and distribution systems, as well as identifying opportunities for firms in developing countries to enhance their position in global markets. While this definition captures the essence of the value chain, it is also important to consider other aspects such as institutional factors and the legal framework (Schipmann, 2006).

Figure 1: Depicts the typical stages of a value chain

Source: Schipmann, C. (2006)

2.2.2. Value chain Analysis

Value chain analysis breaks down a chain to understand its structure and functioning, identifying actors and their roles (UNIDO, 2009). It studies interactions within an industry (Zamora, 2016) and explores value chains' potential in achieving policy objectives. VCA examines connections between activities and actors from production to consumption (Porral and Stanton, 2017), aiming to increase value or reduce costs for customers.

To conduct value chain analysis, the value chain structure is utilized. The key elements include end markets, the business environment, vertical and horizontal linkages, and supporting markets. Dynamic factors include value chain governance, inter-firm relationships, and value chain upgrading.

End markets: These are the starting point for value chain analysis and consist of people rather than specific locations. They determine the characteristics of a successful product or service, such as price, quality, quantity, and timing (USAID, 2006).

Vertical linkages: Crucial for moving a product or service to the end market, vertical linkages are connections between firms at different levels of the value chain. They facilitate the transfer of learning, information, and various services. The nature and efficiency of these relationships impact the competitiveness of the entire industry (USAID, 2006).

Horizontal linkages: Both formal and informal connections between firms at any level in a value chain can lower transaction costs, create economies of scale, and enhance industry efficiency and competitiveness. They can also contribute to shared resources, improved product quality, collective learning, risk sharing, and innovation. Identifying common constraints is essential for successful horizontal cooperation (Chirwa *et al.*, 2005).

Business enabling environment: The value chain operates within a business enabling environment that encompasses global, national, and local factors such as norms, laws, regulations, policies, trade agreements, and public infrastructure. Enhancing the business environment by addressing constraints and filling gaps in regulatory and administrative support mechanisms is crucial for competitiveness (Asia and Hetherington, 2017).

Supporting markets: It play a vital role in firm upgrading and include financial services, cross-cutting services like business consulting and legal advice, and sector-specific services such as irrigation equipment or design services. Vibrant supporting markets are often necessary for competitiveness (Snodgrass and Woller, 2006).

2.2.3. Dimensions of Value chain analysis

According to Baker (2006), the concept of value chain analysis involves tracing the flow of products, identifying added value at different stages, recognizing key participants and their coordination, evaluating constraints, and identifying strategies to enhance local enterprises' competitiveness and profitability. Understanding how local businesses fit into the global economy is crucial for effective project planning and policy formulation.

2.2.3.1. Network Structure

The network structure of value chains includes local, regional, and global markets. It integrates vertical and horizontal relationships between actors, impacting the effectiveness of agricultural value chains (Ndlovu *et al.,* 2021). Intra-chain linkages are bi-directional, with each stage influencing and being influenced by others (Anandajayasekeram and Berhanu, 2009).

2.2.3.2. Input-output Structure

The input-output structure involves tangible and intangible flows that contribute to value creation. It highlights the quantity and quality of goods, profit distribution, and information flow between chain stages (Neilson, 2014).

2.2.3.3. Value Addition

Value addition transforms primary products into more valuable ones, ranging from simple tasks to complex activities. Value-added products have higher market value and can differentiate themselves through attributes like location, sustainability, and functionality (Tamirat and Muluken, 2018). Value creation contributes to economic growth and development (FAO, 2018).

2.2.3.4. Governance Structure

Governance structures influence market access and operations in developing countries, ensuring sustainability and fair benefit distribution (Gereffi *et al.,* 2003).

Table 2.1: Governance structures in the value chain

Governance type	Information Complexity	Ability to codify Information	Supplier Capabilities
Market	Low	High	High
Modular	High	High	High
Relational	High	Low	High
Captive	High	High	Low
Hierarchy	High	Low	Low

Source: (Gereffi *et al.,* 2003)

2.3. Pulse Crops in Ethiopia

Pulse crops offer small farm holdings an economic advantage by serving as an alternative source of protein, generating cash income, and ensuring food security (Farris and Kaganzi, 2008). These crops are particularly important for individuals who are unable to produce or afford expensive livestock products, as they provide a valuable source of dietary protein. In 2021/22, pulses accounted for 13.75% of the total crop area and 9.66% of grain production. Specifically, haricot beans (white) and haricot beans (red) were cultivated on 0.81% and 1.97% of the grain crop area, respectively. The resulting production from haricot beans (white) and haricot beans (red) constituted 0.52% and 1.26% of the total grain production, respectively (CSA, 2021/22). The main obstacles to pulse crop production were various biotic and abiotic factors, including challenges in the market, pests, diseases such as bollworms, cutworms, and wilt, as well as incidents of human theft (Farris and Kaganzi, 2008).

2.4. Haricot Bean Production in Ethiopia

Haricot beans are an increasingly important commodity for smallholder producers in Ethiopia, providing both food and income. They have economic significance as a source of foreign currency, employment, and cash. Haricot bean production takes place in various regions across the country, with the majority coming from seven major production regions: Oromia, SNNPRS, Sidama, Kaffa, Amhara, Benishangul Gumuz, and Tigray (CSA, 2021/22).

However, haricot bean production in Ethiopia faces challenges. Farmers often use lower seed rates than recommended by researchers, resulting in lower grain yields (CSA, 2021/22). Proper fertilizer application is crucial for high yield and grain quality, though the type and rate of fertilizer vary depending on location, climate, and soil type (CSA, 2021/22). Weed control is also a major constraint, particularly in lowland areas where competition with crops is high (Farris and Kaganzi, 2008). Disease management is important, with common bacterial blight, rust, anthracnose, and angular leaf spot being economically significant diseases (Farris and Kaganzi, 2008). Timely harvest is essential to minimize losses from mold, bird and insect damage, and shattering (CSA, 2021/22).

2.5. The Seed System in Ethiopia

The term "seed system" refers to the entire network of organizations, individuals, and institutions involved in the development, production, processing, storage, distribution, and marketing of seeds in a country (FAO, 2018). It is the mechanism by which farmers' demand for specific seeds and traits is met by various sources of supply. In Ethiopia, the seed industry consists of formal, semi-formal, and informal sectors, including research establishments, universities, regulatory bodies, private companies, and millions of farmers who engage in seed selection and preservation (Guéi *et al.,* 2011).

2.5.1. Formal seed production and delivery system in Ethiopia

In the formal seed marketing sector, a clear distinction is made between "seed" and "grain," while this distinction is less evident in the informal or farmer seed supply (Sperling and Cooper, 2003). Developing countries often subsidize formal seed marketing, including parastatal seed companies, and the private sector may not effectively compete in this area. The seed system in Ethiopia is state-controlled and faces challenges such as limited crop and variety production, unreliable seed quality, and delayed delivery (Spielman *et al.*, 2010). The formal sector's capacity to meet the demand of millions of farmers is insufficient, with less than 10% of the total seed demand being accommodated. Efforts are being made to address these challenges through decentralized seed production and delivery systems to improve the efficiency and effectiveness of the seed sector (Spielman *et al.,* 2010).

2.5.2. The informal system of seed production and delivery in Ethiopia

The informal seed system in Ethiopia consists of individual private farmers who engage in various traditional practices to acquire and exchange seeds. These practices include selecting and saving their own seeds, exchanging seeds through gifts, bartering, labor exchange, cash transactions, or social obligations. For haricot bean producers, the majority obtain their seeds informally from cooperatives, through their own saved seeds, or by participating in local seed exchanges. This informal seed system operates at the individual farmer level and relies on local knowledge for plant and seed selection, sourcing, retention, and management, as well as local mechanisms for seed diffusion. However, it is important to note that the seed production process within the informal system is complex and the capacity of farmers involved is limited, as highlighted by (Zewdie and Gastel, 2008).

2.5.3. Community-based seed system in Ethiopia

The informal seed system in Ethiopia is often overlooked and undocumented, while the formal seed sector fails to meet the needs of farmers in less favorable areas (Zewdie and Gastel, 2008). Many farmers lack access to improved varieties due to affordability issues. Alternative seed systems have been introduced to address this issue. NGOs establish cooperative, community-based seed enterprises that produce and sell improved seeds to farmers or back to the NGOs for further distribution (Zewdie and Gastel, 2008). Community seed production is another approach where farmers organize themselves into groups or cooperatives, producing seeds at the household level. They access input and output marketing through community-based seed producer organizations (Tebeka *et al.*, 2017). Locally operating international NGOs play a significant role in seed production, marketing, and distribution through community-based seed systems (FAO, 2018). Strengthening the links between formal and informal seed systems requires collaboration among the public sector, commercial sector, and NGOs to promote community seed production (Tebeka *et al.*, 2017).

2.6. Analytical Framework of the study

In the agricultural sector, it is essential to conduct a comprehensive value chain analysis, as outlined by Tebeka *et al.* (2017). When examining the haricot bean seed value chain, the following steps of value chain analysis were employed.

2.6.1. Mapping the value chain

A value chain map illustrates the flow of products, information, and money in a value chain, providing insights into the interactions between businesses and the formation of a cohesive system. This tool is valuable for integrating smallholder farmers into supply chains. Lundy *et al.* (2014) explain that a visual map showcases stakeholders, system boundaries, interrelationships, functional roles, and the flow of goods, services, payments, and information within the value chain, highlighting connections and gaps between parties involved.

Understanding the value chain is crucial for analyzing the actors and their relationships within the chain. This includes studying all actors, the flow of goods, employment characteristics, and domestic and foreign sales. Surveys, interviews, workshops, and

secondary data sources can provide this information. According to Lundy *et al.* (2014), agricultural value chain mapping involves three levels or dimensions: core processes (direct actors), partner network (indirect actors), and external influencers.

Direct actors are involved in production, post-harvest handling, processing, and marketing. They own the product in one or more links of the chain and bear direct risk (Gereffi *et al.,* 2003).

Indirect actors provide operational and support services to direct participants along the chain, but do not take possession of the product or bear direct risk (Gereffi *et al.*, 2003).

External influences refer to factors outside the control of direct actors that can impact the value chain. These include economic, legal/political, environmental, and cultural factors, such as new pesticide laws, stock exchange prices, environmental resources, and cultural demand (Lundy *et al.,* 2014).

2.6.2. Analyzing how benefits are allocated throughout the value chain

To assess benefit distribution in the chain, analyze margins/profits and identify beneficiaries. Identify those needing assistance to improve performance/gains. Kasahun (2020) highlights importance, especially for economically disadvantaged individuals in value chain promotion projects.

2.6.3. Value chain governance and coordination

Value chain governance and coordination determine the structure of relationships and coordination mechanisms among chain actors. Kaplinsky and Morris (2002) highlights that coordination refers to non-market relationships within the value chain actors or external parties, while Roldan and Pelupessy (2005) use it to describe the exchange of non-market information, skills, and activities between segments of the commodity chain not linked by ownership. Governance plays a crucial role in improving capabilities, increasing value added, and addressing distributional distortions in the value chain. Moreover, coordination in the value chain ensures product specifications and reliable transactions.

2.6.4. Upgrading Value Chain

Value chain analysis helps identify and address weaker links in a chain, particularly those with low returns or limited purchasing power (Lundy *et al.,* 2014). Upgrading, as defined by Gereffi *et al.* (2003), empowers firms to assume more value-intensive roles, resulting in larger profits. According to Kaplinsky and Morris (2002), upgrading involves embracing innovation and recognizing relative resources and rents. Additionally, Kaplinsky and Morris (2002) propose four directions for upgrading: improving internal operations, enhancing collaboration, developing new products, and adjusting the activity mix.

Process upgrading involves improving internal processes to outperform competitors and achieve cost-effectiveness. This can be achieved through increased inventory turns, reduced waste, and improved delivery frequency and reliability (USAID, 2008). It also entails producing the same product more efficiently using new technologies or management techniques (Kaplinsky and Morris, 2002).

Product upgrading refers to introducing new products or improving existing ones faster than competitors. This includes changing processes for developing new products within individual links and between different links in the chain. Farmers can enhance their products by planting new varieties or transitioning to organic farming practices (Kaplinsky and Morris, 2002).

Functional upgrading involves changing the mix of activities performed within the value chain to increase value addition. This can include outsourcing accounting, logistics, and quality functions, or relocating activities to other links in the chain (Kaplinsky and Morris, 2002).

Chain or inter-sectorial upgrading occurs when firms enter new, often related industries. This happens when a company applies capabilities acquired in a particular function of the chain to a new sector (Gereffi *et al.,* 2003).

2.6.5. Multiple Linear Regression Model

Multiple linear regressions are an important statistical tool for investigating relationships between variables and determining the causal effect of one variable on another. It can be used to predict outcomes and describe functional relationships based on samples from a

population. In this study, multiple linear regression models were employed to identify factors influencing the volume of haricot bean seed supply to the market. Before fitting variables into the regression model, it is crucial to check for violations of assumptions such as heteroscedasticity, multicollinearity, omitted variables, and endogeneity. Endogeneity occurs when an explanatory variable is correlated with the error term, resulting in biased and inconsistent estimates. Tests like the Hausman test and Durbin-Wu-Hausman test can be used to examine endogeneity.

2.7. Determinant Factors for Market Supply

2.7.1. Factors affecting haricot bean seed market supply

Several factors have been identified as influential in the market supply of various agricultural products. For instance, Taye Melese *et al.* (2018) found that the age of the household head, distance to the nearest market, distance to the urban market, literacy level, contract farming, access to training, and extension services all have significant effects on market supply and participation.

Another study conducted by Solomon (2017) focused on the market supply of community-based Chickpea and Common bean in Abeshge and Sodo districts. Using a multiple linear regression model, Solomon found that district, level of education, seed farming experience, amount of seed produced, and frequency of extension contact all influenced market supply.

Tewodros (2014) undertook a study on the factors affecting the market orientation of chickpea and common bean. The study revealed that education levels of the household head, access to credit, and land size had a positive and significant effect on chickpea market orientation. However, being a female household head was found to be less market-oriented than male households in terms of chickpea crop. Additionally, the productivity of chickpea crops varied across different kebeles.

In another study by Mekdes *et al.* (2017), age and education level were found to have a positive and significant influence on the marketable supply of red pepper. Conversely, factors such as distance from the market, disease, and drought were found to have a negative and significant relationship with the volume of red pepper marketed in Abeshge Woreda.

These studies provide valuable insights into the importance of socio-economic factors in determining market supply. Nugusa Abajobir (2018) found that the amount of income received from off-farm activities, yield, sex of the household, farming experience, and family size significantly impact the supply of maize products to the market. The study conducted in the Horro Guduru Wollega zone revealed that an increase of one birr in off-farm income leads to a 1.404 quintal increase in maize supply. Similarly, a one-year increase in farming experience results in a 0.149 quintal increase in maize supply, and a one quintal increase in productivity leads to a 0.521 quintal increase in maize supply. Almaz Giziew (2018) also confirmed that the farm experience of onion producers has a positive influence on the quantity of onion market supply.

In Sultan Usman's study (2016), the quantity of the commodity produced, landholding size, number of livestock owned, and family size were identified as determinant factors influencing the amount of product supplied to the market. The study on wheat supply found that a one quintal increase in quantity produced leads to a 0.623 quintal increase in wheat supply. Additionally, a one-hectare increase in farmland size and a one TLU (Tropical Livestock Unit) increase in the number of livestock owned result in a 4.25 quintal and 0.37 quintal increase in wheat supply, respectively. However, as the household size increases by one, the wheat supply decreases by 0.05 quintal.

In the case of teff market supply, Tadie Marie and Lema Zemedu (2018) and Edosa Tadesa (2018) found a negative correlation between quantity of teff market supply and family size in studies conducted in the South Gondar zone and Horo Guduru Wollega zones. Another study conducted in Southern Ethiopia by Dagnayegbaw Goshme *et al.* (2018) revealed that the quantity of sesame market supply decreases by 0.24 quintal as the distance to the nearest market increases by a kilometer.

It is worth noting that no research has been conducted specifically on the community-based haricot bean seed value chain. Previous studies have primarily focused on breeding, production, and, to some extent, market participation. Although some studies have examined the value chain analysis of haricot bean and estimated the profit margins of marketing actors, they have not thoroughly analyzed the determinants factors of haricot bean seed supply and the profit margins of value chain actors in the study area.

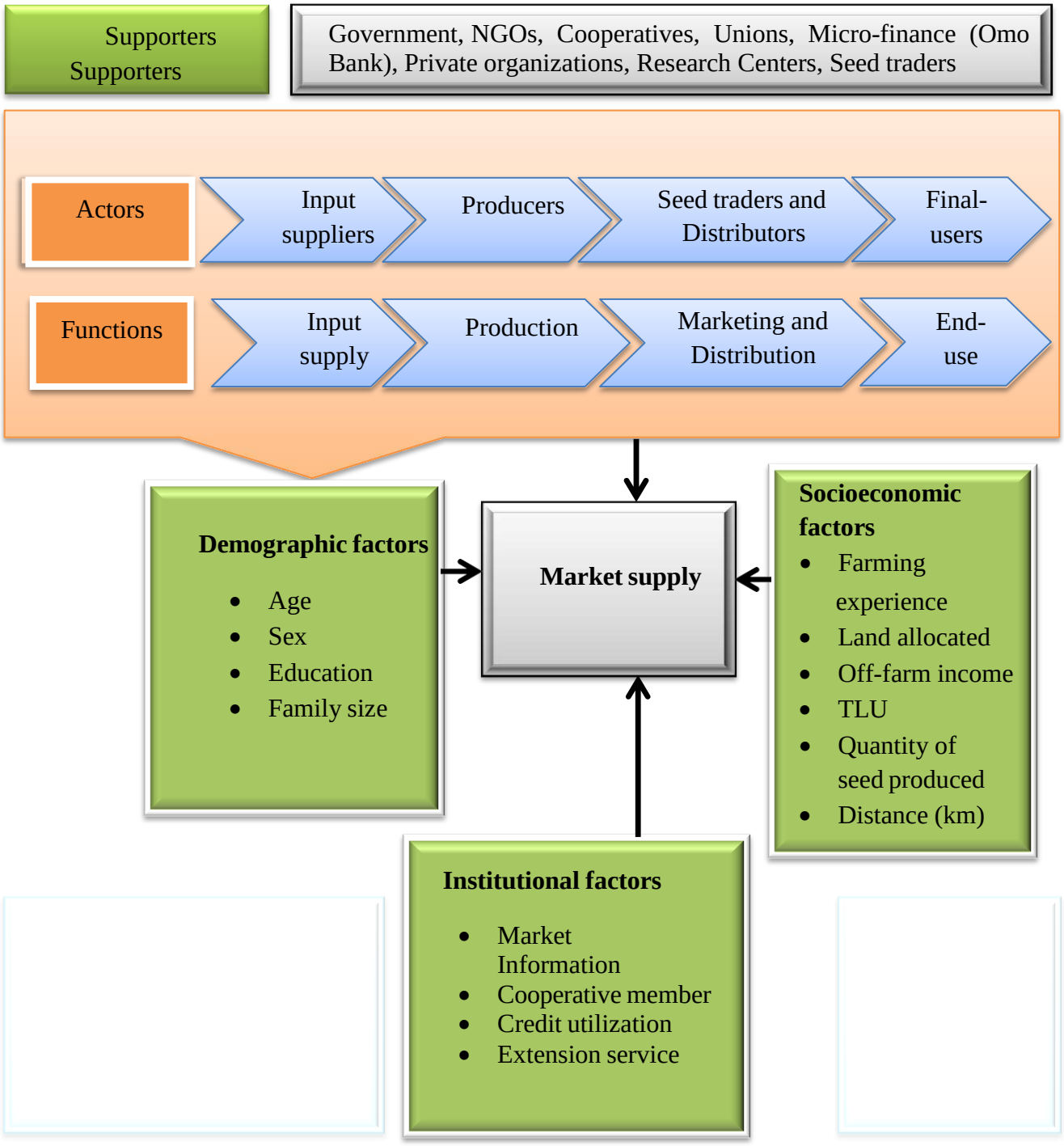
One study conducted in Boricha district in the Sidama Region during the 2017/18

production season identified the actors and factors affecting the volume of market supply, but it did not analyze the costs incurred and profit margin of each actor. This knowledge gap prompted the initiation of the current study, which aims to address these specific issues related to community-based seed production.

2.8. Conceptual Framework of the Study

In value chain analysis, multiple actors participate in the overall processes of production, marketing, consumption, and disposal (Porter, 1985). The process begins with input supply and progresses through production to the final stages. Additionally, there are support service providers, known as supporters, who have an indirect role in the value chain. The quantity of haricot bean seed market supply is influenced by the number and types of producers.

Demographic, socioeconomic, and institutional factors affect the volume of market supply and the fair distribution of benefits and profit shares among actors in the valuechain. To improve haricot bean seed production and the value chain in the study areas, it is necessary to identify the determinant factors for market supply and analyze the marketing margin of actors in the Bilate Zuria and Gimbo districts. When value chain analysis concepts align with the community-based seed production perspective, the value chain is seen as a network of actors, both horizontally and vertically integrated, collaborating to provide seeds to the market. Figure 2 visually illustrates the possible order of analysis for the community-based haricot bean seed production value chain in the study areas.



Source: Own sketch by reviewing related literature, 2023

Figure 2: Conceptual framework of the study

3. RESEARCH METHODOLOGY

This chapter focuses primarily on the research methodology employed in this study, encompassing the description of the study area, research design, data types and sources, sampling methods, as well as data collection and analysis techniques.

3.1. Description of the Study Area

The study was carried out in two districts, namely Bilate Zuria and Gimbo, which are recognized for their community-based haricot bean seed production. A comprehensive description of each district is provided below, highlighting their involvement in the multiplication and production of community-based haricot bean seeds.

3.1.1. Bilate Zuria District

Location: Bilate Zuria district is found in the Sidama National Regional State, approximately 48 km away from the regional capital, Hawassa. It is renowned as the largest area for haricot bean seed multiplication and production in the Sidama region. The district shares its boundaries with Hawassa Zuria and Siraro districts to the North, Darara district to the South, Boricha district to the East and Wolayaita Zone, Dugana Fango district to the West. Geographically, it extends from coordinates $6^0 46^{\cdot\cdot}$N and $38^0 04^{\cdot\cdot}$E to $7^0 01^{\cdot\cdot}$N and $38^0 24^{\cdot\cdot}$E.

Population and Topography: Administratively, the district is divided into 17 rural and 2 urban Kebeles. According to the BZDOA (2021) report, the total population of the district is 173,155 with 84,184 males and 88,971 women. The altitude ranges between 1700 and 2000 m. a. s. l and the area is characterized by a combination of lowland (22%) and midland (78%) agroecological zones.

Climate and Growing Seasons: Bilate Zuria district experiences an average annual rainfall ranging between 1900-2200 mm, with temperatures varying between 28-33°C. The rainfall follows a bimodal pattern, occurring during two distinct growing seasons: the belg growing season (from March to May) and the *kiremt* growing season (from June to August). The belg season is dedicated to land preparation and planting of crops such as maize, *enset*, and potato, while the *kiremt* season is for the cultivation of crops like *enset*, potato, and sweet potato.

The main crops grown in the area are haricot beans and maize. The district predominantly has silt and loam soil types, which are conducive to agricultural production. Small-scale farming is the primary livelihood in the Bilate Zuria district, with cattle being the most common livestock, followed by goats, sheep, donkeys, and horses. The district practices mixed agriculture, involving both crop and livestock production.

3.1.2. Gimbo District

Also, the study was conducted in the Gimbo district, found in the Kaffa Zone of the South West Ethiopia People's Regional State. This region was established on November 23, 2021, following a referendum that resulted in its separation from the SNNPR State. The district is located 18 km away from Bonga, the regional town. The Gimbo district shares borders with the Shebe district in the Jimma Zone to the Southwest, the Decha district to the North, the Adiyo District to the Northwest, and the Gewata district to the Southeast.

Demographically: the district has a total population of 117,588 individuals, with 58,559 men and 50,059 women. The majority of the population resides in rural areas, while urban inhabitants number only 13,438. In terms of households, the district has a total of 12,311, with 10,942 being led by men and 1,369 headed by women (GDOA, 2023).

Geographically: the Gimbo district consists of 36 kebeles and covers a vast area of 88,129 hectares. The land within the district is allocated for various uses: 1,064 hectares for arable land, 28,240 hectares covered by forests, 30,531 hectares for permanent crops, 10,177 hectares for annual crops, 855 hectares serving as grazing land, 7,257 hectares designated as wetlands, and 1,259 hectares occupied by private plantation forests.

Economically: agriculture plays a crucial role in the district as the primary source of income for the majority of rural households. The Gimbo district cultivates various significant crops, including maize, pepper, coffee, haricot beans, finger millet, sorghum, rice, and tea.

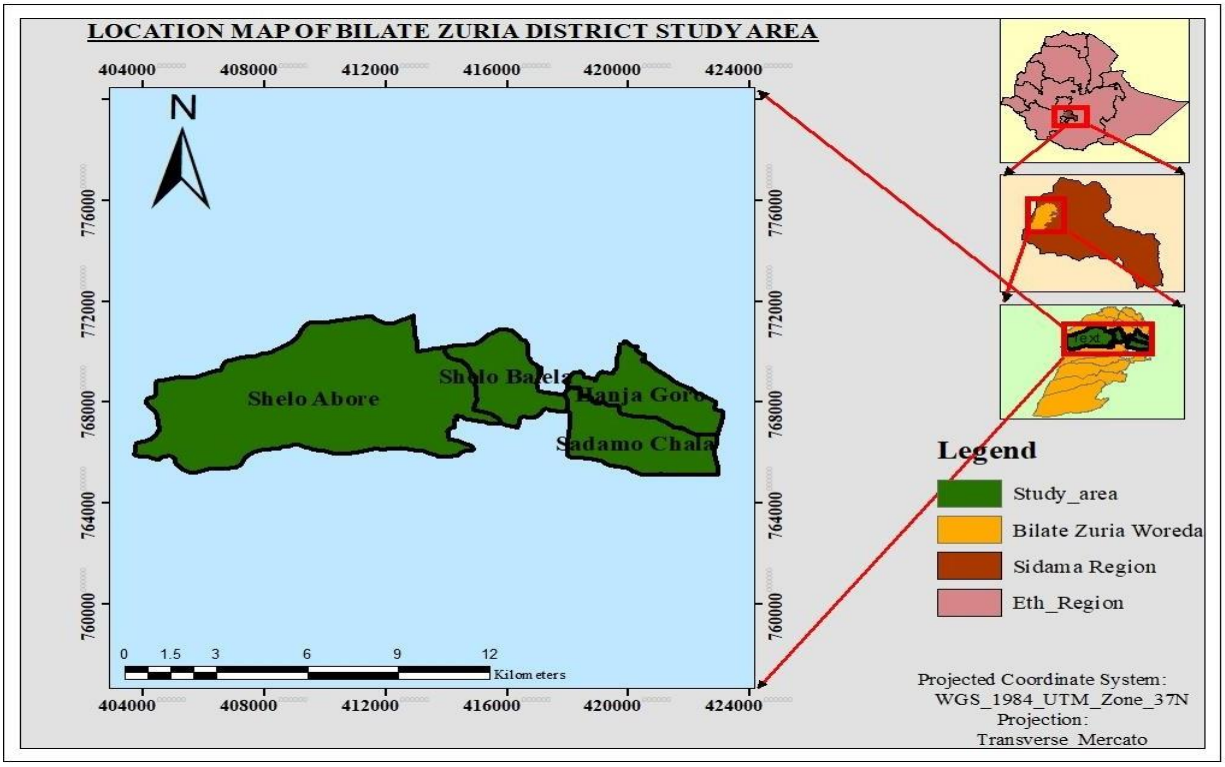


Figure 3: Bilate Zuria district Study area

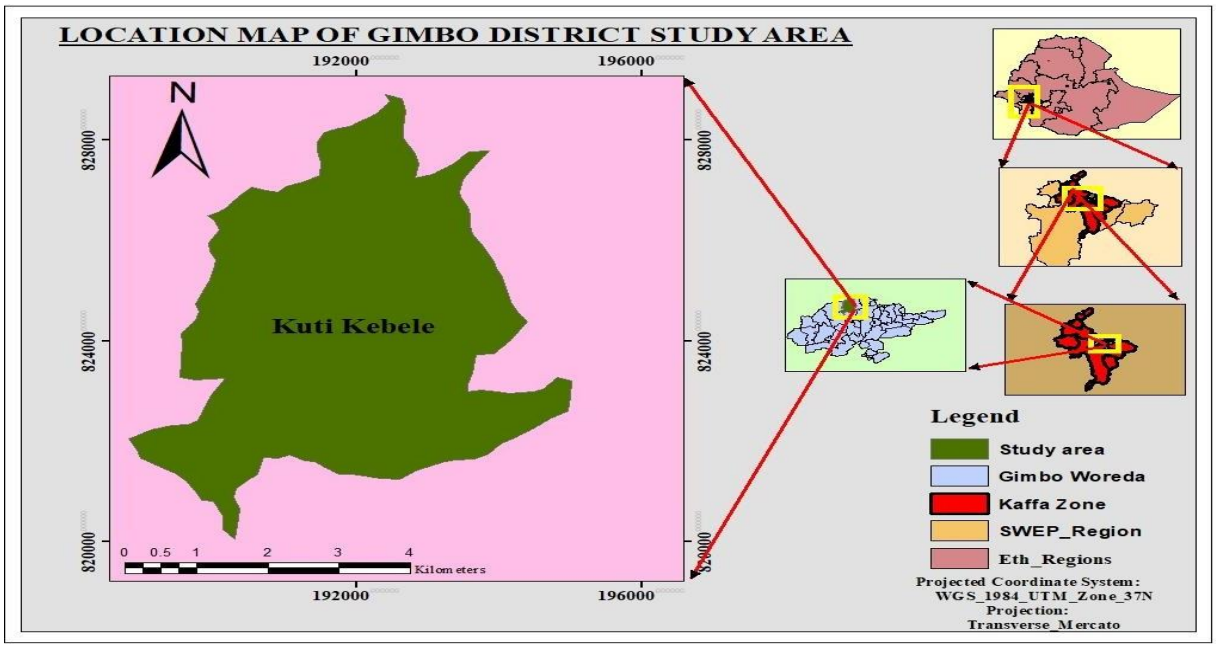


Figure 4: Gimbo district Study area

Source: ArcGIS Version 10.1, 2023

3.2. Research design

The study utilizes a cross-sectional study design that incorporates both qualitative and quantitative approaches, making it a non-experimental design. This design allowed for data collection at a specific point in time, specifically during the 2014 E.C. crop production season, capturing a snapshot of the respondents' lives. The main purpose of employing this design was to estimate prevalence rather than investigate cause-effect relationships.

3.3. Reliability Analysis

To ensure accurate responses, the questionnaire's reliability was conducted. Separate questionnaires were prepared for haricot bean seed producers and seed traders. Trained enumerators with plant science degrees and socio-economic survey experience collected the data. A pretest was conducted, and adjustments were made based on the results. Final data collection was supervised to ensure accuracy by researcher. The reliability of the scale was evaluated by calculating Cronbach's alpha coefficient (Spiliotopoulou, 2009). A higher coefficient suggests higher reliability. The quantities of haricot bean seeds sold exhibited strong reliability (α= 0.864 for Bilate Zuria district and α = 0.844 for Gimbo district), meeting the accepted threshold of 0.7 or above (Cronbach, 1951; George and Mallery, 2003).

Table 3.2: Reliability Statistics

	Bilate Zuria	Gimbo	
Variable	Cronbach's Alpha		The number of items
Volumes of haricot bean seed sold	0.864	0.844	25

Source: Own survey result, 2023

3.4. Types of Data and Sources

Both qualitative and quantitative data from primary and secondary sources were used in this study. Primary data was obtained from the field through the administration of semi-structured questionnaires and personal observations, while secondary sources include published and unpublished resources such as research dissertations, journal articles, textbooks, and government agencies. Formal surveys were conducted to gather the

information necessary to accurately identify and address the research problem in the study area.

In addition to the survey, Key Informant Interviews were conducted to gather data from various stakeholders involved in each stage of the seed value chain. Furthermore, focused group discussions were carried out to identify and understand the different actors involved in the haricot bean seed value chain within the study areas.

3.5. Sampling Procedure and Sample Size Determination

To ensure the selection of a representative sample, a multi-stage sampling technique was employed for the identification of community-based haricot bean seed producer kebeles and sample households. In the first stage, in consultation with development agents from the Bilate Zuria and Gimbo districts, kebeles were purposefully identified. From a total of 19 kebeles in Bilate Zuria, and 36 kebeles in Gimbo district,[1] taking into consideration the community-based seed producer kebeles, a selection was made. In the second stage, a random selection was applied to choose four sample kebeles from Bilate Zuria district, while in Gimbo district, the only community-based haricot bean seed producer kebele was selected as a cluster (they have been producing seed a group of a cluster). In the third stage, community-based seed producers were distinguished from non-community-based haricot bean seed producers within the sampled kebeles. In the fourth stage, household participants were selected from prearranged lists using simple random sampling, based on the Probability Proportionate to Size (PPS) principle, which was employed to distribute the number of respondents among the four haricot bean seed-producing kebeles. Consequently, a total of 228 community-based haricot bean seed producers were randomly selected from the identified group. These included Sadamo Chala, Hanja Goro, Shelo Balela, and Shelo Abore from Bilate Zuria district, and Kuti Kebele from Gimbo district.

[1] In the Gimbo district, the production of the community-based haricot bean seed is primarily concentrated in a single kebele called Kuti. Consequently, the district was purposefully selected for the study, while households within the district were chosen randomly.

The Yamane (1967) formula was utilized to determine the sample size for this study. This formula is applicable in situations where the total population size is known or can be estimated. In the case of haricot bean seed production, the household size in the specific areas (Bilate Zuria and Gimbo districts) was known to be 287 and 70, respectively. Given that the majority of farmers in the Bilate Zuria district are involved in haricot bean seed production and share similar agro-ecological conditions, a similar situation exists in the Gimbo district, where there is not a significant degree of variability among farmers in terms of haricot bean seed production.

In light of this similarity, the researchers employed a formula with a precision level of 5% to calculate the required sample size. The formula is as follows:

$$n = \frac{N}{1+(e2)N} \qquad \text{(Equation 1)}$$

In this formula, N represents the total population size. The level of precision is representedby e, and n represents the total sample size (Table 3).

For this specific study, a precision level of e = 0.05 and a 95%confidence level were used. The population sizes for Bilate Zuria and Gimbo districts were 287 and 70, respectively.

Since the population size is known, for the Bilate Zuria district, the required sample size was calculated as n = 287 / (1 + (0.05^2) * 287) ≈ 168. After calculating the sample size, the Probability Proportionate to Size (PPS) principle was applied (Table 3). For the Gimbo district, the required sample size was calculated as n = 70
/ (1 + (0.05^2) * 70) ≈ 60.

Table 3.3: The sample size of the study kebeles and the number of households

Study district	Study kebeles	Total seed producing Farmers	Sample respondents by PPS
Bilate Zuria	Sadamo Chala	72	42
	Hanja Goro	68	40
	Shelo Balela	73	43
	Shelo Abore	74	43
	Total	**287**	**168**
Gimbo	Kuti	70	60
	Grand Total	**357**	**228**

Source: Computation from the agricultural offices of Bilate Zuria and Gimbo districts, 2023

Consequently, a total of 228 seed-producing farmers were selected using a simple random sampling technique. This involved employing a lottery method to choose each sample from the sampling frame. It is important to note that, as all respondents provided complete responses without any non-response. Therefore, no invalid data needed to be included as compensation. The collection of quantitative primary datawas conducted from these 228 respondents, who represented a subset of the 357 total haricot bean seed producers in the five sampled kebeles. The primary data collection took place between January 01 and February 10, 2023, and involved the active participation of these selected respondents from the five kebeles.

In addition to seed producers; 12 seed collectors, Kayo cooperative from Bilate Zuria, Cooperative for cereal crop seeds from Gimbo district, Sidama Elto cooperatives union and 16 final-users or haricot bean producers were interviewed. To take sample representative sample from those actors, the snowball sampling method was used.

Table 3.4: Distribution of representative sample

Data source	Number of producers in sample kebeles		Sample size		Out of Districts	Total sample size
	Bilate Zuria	Gimbo	Bilate Zuria	Gimbo		
Producers	287	70	168	60	-	228
Collectors			8	4	-	12
Cooperatives			1	1	-	2
Elto Union			-	-	1	1
Final-users			10	6	-	16
Total	**287**	**70**	**187**	**71**	**1**	**259**

Source: Computation performed using data from the agricultural offices of Bilate Zuria and Gimbo districts, 2023

3.6. Methods of data collection

Darko-Koomson et al. (2020) employed a diverse set of data collection methods to successfully meet the study's objectives. These methods encompassed the utilization of questionnaires, key informant interviews, and Focus Group Discussions. Furthermore, a comprehensive review of pertinent literature was undertaken to supplement the data gathered for the study.

3.7. Methods of Data Analysis

Three distinct data analysis methods, namely descriptive statistical analysis, econometric analysis, and marketing margin analysis, were employed to analyze the primary data using software packages such as STATA (version 16) and SPSS (version 27). Data were cleaned, organized using SPSS and analyzed using STATA.

3.7.1. Descriptive statistical analysis

Various descriptive statistics, such as mean, percentage, maximum, minimum, frequency, and standard deviation, were utilized for analysis.

3.7.2. Value chain analysis

As products progress through different stages, there are interactions between multiple actors in the value chain, involving the exchange of money and information. In line with the approach outlined by Kaplinsky and Morris (2002), this study applied four steps of value chain analysis. The first step involved mapping the value chain to gain insight into the characteristics of the chain actors and their relationships. The second step focused on analyzing the distribution of benefits or costs and market margin among the actors in the chain. The third step involved identifying areas of upgrading required within the chain. Finally, the fourth step of the analysis highlighted the governance role within the chain**.**

3.7.3. Analysis of cost and market margin

The marketing margin was calculated by taking the difference between haricot bean seed producers' prices and retail prices (Tegegn, 2013). This was calculated mathematically as theratio of producers' price to consumers' price as expressed in equation 2.

$$\text{Producers Share} = \frac{\text{Producer price}}{\text{Consumer price}} = 1 - \frac{\text{Marketing margin}}{\text{Consumer price}} \quad \text{(Equation 2)}$$

Computing the Total Gross Marketing Margin (TGMM) is always related to the final price paid by the end buyer and is expressed as a percentage (Mendoze, 1995).

$$\text{TGMM} = \frac{\text{Consumer Price} - \text{Producer price}}{\text{Consumer Price}} * 100 \quad \text{(Equation 3)}$$

Where, TGMM = Total Gross Marketing Margin

Net Marketing Margin (NMM) is the percentage of the final price earned by the intermediary as his income; once his/her marketing costs are deducted.

$$\text{NMM} = \frac{\text{Gross Marketing Margin} - \text{Marketing Costs}}{\text{Consumer Price}} * 100 \quad \text{(Equation 4)}$$

To find the benefit share of each actor the same concept was applied with some adjustments. In analyzing margins, first, the Gross Marketing Margin (GMM) was

calculated. This is the difference between the producer's price and the consumer's price (the pricepaid by the final user).

Gross Marketing Margin will be computed as:

$$GMM = \frac{\text{Consumer Price} - \text{Marketing Gross Margin}}{\text{Consumer Price}} * 100 \quad \text{(Equation 5)}$$

Table 3.5: Summary of Research Methodology

Research objectives	**Data types**	**Data collection methods**	**Data analysis**	**Model used**
Mapping of value chain actors	Demographic & Socio-economic	KIIs & FGDs	Descriptive	
Marketing margin Analysis	Socio-economic	Structured interview schedule	Marketing margin analysis	
Determinants of haricot bean seed supply to Market	Demographic & Socio-economic	Interview schedule KIIs & FGDs	Descriptive & Econometric	Multiple linear regression with Robust.Std.Err
Opportunities & Constraints		KIIs & FGDs		

Source: Author's modification from Delele et al. (2022)

3.7.4. Econometric analysis

The following is a specified econometric model that is valuable for analyzing the factors that influence the supply of haricot bean seeds to the market.

Factors influencing the supply of haricot bean seed in the market: it is appropriate to use the Ordinary Least Squares (OLS) model when all households or respondents participate in the marketing of the commodity. However, if not all participants are involved in the marketing, excluding non-participants from the analysis using the OLS model can

introduce selectivity biases. In such cases, it is recommended to use alternative methods like Tobit, Double-Hurdle, and Heckman's two-stage procedures to address this issue. If the focus is on analyzing the probability of agricultural products selling, Probit and Logit models can be utilized to address these concerns.

In the districts of Bilate Zuria and Gimbo, the majority of farmers in 5 kebeles are involved in producing haricot bean seed for selling purposes rather than for direct consumption. To examine the factors that influence the supply of haricot bean seed in these study areas, a multiple linear regression model was employed. This choice was made because the volume of haricot bean seed supplied to the market is a continuous variable, and all sampled respondents in the study were engaged in producing and selling their haricot bean seed during the 2022/23 cropping season. According to Hanson (2010), the study presents the specification of multiple linear regression models in both the general form and the specific form as follows:

Hanson (2010) presents a multiple linear regression model to analyze the factors influencing the supply of haricot bean seed in the market. The general form of the model is expressed as follows:

$$Y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_k x_k + \varepsilon_i \qquad \text{(Equation 6)}$$

In this equation, Yi represents the quantity of haricot bean seed supplied to the market by the i-th seed producer in the 2022/23 period. The β coefficients (β_0, β_1, β_2, ..., β_k) are the parameters to be estimated by the model, and x_1, x_2, ..., x_k represent the independent variables. The error term εi accounts for unobserved factors that might affect the quantity of haricot bean seed supplied by each producer.

The specific form of the model is given by:

$$Y = \beta_0 + \beta_1 SEX + \beta_2 AGE + \beta_3 EDLEVEL + \beta_4 DISTANCE + \beta_5 SFExp + \beta_6 FAMSZ + \beta_7 LANDSZ + \beta_8 QUPROD + \beta_9 MKTCOST + \beta_{10} TLU + \beta_{11} OFFNONFAM + \beta_{12} CREDIT + \beta_{13} COOPMEMB + \beta_{14} FEXTCONT + \beta_{15} MKTINFN + \varepsilon \qquad \text{(Equation 7)}$$

In this equation, Y represents the quantity of haricot bean seed supplied, and each β coefficient represents the effect of the corresponding independent variable on the volume supplied. The independent variables include SEX, AGE, EDLEVEL, DISTANCE, SFExp,

FAMSZ, LANDSZ, QUPROD, MKTCOST, TLU, OFFNONFAM, CREDIT, COOPMEMB, FEXTCONT, and MKTINFN. The error term ε captures unobserved factors affecting the quantity of haricot bean seeds supplied.

The multiple linear regression models were estimated using Ordinary Least Squares. The OLS method assumes that the disturbance terms follow an independent and normal distribution with a mean of zero and constant variance. The explanatory variables are assumed to be non-stochastic and not perfectly linearly correlated with each other (Gujarati, 2002). Diagnostic tests, including tests for multicollinearity, heteroscedasticity, and normality, were conducted to assess the validity of the model. The model's fitness was evaluated using the coefficient of determination and F-test. Multicollinearity was assessed using the Variance Inflation Factor (VIF), while heteroscedasticity and omitted variables were checked using the Breusch-Pagan/Cook-Weisberg and Ramsey regression specification-error test, respectively.

3.8. Dependent and independent variables definition

In the case of identifying factors influencing haricot bean seed supply to the market, the main task is exploring which factors potentially influence the dependent variables. Therefore, the following dependent and independent variables are hypothesized in this study.

3.8.1. Dependent variable

The volume of haricot bean seed supplied to the market (VHBSOLD): is a continuous variable that represents the dependent variable. This variable quantifies the amount of haricot bean seed that households supply to the market, and it is measured in quintals, which is equivalent to 100 kilograms**.**

3.8.2. Definition of the variables and their a priori expectation

The identification of independent variables in this study was guided by relevant literature and widely accepted theory. Consequently, demographic, socio-economic, and institutional factors that impact the supply of haricot bean seeds in the market were identified. As a result, the following 15 explanatory variables are expected to influence the dependent variable:

Sex household (SEX): which has been assigned as a dummy variable with a value of 1 representing a male-headed household and 0 representing a female-headed household, it is observed that being a male head of a household exerts a positive and significant influence on the ability to sell surplus teff, as reported by Nitsuh in 2019. Consequently, this suggests that maleness has a similarly positive and significant impact on the supply of haricot bean seeds in the market.

Age of household (AGE): is measured in years and has been recognized in various studies as a factor influencing agricultural production (Wacal *et al.,* 2021; Belayneh *et al.,* 2022). Sani *et al.* (2014) suggest that increased age among producers leads to greater experience. As a result, age will have a positive relationship with output, as it significantly influences farmers' decision-making processes and adoption of improved technology.

Education level (EDLEVEL): is important for farmers to understand and evaluate information related to managing their value chain activities. According to a study conducted by Evangilin *et al.* (2020), educated sesame producers tend to achieve higher output compared to their counterparts with limited education. Therefore, it is hypothesized that education has a significant and positive impact on the volume of haricot bean seed supplied to the market.

Market distance (DISTANCE): The distance in kilometres between home and the closest market is a continuous variable. The quantity that is given to the market decreases when households' houses are farther apart (Melaku and Ashalatha, 2016). Therefore, it is assumed that market distance has a negative impact on the volume of haricot bean seed supplied to the market.

Seed farming experience (SFExp): It refers to the number of years the farmers have been involved in haricot bean seed cultivation. Farming experience is expected to influence output positively because increased farming experience enables farmers to make effective farm management decisions concerning input combination or resource allocation (Soviadan *et al.,* 2021).

Family size (FAMSZ): is a continuous variable that infers the number of family members per household head. Tanko (2017) states that the size of a household is primarily influenced by the farmers' status, particularly the number of wives they have. Larger

households are advantageous for labour-intensive activities in haricot bean seed production, such as land preparation, weeding, and harvesting. However, larger households may also prioritize their own food needs, potentially affecting the market supply of haricot beans. Usman (2016) found that for each incremental increase in family size, the market availability of wheat decreased by 0.005 tons. Therefore, family size is expected to have either a positive or negative impact on the availability of haricot bean seeds in the market (Tanko, 2017; Usman, 2016).

Land allocated for haricot bean seed (LANDSZ): This refers to the area of land which is measured in hectares. The area planted is a continuous variable that can influence the output of the production. Thus, haricot bean seed producers who plant in large areas are expected to have a higher output than those who plant in small areas. Land size is expected to be positively related to haricot bean seed output following the research of (Dossa *et al.,* 2023; Wana and Sori, 2018).

The Quantity of haricot bean seeds produced (QUPROD): would have been a continuous variable that would have inferred the amount of haricot bean seeds produced in quintals per hectare during the 2022/23 production seasons. It would have been positively correlated with the supply of sesame on the market (Gebremedhn *et al.,* 2019). Therefore, it would have been hypothesized that the quantity of haricot bean seeds produced could have had a positive and significant effect on the volume of its market supply.

Marketing costs (MKTCOST): is a continuous variable that quantifies the marketing costs to supply haricot bean seed to the market. It is hypothesized that marketing costs have a negative effect on the volume of haricot bean seed market supply.

The ownership of livestock (TLU): is a continuous variable that indicates the quantity of livestock owned by households. When there is an increase in number of livestock owned by a household, it can potentially lead to either an increase or a decrease in the volume of haricot bean seed supplied to the market. According to Shimelis (2021), households are increasing their grazing land while decreasing the amount of land dedicated to wheat production. These findings suggest that the ownership of livestock may have both positive and negative effects on the volume of its market supply. Based on these findings, it can be hypothesized that the ownership of livestock could have either a positive or negative effect on the volume of its market supply.

Off-non/farm income (OFFNONFAM): It has been set as a dummy variable (1 for farmers who participated in off-non/farm income activities and 0 otherwise). According to Delele et al. (2022), when farmers have access to additional sources of income beyond their agricultural activities, it enhances their purchasing power for various agricultural inputs. As a result, this leads to a further increase in production surplus, enabling them to supply more outputs to the market. Therefore, it is hypothesized that off-non/farm income can have a positive influence on the volume of haricot bean seed market supply.

Access to credit (CREDIT): It has been set as a dummy variable, with a value of 1 assigned to farmers who accessed credit services and 0 assigned to those who did not. When farmers have the ability to borrow in full, it enhances their capacity to produce surplus haricot bean seeds for marketing purposes (Ali and Awade, 2019). In line with this, the researchers proposed that the availability of credit access may positively influence the quantity of haricot bean seed available on the market.

Cooperative membership (COOPMEMB): It has been set as a dummy variable (1 for a cooperative membership and 0 for non-membership). There is a positive correlation between cooperative membership and supply on the market, as evidenced by A. W. Belayneh *et al.* (2022). Therefore, it is hypothesized that cooperative membership has a positive and significant impact on the volume of haricot bean seed market supply.

The frequency of extension contact (FEXTCONT): is a continuous variable that measures the number of times haricot bean seed producers interact with development agents for extension services. Therefore, it is hypothesized that contact with development agents positively influences a farmer's haricot bean seed supply to the market.

Access to market information (MKTINFN): is a dummy variable with a value of 1 indicating that the farmer had access to market information, and a value of 0 indicating the absence of such access. Smallholder producers, due to their limited access to market information, face challenges in producing surplus outputs for the market (Wondim and Desselgn, 2019). Therefore, the availability of market information positively and significantly influences the volume of haricot bean seed market supply.

Table 3.6: Description of independent variable and hypothesis in the MLR model

Variables	Acronym	Type	Measurement (Value)	A priori Expectation
Volume HBSold	VHBSOLD	Continuous	Quintal	
Sex of HH	SEX	Dummy	1= Male, 0= Female	+/-
Age HH	AGE	Continuous	Years	+/-
Education level	EDLEVEL	Continuous	Year of Schooling	+
Market distance	DISTANCE	Continuous	Kilometre	-
Seed experience	SFExp	Continuous	Years	+
Family size	FAMSZ	Continuous	Person	+/-
Landholding	LANDSZ	Continuous	Hectare	+
Quantity Produced	QUPROD	Continuous	Quintal	+
Marketing cost	MKTCOST	Continuous	Ethiopian Birr	-
Livestock owned	TLU	Continuous	TLU	+/-
Off/non-farm inc	OFFNONFAM	Dummy	1= Yes, 0= No	+
Access to credit	CREDIT	Dummy	1=Access, 0=No	+
Coops. Mem.ship	COOPMEMB	Dummy	1=Yes, 0= No	+
Extension contact	FEXTCONT	Continuous	Frequency	+
Market information	MKTINFN	Dummy	1= Yes, 0= No	+

Source: Variable selection based on the relevance to the research question, 2022

4. RESULT AND DISCUSSIONS

This chapter presents the study findings, divided into five sections. The first section describes the sample households and their demographics. The second section discusses the value chain and governance structures. The third section analyzes the performance of the haricot bean seed value chain. The fourth section presents empirical results from a linear regression model. The fifth section highlights constraints and opportunities in community-based seed production and marketing.

4.1. Descriptive Results

4.1.1. Demographic, Socioeconomic, and institutional factors of the respondents

Regarding the sex of the household head, in the Bilate Zuria district, 95.8% were male-headed households and only 4.2% were female-headed households. In Gimbo district, 86.67% were male-headed households and 13.33% were female-headed households. In terms of marital status, in the Bilate Zuria district, 95.8% of the sample respondents were married and 4.2% were widowed. In the Gimbo district, all (100%) of the haricot bean seed producers were married. In both districts, only 15.48% and 13.33% of respondent farmers engage in off-farm activities for additional income, while the majority (84.52% and 86.67%) solely rely on their farms for income. This suggests that households in the study areas have limited experience with off-farm activities. Additionally, during the survey period, 22.62% and 6.67% of farmers reported having access to market information, while the vast majority (77.38% and 93.33%) did not in both districts, respectively. Surprisingly, 94.64% of farmers in Bilate Zuria reported having access to credit, but coordination with the relevant body is necessary. In contrast, only 13.33% of farmers reported having access to credit. Furthermore, 34.52% and 18.33% of farmers are members of cooperatives in both districts, respectively. Overall, there are some notable differences between the two districts in terms of sex distribution, access to market information, access to credit, and cooperative membership. However, both districts have a high percentage of married respondents and a low participation rate in off-farm activities.

Table 4.7: Demographic and institutional characteristics of sample households (dummy variables)

Variables	Category	Bilate Zuria (N=168)		Gimbo (N=60)	
Sex		Freq.	Percent	Freq.	Percent
	Female	7	4.2	8	13.33
	Male	161	95.8	52	86.67
Marital status	Married	161	95.8	60	100
	Widowed	7	4.2	-	-
Off-farm or non-farm participation	Yes	26	15.48	8	13.33
	No	142	84.52	52	86.67
Access to market Information	Yes	38	22.62	4	6.67
	No	130	77.38	56	93.33
Access to credit	Yes	159	94.64	8	13.33
	No	9	5.36	52	86.67
Cooperative Membership	Yes	58	34.52	11	18.33
	No	110	65.48	49	81.67

Source: Primary Data, 2023

According to Table 8, the average age of households in Bilate Zuria and Gimbo districts was 40.88 and 43.85 years, respectively. The average farming experience in haricot bean seed cultivation was 8.10 years in Bilate Zuria and 5.62 years in Gimbo Districts. The mean distance from farmers' homesteads to the market was 6.67 km in Bilate Zuria and 9.68 km in Gimbo district, indicating need for cooperative establishment. The average quantity of haricot bean seed produced was 10.31 qt in Bilate Zuria and 8.93 qt in Gimbo district. Furthermore, the mean marketing cost was 76.38 birr in Bilate Zuria and 85.50 birr in Gimbo district. The average family size of the respondents was 6.08 persons in Bilate Zuria and 5.87 persons in Gimbo Districts. On average, 1.33ha and 1.20ha of land were allocated to community-based haricot bean seed production in the Bilate Zuria and Gimbo districts, respectively. The mean level of education for household heads was found to be 4.21 schooling years in Bilate Zuria and 4.43 years in Gimbo districts. In terms of livestock ownership, the average number of Tropical Livestock Units (TLU) was 6.04 in Bilate Zuria and 5.40 in Gimbo districts. Additionally, farmers in Bilate

Zuria had an average of 11.64 days of contact with extension agents, while in Gimbo districts, the average was 8.27 days. These findings indicate positive progress in the provision of agriculture extension services.

Table 4.8: Demographic, socio-economic, & institutional characteristics of respondents (continuous variable)

Variables	Category	Bilate Zuria (N=168)		Gimbo (N=60)	
Age (year)	Mean(std.dev)	40.88(7.37)		43.85(5.55)	
	Min & Max	27	60	35	56
Family size (person)	Mean(std.dev)	6.08(1.73)		5.87(1.66)	
	Min & Max	3	8	5	12
Seed farming experience (year)	Mean(std.dev)	8.10(1.03)		5.62(0.90)	
	Min & Max	5	10	4	7
Land allocated to seed (ha)	Mean(std.dev)	1.33(0.35)		1.20(0.40)	
	Min & Max	0.5	2	0.5	2.75
Education (year)	Mean(std.dev)	4.21(2.23)		4.43(2.05)	
	Min & Max	1	10	0	8
Distance (km)	Mean(std.dev)	6.67(4.68)		9.68(2.51)	
	Min & Max	3.75	15	5	14
Quantity of seed produced (Qt)	Mean(std.dev)	10.31(2.14)		8.93(1.74)	
	Min & Max	5	15	5	12
TLU	Mean(std.dev)	6.04(1.98)		5.40(1.46)	
	Min & Max	3.5	13	3.04	9.34
Marketing costs (Birr)	Mean(std.dev)	76.38(48.46)		85.50(38.65)	
	Min & Max	50	246	32	170
Extension contact (frequency per year)	Mean(std.dev)	11.64(5.43)		8.27(2.67)	
	Min & Max	4	17.3	3	12

Source: Primary Data, 2023

4.1.2. Seed production, distribution, and marketing overview

In the 2022/23 cropping season, sample households in Bilate Zuria and Gimbo districts produced 890.05 qt and 280.75 qt of haricot bean seed, respectively. The average quantities per hectare were 10.31 quintals in Bilate Zuria and 8.93 quintals in Gimbo, falling short of the national productivity of 17.13 quintals (CSA, 2021/22). Factors hindering productivity included low use of improved seed, late delivery, high input costs, limited fertilizer use, and improper agronomic practices. This aligns with the findings of Afework Hagos and Adam Bekele (2018). Survey results show that the majority of the seed went to the market (95.39% in Bilate Zuria and 74.80% in Gimbo); while a small percentage was consumed locally or reserved for the next season's production (1.58% and 20.57% for consumption, and 3.03% and 4.63% for seed reserve, respectively) (Figure 2).

In Bilate Zuria, the majority of sample respondents (83.3%) produce Hawassa Dume, while smaller percentages produce Ibado (10.7%) or both varieties (6%). In Gimbo District, the majority of sample households (71.7%) produce Hawassa Dume, with smaller percentages producing Tatu (18.3%) or both varieties (10.0%) (Figure 2). On average, haricot bean seed productivity is higher in Bilate District compared to Gimbo district. This difference may be attributed to variations in agro-ecology, natural resources, access to inputs, and production potential.

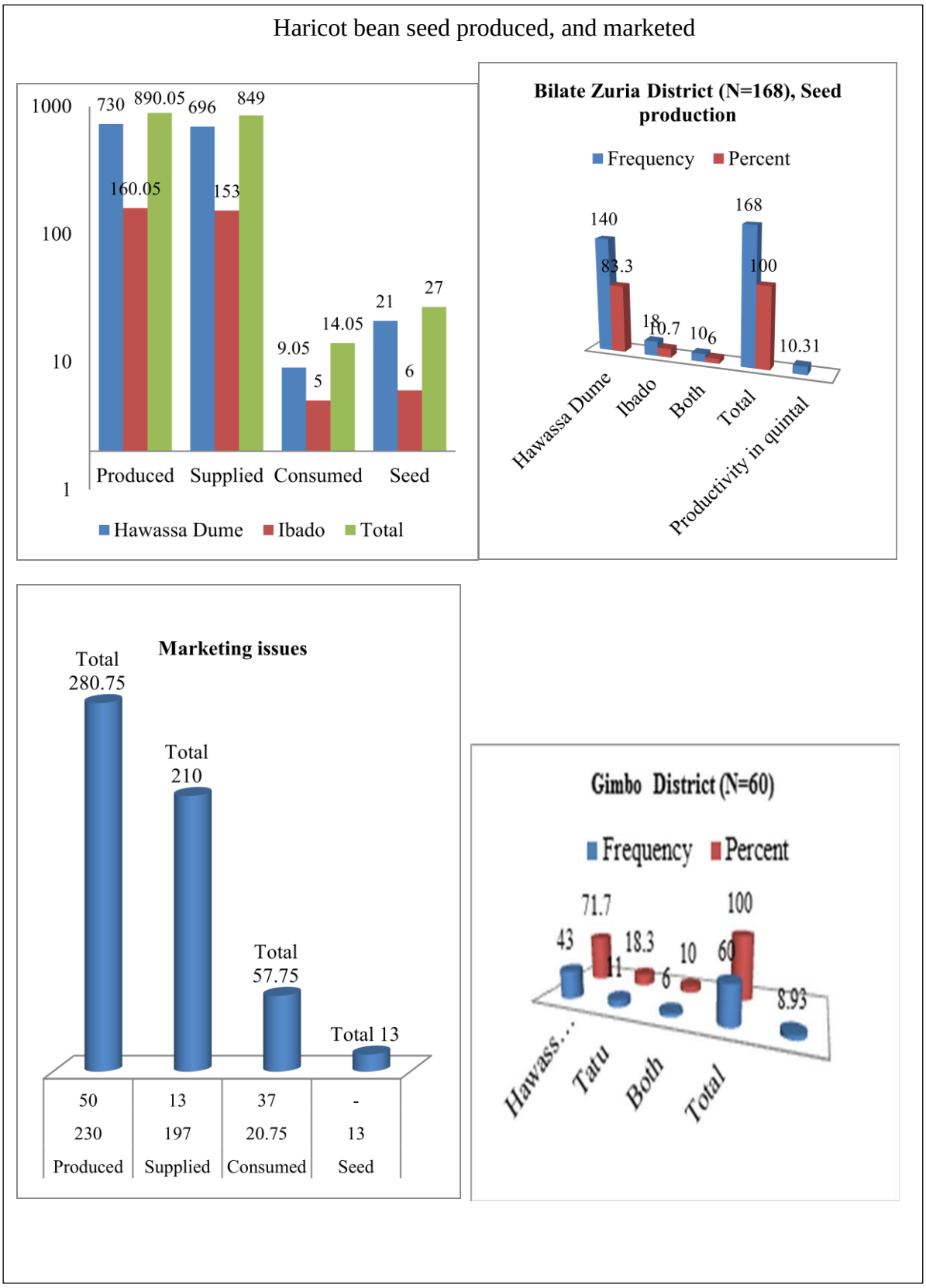


Figure 5: Varieties produced and marketing of seed in Bilate Zuria and Gimbo Districts

Source: Own survey result, 2023

4.1.3. Primary sources of income for respondents

The survey results reveal that the sampled household heads in Bilate Zuria and Gimbo districts had an average annual income of 13,403.9 ETB and 10,497.8 ETB, respectively, from crop production, excluding haricot bean seeds. Additionally, this finding highlights the significance of crop production as a major source of income in both districts.

Furthermore, the average annual income derived from the sales of haricot bean seeds was 7,701.50 ETB and 5,227.50 ETB in Bilate Zuria and Gimbo districts, respectively. Moreover, the average incomes derived from livestock production, specifically the sales of livestock, were 3,962.2 ETB and 4,195 ETB in the Bilate Zuria and Gimbo districts, respectively. On average, household heads obtained 1,303 ETB and 1,034.2 ETB per year from off-farm/non-farm income. From this, it can be inferred that the sale of haricot bean seeds served as an additional source of income, ranking second in terms of average income according to Table 9.

Table 4.9: The primary sources of income for the respondents' households

	Bilate Zuria district (n=168)		**Gimbo district (n=60)**	
Source of income	Mean	Std. Dev	Mean	Std. Dev
Sales of crops, excluding Seeds	13,403.9	3,543.3	10,497.8	2,584.1
Haricot bean seed	7,701.5	2,576.0	5,227.5	1,664.3
Sales of livestock	3,962.2	1,089.5	4,195.0	1,412.1
Off-farm/non-farm	1,303.0	2,148.7	1,034.2	1,977.0

Source: Own computation from survey result, 2023

4.2. Description of Haricot bean Seed Traders and Final-users

4.2.1. Household characteristics of sampled seed traders

All sampled haricot bean seed traders in the study areas were males. Out of the total 12 seed traders interviewed, 7 (87.5%) were married and one (12.5%) seed trader was single in Bilate Zuria district, whereas all sampled seed traders also were married in Gimbo

district. The mean age and family size of seed traders were 42.86 and 5.75 and 37 and 7.75 with a standard deviation of 6.92 and 1.28 and 4.16 and 1.26 in Bilate Zuria and Gimbo districts respectively. On average, seed traders have 10.13 and 5.25 years of experience in haricot bean seed trading respectively.

Table 4.10: Socio-demographic characteristics of sample haricot bean seed traders

		Bilate Zuria (N=8)		Gimbo (N=4)	
Variables (N=12)		Frequency	Percent	Frequency	Percent
Sex (Male)		8	100	4	100
Marital status	Married	7	87.50	4	100
	Single	1	12.50	-	-
		Mean	Std. Dev	Mean	Std. Dev
Age		42.86	6.92	37	4.16
Family size		5.75	1.28	7.75	1.26
Experience of trade on seed		10.13	0.99	5.25	0.50

Source: Own computation from survey result, 2023

4.2.2. Price setting strategies of traders for haricot bean seed purchasing

In Bilate Zuria District, most seed traders (62.5%) purchased haricot bean seeds during the pick and sowing periods. In Gimbo district, haricot bean seed was purchased year-round (50%) and during the sowing period (50%). Payment terms were in cash and credit. The purchasing price of haricot bean seed in Bilate Zuria was set by the seed sellers (62.5%) and through negotiation (2 seed traders). In Gimbo District, the price was set by seed sellers (75%) and through negotiation (25%). In Bilate Zuria, 87.5% of traders said the seed purchase price is set after harvesting, while in Gimbo District, 100% said it is set at the time of purchase. In Bilate Zuria, seed traders' responses align with seed farmers, while in Gimbo District, they contradict, with farmers not influencing the selling price.

Table 4.11: Time of haricot bean seed purchasing and price setting strategies

		Bilate Zuria (N=8)		Gimbo (N=4)	
Variables (N = 12)		Frequency	%	Frequency	%
Time of seed Purchase	Year-round (during pick period & sowing)	5	62.5	2	50.0
	During pick period	1	12.5	-	-
	During sowing period	2	25.0	2	50.0
Terms of Payment	Cash	6	75.0	4	100
	Both cash and credit	2	25.0	-	-
Seed price setting Strategy	Negotiation	2	25.0	1	25.0
	By the seed sellers	5	62.5	3	75.0
	By the market	1	12.5	-	-
Time of seed price setting	After harvesting	7	87.5	-	-
	During market day	-	-	-	-
	At the time of the seed purchase	1	12.5	4	100

Source: Own survey result, 2023

4.2.3. Initial and working capital of haricot bean seed traders

According to the survey, the average initial and current working capital of haricot bean seed traders in the study areas were 38,625.00 and 410,000.00 birr respectively. In Bilate Zuria District, 75% of seed traders used their own saved capital to start their haricot bean seed business, while in Gimbo District, all seed traders had their own saved capital. Two traders (25%) in Bilate Zuria took credit from Omo microfinance. The study revealed that most seed traders in the study areas began their trading business using their own saved capital.

Table 4.12: Initial, current working capital and credit source of haricot bean seed traders

		Bilate Zuria (N=8)		Gimbo (N=4)	
Variables (N=12)		Frequency	Percent	Frequency	Percent
Source of capital	Own saved	6	75	4	100
	Credit (MFI)	2	25	-	-
		Mean	Std. Dev	Mean	Std. Dev
Initial capital (ETB)		38,625.00	21,679.07	20,750.00	11,206.40
Current working capital (ETB)		410,000.00	324,785.64	159,500.00	34,219.88

Source: Own computation from survey result, 2023

4.2.4. Household characteristics of final users (seed consumers)

The survey included ten haricot bean seed consumers from Bilate Zuria and six from Gimbo District. In Bilate Zuria, 80% of the consumers were male, while in Gimbo District, all consumers were male. The consumers were households from different districts in Sidama, South West, and SNNP regions. The education level of the consumers was 5.40 and 4.17 respectively. In Bilate Zuria, 90% of consumers were married, while in Gimbo District, all consumers were married. Farming and trading were the main sources of income for 70% and 30% of consumers respectively. The average age and family size of consumers in both districts were 39.20 years and 4.30 family members, and 37.83 years and 5.50 family members respectively. The average experience of consumers in using haricot bean seed was 7.20 years and 4.83 years respectively. On average, consumers purchased 25 kg of haricot bean seed for 1405 birr in Bilate Zuria and 1187.50 birr in Gimbo District.

Table 4.13: Seed consumer's demographic characteristics

		Bilate Zuria (N=10)		Gimbo (N=6)	
Variables (N=16)		Frequency	Percent	Frequency	Percent
Sex	Male	8	80	6	100
	Female	2	20	-	-
Marital Status	Married	9	90	6	100
	Single	1	10	-	-
Means of income	Farming	7	70	6	100
generation	Trade	3	30	-	-
	Employment	-	-	-	-
		Mean	Std. Dev	Mean	Std. Dev
Age		39.20	3.97	37.83	3.31
Education		5.40	3.10	4.17	1.83
Family size		4.30	0.67	5.50	1.05
Seed consumption experience		7.20	1.55	4.83	0.41
Price of seed purchase		1405.00	154.02	1187.50	68.47

Source: Own survey result, 2023

4.3. Main Haricot Bean Seed Value Chain Actors and Functions

4.3.1. Primary value chain actors and their functions

The value chain encompasses various functions, beginning with farm preparation, input sourcing, production, and extending to post-harvest handling and marketing. Farmers are essential and influential actors in the value chain, as highlighted by Müller et al. (2021). Haricot bean seed producers are primarily responsible for activities such as ploughing, sowing, fertilizing, weeding, pest/disease control, harvesting, and post-harvest handling, including cleaning and storage. These producers handle significant quantities of haricot bean seed. The sale of haricot bean seed occurs both during and shortly after the harvest season, with the primary buyers being cooperatives, local collectors, and consumers within the same production year. The primary actors in the community-based haricot bean seed value chain in Bilate and Gimbo districts were input suppliers (Certified-1 seed, and

fertilizers), producers, collectors, Kayo cooperative, Sidama Elto cooperative Union and final users (grain producers). These actors add value to the process to the value chain.

4.3.1.1. Input Suppliers

Nowadays, the Ethiopian Seed Enterprise and Ethiopian Agricultural Businesses Corporation play a significant role in the supply of agricultural inputs. In the case of Bilate Zuria, the Sidama Elto Cooperative Union acts as the sole input supplier, providing Hawassa Dume, Ibado, and NPS fertilizer, as well as offering financial support for community-based haricot bean seed production. Similarly, in Gimbo district, the BARC serves as the input supplier, providing Hawassa Dume, Tatu, and NPS fertilizer. However, the financial aspects in Gimbo district are mainly supported by microfinance and saving and credit institutions. Regarding Seed availability, the Elto Union mostly purchases Certified-1 seeds from the Hawassa Agricultural Research Center and ArARC. The Ethiopian Agricultural Businesses Corporation serves as the source of NPS fertilizer through the Elto Union, while in Gimbo district, it is supplied through the District Office of Agriculture. In the Bilate Zuria district, households involved in community-based haricot bean seed production receive Certified-1 seeds and fertilizer from the Sidama Elto Cooperatives Union. The seeds are delivered with a 50% credit before the seed production begins, and the remaining payment is made when farmers supply the seed to the Kayo Cooperative. In Gimbo district, the BARC freely provides haricot bean Certified-1 seeds along with NPS fertilizer, supported by AGP-II. However, two years ago, due to budget shortages, the centre only supplied improved seeds (Hawassa Dume and Tatu) to farmers for cluster farming.

4.3.1.2. Producers

The community-based haricot bean seed producers in Bilate and Gimbo Districts are small-scale seed multipliers. Seed multipliers perform various value chain functions, including ploughing, sowing, fertilization, weeding, pest/disease control, harvesting, and post-harvest handling. Post-harvest activities such as threshing, winnowing, grading, packing, storing, transportation, loading, and unloading are carried out by the seed producers themselves, collectors, or the Kayo Cooperative and Sidama Elto Cooperatives Union.

4.3.1.3. Collectors

Haricot bean seed collectors, who primarily operate during the harvesting and sowing seasons, are licensed individuals responsible for gathering seeds from seed-producing farmers and selling them to end-users. In the study area, all the collectors sampled were male. They utilize various means, including human labor, donkeys, and vehicles, to transport the harvested seeds to consumers. These collectors act as traders, acquiring seeds from producers and reselling them to end-users, using their financial resources and local knowledge to gather seeds from the surrounding areas. Moreover, collectors play a crucial role in the seed value chain, accounting for 9.19% of seed sales in Bilate Zuria and 45.4% in Gimbo districts. Their activities involve purchasing and collecting seeds, repackaging them, and selling them to final users, while also performing important functions such as sorting, grading, and transporting the seeds within the value chain.

4.3.1.4. Cooperative

In terms of the cooperative, Kayo Cooperative has actively participated in community-based seed multiplication for haricot beans. They have established a partnership with the district office of agriculture to receive necessary technical support. The cooperative plays a key role in supplying seeds to the Elto Union and directly to end-users. They are responsible for the transportation and storage of the seeds until they are ready for marketing and distribution, based on the demand from the end-users. Similarly, in the Gimbo district, there is a Cereal Seed Cooperative located in the Adiyo Kaka district within the Kaffa Zone. This cooperative focuses on purchasing seeds during the harvesting and sowing periods and ensures their distribution to end-users based on their specific demands. However, producers have expressed concerns regarding the limited opportunities they have to acquire the desired seeds.

4.3.1.5. Sidama Elto Cooperatives Union

In the Hawassa Zuria district, Sidama Elto Cooperative Union operates a haricot bean seed multiplication site near Hawassa Zuria International Airport. They procure high-quality seeds from local farmers through their partnership with Kayo Cooperative. A committee, consisting of representatives from Elto Union, the cooperative chairperson and finance, and the district focal person, determines the market price by assessing prices. Before

procurement, the committee sets the purchasing price in the farmers' fields. Farmers deliver the seeds to Elto Union within the specified timeframe, at a price 15% higher than the premium for Certified-2 seeds. Elto Union, along with Kayo Cooperative, purchases clean seeds from producers for marketing purposes. This involves various activities such as assembly, transportation, cleaning, packaging, storing, and the distribution and sale of clean and high-quality seeds. The seeds are re-cleaned and packed in sacks weighing 25 kg or 50kg, predominantly containing two varieties of haricot beans, Hawassa Dume and Ibado. Seed marketing can be conducted directly by Elto Union to agents and cooperatives, or through the conventional seed marketing system, involving Regional, Zone, and District Offices of Agriculture, reaching grain producers.

4.3.1.6. Consumers/Seed End-users

Consumers, who are the end users of haricot bean seeds, also play a role in further seed multiplication. Among the respondents, 14 of them were men, and only 2 were women. They are the ones who purchase Certified-2 seed for grain production. Based on production levels, three types of seed consumers were identified: grain producer farmers, investors, and NGOs (FAO, Self Help Africa, Save the Children, SNV, and World Food Organization). Grain producer farmers directly purchase Certified-2 seed from producers, collectors, cooperatives, and Elto Union. On average, 7.66% of the haricot bean seed produced in 2022 was saved by the producers themselves out of fear of seed scarcity. Consumers have their criteria for measuring seed quality when making purchases. In Bilate Zuria District, the demand for improved seed collected from grain producers in each seed-producing kebele is channelled through the cooperative (Kayo) to Elto Union and then to different organizations. However, in Gimbo District, these marketing linkages are not well developed.

4.3.2. Support service providers and their roles in haricot bean seed production

Enablers or value chain supporters provide extension, market information, financial, and research services. They are outsiders to the regular business process and facilitate a chain upgrade strategy temporarily. According to Guei et al. (2011), access to information, technology, and finance determines the success of value chain actors. Supporting actors such as Sidama Region Bureau of Agriculture with Quarantine Authority, Durame Seed quality controlling laboratory, South West Region Bureau of Agriculture with Bonga Seed

quality and control center, South Agricultural Research Institute, and DOA play a central role in providing various services. DOA provides agronomic practice, technical advice, and post-harvest handling support to haricot bean seed-producing farmers. SARI assists in identifying and disseminating haricot bean seed technology and aims to strengthen research-extension-farmer relations. Additionally, the following lead organizations provide support to primary actors at different stages of the value chain.

Table 4.14: Haricot bean seed value chain supporters and their functions

Supportive/indirect actors	**Functions**	
Extension workers	➢ Advisory services provision ➢ Farmers training ➢ Field supervision and follow-up	
District Offices of Agriculture	➢ Providing advisory services ➢ Farmer and development agent training ➢ Technical support and facilitation for cooperatives and unions	
District Trade and Industry Office	➢ Issuing trading licenses for collectors	
Local administration at the kebele level	➢ Mobilizing and facilitating community engagement	
Administration at the district level	➢ Guiding and overseeing	
Sidama Elto cooperative union	➢ Offers market insights and guidance to members of basic cooperatives (Kayo)	
Bonga Agricultural Research Center	➢ Pre-extension and adaptation of improved haricot bean seed varieties (Hawassa Dume and Tatu) in Gimbo. ➢ On farm demonstration of improved haricot bean seed varieties Establishment of seed multiplication to alleviate seed shortage ➢ Provision of technical training and advisory service to extension workers, experts, cooperatives/unions (Field day)	
Financial service providers	Micro finance, Saving and credit association and (CBO)	Credit services Solve the financial problems of producers and local traders
Transport service providers	Local Transporters	Transport the haricot bean seed from farmers houses to local markets (Balela, Kayo cooperative, Kuti, Getiya Addis Amba, Chicha, Gimbo, Shonba, and Bonga)

Source: Own survey, 2023

4.3.3. Extension services and quality verification

An extension service relies on agronomic practices, such as land preparation, fertilizer application, crop management, harvesting, and post-harvest handling. Agricultural development agents and district seed multiplication experts provide advisory services on seed production and post-harvest value addition. In Bilate Zuria, input availability and market information are provided by the Elto Union through the Kayo cooperative. In Gimbo district, these services are provided by district agricultural development agents. Elto Union collaborates with SRBOA to train seed-producing farmers in agronomic practices and market information in Bilate Zuria. The BARC multidisciplinary team conducts supervision and evaluation of haricot bean seed activities, addressing specific needs. Field supervision involves farmers, experts, development agents, and researchers, while the second level includes representatives from each discipline. SWRBOA seed regulation process, in collaboration with the Bonga seed quality and control center, carries out field supervision and quality control services. This includes assessing crop fields for uniformity, pests, diseases, seed purity, germination, and moisture content.

4.3.4. Financial services

Financial services are crucial for businesses along the value chain, providing credit for various needs. Farmers rely on credit to purchase seeds, fertilizer, pay laborers, and transport their produce, while traders need credit for buying goods, transportation, and storage. In the haricot bean seed value chain, Elto Union offers credit for input supplies and operating expenses, collaborating with the Kayo cooperative to provide NPS fertilizer. Repayment is done in kind, without interest. Micro-finance institutions, Omo Bank, and individual lenders serve as sources of credit on a cash basis. In Bilate Zuria, 57.69% of respondents obtained credit from micro-finance institutions, while in Gimbo, only 25.00% did. Traders accounted for 15.38% of respondents in Bilate Zuria and 62.50% in Gimbo. Relatives served as a source of credit for 26.92% in Bilate Zuria and 12.50% in Gimbo.

Table 4.15: Source of credit by sample households

Source of credit	Bilate Zuria (N=168)		Gimbo (N=60)	
	Freq.	Percent	Freq.	Percent
Micro-finance	15	57.69	2	25.00
Traders	4	15.38	5	62.50
Relatives	7	26.92	1	12.50
Total	**26**		**8**	

Source: Own survey result, 2023

4.3.5. Value chain governance

Elto Union plays a crucial governance role in the value chain as it influences the seed market and establishes purchasing prices for seed producer farmers. To ensure fairness, a committee within the union, comprising representatives from various committees, determines the purchasing price based on the prevailing grain price with a 15% premium. The cooperative purchases haricot bean seeds from its members and supplies them to Elto Union, which also provides fertilizers to both cooperative members and non-members. This strong linkage helps address price volatility and financial liquidity challenges faced by farmers. In contrast, the Gimbo district lacks formal organization among smallholder seed producer farmers, resulting in a weak linkage within the value chain. Consequently, farmers are forced to sell their seeds at the prices offered by collectors during harvest time, leading to lower quality seeds and reduced selling prices in the food grain market. Decisions regarding selling prices for clean and packaged seeds are made during joint meetings involving federal and regional seed enterprises.

4.3.6. Map of haricot bean seed value chain

The initial stage in performing a value chain analysis is value chain mapping, as this process involves creating a visual representation to illustrate the flow of products. This flow starts from production and extends to the end consumers, passing through various stages.

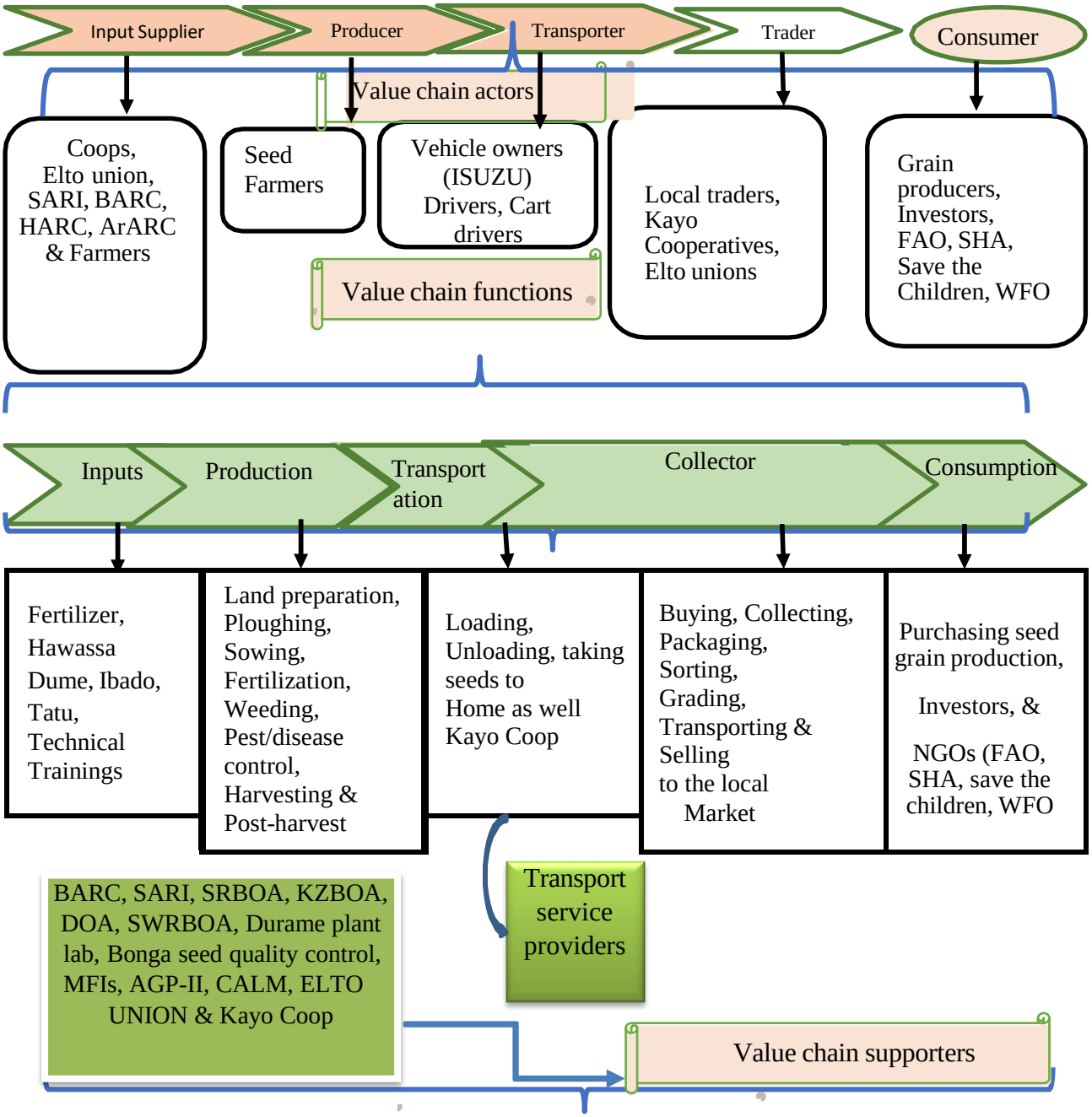


Figure 6: Map of haricot bean seed value chain in Bilate Zuria, and Gimbo districts

Source: Survey result, 2023

4.4. Performance Analysis of Haricot Bean Seed

When conducting a performance analysis, it is important to consider the identification of marketing channels and the analysis of marketing margins. Evaluating the performance of the seed market involves examining the costs, returns, and marketing margins associated with it.

4.4.1. The marketing channels for haricot bean seed in the Bilate Zuria district

Marketing channels involve individuals and firms that facilitate product availability to consumers. Analyzing these channels helps us understand how goods and services flow from production to consumption.

Four primary marketing channels for haricot bean seeds have been identified in the Bilate Zuria District. Producer farmers supplied 849 quintals of seeds to the Bilate market through Balela and Kayo cooperatives. The primary recipients were Sidama Elto Cooperative Union, Kayo Cooperative, Collectors, and grain producers. The fourth channel, involving the cooperative, accounted for 58.89% of the total market share. Channels III and IV, connecting seed producers to the Kayo Cooperative, accounted for 85.63% of the total supply. This shows a strong connection between producers and the cooperatives.

Based on the volume that passes through each channel, channel four carries the largest volumes, followed by channel three and channel two.

Channel1: Producers ⟶ Consumers (44 Qt, 5.18%)

Channel2: Producers ⟶ Collectors ⟶ Consumers (78 Qt, 9.19%)

Channel3: Producers ⟶ Kayo Cooperative ⟶ Consumers (227 Qt, 26.74%)

Channel4: Producers ⟶ Kayo Cooperative ⟶ Elto Union ⟶ Consumers (500 Qt, 58.89%)

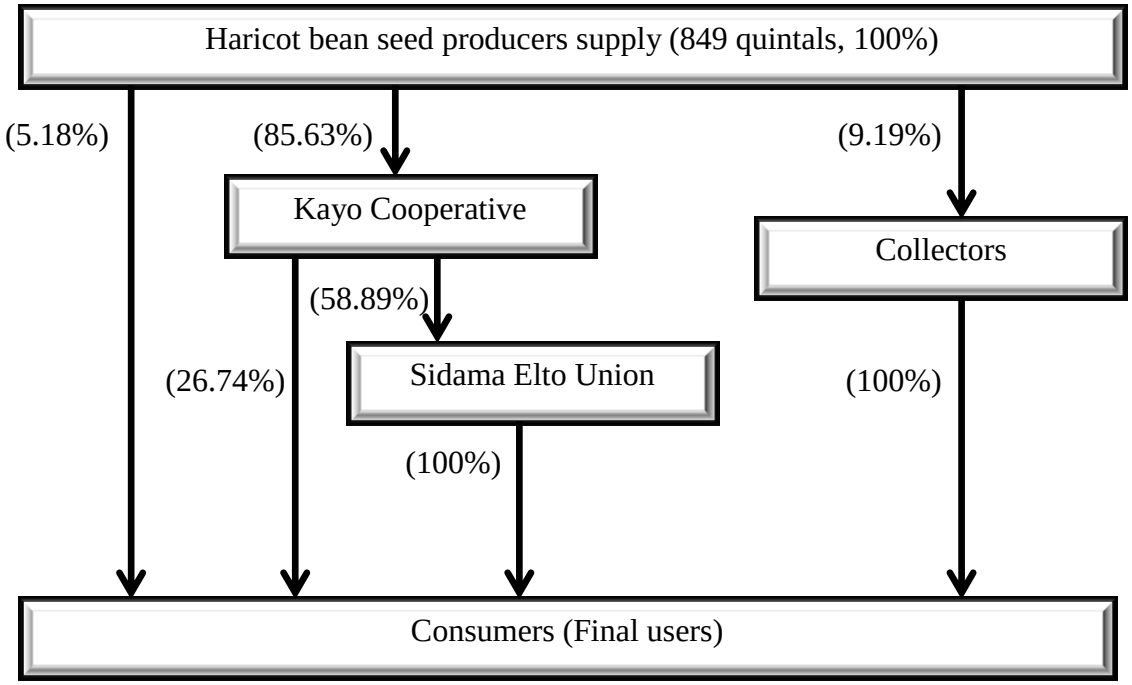


Figure 7: Haricot bean seed marketing channel in Bilate Zuria District

Source: Own sketch from survey, 2023

4.4.2. Production costs of Haricot bean seed in Bilate Zuria district

Cost identification and profit estimation are integral tasks in value chain analysis. Before calculating the profit share of each actor, it is essential to identify each cost type. Haricot bean seed-producing farmers in the Bilate Zuria district primarily incur costs during the production phase rather than during the marketing of their produce. They face a production cost of 2399 birr per quintal. The estimated land cost represents the opportunity cost of land, which is the rental value of land in the study areas. Moreover, in the study areas, haricot bean seed is produced by both family and daily labor. The largest cost item in the study areas was input costs, accounting for 47.9% of the total production costs. Based on the incurred costs, especially input costs (fertilizer and seed purchase), land rent, land preparation, and seed management are ranked as the top four expenses for haricot bean seed producers in the study area. Additionally, the highest cost was incurred during the time of input purchase, amounting to 1150 birr.

Table 4.16: Production costs per quintal of haricot bean seed in Bilate Zuria district

Production items	Cost per quintal (birr/Qt)	Share in percentage
Land rent	826	34.4
Input costs	1150	47.9
Land preparation costs	190.50	7.9
Crop management costs	89	3.8
Harvesting costs	73.50	3.1
Threshing costs	70	2.9
Total costs	**2399**	**100**

Source: Own survey result, 2023

4.4.3. Marketing costs in the Bilate Zuria district

The marketing cost of the haricot bean seed primarily comprises the expenses associated with post-harvest activities that occur before the product reaches the final users, who are seed producers. This includes the cost of packing (including material and labor costs), handling (such as cleaning, loading, and unloading), and transportation costs. Table 17 provides information on the marketing costs associated with the transaction of haricot bean seed, involving seed producers, collectors, Kayo seed multiplication and marketing cooperative, and Sidama Elto Cooperative Union.

Table 4.17: Marketing costs of haricot bean seed by birr per quintal

Cost Items	Producers	Collectors	Kayo Coop	Elto Union
Purchased price	—	3360	3800	4142
Production costs	2399	—	—	—
Marketing costs				
Cleaning costs	16.5	—	30.5	60
Loading and unloading	13	10	8	15
Transport cost	14.50	30	15	50
Store fumigation cost	—	—	—	5
Loss during cleaning	—	—	250	124.23
Store cost	—	—	—	25.20
Labor for packaging	12	17	20	25
Packaging material costs	20	20	30	26
Sales commission agent	—	—	—	30
Tax	—	10	—	—
Total marketing costs	76	87	353.50	360.43
Total costs	**2475**	**3447**	**4153.50**	**4502.43**

Source: Own survey result, 2023

4.3.4. Distribution of benefits in Haricot Bean Seed Value Chain Actors

Marketing margin calculation determines the distribution of benefits across the haricot bean seed value chain. It analyzes the profit share received by each actor based on the selling price and average seed price. The gross marketing margin (GMM) shows the profit percentage after deducting the selling price. It measures the benefits obtained by specific actors in the value chain. Each actor adds value to the seed through quality improvement and utility creation. Table 18 displays the marketing margins for the identified channels.

The total gross marketing margin (TGMM) for haricot bean seed is 42.2%, 30.2%, and 15.1% for channels II, III, and IV, respectively. Channel II has the highest TGMM, which accounts for approximately 42.2%. In channels III and IV, excluding channel I where producers sell directly to end-users, the producer's share is 57.8%, 69.8%, and 84.9% respectively.

At channel IV, the share of the farmer (GMMp) is the highest at 84.9%, indicating that this channel provides producers with the greatest share of the value created. The share of the collector (GMMcl) is 15.6% at channel II, while the shares of Kayo cooperative (GMMcp) and Elto Cooperative Union (GMMeu) at channels III and IV are 13.3% and 14.9%, and 15.1% respectively.

In terms of profit and value-added, producers earn 105, 323, 489.5, and 489.5 birr per quintal at channels I, II, III, and IV respectively. The Kayo cooperative adds the value of 1288.50 birr per quintal at channel III, while the Elto Union adds the value of 1058.57 birr per quintal at channel IV. Collectors added a value of 1053 birr per quintal at channel II, mainly due to the significant increase in seed prices in the market.

According to Table 18, the net marketing margin (NMM) for collectors is 23.4% at channel II, while the NMM for the cooperative (NMMcp) is 23.7% and 18.6% at channels III and IV respectively. The NMMeu is 19% at channel IV. The highest NMM is observed at channel III, which is 23.7%. This can be attributed to the cooperative purchasing seed at a low price during harvesting and selling it to the Elto Union with a profit margin of 15%, as well as to the final seed users.

Table 4.18: Marketing margin of haricot bean seed value chain in Bilate Zuria district

Seed actors	Cost/profit per quintal	Marketing channels			
		I	II	III	IV
Producers	Selling price	2600	3800	4719	4719
	Marketing cost	20	30	76	76
	Value added (Birr)	105	323	489.5	489.5
	TGMM (%)	0	42.2	30.2	15.1
	GMM_p (%)	100	57.8	69.8	84.9
Collectors	Purchasing price		3800		
	Selling price		4500		
	Value added (Birr)		1053		
	GMM_{cl} (%)		15.6		
	NMM_{cl} (%)		23.4		
Kayo Coop	Purchasing price			4719	4719
	Selling price			5442	5542
	Value added (Birr)			1288.50	1039.57
	GMM_{cp} (%)			13.3	14.9
	NMM_{cp} (%)			23.7	18.6
Elto Union	Purchasing price				4719
	Selling price				5561
	Value added (Birr)				1058.57
	GMM_{eu} (%)				15.1
	NMM_{eu} (%)				19

Source: Own survey result, 2023

4.4.5. The marketing channels for haricot bean seed in the Gimbo district

According to the survey, three primary alternative channels were identified for marketing haricot bean seeds in the Gimbo district. The sampled producers supplied 210 quintals of seedsto various markets through different routes. The main recipients of the seeds from the producer farmers were Collectors, Adiyo Kaka Cereal seed producers and marketing cooperatives, and grain producers, with estimated percentage shares of 45.4%, 34.8%, and 19.8%, respectively, for the three identified channels. Channel two carries the largest

volume, followed by channel three, indicating a weak linkage in the seed value chain. Notably, there is no dedicated cooperative for pulse crop seeds, so producers sell directly to consumers, collectors, and occasionally to the cereal seed cooperative.

Based on the volume that passes through each channel, channel two carries the largest volume, followed by channel three and channel one.

Channel1: Producers ⟶ Consumers (41.50 Qt, 19.8%)

Channel2: Producers ⟶ Collectors ⟶ Consumers (95.50 Qt, 45.4%)

Channel3: Producers ⟶ Cereal Seed Cooperative ⟶ Consumers (73 Qt, 34.8%)

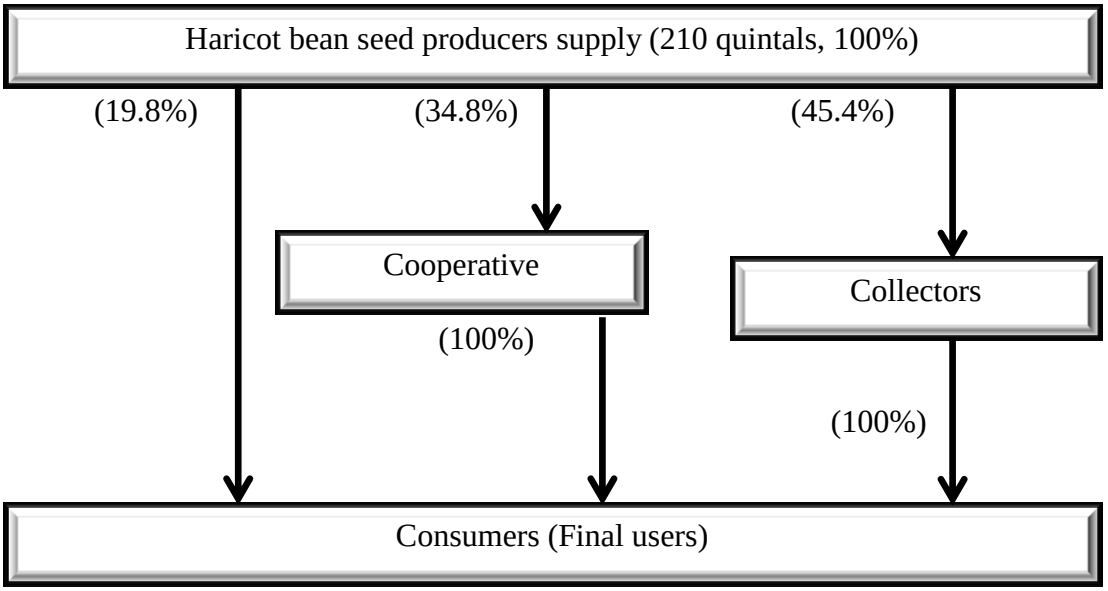


Figure 8: Haricot bean seed marketing channel in Gimbo District

Source: Own sketch from survey, 2023

4.4.6. Production costs of haricot bean seed in Gimbo district

The focus is on cost identification and profit estimation, crucial aspects of value chain analysis. To determine profit shares, it is important to identify different cost types. In Gimbo district, haricot bean seed producers incur the most costs during production rather than marketing. Production cost per quintal is 2185 birr. Land cost represents the rental value, while input costs make up 66.4% of total production costs. Among these, the highest-ranking costs are input purchases (1450.50 birrs), followed by land rent, land preparation, and crop management (Table 19).

Table 4.19: Production costs per quintal of haricot bean seed in Gimbo district

Production items	Cost per quintal (birr/Qt)	Share in percentage
Land rent	312	14.3
Input costs	1450.50	66.4
Land preparation costs	190.50	8.7
Crop management costs	115	5.3
Harvesting costs	62	2.8
Threshing costs	55	2.5
Total costs	**2185**	**100**

Source: Own survey result, 2023

4.4.7. Marketing costs of haricot bean seed in Gimbo district

The marketing cost of haricot bean seed encompasses the total costs associated with delivering the seed to the market. This indicates that there are various types of marketing costs related to the transaction of haricot bean seed by seed producers, collectors, and cooperatives (Table 20).

Table 4.20: Marketing costs of haricot bean seed in Gimbo district

Cost Items	Producers	Collectors	Cooperative
Purchased price	—	3160	3600
Production costs	2185	—	—
Marketing costs			
Cleaning costs	12	—	32
Loading and unloading	15	10	10
Transport cost	18.50	30	55
Store fumigation cost	—	—	—
Loss during cleaning	—	—	315
Store cost	—	—	—
Labor for packaging	15	20	20
Packaging material costs	25	25	35
Sales commission agent	—	—	—
Tax	—	10	—
Total marketing costs	85.5	95	467
Total costs	**2270.5**	**3255**	**4067**

Source: Own survey result, 2023

4.4.8. Distribution of benefit among haricot bean seed value chain actors

Benefit distribution among seed actors is measured using gross marketing margin calculations. This helps determine the individual benefits taken by each actor in the seed value chain. By analyzing this, we can observe how benefits are distributed among Haricot bean seed value chain actors within the marketing channel. In the study area, each actor in the value chain adds value to the seed as it moves from one actor to another. This includes improving quality through cleaning and creating space and time utility. Table 21 provides the marketing margins of haricot bean seed for each participant in the three channels.

Table 21 provides an overview of the gross marketing margins (TGMM) in channels II and III, which were 34.7% and 33.5% respectively. Channel II had the highest TGMM at 34.7%. Excluding channel I (direct sales from seed producers to final users), the producer's

share in channel II was 65.3%, and in channel III it was 66.5%. Channel III had the highest producer's share at 66.5%, indicating a better distribution of value for seed producers.

Additionally, Table 21 shows that at channel II, the collector's share (GMM_{cl}) was 12.2% and the Cooperative's share (GMM_{cp}) was 24.2%. The producer's profit per quintal was 64.5 birr at channel I, 125 birr at channel II, and 597.5 birr at channel III. The Cooperative added a value of 683 birr per quintal at channel III, while collectors added 345 birr per quintal at channel II. Furthermore, the net marketing margins (NMMcl and NMMcp) at channel II were 9.6% and at channel III were 14.4%. Channel III had the highest NMMcp at 14.4%, which can be attributed to the Cooperative directly purchasing seed at a lower price during seed harvesting from producers and selling it to final seed users.

Table 4.21: Marketing margin of haricot bean seed value chain in Gimbo district

Seed actors	Cost/profit per quintal	Marketing channels		
		I	II	III
Producers	Selling price	2350	3160	3600
	Marketing cost	15	20	85.5
	Value added (Birr)	64.5	125	597.5
	TGMM (%)	0	34.7	33.5
	GMM_p (%)	100	65.3	66.5
Collectors	Purchasing price		3160	
	Selling price		3600	
	Value added (Birr)		345	
	GMM_{cl} (%)		12.2	
	NMM_{cl} (%)		9.6	
Coop	Purchasing price			3600
	Selling price			4750
	Value added (Birr)			683
	GMM_{cp} (%)			24.2
	NMM_{cp} (%)			14.4

Source: Own survey result, 2023

4.5. Econometrics Analysis

To interpret the outputs of the Ordinary Least Squares (OLS) model, the basic assumptions of the traditional linear regression model must be fulfilled. These assumptions include linearity, independence, homoscedasticity, and absence of multicollinearity and omitted variables. To ensure the satisfaction of these assumptions, various post-estimation tests are employed. The most significant tests include those for multicollinearity, heteroscedasticity, and omitted variables. It is essential to report the results of these tests alongside the OLS model outputs to assess the validity of the model and the reliability of the estimated coefficients. The table is organized into two columns, with the first column representing the coefficients for one district (Bilate Zuria) and the second column representing the coefficients for another district (Gimbo).

4.5.1. The determinant factors affecting the haricot bean seed market supply

To understand the factors influencing seed marketing, it is essential to identify key factors that impact the amount of seed marketed by producers. This information plays a crucial role in value chain analysis, as it promotes small-scale seed production and improves the marketable yield, leading to effective enhancement during the upgrading stage.

Before conducting the OLS regression analysis, it is important to assess potential issues that could violate the model. These issues include multicollinearity, heteroscedasticity, and specification errors. In this study, a multiple linear regression model (OLS) was utilized to examine the factors influencing the volume of community-based haricot bean seed supply to the market. The results, presented in Table 22, demonstrate the coefficients of the independent variables, indicating the extent of change in the haricot bean seed supply volume for a unit change in each independent variable.

To assess multicollinearity, the variance inflation factor (VIF) was examined. The results showed VIF values ranging from 1.11 to 3.29 for Bilate Zuria and 1.16 to 1.75 for the Gimbo district, indicating no significant multicollinearity issues among the explanatory variables (Appendix Table 2). Furthermore, the presence of heteroscedasticity was tested using the Breusch-Pagan/Cook-Weisberg test, which confirmed its existence. To address this, robust regression techniques were employed (Appendix Table 3). Finally, a test for

omitted variables were conducted, and the null hypothesis suggested no omitted variable bias in the model (Appendix Table 4).

The study proposed a total of 15 variables, including both continuous and dummy variables, for the two districts under consideration. Among these variables, six (EDLEVEL, DISTANCE, FAMSZ, QUPROD, CREDIT, and MKTINFN) were found to have a statistically significant impact on the market supply of households involved in community-based haricot bean seed production in the Bilate Zuria district. Of these variables, DISTANCE and FAMSZ were found to have a negative effect on the market supply, while the other four variables had a positive effect, thereby enhancing the market supply of these households. On the other hand, the remaining variables (SEX, AGE, SFExp, LANDSZ, MKTCOST, TLU, OFFNONFAM, COOPMEMB, and FEXTCONT) were observed to have no notable impact on the community-based haricot bean seed market supply. This outcome can be justified by the absence of a strong linear correlation between these variables and the dependent variable, and/or the presence of substantial variability in their values, leading to a considerable standard error.

In the Gimbo district, the study identified nine variables that significantly influenced the volume of haricot bean seed marketed. These determinants were AGE, DISTANCE, SFExp, LANDSZ, QUPROD, TLU, COOPMEMB, FEXTCONT, and MKTINFN. Among these variables, AGE, SFExp, LANDSZ, QUPROD, TLU, COOPMEMB, FEXTCONT, and MKTINFN were found to be statistically significant and exhibited a positive relationship with the quantity of haricot bean seed supplied to the market. Conversely, market distance (DISTANCE) had a negative impact on the volume of supply. On the other hand, the remaining variables, namely SEX, EDLEVEL, FAMSZ, MKTCOST, OFFNONFAM, and CREDIT, were determined to have no significant effect on the market supply of haricot bean seed. The summarized results of the overall study can be found in the table below.

Table 4.22: Regression results of factors affecting haricot bean seed supply in the market

	Bilate Zuria district			Gimbo district		
Variables	**Coef.**	**Robust SE**	**P-value**	**Coef.**	**Robust SE**	**P-value**
SEX	0.002	0.344	0.996	-0.233	0.158	0.149
AGE	0.014	0.009	0.112	0.031**	0.015	0.050
EDLEVEL	0.047**	0.018	0.012	0.038	0.048	0.426
DISTANCE	-0.263*	0.134	0.052	-0.056*	0.033	0.094
SFExp	0.026	0.057	0.647	0.178**	0.086	0.044
FAMSZ	-0.128**	0.057	0.026	-0.067	0.047	0.156
LANDSZ	0.520	0.356	0.146	0.356**	0.146	0.019
QUPROD	0.828***	0.068	0.000	0.808***	0.054	0.000
MKTCOST	-0.001	0.001	0.359	-0.003	0.003	0.255
TLU	-0.009	0.029	0.737	0.170***	0.061	0.008
OFFNONFAM	0.079	0.141	0.577	0.440	0.328	0.187
CREDIT	0.494*	0.294	0.095	0.120	0.185	0.520
COOPMEMB	0.009	0.129	0.943	0.320**	0.158	0.049
FEXTCONT	0.002	0.011	0.829	0.054*	0.031	0.088
MKTINFN	0.487***	0.142	0.001	0.795*	0.424	0.067
Constant	-3.037*	1.572	0.055	-1.302	1.124	0.253

Source: Survey result, 2023.

Dependent variable: Volume of haricot bean seed supplied to market in Quintal
N = 168 for Bilate Zuria district and 60 for Gimbo district, R^2= 0.8958 and 0.8935, respectively;

***, ** and * imply statistical significance at the 1% level, 5% level and 10% level respectively.

Results from Robust OLS analysis with heteroscedasticity consistent covariance matrix are considered as BLUE. According to the OLS model results, the coefficients of determination (R^2) were found to be 0.8958 and 0.8935 for the Bilate Zuria and Gimbo districts, respectively. This implies that approximately 89.58% and 89.35% of the variation in the quantity of haricot bean seed supplied to the market can be explained by the independent variables included in the model. In addition, the F-value for the model, after

correcting for heteroscedasticity for both districts (F = 87.14, p > 0.0000 for Bilate Zuria and F = 24.60, p > 0.0000 for Gimbo, respectively) indicate that the overall model was significant at the 1% level of probability. This infers that the model fit is good (Appendix Table 5).

The age of the household head (AGE): as expected, age had a significant and positive effect on the supply of haricot bean seed in the Gimbo district, with a significant level of 5%. The findings of the study indicate that for every one-year increase in the age of households, the quantity of haricot bean seed supplied to the market increased by 0.031 quintals while holding all other factors constant. This suggests that experienced farmers, who have accumulated greater skills, are more likely to make informed decisions regarding land allocation for producing the haricot bean seed and supplying it to the market. These results are consistent with the findings of Mossie *et al.* (2020), who also identified a direct relationship between the age of farmers and market supply.

The education level of the household head (EDLEVEL): The education level of the household head is significant and positively affects the supply of haricot bean seed at a 5% significant level. This means that an increase in one grade in education level leads to an increase of 0.047 quintals of haricot bean seed supplied to the market in the Bilate Zuria district. The findings suggest that household heads with higher education levels are more likely to be market-oriented and are more willing to supply their seeds to the market compared to those who are illiterate. This result is consistent with previous studies conducted by Dessie *et al.* (2018), Endalew *et al.* (2020), and Abate *et al.* (2021), which also found a positive and significant effect of the educational status of household heads on the market supply of wheat. These studies have consistently found that the educational status of the household head has a positive and significant effect on the volume of market supply.

Market distance (DISTANCE): is a continuous variable that measures the number of kilometres households need to travel to reach the nearest market. The proximity to the closest market significantly and negatively affects the supply of haricot bean seed, with a significant level of 10%. The results indicate that for every one-kilometre increase in distancefrom the market, the volume of haricot bean seed supplied to the market decreases. Specifically, in the Bilate Zuria district, a unit-kilometer increase in distance leads to a

reduction of 0.263 quintals in the supply of haricot bean seed, while in the Gimbo district, the reduction is 0.056 quintals. Households located far from marketplaces face various challenges, such as higher transportation costs and longer distances to cover on foot. These factors contribute to reduced participation in haricot bean seed production. Limited access to haricot bean seed may be a key factor affecting farmers situated far from markets. This finding is consistent with the study conducted by Sori (2021), which showed that even a slight decrease in walking distance for households led to an increase in groundnut quantity by 0.012 quintal. Similarly, studies by Mussema *et al.* (2013), Melaku and Ashalatha (2016), and Solomon (2017) have confirmed that proximity to the nearest market has a negative and significant impact on the quantity of various agricultural products supplied to the market.

Haricot bean seed farm experience (SFExp): The experience that households have with haricot bean seed farming has a significant and positive impact on the volume of haricot bean seed market supply in Gimbo district, as expected. According to the model's results, for every additional year of haricot bean seed producers' farm experience, the volume of market supply of haricot bean seed increases by 0.178 quintals, assuming that all other factors remain constant. This finding aligns with the results of studies conducted by Modeste *et al.* (2018) and Melaku and Ashalatha (2016), which found significant and positive relationships between market supply and farm experience for soybeans and teff. Additionally, Almaz (2019) studied a similar trend for onion market supply, where an increase of 0.0019 tons was observed for every additional year of onion producers' farm experience. These findings also support the conclusions drawn by Girma *et al.* (2017), who found a strong and positive relationship between farm experience and the quantity of sesame and haricot beans marketed. Overall, it is expected that farming experience positively influences output, as increased experience enables farmers to make effective farm management decisions regarding input combination and resource allocation (Soviadan *et al.*, 2021).

Family size (FAMSZ): as expected, has a negative impact on the supply of haricot bean seed to the market. The study conducted by Mussema *et al.* (2022) found that at the farm household level, soybean utilization was distributed: approximately 73% for the market, 17% for consumption, and 10% for seed. This distribution aligns with my study, which focused on the negative relationship between family size and the supply of haricot bean seed to the market in Bilate Zuria district. The OLS results demonstrated a statistically significant association between family size and the supply of haricot bean seedsto market. Specifically, for each additional person in the family, there was a decrease of 0.128 quintals in the supply of haricot bean seed to the market. This significance level of 5% indicates that the observed relationship is unlikely to occur by chance alone, further supporting the findings of Mussema *et al.* (2022). Focus group discussions (FGDs) conducted in the Bilate Zuria district revealed that a significant majority of farmers in the area practice the incorporation of haricot beans with other crops, such as maize and enset, during the food preparation process. This practice of combining different crops in their haricot bean-based dishes was found to be prevalent among the surveyed farmers. Furthermore, it was confirmed that most farmers commonly prepare soybean food by mixing it with other crops like teff, *enset,* and maize (Mussema *et al.,* 2022). The FGDs provided valuable insights into the culinary traditions and preferences of the local farming community, shedding light on the widespread utilization of diverse ingredients in their cooking practices within the study area.

Land allocated for haricot bean seed (LANDSZ): as expected, the study conducted in Gimbo district found a statistically significant positive relationship between the sizes of land allocated for haricot bean seed cultivation and the volume of seed supplied to the market, at a 5% significance level. When holding all other variables constant, the results indicate that for every one-hectare increase in the size of land allocated for haricot bean seed cultivation, there is an increase of 0.356 quintals in the volume of seed supplied to the market. This suggests that allocating more land for haricot bean seed cultivation leads to a larger volume of seed being supplied to the market. These findings are consistent with previous research conducted by Gebremedhn *et al.* (2019) and Jaji *et al.* (2018), which also identified a direct relationship between the size of land allocated and the volume supplied to the market.

Quantity of haricot bean seed produced (QUPROD): Through careful analysis and prediction, it has been observed that there is a positive and significant influence of the quantity of haricot bean seed produced on the market supply, with a significant level of 1%. Based on the theory of production and marketing, the quantity produced and supply to the market is directly proportional. The more significant the amount of haricot bean seed production; the more considerable amount of product will be available in the market. The results obtained from the OLS model shed more light on this relationship. According to the results, on average, for every one-quintal increase in the quantity of haricot bean seed produced, there is an average increase of 0.828 quintals in the Bilate Zuria district and 0.808 quintals in the Gimbo district, respectively in the amount of seed supplied to the market. According to the study by Solomon (2017), confirmed that the quantity of Chickpea and Common bean produced was positively and statistically significant. Furthermore, this finding aligns with a study conducted by Gebremedhn *et al.* (2019), where an increase in sesame production by a unit resulted in a market supply increase of 0.350 tons. This parallel finding further supports the notion that an increase in the quantity of production has a positive impact on the volume of seed supplied to the market.

Total Livestock Owned: this has a significant positive impact on the quantity of haricot bean seed supply in Gimbo district, with a significant level of less than 1%. This means that owning more livestock has a direct and significant effect on increasing the supply of agricultural inputs for cultivating haricot bean seed, which in turn leads to an indirect increase in haricot bean seed output and market supply. The OLS results indicate that for every unit increase in the livestock owned, there is a corresponding increase of 0.170 quintals in the amount of haricot bean seed supplied to the market, assuming all other factors remain constant. This finding is consistent with the study conducted by Bezie (2016) and Kebede *et al.* (2020), who also observed a positive and significant influence of tropical livestock units on the amount provided to the market.

Access to credit (CREDIT): plays a significant role in promoting agricultural development and enhancing the livelihoods of smallholder farmers, as highlighted by Twumasi *et al.* (2020). The positive coefficient observed in the Bilate Zuria district for access to credit, with statistical significance at the 10% level, indicates that households with credit access for haricot bean seed production can supply a greater volume of marketable haricot bean seed compared to those without access to credit. The OLS results

show that supply increased by 0.494 quintal with an improvement in credit access, assuming other factors remain constant. This finding aligns with Ali and Awade (2019), who found a positive and significant influence of credit availability on surplus production of soybeans and market return, as well as with Seven and Tumen (2020), who observed that credit utilization enhances farmers' productivity and leads to an increase in the quantity of marketed surplus. Furthermore, the study by Twumasi *et al.* (2020) emphasizes the significant role of access to credit in promoting sustainable agricultural development. The presence of credit access has a beneficial impact on haricot bean seed supply, contributing to increased production and market availability. This supports the notion that credit access not only improves farmers' livelihoods but also enhances overall agricultural productivity and market participation.

Cooperative membership (COOPMEMB): It has a significant and positive impact on the volume of haricot bean seed market supply, with a significance level of 5%. According to the findings of the OLS model, farmers who are members of cooperatives in the Gimbo district experienced an increase in the volume of haricot bean seed supplied to the market by 0.320 quintals. This suggests that cooperative leaders and other supporters play a crucial role in providing members with valuable information and understanding regarding the benefits of haricot bean seed production and marketing. Cooperative members have access to favourable market options and can acquire production inputs through cooperatives or unions. As a result, they are motivated to produce surplus output for the market, which contributes to the positive and significant relationship between cooperative membership and the volume of market supply. This finding aligns with the work of Belayneh *et al.* (2022), who also confirmed a positive and significant association between cooperative membership and the volume of sesame market supply. Furthermore, this study is consistent with the research conducted by Kassa *et al.* (2021), which found that the Bonga sheep breeding cooperative, as a result of their cooperative membership, was able to supply a greater number of improved rams compared to non-member breeders. These findings highlight the significant role of cooperative membership in enhancing the economic conditions of sheep producers by granting them access to a wide range of resources and market opportunities.

Extension contact by household (FEXTCONT): Extension contact of the household heads positively and significantly influenced the output of haricot beans at a 10% level of significance in the Gimbo district. The sign of the coefficient is a prior expectation. This implies

that as the frequency of extension contacts of producers increases, the amount of haricot bean seed output obtained tends to increase by 0.054 quintals, while other things remain constant. This study in line with the study conducted by Hailu (2017) found a positive relationship between the number of extension contacts and the onion market choice. However, this finding is opposite to the findings by Melese *et al.* (2018), the contact with extension agents could lead to a 5% reduction in onion farmer market participation. They indicated that the farmers who have access to the extension service do not appropriately apply the techniques and advice suggested by the extension agents. Also, this study contradicted Wogayehu and Tewodros (2015), who found a negative coefficient for the frequency of extension contact. The other important thing related to extension service in Ethiopia is that the agricultural extension implementation modality differs from one regional state to the other (Leta *et al.,* 2017). Therefore, this study result may be due to a better agricultural extension delivery system in Sidama and Southwest regional states relative to some other regional states that have reported a negative relation with the market supply in Ethiopia.

Access to market information (MKTINFN): there is a significant and positive relationship between access to market information and the supply of haricot bean seed. The significance level is 1% for the Bilate Zuria district and 10% for the Gimbo district. This implies that farmers who have access to market information are more likely to supply a higher volume of haricot bean seed to the market compared to those who do not have access. The positive sign of the relationship indicates that as farmers gain access to market information, there is an observed increase in the quantity of haricot bean seed supplied to the market. The coefficients further confirm this relationship, showing that accessing market information leads to an increase in the market supply of haricot bean seed by 0.487 quintals for Bilate Zuria district and 0.795 quintals for Gimbo district, respectively. In line with this finding, Ayalew (2018) in his study found that access to market information for the tomato market significantly affected the market supply of the selected commodity. In addition to this, Tegegne (2013) in his study found that access to market information significantly influenced vegetable market supply in his study area. The key to value chain sustainability and development is environmental-related technology, research, and development (Khan *et al.,* 2021).

4.6. The major Opportunities and Constraints

Different actors involved in the value chain of community-based seed in the study areas have identified several constraints, challenges, opportunities, and intervention points for further institutional and organizational innovation. The focus group discussions conducted in the study areas revealed the most significant constraints and opportunities, which were briefly discussed. Additionally, the participants in the focus group discussions prioritized the problems based on their real-life situations.

During all the discussion sessions, the key problems were identified as production and marketing. Production constraints included high costs for inputs and fertilizer, delayed delivery of inputs (especially fertilizer), seed shortages (in the case of Gimbo district), moderate extension services (in both districts), prevalence of pests and diseases, insufficient rainfall (in Bilate Zuria district), inadequate support from government officials, and limited access to credit for purchasing modern tractors, at least at the seed multiplication cooperative level.

In terms of marketing constraints, issues included low seed prices at the time of price setting (in Bilate Zuria), weak market linkages, low prices at seed harvesting (in Gimbo district), and lack of affirmative action for women cooperative members.

4.6.1. Opportunities for production and marketing

According to the findings obtained from both FGDs and KIIs, it was determined that both districts have favourable conditions for not only producing pulse crops, but also other crops such as cereals, vegetables, and livestock. However, it was noted that the potential of fertile arable land and abundant irrigation water resources in the area has not been fully utilized. Furthermore, there are additional opportunities in the community-based haricot bean seed value chain. These opportunities include the presence of research institutions conducting studies on pulse crops, as well as the existence of projects such as AGP-II and CALM that provide support in terms of research funding and capacity building for researchers and development agents. These agents play a crucial role in providing extension and market information services to seed producer farmers. Considering the potential opportunities and the districts' experience in community-based haricot bean seed multiplication, the districts can produce a large quantity of seed.

In Bilate Zuria, there is a demand for seeds from various stakeholders, including grain producer farmers (end-users), Kayo Cooperatives, Sidama Elto Cooperatives Union, NGOs, and investors. The presence of Sidama Elto Cooperatives Union is notable, as they purchase seeds by adding a 15% margin to the grain price and increasing the seed price annually. These opportunities have been identified by many seed producer farmers. When the seed price increases, it serves as motivation for seed producer farmers to increase their production and supply of seeds to the market.

In Bilate Zuria, there are additional opportunities for seed production, including the presence of NGOs like Self Help Africa (SHA) that aim to empower farmers and their households to achieve self-sufficiency in seed production. Furthermore, infrastructure facilities such as well-maintained roads, accessible transportation, kayo cooperatives, Sidama Elto cooperatives, and mobile and wireless telephone services create a favourable environment for seed producers to efficiently produce and supply improved seeds to the market.

Similarly, in the Gimbo district, the existence of the AGP-II and CALM projects presents favourable opportunities for farmers. However, these opportunities have not been fully utilized due to the low quality of the seed supply. Consequently, farmers in Gimbo district receive lower prices for their produce in the market, especially from collectors and final users. This emphasizes the urgent need for improved quality control measures and support in the seed production process. By implementing these measures, farmers can fully benefit from the available opportunities and maximize their potential gains.

4.6.2. Constraints of production and marketing

4.6.2.1. Production constraints

In the study areas, the production of community-based haricot bean seeds is hindered by various factors. According to the responses of sampled farmers, major constraints to seed production include late delivery of inputs (specifically fertilizer in Bilate Zuria and both seed and fertilizer in Gimbo district), shortage of improved seed (in Gimbo district), weak extension services (in both districts), prevalence of pests and diseases, shortage of rainfall (in Bilate Zuria), and excessive rainfall (in Gimbo).

High in inputs purchasing price: During focus group discussion seed producer farmers indicated that; the price of improved seed doubled its price when compared with the previous year. Also, they inferred that this may be due to Russia and Ukraine wars. The survey result depicted that all (100%) of the seed producers' inputs purchasing (fertilizer and improved seed) are very high (Appendix Table 6).

Late delivery of inputs: The seed doesn't arrive on time. It usually arrives late at sowing time. Sometimes, seed arrives after the seed producer farmers give up and make alternative decisions on sowing. In this case, productivity is below potential due to the late delivery of inputs at the right time.

Shortage of improved seed: According to FGDs conducted, the most important physical inputs for seed production are improved seeds. The lack of an adequate seed multiplicative in Ethiopia in general and study areas, in particular, created a shortage of haricot bean seed, so the amount of seed supplied by producers is inadequate. Also, KIIs (development agents) confirmed that improved seeds were inadequate in supply. The study result shows; that 100% of the seed producer farmers in the Gimbo district responded that there was a shortage of improved seed (Appendix Table 6).

Weak extension service: Nowadays in study areas, in most of the kebeles three development agents are assigned to support producers from land preparation to postharvest handling. However, unavailability of perdium, vehicles, and necessary inputs, the development agents do not properly provide extension services for seed producer farmers.

Prevalence of pest/disease and erratic rainfall: Sometimes in the production season, unexpected pests/disease happens in the seed field. Shortage of rainfall in Bilate Zuria as compared to the previous cropping season and high rainfall in Gimbo district leads to seed loss. These natural phenomena happened due to changes in weather conditions were the problems frequently encountered in the production season.

4.6.2.2. Marketing related constraints

Besides production constraints, different constraints are involved in seed marketing. During the FGDs in Gimbo district, almost all the community-based seed farmers responded that there were marketing constraints (Appendix Table 7). The major marketing constraints are mostly related to weak market linkage (market intelligence) and low seed price at harvesting time, poor postharvest handling that leads to poor quality seeds which cannot meet the consumer's demand.

Weak market linkage and low price at harvesting time: According to FGDs, the market linkage is somehow fine in the Bilate Zuria district, but sometimes Elto Union does not accept all haricot bean seed supplied by producers due to financial constraints. On the contrary, in Gimbo district seed producer farmers are small-scale and formally unorganized when compared with Bilate Zuria. Also, this leads to a low price of seed during the harvesting period. 85% of sampled respondents responded that the market linkage was one of the major marketing problems (Appendix Table 7).

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary

This study focuses on analyzing the value chain of community-based haricot bean seed production in the Bilate Zuria and Gimbo districts. Haricot beans are crucial for the local economy, but the seed production and marketing systems face challenges, which lead to limited availability of quality seeds and delays in input delivery. The main objective was to identify key actors, roles, linkages, shares, determinant factors, and opportunities and challenges within the haricot bean seed value chains in these districts.

The study involved interviews with various Haricot bean seed value chain actors. 228 Haricot bean seed producers were randomly selected and interviewed using a semi-structured questionnaire. Additionally, 12 collectors, 2 cooperatives, one union, and 16 seed users were interviewed. The research also included focus group discussions and key informant interviews. Secondary data was collected from published and unpublished sources, including academic papers and review articles. Unpublished information was obtained from the District Office of Agriculture and the District Trade and Industry Office. These data collection methods allowed for a thorough analysis of the study area's Haricot bean seed value chain.

Data analysis for this study employed a combination of qualitative and quantitative approaches. The collected data was organized and analyzed using both STATA version 16 and SPSS version 27. Descriptive statistics were utilized to analyze the demographic, socio-economic, and institutional characteristics of the respondents. Additionally, value chain mapping was employed to map out the actors and their roles within the haricot bean seed value chain. Furthermore, market margin analysis was conducted to assess production and marketing costs, market share, and the distribution of profit margin within the chain. Lastly, multiple linear regression analysis was utilized to analyze the key factors influencing the volume of seed

5.2. Conclusion

The overall findings of this study conclude that within the Haricot bean seed value chain, key participants include seed producers, local collectors, cooperatives, unions, and seed-users, with the support of various stakeholders. Nevertheless, the expected contribution of Haricot bean seed to community-based economic growth has fallen short due to constraints in production and marketing. Significantly, more than half of the production costs for haricot bean seed producers can be attributed to inputs, particularly fertilizers. The Kayo cooperative has emerged as the leader with the highest profit margin, as a significant proportion of seed producers (85.63%) supply their seed through the cooperative, giving them the ability to influence the selling price and establish strong market linkages. In terms of value distribution, the share of farmers (GMMp) is highest in channel IV in the Bilate Zuria district (84.9%), indicating a more favourable allocation of value to producers. Likewise, in Gimbo district, the seed producer's share is highest in channel III (66.5%).

Multiple linear regression analysis identified several factors that influenced the seed value chain in both districts. In Bilate Zuria, education, the quantity of seed produced, credit access, and market information have a positive and statistically significant effect, while distance and family size have a negative impact. In the Gimbo district, age, experience, land size, quantity produced, livestock ownership, membership, extension contact, and market information show a positive effect, while distance has a negative effect. Constraints, with a particular focus on production and marketing, include high input costs, delayed delivery, seed shortages, and unpredictable rainfall. In Gimbo district, weak market linkages and low prices during harvesting time were marketing challenges. However, several opportunities have been identified: high seed demand, the presence of cooperatives, unions, NGOs (ENSP), and investors. Additionally, the Sidama Elto Cooperative Union purchases seed at a higher price (15% margin) than grain and increases the seed price annually. Significantly, the findings of this study will provide valuable information that can be utilized to develop and implement interventions aimed at enhancing seed production, increasing productivity, and improving the market supply of haricot bean seeds in Bilate Zuria and Gimbo districts.

5.3. Recommendations

Based on the findings of this research, the following recommendations and interventions are forwarded to improve and develop a sustainable and viable haricot bean seed value chain that is locally adaptable and expected to increase seed competitiveness.

The study highlighted the presence of good market linkage in the Bilate Zuria district through the Elto Union, but occasional carryover issues have been identified. To strengthen these linkages further, it is recommended to establish contract farming arrangements that connect farmers more closely. In contrast, the Gimbo district has an uncoordinated and lacking integrated marketing system. To address this issue, it is recommended to establish a seed multiplication and marketing cooperative. This can be achieved by involving key stakeholders such as the Gimbo district office of agriculture, the Bonga seed quality testing center, the district Trade and Industry office, and the district cooperative offices.

To address the issue of high fertilizer costs, the Regional Bureau of Agriculture must assume responsibility and establish close coordination with fertilizer suppliers, transporters, and district agricultural offices. By doing so, the bureau can ensure uninterrupted access to affordable fertilizers for farmers, thereby supporting sustainable agricultural practices and enhancing productivity in the region.

The results of the multiple linear regression analysis indicated that age, education, farming experience, land size, the quantity of seed produced, livestock ownership, credit access, cooperative membership, extension contact, and market information all have a positive and significant impact on the amount of haricot bean seed available in the market. To increase the supply of haricot bean seed, it is important to focus on and promote these factors. Additionally, surplus production can be improved by using better seed varieties and following recommended farming practices. It's crucial to seek help from experts and relevant organizations to ensure the successful implementation of these measures.

This study focused on the value chain analysis of haricot bean seed, specifically from seed producers to seed consumers. The study investigated the profit and marketing margins of each actor involved in this value chain. Additionally, there is a need to quantify the impact of community-based haricot bean seed production on the market participation and income of small-scale farmers

6. REFERENCES

Abate, D., Mitiku, F., and Negash, R. 2021. Commercialization level and determinants of market participation of smallholder wheat farmers in northern Ethiopia. *African Journal of Science, Technology, Innovation and Development,* 1–12. https://doi.org/10.1080/20421338.2020.1844854

Abebe, G. and Alemu, A. 2017. Role of Improved Seeds Towards Improving Livelihood and Food Security at Ethiopia. *International Journal of Research*. 5(2).

Abraham Tegegn. 2013. Value chain analysis of vegetables: The Case of Habro and Kombolcha Woredas in Oromia Region. MSc. Thesis Haramaya University, Haramaya.

Adugna Gessesse. 2009. Analysis of fruit and vegetable market chains in Alamata, Southern zone of Tigray: The case of onion, tomato and papaya. MSc. Thesis, Haramaya University, Haramaya.98Pp.

Afework Hagos and Adam Bekele. 2018. Cost and returns of soybean production in Assosa Zone of Benishangul Gumuz Region of Ethiopia. *Journal of Development and Agricultural Economics,* 10(11), pp. 377-383.

Alemu, D. 2010. The political economy of Ethiopian cereal seed systems: State control, market liberalization and decentralization. Future agriculture working paper 017, 21pp.

Ali, E., and Awade, N. E. 2019. Credit constraints and soybean farmers' welfare in subsistence agriculture in Togo. *Heliyon,* 5(4), e01550. https://doi.org/10. 1016/j.heliyon.2019.e01550

Almaz Giziew. 2018. Analysis of gender and determinants of market supply of onion in Dugda District, East Shoa, Ethiopia. *Journal of Agriculture and Environmental Sciences,* 3(1), 39-55.

Anandajayasekeram, P., and Gebremedhin, B. 2009. Integrating innovation systems perspective and value chain analysis in agricultural research for development: Implications and challenges (Vol. 16). ILRI (aka ILCA and ILRAD).

Andaregie, A., Astatkie, T., and Teshome, F. 2021. Determinants of market participation decision by smallholder haricot bean (phaseolus vulgaris l.) farmers in Northwest Ethiopia. *Cogent Food & Agriculture*, 7(1), 1879715.

Asia, S., and Hetherington, D. 2017. Business Environment Reform Facility.

Ayalew, A. W. 2018. Vegetable Market Chain Analysis in Mecha District, West Gojjam Zone, Amhara National Regional State. *Archives of Current Research International*, 15(4), 1–12. https://doi.org/10.9734/ACRI/2018/45840

Baker, P. 2006. Designing distribution Centers for agile supply chains. International Journal of Logistics, 9(3), 207-221.

Behl, R. K., Singh, M., Ibenthal, A., and Merbach, W. 2019. Emerging Technologies: Towards Agriculture, Food and Environment.

Belayneh, A. W., Yesho, E. G., Gemeyida, K. H., and Merah, O. 2022. Determinants of sesame market supply in West Omo and Bench Sheko zones, Southwest Ethiopia. *International Journal of Agronomy*, 2022, 1–8. https://doi.org/10.1155/2022/5134478

Beyene, T., Mulugeta, W., and Merra, T. 2020. Technical efficiency and impact of improved farm inputs adoption on the yield of haricot bean producer in Hadiya zone, SNNP region, Ethiopia. *Cogent Economics & Finance*, 8(1), 1833503.

Bezie, S. 2016. Dairy Value Chain Analysis in Meta District, Eastern Ethiopia (MSc Thesis). Haramaya University, Haramaya, Ethiopia.

Bishaw, Z., and van Gastel, A. J. 2008. ICARDA's seed-delivery approach in less favorable areas through village-based seed enterprises: Conceptual and organizational issues. Journal of New Seeds, 9(1), 68-88.

Bokansa, G. 2018. An analysis of haricot bean value chain: The case of Boricha district, Sidama zone, SNNPR, Ethiopia. Master's thesis. Addis Ababa University, Ethiopia.

BZDOA (Bilate Zuria District Office of Agriculture). 2021. Annual report, unpublished document.

BZDTIO (Bilate Zuria District Trade and Industry Office). 2022. Annual report, unpublished document.

Chirwa, E., Dorward, A., Kachule, R., Kumwenda, I., Kydd, J., Poole, N., and Stockbridge, S. 2005. Walking tightropes: Supporting farmer organisations for market access.

Cronbach, L. J. 1951. Coefficient alpha and the internal structure of tests. psychometrika, 16(3), 297-334.

CSA (Central Statistical Authority of Ethiopia). 2021/22. Agricultural Sample Survey 2021/22. Report on area and production of major crops (private peasant holdings, meher season): Volume I. Statistical Bulletin 593, April 2022. Addis Ababa, Ethiopia.

Dagnaygebaw Goshme, Bosena Tegegne, and Lemma Zemedu. 2018. Determinants of sesame market supply in Melokoza District, Southern Ethiopia. *International Journal of Research Studies in Agricultural Sciences* (IJRSAS), 4(10), 1-6.

Darko-Koomson, S., Aidoo, R., and Abdoulaye, T. 2020. Analysis of cassava value chain in Ghana: implications for upgrading smallholder supply systems. Journal of Agribusiness in Developing and Emerging Economies, 10(2), 217-235.

Delele, T. A., Adugna, A. G., and Gelaw, B. M. 2022. Determinants of soybean (Glycine max.) market supply in Northwestern Ethiopia. *Cogent Economics & Finance*, 10(1), 2142313. https://doi.org/10.1080/23322039.2022.2142313

Dessie, A. B., Abate, T. M., and Mekie, T. M. 2018. Factors affecting market outlet choice of wheat producers in North Gondar Zone, Ethiopia. *Agriculture & Food Security*, 7(1), 1–8. https://doi.org/10.1186/s40066-018-0241-x

Dossa, K. F., Enete, A. A., Miassi, Y. E., and Omotayo, A. O. 2023. Economic Analysis of Sesame (sesamum indicum L.) production in northern Benin. *Frontiers in Sustainable Food Systems*, 6. doi:10.3389/fsufs.2022.1015122

Endalew, B., Aynalem, M., Assefa, F., and Ayalew, Z. 2020. Determinants of wheat commercialization among smallholder farmers in Debre Elias Woreda, Ethiopia. *Advances in Agriculture*, 2020, 1–12. https://doi.org/10.1155/2020/2195823

Eshetu Mulatu, Osman E and Etenesh Bekele. 2005. Improving potato seed tuber quality and producers' livelihoods in Hararghe, Eastern Ethiopia. *Journal of New Seeds* 7(3): 31-56.

Ethiopian Economic Outlook. 2022. The story behind the numbers.

Evangilin, N. P., Murthy, B. R., Naidu, G. M., and Aparna, B. 2020. Statistical model for forecasting area, production and productivity of sesame crop (Sesamum indicum L.) in Andhra Pradesh, India. *International Journal of Current Microbiology and Applied Sciences*, 9, 1156–1166. https://doi.org/10.20546/ijcmas.2020.907.135

FAO (Food and Agriculture Organization). 2018. Market and value chain analysis of selected sectors for diversification of rural economy and womens' economic empowerment, Central Asia: UN.

Ferris S and Kaganzi E. 2008, Evaluating marketing opportunities for haricot beans in Ethiopia. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 7. ILRI (International Livestock Research Institute), Nairobi, Kenya. 68 Pp.

GDOA (Gimbo District Office of Agriculture). 2021. Annual report, unpublished document.

GDOA (Gimbo District Office of Agriculture). 2023. Report on socio economic profile and background information of the district, accessed 15 January 2023.

Gebremedhn, M. B., Tessema, W., Gebre, G. G., Mawcha, K. T., Assefa, M. K., and Yildiz, F. 2019. Value chain analysis of sesame (Sesamum indicum L.) in Humera district, Tigray, Ethiopia. *Cogent Food & Agriculture*, 5(1), 1705741. https://doi.org/10.1080/23311932.2019.1705741

Gedefaw Kindu Wubet. 2022. Value chain analysis of Garlic in LiboKemkem District: In the era of COVID-19, South Gondar Zone Amhara Region, Ethiopia. *Cogent Business & Management*, 9(1), 2076298. https://doi.org/10.1080/23311975.2022.2076298

George, D., and Mallery, M. 2003. Using SPSS for Windows step by step: a simple guide and reference.

Gereffi, G. 1994. The organization of buyer-driven global commodity chains: How US retailers shape overseas production networks. Commodity chains and global capitalism, 95-122.

Gereffi, G., and Memedovic, O. 2003. The global apparel value chain: What prospects for upgrading by developing countries (pp. 2009-12). Vienna: United Nations Industrial Development Organization.

Girma, T., Tefera, T., Kaske, D., and Shashemene, E. 2017. Determinants and resource use efficiency of haricot bean production in Halaba Special District, Southern Ethiopia. *Journal of Economics and Sustainable Development*, 8, 12–19.

Grethe, H. 2006. Value chains for a better integration of smallholders to trade–the case of chilli in Ghana (Doctoral dissertation, Humboldt-University Berlin).

Guéi, R. G., Bentley, J. W., and Mele, P. V. 2011. Introduction: a full granary. In African seed enterprises: sowing the seeds of food security (pp. 1-7). Wallingford UK: CABI.

Gujarati, D. N. 2002. Basic Econometrics 4th ed.

Hailu, A. 2017. Factors affecting onion market outlet choices in Ejere district, West Shoa zone, Oromia region of Ethiopia. Journal of Marketing and Consumer Research, 34.

Hanson, T. 2010. Multiple regression.

Herr, M. L., and Muzira, T. J. 2009. Value chain development for decent work. Geneve: International Labour Office (ILO).

Hirpa, A., Meuwissen, M.P., Tesfaye, A., Lommen, W.J., Lansink, A.O., Tsegaye, A. and Struik, P.C. 2010. Analysis of seed potato systems in Ethiopia. *American journal of potato research*, 87(6): 537-552.

Howard, P. 2006. Consolidation in food and agriculture: Implications for farmers & consumers. The Natural Farmer, 2(68), 17-20.

Jaji, K., Man, N., & Nawi, N. M. 2018. Factors affecting pineapple market supply in Johor, Malaysia. International Food Research Journal 12, 25(1), 366-375.

Kaplinsky, R., and Morris, M. 2002. A Handbook for Value Chain Research.

Kasahun, T. 2020. Value chain analysis and development: the case of bamboo and honey products from maraka woreda, dawuro, southern Ethiopia.

Kassa Tarekegn and Mogiso, M. 2020. Assessment of improved crop seed utilization status in selected districts of Southwestern Ethiopia. *Cogent Food & Agriculture*, 6(1), 1816252.

Kassa, T., Yishak, S., and Tesfaye, G. 2021. Does Bonga sheep producers' cooperative membership improve households' income in southern Ethiopia? *African Journal of Science, Technology, Innovation and Development*, 13(4), 513-520. DOI: 10.1080/20421338.2021.1945774

Kebede, A. L., Dinku, A., & Sheko, M. 2020. Value chain analysis of smallholder milk producers in West Hararghe Zone, Ethiopia. *International Journal of Agricultural Science and Food Technology*, 6(2), 93-100.

Khan, M. K., Babar, S. F., Oryani, B., Dagar, V., and Rehman, A. 2021. Role of financial development, environmental-related technologies, research and development, energy intensity, natural resource depletion, and temperature in sustainable environment in Canada. *Environmental Science and Pollution Research*, 29(27), 1–17. https://doi.org/10.1007/s11356-021-15421-0

Kumar, A., Singh, H., Kumar, S., and Mittal, S. 2011. Value chains of agricultural commodities and their role in food security and poverty alleviation-A synthesis. *Agricultural Economics Research Review*, 24(1), 169-181.

Lemu, E. T. 2016. Review of haricot bean value chain in Ethiopia. *International Journal of African and Asian Studies*, 24, 65-72.

Leta, G., Kelboro, G., Stellmacher, T., and Hornidge, A. K. 2017. The agricultural extension system in Ethiopia: Operational setup, challenges, and opportunities ZEF

working paper series, 1864-6638, Center for Development Research, University of Bonn.

Lundy, M., Amrein, A., Hurtado Bermudez, J. J., Becx, G., Zamierowski, N., Rodríguez, F., and Mosquera Echeverry, E. E. 2014. LINK methodology: a participatory guide to business models that link smallholders to markets. Version 2.0.

Melaku, T., and Ashalatha, D. 2016. Determinants of teff and wheat market supply in Dendi district, West Shoa zone, Ethiopia. *International Journal of Current Research,* 8(10), 40716-40721.

Melese, T., Dessie, A. B., and Abate, T. M. 2018. Determinants of commercialization by smallholder onion farmers in Fogera district, South Gondar Zone, Amhara national regional State, Ethiopia. *Journal of Development and Agricultural Economics,* 10(10), 339–351. https://doi.org/10.5897/JDAE2018.0964

Mendoza, G., 1995. A premier on marketing channel and margins. Lyme Rimer Publishers Inc., USA

Modeste, M., Mulyungi, P., Wanzala, F. N., Eric, N., and Aimable, N. 2018. Effect of social-economic factors on profitability of soya bean in Rwanda. *International Journal of Scientific & Engineering Research,* 9(9), 828-833.

Mossie, H., Berhanie, Z., and Alemayehu, G. 2020. Econometric analysis of onion marketed supply in Northwest Ethiopia. *Cogent Food & Agriculture*, 6(1), 1733329.

Muhammed Urgessa. 2011. Market chain analysis of Teff and Wheat production in Halaba special woreda, souther Ethiopia. MSc. Thesis. Haramaya University, Haramaya. 104 pp.

Müller, F. C., Kleibert, J. M., and Ibert, O. 2021. Hiding in the spotlight: commodifying nature and geographies of dissociation in the fur-fashion complex. *Economic Geography*, 97(1), 89-112.

Mussema M. and Dawit Alemu. 2013. Red Pepper marketing in Silti and Alaba in SNNPRS of Ethiopia: factors affecting households' marketed pepper. *International Research Journal of Agricultural Science and Soil Science*, 2(6): 261-266

Mussema, R., Diro, S., Erko, B., Teshale, D., Dibaba, R., Tesfaye, A., and Zemedu, L. 2022. *Soybean Value Chain Analysis in Ethiopia: A Qualitative Study Research* Report Number: 134. October 2021. Addis Ababa, Ethiopia: Ethiopian Institute of Agricultural Research (EIAR). Retrieved from http://www.eiar.gov.et

Ndlovu, P. N., Thamaga-Chitja, J. M., and Ojo, T. O. 2021. Factors influencing the level of vegetable value chain participation and implications on smallholder farmers in Swayimane KwaZulu-Natal. Land Use Policy, 109, 105611.

Neilson, J. 2014. Value chains, neoliberalism and development practice: The Indonesian experience. *Review of International Political Economy*, 21(1), 38-69.

Nitsuh, H. 2019. Market chain analysis of teff (Eragrostis tef): The case of Dejen District, East Gojam Zone.

Nugusa Abajobir. 2018. Analysis of Maize Value Chain: The Case of Guduru Woreda, Horro Guduru Wollega Zone of Oromia Regional State, MSc Thesis, Haramaya University, Ethiopia, 107 pp.

Ojiewo, C. O., S. Kugbei, Z. Bishaw, and J. C. Rubyogo, 2015. Community Seed Production. Workshop Proceedings. Pp. 1-176.

PABRA (Pan Africa Bean Research Alliance). 2005. Annual Report 2005. Kampala, Uganda.

Porral, C. C., and Stanton, J. L. 2017. *Principles of marketing*. ESIC Editorial.

Porter, M. E. 1985. Technology and competitive advantage. Journal of business strategy, 5(3), 60-78.

Priyadarshi, R., and Routroy, S. 2018. Vertical integration level selection for value addition of herbal products: A farmer's perspective. Materials Today: Proceedings, 5(9), 18354-18361.

Roldan and Pelupessy, W. 2005. Governing the coffee chain: The role of voluntary regulatory systems. World Development, 33(12), 2029-2044.

Sani, A., Abubakar, B. Z., Yakubu, D. H., Atala, T. K., and Abubakar, L. 2014. Socio-economic factors influencing adoption of dual-purpose cowpea production technologies in Bichi Local Government Area of Kano State, Nigeria. *Asian Journal of Agricultural Extension, Economics and Sociology*, 3(4), 257-274.

Seifu, H., Gebreyes, M., Mekonnen, K., and Whitbread, A. 2022. Sustainable Intensification of Mixed Farming Systems (SI-MFS) Initiative Report on the Ethiopia Team System Analysis meeting, 14–15 June 2022, Addis Ababa, Ethiopia.

Seven, U., and Tumen, S. 2020. Agricultural credits and agricultural productivity: Cross-country evidence. The Singapore Economic Review, 65(supp01), 161–183. https://doi.org/10.1142/S0217590820440014

Simatupang, T. M., Piboonrungroj, P., and Williams, S. J. 2017. The emergence of value chain thinking. *International Journal of value chain management,* 8(1), 40-57.

Sisay, D.T., Verhees, F.J. and van Trijp, H.C. 2017. Seed producer cooperatives in the Ethiopian seed sector and their role in seed supply improvement: A review. *Journal of crop improvement,* 31(3): 323-355.

Snodgrass, D., and Woller, G. 2006. Evaluability assessment of PROFIT Zambia.

Solomon Adimasu. 2017. Value chain analysis of community-based chickpea and common bean seed production: The case of Abeshge and Sodo Districts in Southern Region, Ethiopia (Master's thesis). Hawassa University, Ethiopia. 107PP

Sori, O. 2021. Factors affecting groundnut market supply in Western Oromia, Ethiopia. *Heliyon*, 7(1), e05892. https://doi.org/10.1016/j.heliyon.2020.e05892

Soviadan, M. K., Enete, A. A., Okoye, C. U., and Dossa, K. F. 2021. Extensive and Improved Traditional Poultry Farming in Togo: A Comparative Analysis of Socioeconomic Characteristics of Farmers. *European Scientific Journal, ESJ,* 17(35), 274. https://doi.org/10.19044/esj.2021.v17n35p274.

Sperling, L., and Cooper, D. 2003. Understanding seed systems and strengthening seed security.

Sperling, L., Boettiger, S., and Barker, I. 2014. Integrating seed systems (Planning for Scale Brief No. 3). Retrieved from AgPartnerXChange: https://seedsystem. org/wp-content/uploads/2014/03/Integrating-Seed-Systems-. pdf.

Spielman, D. J., Byerlee, D., Alemu, D., and Kelemework, D. 2010. Policies to promote cereal intensification in Ethiopia: A review of evidence and experience. *Food Policy*, 35(3), 185-194.

Spiliotopoulou, G. 2009. Reliability reconsidered: Cronbach's alpha and paediatric assessment in occupational therapy. *Australian Occupational Therapy Journal,* 56(3), 150-155.

Stein, C. and Barron, J. 2017. Mapping actors along value chains: Integrating visual network research and participatory statistics into value chain analysis (Vol. 5). International Water Management Institute (IWMI). CGIAR Research Program on Water, Land and Ecosystems.

Sultan Usman. 2016. Analysis of Wheat Value Chain: The Case of Sinana District, Bale Zone, Oromia Region, MSc Thesis, Haramaya University, Ethiopia, 127 pp.

Tadesa, E. 2018. Determinants of commercialization of teff crop in Abay Chomen District, Horo Guduru Wollega zone, Oromia Regional State, Ethiopia. *Journal of Agricultural Extension and Rural Development,* 10(12), 251-259.

Tadie Mirie and Lemma Zemedu. 2018. Determinants of market participation and intensity of marketed surplus among teff producers in Dera district of South Gondar Zone, Ethiopia. *Journal of Development and Agricultural Economics,* 10(10), pp.359-366.

Tamirat, G., and Muluken, P. 2018. Analysis of apple fruit value chain in Southern Ethiopia; the Case of Chencha District. *Greener J Plant Breed Crop Sci,*6(3),26-34.

Tanko, L. 2017. Determinants of sesame productivity in selected local government areas of Niger State, Nigeria. *J. Sustain. Dev.* 12, 2–10.

Taye Melese, Abebe Birara and Tadie Mirie. 2018. Determinants of commercialization by smallholder onion farmers in Fogera district, South Gondar Zone, Amhara National Regional State, Ethiopia. *Journal of Development and Agricultural Economics,* 10(10), pp.339-351.

Tebeka, Y. A., Katungi, E., Rubyogo, J. C., Sserunkuuma, D., and Kidane, T. 2017. Economic performance of community based bean seed production and marketing in the central rift valley of Ethiopia. *African Crop Science Journal,* 25(2), 189-205.

Teshome, A., and Adgo, E. 2006. An over view of Research Extension-Farmer linkage in Amhara Region: Challenge and opportunity Bahir Dar. Ethiopia. 54p.

Twumasi, M. A., Jiang, Y., Danquah, F. O., Chandio, A. A., and Agbenyo, W. 2020. The role of savings mobilization on access to credit: A case study of smallholder farmers in Ghana. Agricultural Finance Review, 8(2), 275–290. https://doi.org/10.1108/AFR-05-2019-0055

UNIDO, U. O. 2009. Agro-value chain analysis and development: The UNIDO approach. Recuperado de https://www. unido. org.

USAID (United States Agency for International Development). 2006. PRA Project Annual Report FY. Chemonics International p. 1

Wacal, C., Basalirwa, D., Okello-Anyanga, W., Murongo, M. F., Namirembe, C., & Malingumu, R. 2021. Analysis of sesame seed production and export trends; challenges and strategies towards increasing production in Uganda. OCL Oilseeds Fats Crops Lipids, 28, e2020073. https://doi.org/10.1051/ocl/2020073

Walsh, S., Remington, T., Kugbei, S., and Ojiewo, C. O. 2015. Review of community seed production practices in Africa Part 1: Implementation strategies and models.

Wana, H., and Sori, O. 2018. Analysis of economic efficiency of sesame (Sesamum indicum L.) production in Babogambel District of West Wollega Zone. *Food Science and Quality Management*, 76, 47-61.

Wogayehu, A., and Tewodros, T. 2015. Factors Affecting Production and Market Supply of Haricot Bean in Southern Ethiopia. *Journal of Economics and Sustainable Development*, 6(15), 103-109.

Woldesenbet, A. T. 2013. Value chain analysis of vegetables: The case of Habro and Kombolcha woredas in Oromia region, Ethiopia. School of Agricultural Economics and Agribusiness, School of Graduate Studies, Haramaya University.

Wondim, A., and Desselgn, M. 2019. Market chain analysis of potato and factors affecting market supply in West Gojam Zone, Ethiopia. Journal of Development and Agricultural Economics, 11(2), 43–51. https://doi.org/10.5897/JDAE2018.0988

Wondmagegn Belete. 2014. Market Chain Analysis of Coffee in Dale District Of Southern Ethiopia. M.Sc thesis. Haramaya University, Haramaya.

Worako, T. K. 2019. Analysis of price incentives for haricot beans in Ethiopia for the time period 2005–2012. Gates Open Res, 3(376), 376.

Xaba, B. G., and Masuku, M. B. 2012. An analysis of the vegetables supply chain in Swaziland. Sustainable Agriculture Research, 2(2), 1-10.

Yamane, T. 1967. Statistics: An introductory analysis. Retrieved from https://www.researchgate.net/figure/A-simplified-formula-to-calculate-sample-size-Yamane-1967-fig4-281629128

Zakic, N., Bozilovic, S., and Sijakovic, I. 2018. Analysis and upgrading of value chain. *Ekonomika, Journal for Economic Theory and Practice and Social Issues*, 64(1350-2019-2914), 1-15.

Zamora, E.A. 2016. Value chain analysis: A brief review. *Asian Journal of Innovation and Policy*, 5(2), pp.116-128.

Zebire, D. A., and Gelgelo, S. 2019. Effect of phosphorus fertilizer levels on growth and yield of haricot bean (Phaseolus vulgaris. L.) in South Ommo Zone, Ethiopia. *Agricultural Science Digest-A Research Journal*, 39(1), 55-58.

7. APPENDICES

Appendix Table 1: Livestock conversion factors

Livestock category	Conversion factors
Ox	1.1
Cow	0.8
Bull	1.1
Heifer	0.5
Calf	0.2
Sheep	0.09
Goat	0.09
Mule	0.8
Donkey	0.36
Hen	0.01

Source: ILRI (International Livestock Research Institute)

Appendix Table 2: Test for Multicollinearity of the explanatory variables

Bilate Zuria district			Gimbo district		
Variables	VIF	1/VIF	Variables	VIF	1/VIF
QUPROD	3.29	0.304091	MKTINFN	1.75	0.569930
LANDSZ	3.24	0.308213	CREDIT	1.65	0.604432
MKTINFN	1.84	0.543432	MKTCOST	1.61	0.619950
MKTCOST	1.72	0.580230	TLU	1.55	0.643914
FAMSZ	1.56	0.642291	SFExp	1.55	0.644156
DISTANCE	1.48	0.677840	OFFNONFAM	1.50	0.664707
AGE	1.46	0.685719	COOPMEMB	1.40	0.714812
CREDIT	1.43	0.701242	AGE	1.36	0.733243
FEXTCONT	1.32	0.757768	EDLEVEL	1.36	0.734191
TLU	1.31	0.763642	FEXTCONT	1.32	0.754822
SFExp	1.21	0.828507	QUPROD	1.32	0.754866
SEX	1.19	0.838439	DISTANCE	1.28	0.779989
COOPMEMB	1.16	0.863435	SEX	1.19	0.843775
OFFNONFAM	1.14	0.875370	FAMSZ	1.17	0.851392
EDLEVEL	1.11	0.902297	LANDSZ	1.16	0.865419
Mean VIF*	1.63		Mean VIF*	1.41	

Source: Own survey result, 2023; * imply the average variance inflation factor

Appendix Table 3: Tests for heteroskedasticity (estat hettest)

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Bilate Zuria district	Gimbo district
Ho: Constant variance	Ho: Constant variance
Variables: fitted values of VHBSOLD*	Variables: fitted values of VHBSOLD*
chi2(1) = 11.35	chi2(1) = 9.37
Prob > chi2 = 0.0008	Prob > chi2 = 0.0022

Source: Survey result, 2023
Aasterisk (*) implies Volume of haricot bean seed sold

Appendix Table 4: Ramsey specification-error test for omitted variables (estat ovtest)

Ramsey RESET test using powers of the fitted values of Volume of haricot bean seed sold	
Bilate Zuria	Gimbo district
Ho: model has no omitted variables	Ho: model has no omitted variables
F(3, 149) = 0.05	F(3, 41) = 1.64
Prob > F = 0.9853	Prob > F = 0.1948

Source: Survey result, 2023

Appendix Table 5: ANOVA table for F-statistic

Bilate Zuria district					
Source	SS	Df	MS	F	Sig.value
Model	645.89	15	43.06	87.14	0.0000
Residual	75.11	152	0.49		
Total	721	167			
Gimbo district					
Source	SS	Df	MS	F	Sig. value
Model	123.80	15	8.25	24.60	0.0000
Residual	14.76	44	0.34		
Total	138.56	59			

Source: Own survey result, 2023

Appendix Table 6: Major Constraints for seed producers

Major constraints	Responses	Bilate Zuria district		Gimbo district	
		N	%	N	%
High in inputs purchasing price	No	-	-	-	
	Yes	168	100	60	100
Late delivery of inputs	No	25	14.9	-	-
	Yes	143	85.1	60	100
Shortage of improved seed	No	116	69	-	-
	Yes	52	31	60	100
Weak extension service	No	21	12.5	9	5.4
	Yes	147	87.5	159	94.6
Prevalence of pest	No	130	77.4	10	6
	Yes	38	22.6	158	94
High rain fall	No	153	91.1		
	Yes	15	8.9	60	100
Shortage of rain fall	No	12	7.1	60	100
	Yes	156	92.9	-	-

Source: Own survey result, 2023

Appendix Table 7: Major marketing constraints of haricot bean seed producers

Major marketing constraints	**Responses**	**Bilate Zuria district**		**Gimbo district**	
		N	%	N	%
Weak market linkage	No	114	67.9	9	15
	Yes	54	32.1	51	85
Low price at harvesting time	No	12	7.1	-	-
	Yes	156	92.9	60	100
Lack of storage	No	168	100	-	-
	Yes	-	-	60	100
Seed quality problem	No	16	9.5	7	11.7
	Yes	152	90.5	53	88.3

Source: Own survey result, 2023

Appendix 2: Questionnaires for different stakeholders

Survey questionnaire for haricot bean seed producers

Questionnaire Code: _____

District_____Kebele_____Village_____Date _____

I. General identification questions

1. Name of respondent_____Age_____years

2. Sex (Gender):- 1 Male 0. Female

3. Educational level of the household _____

4. Marital status of the household head: - 1. Single 2. Married 3. Divorced 4. Widowed

5. Distance to nearest market_____km/_____hr walk

6. Distance to FTC/DA center_____km/_____hr walk

7. How many years of experience do you have in CBHB*[2] seed production?_____Year

II Household and Resource data

1. Family size: - Male_____Female_____Total _____

2. Total land size you have_____hectare

3. Total crop land_____(Note: 1ha = 8timad = 0.125ha)

4. Total land used to CBHBS production: _____

5. Livestock ownership

Livestock type	Number owned
Ox	
Cow	
Bull	
Heifer	
Calf	
Sheep	
Goat	
Mule	
Hen	
Donkey	

6. Do you have transportation facility (means of transportation used)? 1. Yes 0. No

7. If you answer for Q.6 is **–Yes‖**, what types? 1. Vehicles 2. Carts 3. Manpower 4. Back of animals 5. Others (specify) _____

III Haricot bean production information

1. Farming System: 1. Mono-cropping 2. Mixed-cropping 3. Both

2. Total area of haricot bean seed production during the 2014 E.C. cropping season in timad_____/ha _____

3. How many quintals seed did you harvest from the total land in 2014 E.C? _____

4. Which variety of improved haricot bean seed did you use? _____

5. Why you **prefer** to use this variety? 1. Productivity 2. High demand 3. Early maturity

[2] CBHB: Community-based haricot bean

4. Food quality 5. Resistance to pest and diseases

6. Do you have encountered problems with the use of improved HB*[3] seed varieties?

1. Yes 0. No

7. If you answer to Q.6 is –**Yes**‖, what types (Multiple responses are possible)

1. There is germination problem 2. Low productivity than local seed

3. Low environmental adaption (drought, flood etc) 4. Low resistance, pest and diseases 5. Others (specify) _____

8. What is the source of labour used for haricot bean seed production? (Multiple responses are possible). 1. Family labour 2. Daily labour 3. Hired labour 4. Debo

9. What is the estimated amount of income you obtain from non-farm or off-farm activities annually?_____ETB

10. Input used in haricot bean seed production during last season?

Input	Unit	Quantity
NPS		
Bio-fertilizer		
Seed		
Herbicide		
Pesticide		
Insecticide		

11. Cost of labour and inputs used for community-based haricot bean seed production

Items	Unit Price	Amount used	Total cost
Cost of fertilizer			
Cost of seed			
Cost of chemical			
Land preparation and sowing cost			
Weeding cost			
Harvesting cost			
Threshing cost			
Transporting cost			
Land value (if rented)			

12. How was the trend of volume of haricot bean seed production during last years?

1. Increasing 2. Decreasing 3. The same

13. If production increasing, what are the **MAIN** reasons? _____

14. If the haricot bean seed production decreasing, what are the **MAIN** reasons? _____

15. Would you like to expand haricot bean seed production? 1. Yes 0. No

16. If your answer for Q.13 is –**Yes**‖, why? _____

[3] **HB: Haricot bean**

17. If your answer for Q. 13 is **–No‖**, why? _____

18. What are the haricot bean seed production constraints you encountered?

Major constraints	Response Yes (1) No (0)	If yes what do you think was/were the cause/s of this problem?	What is your suggestion to solve each problem?
High in inputs purchasing price			
Late delivery of inputs			
Shortage of improved seed			
Weak extension service			
Prevalence of pest			
High rain fall			
Shortage of rain fall			

IV. Production Services

Input supply

1. From which source and how did you get agricultural inputs in the seed production process for last production season? (Multiple responses are possible)

Types of inputs used*	**Source****	**How did you get*****

***: 1.Improved seed 2.Fertilizer 3.Pesticides/herbicides 4.Other (Specify)

****: 1.DOA 2. Kayo cooperative 3. Sidama Elto cooperative union 4. Other

*****: 1.Through purchase 2.On credit base (100%) 3. On credit base (50%) 3.Freely

2. Do you **always get inputs at right time** for community-based haricot bean seed production? 1. Yes 0. No

3. Do you always get inputs in the quantities that you need? 1. Yes 0. No

4. If your answer for Q. 3 is **–No‖**, what are the **MAIN** reasons? (Multiple responses are possible) 1. Not available on time 2. Shortage of supply 3.Other (Specify) _____

5. Have you in accessing to **basic seed**? 1. Yes 0. No

6. If your answer for Q.5 is **–No‖**, what are the problems? (Multiple responses are possible)

1. Unavailability 2. Shortage of supply 3. Other (Specify) _____

7. If you faced the above problems, how you solved them? _____

V. Credit access

1. Did you borrow money for haricot bean seed production for the last production season?

1. Yes 0. No

2. If yes, how much did you take for haricot bean seed production_____ETB?

3. From where and for what purpose did you borrowed? (Multiple responses are possible)

Source*	Purpose**

*: 1.Relative 2. Traders 3. Bank 4. NGO 5. Micro-finance institution 6. Peasant association 7. Friends 8. Others (specify) _____

**: 1. Payment for hired labour 2.Purchase of fertilizer and seed 3.Payment for rented oxen 4. Purchase of transport animals 5. Land rent 6.Other (Specify) _____

4. If your answer for Q.1 is **–Yes‖**, have you paid the loan? 1. Yes 0. No

5. If your answer for Q.3 is **–No‖**, what are the reasons? _____

6. Did you face any problem in accessing credit? 1. Yes 0. No

7. If your answer for Q.6 is **–Yes‖**, what were the problems? (Multiple responses are possible) 1. Limited supply of credit 2. Limited access to credit 3. Bureaucracy 4. Other

8. How did you solve these problems? _____

9. Is there any **community-based seed cooperative** in your area? 1. Yes 0. No

10. If yes, are you the **member of the cooperative**? 1. Yes 0. No

11. If yes for Q9, what is the advantage of being cooperative membership? _____

VI. Extension Service

1. Did you have extension contact in relation to haricot bean seed production in the 2014 E.C. cropping season? 1. Yes 0. No

2. If your answer for Q.1 is **–Yes‖**, how often the **extension agent** contacted you? _____

3. If your answer for Q.1 is **–Yes‖**, what are the services provided by the extensions? (Multiple responses are possible)

1. Land preparation 2. Sowing 3. Fertilizer application 4. Crop protection

5. Post-harvest handling and value adding 6. Other (Specify) _____

4. If your answer for Q.1 is **–No‖**, why? (Multiple responses are possible)

1. No service provider nearby 2. Unavailability of contact farmers 3. Do not have time to get the service 4. Lack of information.

VII. Seed Marketing and Price Information

1. Did you participate selling of the community-based haricot bean seed? 1. Yes 0. No

2. If your answer for Q.1 is –**Yes**‖, to whom you sold your seed? (Multiple answers are possible)

Amount Produced (qt)	Amount sold (qt)	To whom did you sold*	Price per qt	Where did you sold**

*: 1.Wholesaler 2. Retailers 3.Collectors 4.Consumers 5. Elto cooperative union 6. Kayo cooperative 7. Cereal cooperatives 8.Other (specify) _____

**: 1.Farm gate 2.Market center 3. Retailing yourself 4. Others (specify) _____

3. If your answer for Q.1 is –**No**‖, why you did not participated? _____

4. What is the trend of community-based haricot bean seed price during the last year?

1. Increasing 2. Decreasing 3.The same

5. If your answer for Q.4 is increasing, why? _____

6. If your answer for Q.4 is decreasing, why? _____

7. Do your community-based haricot bean seed preferred quality by buyers? 1. Yes 0. No

8. If your answer for Q.7 is –**No**‖, what intervention is needed to improve quality and quantity of haricot bean seed production to attract buyers or consumers? _____

9. What are your sources of information about quality requirement of your customers? ____

10. Have you added any value on your haricot bean seed? 1. Yes 0. No

11. If your answer for Q.1 is –**Yes**‖, what are those value adding activities?
(Multiple responses are possible)

1. Clearing 2. Storage 3. Packaging 4. Transportation

12. Linkage with value chain actors: (Multiple responses are possible)

1. Wholesalers 2. Consumers 3. Local collectors 4. Kayo cooperative 5. Others

13. Did you get **access to** haricot bean seed market information in last year? **1. Yes 0. No**

14. If your answer for Q.13 is –**Yes**‖, from whom did you get the market information?

1. DAs 2. Kebele administration 3. Woreda experts 4. From market 5. SSE 6 Radio/TV 7. Other (specify)_____

15. What **type** of information did you get?

1. Price information 2. Market place information 3. Buyers' information 4. Others _____

16. Was the information valuable to you in marketing? **1. Yes 0. No**

17. Marketing costs of the haricot bean_____

18. What are the constraints? (**Rank from the first most severe=1 to second most severe=2 in the cell next to the possible constraints)**

Major marketing constraints	Response Yes (1) No (0)	If yes what do you think was/were the cause/s of this problem?	What is your suggestion to solve each problem?
Weak market linkage			
Low price at harvesting time			
Lack of storage			
Seed quality problem			

Survey questionnaire for haricot bean seed traders

I. General information

Address: Region_____Zone_____District_____Town_____

1. Trader's Name (optional)_____Sex: 1.Male 0. Female

2. Age of the respondent_____

3. Marital status 1. Single 2. Married 3. Divorced 4. Widow 5. Separated

4. Family size: Male_____Female_____Total _____

5. Education level of the respondent _____

6. Type of trade: 1. Retailer 2. Wholesaler 3. Collectors 4. Other_____

7. How you trade or did your business? 1. Alone 2. Partnership 3. Cooperative

8. Number of years operating the business_____years

9. At which period do you participate in haricot bean seed trading?

1. Year round 2. During harvesting time 3. During sowing time 4. Other _____

10. How much was your initial capital when you started this trade business?_____ETB

11. How much current working capital do you have?_____ETB

12. Sources of your working capital are: 1. Own 2. Loan 3. Gift (relatives/friends) 4. Share

13. If it was a loan, from whom did you borrow?

1. Relative/family 2. Private money lenders 3. Friends 4. Micro finance institution

5. Bank 6. Other _____

14. How much was the rate of interest?_____ETB for formal,_____ETB for informal

15. How **was accessing finance for haricot bean seed trade** in recent times? How is the trend? 1. Improved 2. Decreasing 3. Remaining the same

16. What mode of transportation do you use? _____

17. Do you add value on haricot bean seed? 1. Yes 0. No

18. If your answer for Q.17 is **–Yes‖**, what are those value adding activities? (Multiple responses are possible) 1. Cleaning 2. Storage 3. Packaging 4. Other_____

19 Asset owned

Asset		Number
Store	Separate	
	Residence	
Mobile telephone		
Weighting scale		
Motor cycle		
Vehicle		
Other		

20. Is there entry barriers in community-based haricot bean seed trading? 1. Yes 0. No

21. If your answer to Q.20 is **–Yes‖**, what are the barriers?

1. Capital 2. Information problems 3. Administrative problems 4. Government policy 5. Monopoly of traders 6. Others _____

22. Linkage with other seed chain actors: (Multiple responses are possible)

1. Farmers 2. Retailers 3. Wholesaler 4. Consumer 5. Local collectors 6. Coop

23. Do you consider quality requirement of your customer? 1. Yes 0. No

24. If your answer to Q.23 is **–Yes‖**, what quality requirement do you consider?

25. What was your source of information about quality requirement of your customer?

26. How many regular suppliers do you have? Producer's_____, Collectors_____, Wholesaler_____Other

27. Have you ever stopped purchasing due to **lack of fund**? 1. Yes 0. No

28. Have you ever stopped purchasing due to **lack of supply**? 1. Yes 0. No

29. How did you attract your buyers or customers?

1. By giving fair price 2. By quality of seed 3. By advertising 4. By value adding

30. How many regular buyers do you have? Retailer's_____, Wholesalers_____, Collectors_____, Consumers_____, Kayo coop_____Elto coop Union_____other _____

31. What is your packing material? 1. Sack 2. Plastic sack 3. Plastic bags 4. Other

32. How many Kg did you pack? _____

33. Do you think that the packing material **add value** to the product? 1. Yes 0. No

34. Do you get **market price information** before you sold the seed? 1. Yes 0. No

35. Do you have store before selling the seed? 1. Yes 0. No

36. Do you think that storage condition would **add value** to the seed? 1. Yes 0. No

37. Who sets selling price? 1. Yourself 2. Buyers 3. Demand and supply 4. Negotiations

38. Do you pay tax? 1. Yes 0. No

39. If your answer for Q.38 is **–Yes‖**, how much?

Amount (Birr)	Base of payment*	Rate of payment

*: 1. Per quintal 2. Simply on daily bases 3. Per track base 4. Based on sale of products

40. Indicate your average cost incurred per quintal in the trading of haricot bean seed

Category of cost	Cost incurred in birr/quintal	Local unit measurement
Purchasing price		
Labor for packing		
Loading /unloading		
Transportation fee		
Cleaning cost		
Storage cost		
Loss in transport and storage		
Processing cost		
Other personal costs (specify)		
Taxes		
Total costs		
Selling price		
Revenue		

41. Are the problems on haricot bean seed marketing? 1. Yes 0. No

42. If your answer to Q.41 is **–Yes‖**, what are the problems?

Problems	Yes (1) No (0)	If yes what do you think was/were the cause/s of this problem?	What is your suggestion to solve each problem?
Credit			
Price setting			
Supply shortage			
Storage problem			
Lack of demand			
Information flow			
Quality problem			
Lack of government support in Marketing			
Other (specify)			

Survey questionnaire for seed consumers (users)

I. General Information

1. Zone:_____District_____Kebele_____Village _____

2. Name of respondent_____Age_____Sex _____

3. The educational level of the respondent: _____

4. Marital status: 1. Single 2. Married 3. Divorced 4. Widow

5. Distance to nearest market:_____Km or_____hrs.

6. Distance to seed marketing cooperative:_____Km or_____hrs.

7. What is your major means of income generation? 1. Farming 2. Trade 3. Employment

8. Do you know the importance of **community-based haricot bean seed**? 1. Yes 0. No

9. Did you purchase seed from community-based haricot bean producers? 1. Yes 0. No

10. If your answer for Q.9 is ―**Yes**‖, for how many years did you use the community-based haricot bean seed?_____years

11. Do you produce and use it next season or purchase? 1. Yes 0. No

12. If you purchase, how much Kg did you purchase the previous cropping season?____Kg

13. If you purchase, do you always get community-based haricot bean seed at right time?

    1. Yes 0. No

14. If your answer for Q.13 is ―**No**‖, what are the reasons?

    1. Unavailability 2. I am not sure of the benefit 3. Expensive 4. Cash shortage

    5. Far distance 6. Other (specify) _____

15. Do you always get community-based haricot bean seed in the quantities that you need?

    1. Yes 0. No

16. If no to Q.15, please give the **MAIN** reason? (Multiple responses are possible)

    1. Not available on time 2. I am not sure of the benefit 3. Too expensive 4. Cash shortage 5. Shortage in supply 6. Other (specify) _____

17. If you faced the above problems, how you solved them? _____

18. Do you consider any quality requirements to purchase community-based haricot bean seeds? 1. Yes 0. No

19. If your answer for Q.18 is ―**Yes**‖, what quality requirement do you consider for, _____

20. Do you think there is problem in community-based haricot bean seed? 1. Yes 0. No

21. If your answer for Q.20 is –**Yes**‖, what are constraints hindering to use community-based haricot bean seed? Rank horizontally (1=most severe, 2=second severe and etc)

Supply shortage	Income shortage	High price of seed	Poor quality of seed	Lack of information	Other (specify)

22. In what amount **kilogram** packed community-based haricot bean seed do you prefer?

Questions for KIIs for Sidama Elto Farmers' Cooperatives Union

1. Location and contact information: Region_____Zone_____Woreda_____
Kebele_____P.O.Box_____Telephone _____
2. Name of the organization _____
3. Role of the interviewee in the organization in the community-based haricot bean seed____
4. Types of the organization: 1. Public 2. Private 3. NGO
5. Member of the organization: Male_____Female_____Total _____
6. What is the role of your organization in community-based haricot bean seed value chain?
7. What are the challenges and opportunities you faced in undertaking those roles to your organization?
8. Explains the relationship (linkage) your organization has with different actors in the haricot bean seed value chain_____
9. What attempt has been done so far to improve the sector (haricot bean seed)? What would be the future direction to strengthen the seed value chain?

Thank you for your willingness to participate in this study!

AUTHOR BIOGRAPHICAL SKETCH

The author was born on October 8, 1994, G.C., in the Sidama Zone of the Southern Nations Nationalities and Peoples' Region (formerly known as SNNPR), which is now called Sidama National Regional State. Specifically, he was born in Dore Bafano 01 Kebele, Hawassa Zuria district to his father Mr Shitaye Banta and his mother Mrs Zenebech Dama. For his primary education, he attended Wondo Tika Primary School for grades 1-3 and Mulate Primary School for grades 4-8. He then moved on to Langano High School for grades 9 and 10, followed by Hawassa Tabor Preparatory and Comprehensive Secondary School for grades 11 and 12.

After successfully passing the Ethiopian Higher Education Entrance Examination (EHEEQ), he enrolled at Hawassa University in 2015. In June 2017, he graduated with a Bachelor of Science degree in Agribusiness and Value Chain Management. Shortly after completing his studies, he began working as an Agricultural Activity Coordinator for Progetto Continenti, an international non-profit organization. He occupied this position for roughly 5 months. Subsequently, he worked as a market expert for the Hawassa Zuria Woreda Urban Development and Housing Office, where he served for about 5 months and 22 days. Following that, he joined the Southern Agricultural Research Institute at the Bonga Agricultural Research Center. However, due to the region's separation, the Bonga Agricultural Research Center continued as the centre for the newly emerged South West Agricultural Research Institute. He initially worked as a socio-economics researcher from January 22, 2018, but later transitioned to the position of an Agricultural Economics and Gender issues researcher, which he has held until the present. In 2021, he returned to Hawassa University to pursue graduate studies in the Master of Science (M.Sc.) program in Agricultural Economics.