AMERICAN COLLEGE OF TECHNOLOGY

DEPARTMENT OF BUSINESS STUDIES

MASTER OF BUSINESS ADMINISTRATION PROGRAM

PROJECT: IMPROVED-COFFEE SEEDLING PLANTING AND DISTRIBUTION IN ZEGE PENINSULA, NORTH GOJJAM

A Project Submitted to the Department of Business Studies of American College of Technology as Partial Fulfillment of the requirement of the Award of Master of Business Administration

By

Alebachew Semeneh Talema

ID No: OMBA-457-22A

Advisor

Dr. Yirgalem Tadele

June 2024

Addis Ababa, Ethiopia

Declaration

I, Alebachew Semeneh Talema hereby declare that a project work entitled **Improved-coffee seedling planting and distribution in Zege Peninsula, North Gojjam** submitted to The Department of Business studies of American College of Technology in partial fulfillment of the requirements for the award of the **Master Business Administration** is a record of original work done by me during 2023/2024 academic year under the supervision and guidance of Dr.Yirgalem Tadele and it has not formed the basis for the award of any Degree/Diploma/Associate ship/Fellowship or other similar title of any candidate of any university.

Place: Addis Ababa, Ethiopia

May,2024

Signed by:

DocuSigned by:

Alebachew Semeneh

CC11C5DCCB58405...

Signature of the Candidate

Certificate

This is to certify that the project work entitled **Improved-coffee seedling planting and distribution in Zege Peninsula, North Gojjam** submitted to the Department of Business Administration, MBA Program in partial fulfillment of the requirements for the award of the **Master of Business Administration** is a record of original project work done by Alebachew Semeneh Talema during the period 2023/2024 academic year under my supervision and guidance and the thesis has not formed the basis for the award of any Degree/Diploma/Associate ship/Fellowship or other similar title of any candidate of any University and it complies with the regulation and accepted standards of the College.

Name of Advisor: Dr. Yirgalem Tadele

Signature: _____

Date: _____

Approval Sheet

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| --- | --- | --- |
| **Name** | **Signature** | **Date** |

Internal Examiner

| --- | --- | --- |
| **Name** | **Signature** | **Date** |

External Examiner

| --- | --- | --- |
| **Name** | **Signature** | **Date** |

Acknowledgment

First and foremost, I want to give my thanks to Almighty God for giving me the chance to enjoy the fruits of my Endeavour.

Second, I thank my esteemed advisor Dr. Yirgalem Tadele for his incessant guidance, perspicacious thoughts, constructive criticism, and his great efforts to clarify things clearly and easily throughout my project work period.

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Name: Alebachew Semeneh Talema

Signature: Signed by:

Date: 06-07-2024

Table of Contents

List of Figures

List of Tables

Acronyms

ARAB-Amhara Region Agriculture Bureau
ARARI-Amhara Region Agricultural Research Institute
CBD- Coffee berry disease
CSOs-Civil Society Organizations
EARI-Ethiopian Agricultural Research Institute
M&E-Monitoring & evaluation
R&D- Research & Development
NGOs-Non-Governmental Organizations
SWOT-Strength, Weakness, Opportunity, Threat

Executive Summary

Multi-donor financed community based projects for improved coffee nursery and seedling distributions are not commonly practiced interventions. The existing ARARI nursery centers distribute seedlings in a piecemeal way to individual smallholder coffee farmers. The fragmented technical support and trainings provided did not bring significant impacts. Hence, development of a project is required to fill those gaps that ensures improved and sustainable livelihood of the community through modern and sustainable agriculture practices which enhances high-yield and quality products that have competitive market in the long-term.

This project highlights the gaps in small scale coffee production system and level of utilization of improved systems and various research outcomes through awareness trainings to farmers.

Consequently, this project is designed to address the gaps mainly through improved coffee varieties that have been released by the Ethiopian Agricultural Research Institute (EARI) as well as The Ethiopian Agricultural Authority plant variety release, protection and seed quality control directorate. The project will be executed under a not-for-profit organization, community based entity that will be fully financed by multi-donors.

Overall, this project when appropriately implemented, it will greatly boost the long-term economic viability of the community in the monastery of Zege Peninsula and reasonably contributes to the overall economy.

Both secondary and primary data sources are used for the project study

Introduction

The global demand for high quality coffee production necessitates enhanced coffee agricultural production system that ensures both improved quality and better yield. Ethiopia is the home of variety of coffee under diverse environmental conditions and coffee export has been continued to be the back-bone of the economy. According to researches, ninety-five per cent of the coffee produced in Ethiopia is organic. The project highlights the current coffee production system and need for utilization of improved systems and research outcomes through awareness trainings to farmers. The rationale behind this project aims at:

- a resilient and sustainable economy that ensures improved community livelihood;
- labor intensive project that ensures job opportunity;
- Improved agricultural products by providing improved species seedlings to farmers; and
- Importance of coffee in Ethiopia in general and in Zege Peninsula /North Gojjam in particular.

  The project development considers the following key factors:
  - The current agricultural production system (traditional, modern, large farm, backyard) and its strengths and weakness;
  - Production and productivity per unit area;
  - Area coverage and productivity of coffee in Zege Peninsula /North Gojjam

1.1 Background of the project

The Zege Peninsula is located in the Amhara Regional State, Southern shore of Lake Tana.
The Zege Peninsula rural community livelihood is mainly dependent on the naturally and indigenously Arabica coffee in the forest of the monastery. This traditional coffee is mainly for own consumption and local market, moreover, there were efforts to introduce this coffee to the global market through special arrangements with foreign consumers and promotors[1].
Currently, the coffee in Zege Peninsula monastery is seriously affected by coffee berry disease (CBD). The Amhara Regional Agricultural Research Institute (ARARI) suggested to gradually replace the traditional coffee with improved coffee varieties that are disease resistant and better yield since the effort to disinfect the coffee has not been successful and the yield deteriorated from year to year.
In general, the altitude (1,838 meters above sea level), rainfall, temperature and soil type studies of the project location, Zege Peninsula is proved viable for coffee production.

[1] Ethiopia's Amhara region produces a wide range of local coffee varieties with varying cup characteristics. However, the coffees have not yet been characterized and then trademarked to be included in the country's coffee export market.
Coffee beans from Zegie peninsula exhibited the lowest trigonelline and caffeine levels. Linear discriminant analysis reveals the possibility of distinguishing coffee samples into their respective cultivation zones with a success rate of 51%, Journal of Agriculture and Food Research Volume 16, June 2024, 101082,[Abstract].[PDF]

The major constraints associated with the traditional coffee production in Zege Peninsula are the following:

- The coffee variety is a low-yield local variety
- There is serious coffee berry disease (CBD)
- Poor agronomic practices are being applied by the local farmers (weeding, watering, fertilizer application, pruning)
- Poor coffee harvesting, processing and handling practices

The aforementioned challenges shall be mitigated through:

- Multiplication and distribution of improved CBD tolerant improved coffee varieties at scale to gradually replace the existing local variety
- Provision of continuous skill training to local farmers on best practices (weeding, watering, fertilizer application, pruning) to gradually replace the traditional coffee plant by improved coffee plants.
- Provision of small scale coffee processing and handling equipment including materials for small scale irrigation purposes

In consideration of the above facts, the intended 5-years project is designed to address the gaps mainly through nursery and distribution of improved coffee varieties that have been released by the Ethiopian Agricultural Research Institute (EARI) as well as The Ethiopian Agricultural Authority plant variety release, protection and seed quality control directorate[2]. The project will be executed under a not-for-profit organization community based entity that will be fully financed by multi-donors

Overall, this project when appropriately implemented, it will greatly boost the long-term economic viability of the community in the monastery and reasonably contributes to the overall economy.

1.2 Objective of the Project

As stated in the introduction, the general objective of the project is to ensure a resilient and sustainable economy that ensures improved community livelihood by introducing improved agricultural products by providing improved species seedlings to farmers in consideration of importance of coffee in Ethiopia in general and in Zege Peninsula /North Gojjam in particular.
The specific objectives are targets that aims what the project intends to achieve with regard to goal setting parameters, **Specific**, **Measurable**, **Achievable**, **Relevant**, and **Time-bound** (**SMART**).

- Establishment of improved coffee nursery project, training and demonstration sites
- 250-hectare coverage of new improved variety coffee plants per year for five-years
- Distribution of 625,000 seedlings per year to farmers
- Establish effective distribution system

[2] Crop variety register, issue no. 25, June 2022, under the Ethiopian condition, control of CBD (Coffee Berry Disease) with resistant variety was recognized and therefore, a program was initiated to select resistant genotypes. As a result, a number of CBD resistant Coffee Cultivars have been released.

The above objectives target to increase production and productivity of coffee in Zege Peninsula by 300%[3]; to this end, the monitoring and evaluation mechanism will set key performance indicators of project implementation. The regional Rural and Agricultural Development Bureau, ARARI and farmers' cooperatives are the key stakeholders to the achievement of this project.

1.3 Statement and Justification of the Problem

As part of the global strategies, poverty reduction, livelihoods and jobs creation, the project under study, improved-coffee seedling planting and distribution is focused on the mechanism to alleviate the prevailing challenges.

Outcomes of agricultural research institutions such as seed selection and innovations are not prudently implemented to a satisfactory extent in order to enhance improved agricultural products[4].

The coffee in Zege Peninsula monastery is seriously affected by coffee berry disease (CBD) and the effort to disinfect the coffee has not been successful and the yield is deteriorated from year to year; moreover, the poor and traditional agronomic practices applied by the local farmers worsens the situations.

Hence, a project is designed to mitigate such challenges by exploiting research outcomes through implementation of improved coffee planting and distribution along with appropriate trainings and support to local farmers with best agronomic practices.

What makes this project different from other projects that have been tried previously is that this project is well designed and highly involve the local community, multi-donors and to be executed through joint-finance arrangements with effective oversight steering committee from key stakeholders.

1.4 Scope of the Project

The scope designed a strategy for improved coffee-seedling planting and distribution and dissected the strategy into total work elements as follows:

a. Utilize the research development (R&D) outcomes of EARI
    - Obtain guidance and expert support to start the project

[3] The propensity score matching (PSM) was used to empirically determine the impact of the adoption of improved coffee varieties on farmers' yield. The result exhibited a positive and significant effect of improved coffee variety on productivity, Ethiop. J. Agric. Sci. 32(3) 55-80 (2022, The Impact of Improved Coffee Technology Adoption and Determinants of Coffee Productivity, A Quantile Regression Approach, [Abstract],[Google Scholar]

[4] Coffee, Ethiopia's largest export crop is the backbone of the Ethiopian economy. However, Ethiopia has **not** yet fully exploited its position as the producer of some of the best coffees in the world. [Abstract] [PDF]

- environmental and social impacts shall be assessed at this stage to ensure sustainability
- Establish seedling nursery project, training and demonstration site

b. Design seedling distribution strategies
   - Local farmers' cooperatives are designated for the distribution

c. Training & continuous support
   - Set training program and technical support to farmers

d. Proposed project phase:

Phase1: Based on the defined objective and scope, identification of stakeholders and formation of the project team

Phase2: Planning

- Resource planning (Capital, time, human resources)
- Risk management plan and mitigation strategy

Phase3: Execution as per approved plan

Phase4: Ongoing Monitoring and evaluation

- Monitoring the project progress as per the plan and schedule and make adjustments as required

Phase5: Project Closure

- Make sure all the project activities are completed and conduct post-project evaluation and report the results, lessons learned and recommendations; and
- finally, officially close the project

1.5. Limitation of the project

Fully donors' dependent projects might face challenges of delay in the project implementation; moreover, it may affect self-sustainability of the community in the long-term. Nonetheless, the community based-project will be highly backed by private business sectors as well as concerned local and diaspora community so as to mitigate the funding risks.

2. Project Concept

The expected benefits of the project, seedling planting and distribution of improved coffee varieties in Zege Peninsula monasteries are improved quality, higher yield and disease resistant coffee plantation that ensures increased income and sustainable livelihood of the community.

2.1 Opportunity study

The improved coffee nursery project, training and demonstration site will be located in a leased land in one of the monasteries' church at the coastline of lake Tana where resources, favorable altitude, fertile soil, water, natural forest shade and labour availability is not questionable. Distribution of the seedlings will be facilitated through cooperatives that are chosen at five different Orthodox church sites, **Zege Medhanialem**, **Ura-KidaneMeheret, Mehal-Zege Giorgis**, **Yiganda-TekleHaimanot** and **Azua-Mariam**

The pilot project will be located at **Zege Medhanialem Church** and according to the discussion in respect of the project idea, the church shows high concern and collaboration for its implementation.

The demand and marketability for the improved coffee is rewarding; beyond the local market, the monasteries' coffee production is targeted to neighborhood countries such as, Eritrea, Sudan as well as European countries and Asia.

According to the preliminary study and focus group discussion this project attracts potential financers and collaborators, the main ones are listed below:

- The Diaspora Community
- The local community
- Religious Relief Organizations
- Private Sector business owners
- ARARI Projects' development partners
- Amhara Regional Bureau of Agriculture and Rural Development
- Cooperatives

2.1.1 SWOT Analysis Matrix

INTERNAL FACTORS

STRENGTHS +	WEAKNESSES –
○ Awareness and commitments to replace the traditional coffee with high-yield, disease-resistant, and sustainable and improved quality coffee varieties ○ Experience of coffee production by the community	○ Traditional coffee production and harvesting System ○ Farmers' Change resistance to new technology

EXTERNAL FACTORS

OPPORTUNITIES +	THREATS –
○ Conducive climate and available resources ○ Will by potential project financers ○ Increasing demand for high-quality coffee verities ○ Will by ARARI and development partners to provide technical and in-kind support	○ Climate change which hampers coffee production ○ competition by existing coffee seedling suppliers ○ hybrid varieties may require significant initial investment for operation and training ○ Hybrid varieties may lead to a reduction in genetic diversity, new diseases and environmental changes may occur in the long term.

Figure 1 SWOT Analysis

2.2 The project Concept and Profile

The ultimate objective of the project is economic growth and improved community livelihood through improved coffee seedling planting and distribution at the macro level thereby accelerate the growth and transformation of Ethiopia's agriculture sector. This project will address the gaps in implementation of outcomes of researches to some extent in order to enhance improved agricultural products.

The project studies include Climate, soil and environmental study for coffee nursery project. The focus on selected species is made based on recent research outcome with regard to climate, soil and other conditions of the project site and distribution locations. The project study considered design and implementation of efficient and effective distribution channels of seedlings to farmers at targeted locations.

The project will achieve its objectives with sustainable stakeholders' support such as the Ethiopian Institute of Agricultural Re-search, Ministry of Agriculture and Rural Development and other similar stakeholders.

This project is labour intensive thereby it will create job opportunities.

2.2.1 Project Overview

Project Name: Improved-coffee Seedling Planting and Distribution

Project Duration: 5 Years (2025-2029)

Project Location: Amhara Region, Zege Peninsula, North Gojjam, Ethiopia

Project Stakeholders: The proposed stakeholders who will be involved in the initiation, planning and implementation of the project are:

a. Project staff
b. The local Community
c. Local farmers' cooperatives
d. The Diaspora Community
e. Ethiopian Institute of Agricultural Research (EIAR)
f. Ministry of Agriculture and rural development
g. Development Bank of Ethiopia
h. Micro-Finances
i. Private and government agricultural projects
j. Agricultural inputs suppliers
k. Coffee consumers (Local and global)
l. Religious Relief Organizations
m. Private Sector business owners
n. Projects' development partners (NGOs)
o. Promotors for quality coffee branding to domestic and international markets

Project Budget: ETB 10,000,000 (ETB Ten Million)

Project Risks and Mitigations

- Climate change risks shall be mitigated through implementation of early warning platforms
- The risks that may arise from traditional coffee production and harvesting System will be mitigated by promoting sustainable farming practices
- The challenges to secure project initial investment and operational costs will be managed through diversified funding sources and financial planning
- New coffee diseases will be mitigated through recommended control practices and successive trainings in collaboration with EARI

2.3. Preliminary study

The main objective of the nursery project is to gradually replace the indigenous coffee of Zege Peninsula monastery with improved quality, high-yield, disease resistant and sustainable new varieties through cooperatives' seedlings distribution sites along with successive training of farmers on modern agronomic practices.

The demand and marketability for the improved coffee is rewarding; beyond the local market, the monasteries' coffee production is targeted to neighborhood countries such as, Eritrea, Sudan, European countries and Asia.

The regional Rural and Agricultural Development Bureau, ARARI and farmers' cooperatives are the key stakeholders to the achievement of this project; moreover, the project has diversified potential-sponsors as shown under 2.1 & 2.2 of the proposal.

Improved variety of coffee seeds for the nursery project will be supplied by the ARARI with subsidized prices; moreover, the institute will provide technical and training services.

The comprehensive overview of the intended project is shown by the business model canvas under 2.3.1

2.3.1 Business Model Canvas

<table>
<tr>
<td rowspan="2">Key Partners
p. The local Community
q. Local farmers' cooperatives (Associations)
r. The Diaspora Community
s. Ethiopian Institute of Agricultural Research (EIAR)
t. Ministry of Agriculture and rural development
u. Development Bank of Ethiopia
v. Micro-Finances</td>
<td>Key Activities
a. Research and development of improved coffee varieties (improved coffee varieties tissue culture multiplication)
b. ongoing supply of improved coffee varieties
c. Training and technical support services in the preparation, implementation and monitoring stage of the project and setting feedback mechanism
d. Construction of reservoir
e. seedling distribution to farmers</td>
<td rowspan="2">Value Propositions
Gradual replacement of disease affected indigenous forest coffee with improved varieties of high-yield, disease resistant and sustainable production thereby ensure better livelihood of the community

Impact: increase productivity by 300%</td>
<td rowspan="2">Customer Relationship
Regular trainings and demonstration; and monitoring, evaluation and feedback mechanism</td>
<td rowspan="2">Customer Segments
Smallholder farmers</td>
</tr>
<tr>
<td>Key Resources</td>
<td>Channels</td>
</tr>
</table>

w. Private and government agricultural projects x. Agricultural inputs suppliers y. Coffee consumers (Local and global) z. Religious Relief Organizations aa. Private Sector business owners bb. Projects' development partners (NGOs) cc. Promotors for quality coffee branding to domestic and international markets *** Motivators for partnership: • National policies and Institutions' priorities to alleviate communities' problems • Availability of resources • Increasing demand for high quality coffee products	f. Suitable climate, rainfall, fertile soil g. financing h. Water from Lake Tana i. Labor from the local community j. Improved coffee seed varieties k. Technical support and training experts l. Land lease (proposed from churches) m. Agricultural inputs • Water pumps • Materials, equipment and supplies		Direct distribution to farmers	
Cost Structure Cost structure is shown in the budget table			**Revenue Streams** Revenue streams are shown in	

	the projected Income & expenditure reports

Investment & operational cost budget estimate for 5-years:		(Ethiopian Birr)
i.	Investment for pilot project (Land lease, R&D & Demonstration)	2,000,000.00
ii.	Training and Capacity Building	800,000.00
iii.	Operational costs (Seeds, water pumps , construction of reservoir,….)	5,000,000.00
iv.	Project staff and distribution costs	1,000,000.00
v.	Monitoring and Evaluation	700,000.00
vi.	Contingency	500,000.00
	Total	10,000,000.00

According to research outcomes and the survey done , production of improved coffee varieties will increase production and productivity of coffee in Zege Peninsula on average by 300% compared with the current disease affected indigenous forest coffee (from 3 quintals yield per hectare to 12 quintals per hectare)

3. Project Methods and Procedure

The project methods and procedure follows the following key sections:

i. Conduct Survey with coffee farmers, agricultural experts, cooperatives, ARARI and other stakeholders
ii. Identify pilot project site
iii. Identify potential planting and distribution sites
iv. Organize meetings with beneficiaries, stakeholders and sponsors
v. Initiate pilot project of the improved coffee varieties that were proved by R&D and officially initiate the project
vi. prepare seed procurement and seedlings distribution plan
vii. Prepare successive farmers' training and technical support implementation plan
viii. Set regular monitoring system and release of progress reports

Finally, make sure that all the project activities are completed and conduct post-project evaluation, impact assessments to evaluate the economic, social, and environmental benefits of the project and report the results, lessons learned and recommendations; and finally, officially close the project.

The standard logical framework matrix is used as an important tool for the project design and preparation based on its key elements, the problem and objective trees.

Problem Trees:

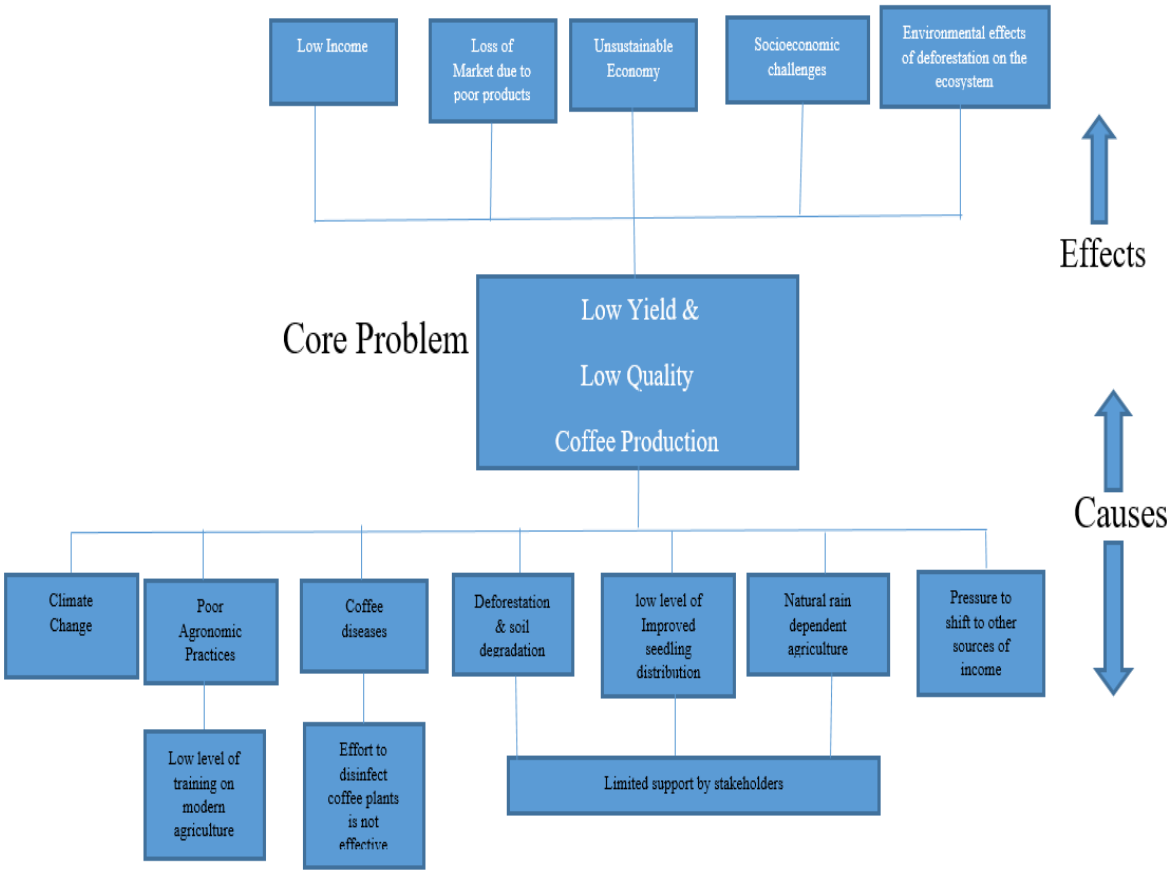

Figure 2 Problem Tree

Objective Trees:

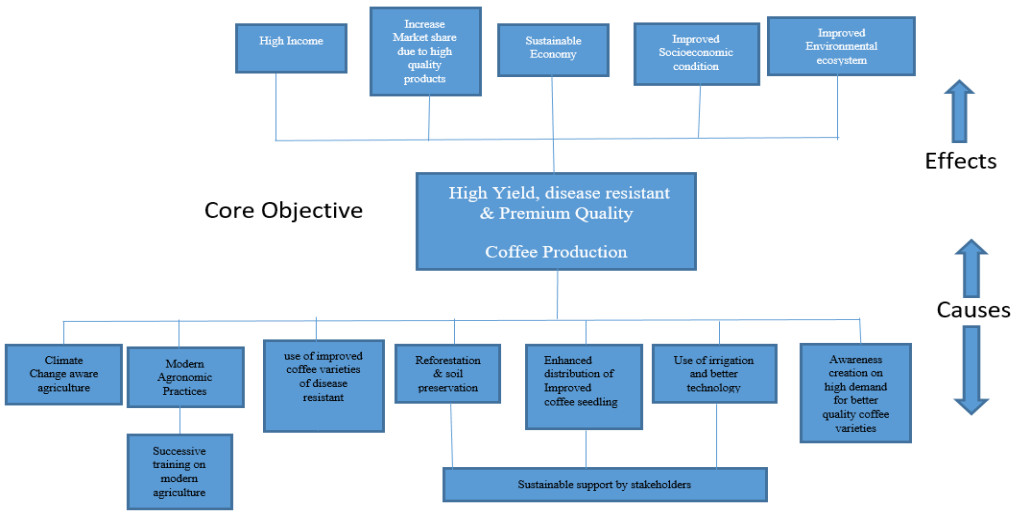

Figure 3 Objective Tree

Alternative Trees:

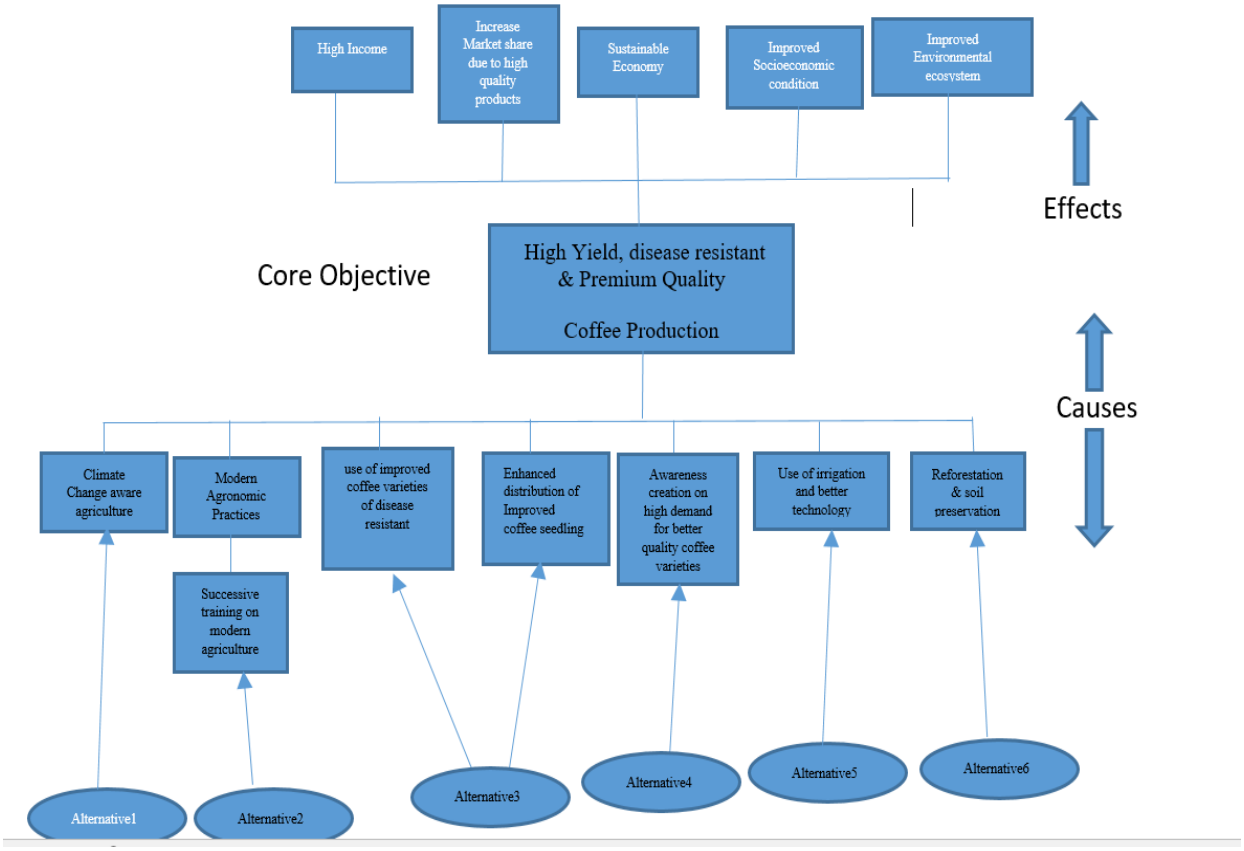

Figure 4 Alternative Tree

Analysis of strategies through alternative trees:

The alternative solutions are interconnected; for the purpose of this project 3 4 5 are used intensively in combination, while other alternatives are complementary.

Table 1: Logical Framework Matrix (Logframe)

Narrative Summary	Objectively verifiable Indicators	Means of Verification	Important Assumptions
Goal Establish a system of coffee nursery and distribution of higher yield and disease resistant coffee that ensures increased income and sustainable livelihood of the community	Increased coffee yield productivity and quality	Productivity survey and reports on market and community income	(i)Sustainable market demand for high quality coffee products (ii) managed climate change risks
Purpose Nursery and distribution of improved coffee seedlings to farmers along with successive trainings	Targeted 625,000 improved coffee seedlings are distributed to farmers every year Trained farmers	Nursery distribution tracking sheets, training reports, M&E reports, farmers survey and feedback	(i)The nursery and distribution system, schedule and trainings are embedded in the targeted community (ii)No funding challenges (iii) there is sustainable stakeholders support
Outputs i. Established sustainable and manageable nursery and distribution as well as demonstration centers ii. Creation of modern agriculture aware community iii. job opportunities to the local community iv. Trained farmers	(i)Number of nursery, distribution and demonstration centers established (ii) Number of trainings conducted (iii) number of trained farmers (iv) Number of farmers employed by the nursery and distribution project	(i)Regular project M&E and progress reports (ii) Training reports (iii) HR and payroll data	(i)Project site and location is efficient and effective for the nursery and distribution (ii) the project implementation plan is not disrupted by unforeseen factors
Inputs a. Suitable climate, rainfall, fertile soil b. financing c. Water from Lake Tana d. Labor from the local community e. Improved coffee seed varieties f. Technical support and training experts g. Land lease (proposed from churches) h. Agricultural inputs i. Water pumps j. Materials, equipment and supplies	(i)Research and development (ii)Funding by donors (iii)Number of farmers employed by the nursery and distribution project (iv) Sustainable Seeds supplies (v) In-kind support by stakeholders (vi) Economically efficient procurement of inputs	(i) Regular R&D reports (ii)Financial reports of income, expenditure and cash flow (iii) HR and payroll data (iv)Procurement reports of seed varieties (v)Memorandum of understanding or agreements with stakeholders regarding in-kind supports (vi) internal and external audit reports	(i)There is efficient Project management system (ii)No funding challenges (iii) the project organization structure is effectively operational to implement the project

A decision tree analysis is prepared to answer the basic problem regarding decrease in productivity of coffee for the intended project to show the potential outcomes.

Decision Tree:

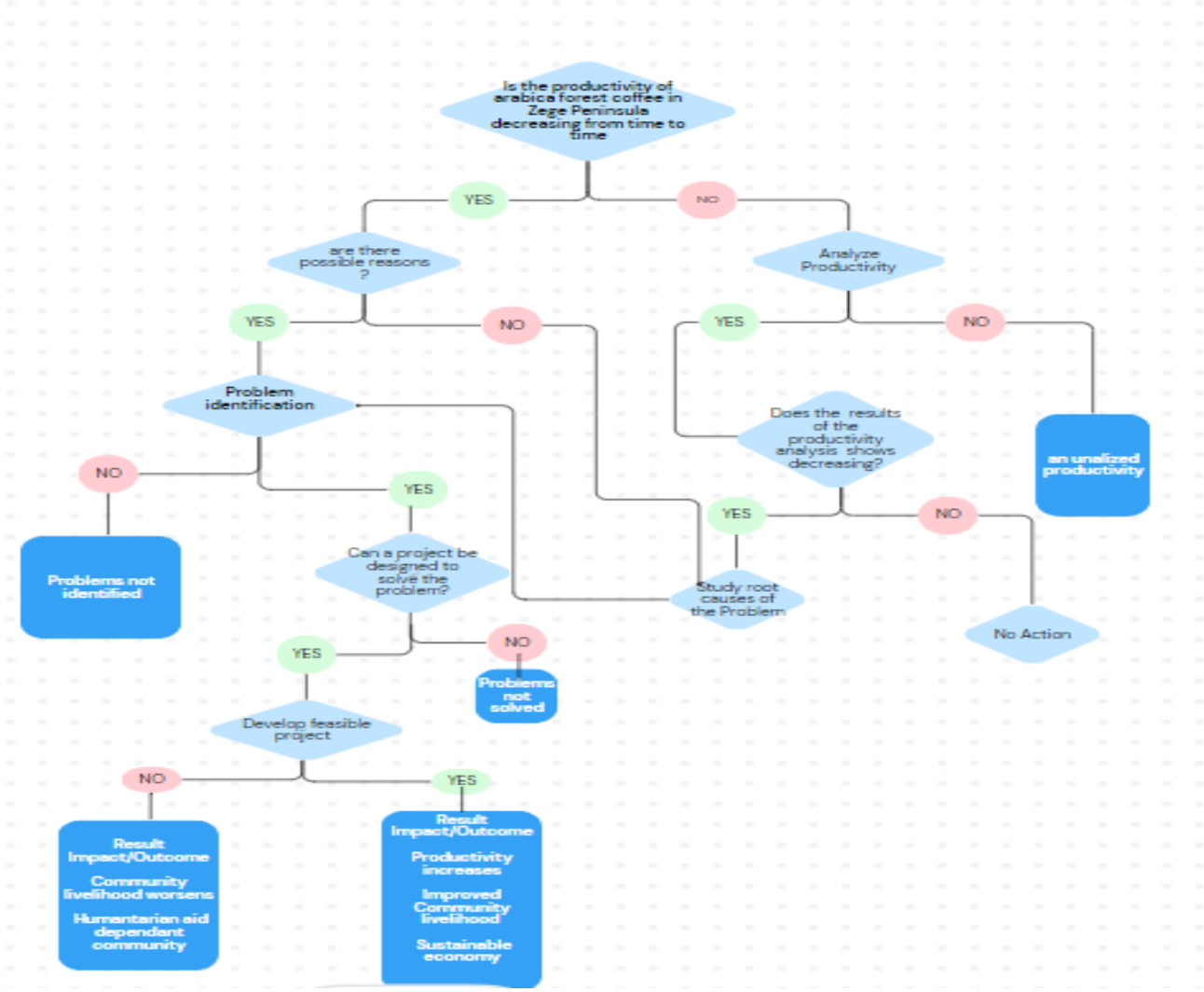

Figure 5 Decision Tree

4. Project Preparation

The global demand for improved coffee is increasing, likewise the competition from smallholder farmers to nationwide coffee producers become challenging due to standardized requirements of farming practices by beneficiaries and importing countries.

To this end, the market, environmental, socioeconomic, organizational and financial situations are thoroughly analyzed in order to make a decision if the project is viable so that development partners and potential project sponsors become proactive stakeholders.

4.1. Markets and Demand Analysis

To understand the real situation of the Zegie Peninsula regarding the challenges of traditional coffee farming, and to analyze the market and demand for coffee products, survey questionnaire was prepared in Amharic Language and dispatched; out of the total 56 respondents, 3 of them were not complete and not relevant to summarize the results. For the purpose of consistency, the survey summary is translated to English.

1. Indicate your age

1. የእርሶን የእድሜ ክልል ያመልክቱ

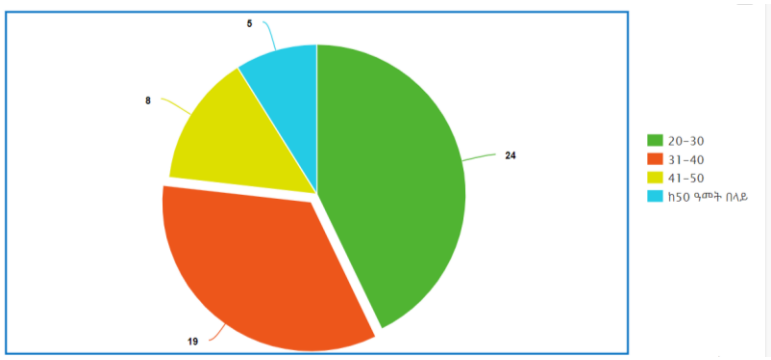

Figure 6 Pie chart 1

Out of the total of 56 respondents 24, 19, 8 and 5 respondents are under age group of 20-30, 31-40,41-50 and above 50 years old, respectively.

2.Do you have coffee agricultural land?

2. በዘጌ የቡና ግብርና መሬት አሎት?

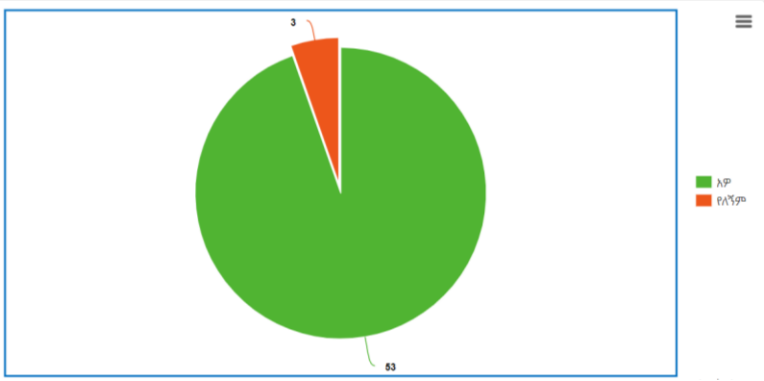

Figure 7 Pie chart 2

Yes=53

No=3

3.What is your family source of income?

3. የቤተሰዎና የርሶ ዋናው የኑሮ የገቢ ምንጭ ምንድን ነው?

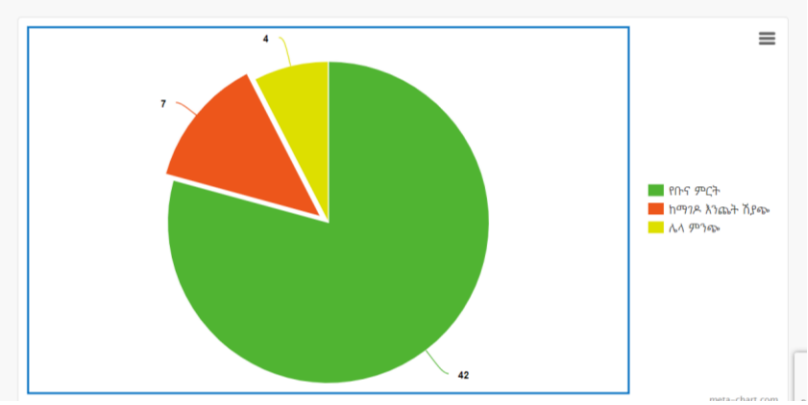

Figure 8 Pie chart 3

Coffee farming=42

Sales of firewood= 7

Other source=4

4.Is coffee productivity in Zege increasing or decreasing from time to time?

4. የዘጌ የቡና ምርት ከጊዜ ወደ ጊዜ እየጨመረ ነው ወይስ እየቀነሰ?

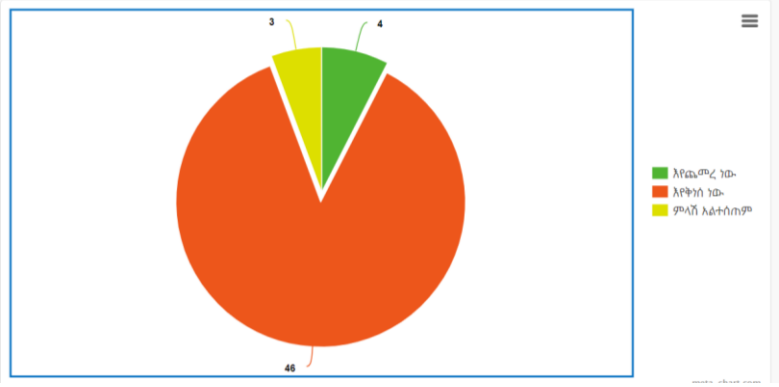

Figure 9 Pie chart 4

Decreasing=46

Increasing=4

Not answered=3

5.What is the main reason for decrease in coffee productivity?

5. ለቡና ግብርና ምርት መቅነስ ዋናው ችግር ምንድን ነው?

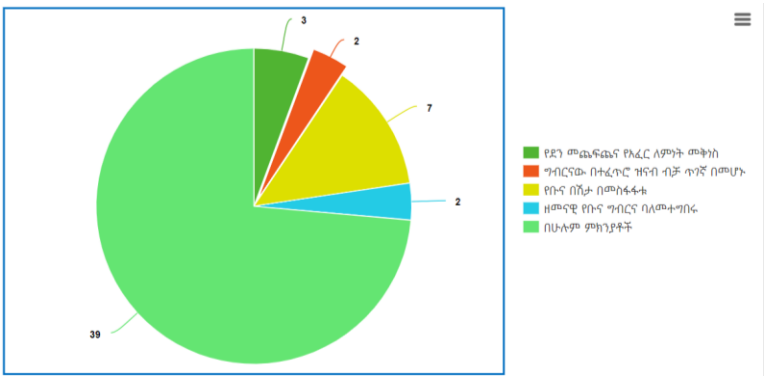

Figure 10 Pie chart 5

Deforestation and loss of soil fertility=3

Coffee disease =7

Natural rain dependent agriculture=2

Absence of modern agriculture=2

All are reasons=39

6.Have you heard about modern agriculture?

6. ስለተሻሻለና ዘመናዊ ግብርና ስምተው ያውቃሉ?

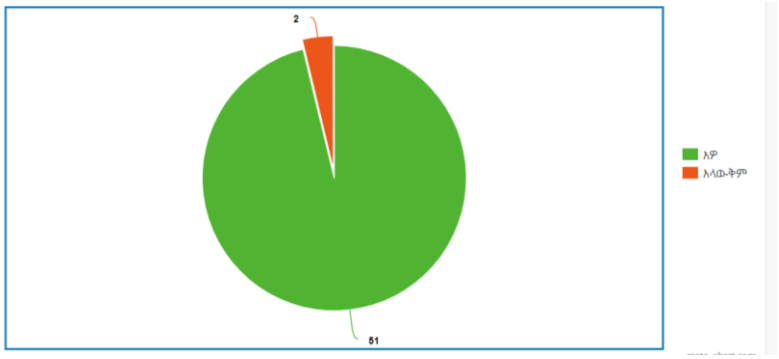

Figure 11 Pie chart 6

Yes=51

No=2

7.were there trainings and practices of modern agriculture?

7. ከአሁን በፊት የተሞከሩ ዘመናዊ የቡና ግብርና ስልጠናና ትግብራዎች ነበሩ?

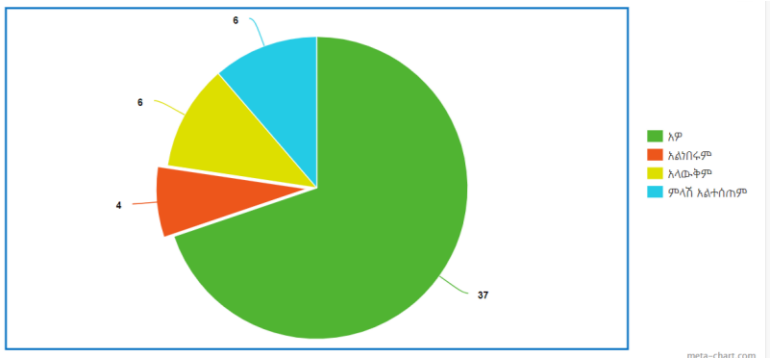

Figure 12 Pie chart 7

Yes=37

No=4

I don't know=6

Not answered=6

8.were the trainings and practices successful?

8. የተሞከሩ የቡና ግብርና ስልጠናና ትግብራዎች ስኬታማ ነበሩ?

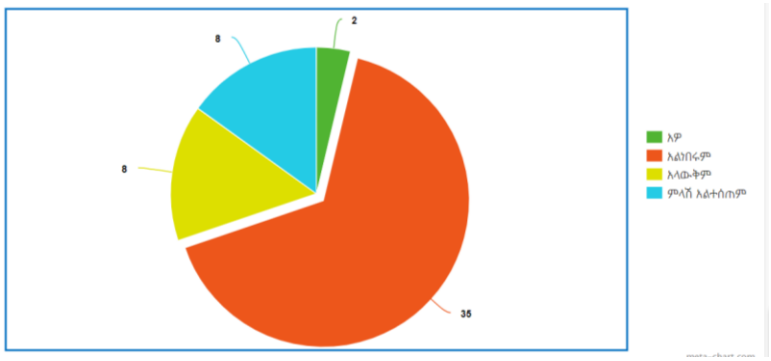

Figure 13 Pie chart 8

Not successful=35

Successful=2

I don't know=8

Not answered=8

9.Are you willing to be trained on modern coffee agriculture and practices?

9. ስለተሻሻለና ዘመናዊ የቡና ግብርና ትምህርትና ትግበራ ዝግጁ ነዎት?

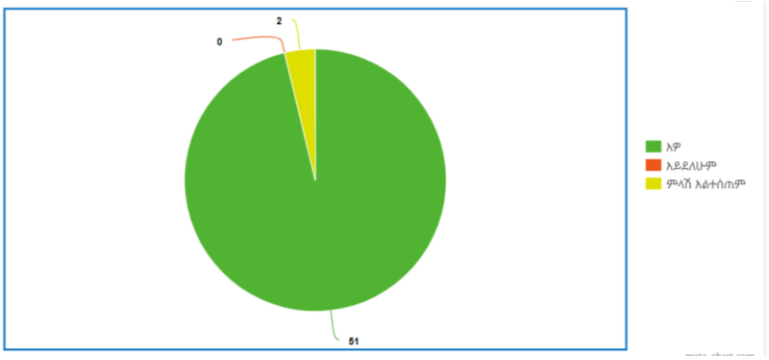

Figure 14 Pie chart 9

Yes=51

Not answered=2

10. On the average, how much quintal of coffee product per hectare you harvested annually?

10. በዘጌ የቡና ግብርና መሬት በዓመት በአማካይ በ 1 ሄክታር በኩንታል በግምት ምን ያህል ምርት ይሰበስባሉ?

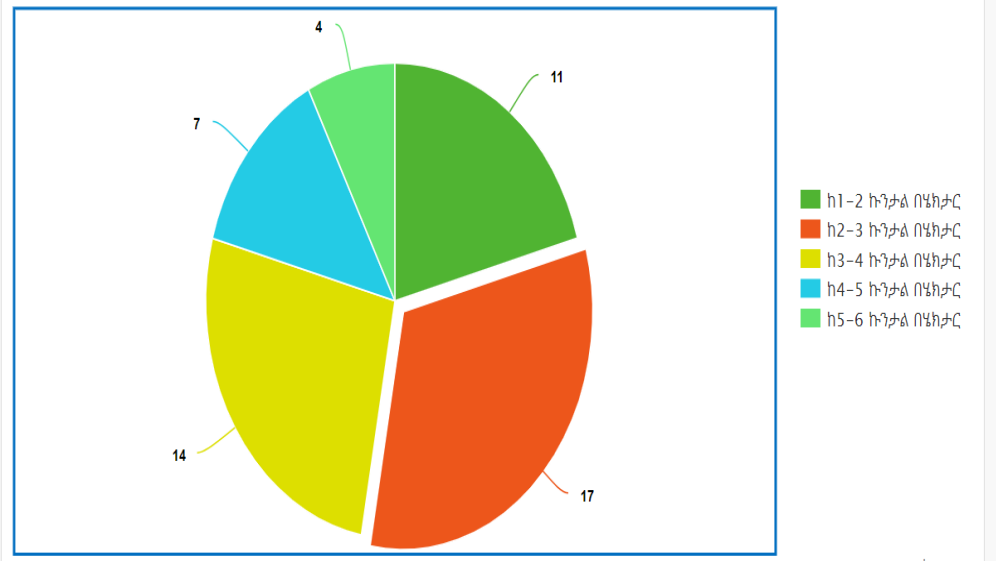

Figure 15 Pie chart 10

From 1-2 Quintal per hectare=11

From 2-3 Quintal per hectare=17

From 3-4 Quintal per hectare=14

From 4-5 Quintal per hectare=7

From 5-6 Quintal per hectare =4

If we divide the total yield by the 53 respondents (which is equal to 53-hectare land size), the average yield will be 3 Quintal per hectare.

Table 2: Average yield per Hectare

Average yield/hectare	No. Of repondants		Total Yield		
1.5	11		16.5		
2.5	17		42.5		
3.5	14		49		
4.5	7		31.5		
5.5	4		22		
17.5	53		161.5		
Assumed Size of coffee production land (Hectare)=No. of Respondents=53 Hectare					
Then Average yield per Hectare=161.5/53=3 Quintal/Hectare					

11.On the average, how much is the selling price of Zege's prepared coffee?

11. በዘጌ በአማካይ የ1 ኩንታል የተዘጋጀ የቡና ምርት የመሸጫ ዋጋ በብር ምን ያህል ይሆናል?

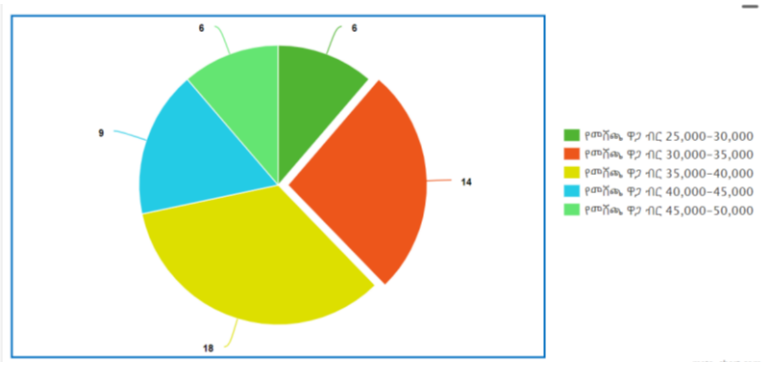

Figure 16 Pie chart 11

ETB 25,000-30,000=6 respondents

ETB 30,000-35,000=14

ETB 35,000-40,000=18

ETB 40,000-45,000=9

ETB 45,000-50,000=6

12.What is the demand and marketability of Zege's coffee?

12. ባሁኑ ወቅት የዘጌ የቡና ምርት በገበያ ላይ ተወዳዳሪነቱና ፍላጎቱ ምን ያህል ነው?

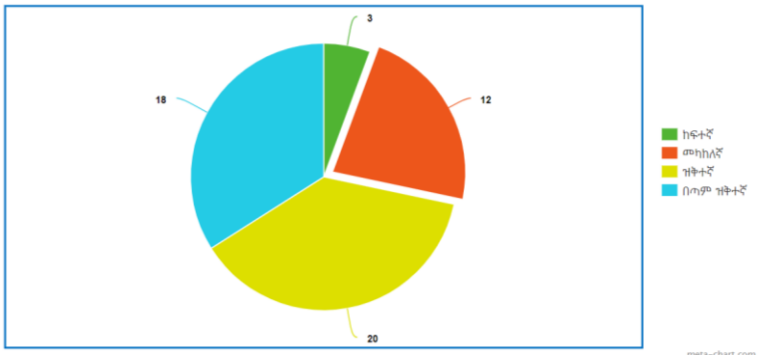

Figure 17 Pie chart 12

High=3

moderate=12

Low=20

Very low=18

4.2.Project Inputs

The inputs that are required to achieve the project goal for distribution of 625,000 improved coffee seedlings per annum are clearly summarized in the budgets and income and expenditure statements; whereas breakdown (somehow disaggregated) inputs costs are shown under this section.

Table 3: Project inputs breakdown

Ser.No.	Inputs	Unit	Estimated cost for 5 years (ETB)
1	Land lease for Pilot project & demonstration	2500m2	400,000
2	Nursery project land preparation	Field staff cost ETB147,000 and expert salaries, ETB253,000	400,000
3	On-going R&D	The R&D is considered as in kind contribution by ARARI	1,200,000
4	Improved varieties coffee seeds	Government subsidized along with technical support by ARARI	1,500,000
5	Water pump, pipes, and accessories	25 units at average cost of 80,000	2,000,000
6	Construction of reservoir	10 units at average cost of 150,000	1,500,000
7	On-going Training and Capacity Building of farmers		800,000
9	Project staff and distribution costs (Salaries, Wages, perdiem)	Wages as per the daily prevailing rate of 350/day and experts' salaries	1,000,000

10	Materials & equipment (Shade, fertilizer, utilities supplies and overheads), this cost include Administrative expenses		500,000
11	On-going Monitoring and Evaluation		700,000
		Total	10,000,000

4.3.Location and Site Assessment

The suitable altitude (1,838 meters above sea level), climate, rainfall, fertile soil and the natural forest-shade together with the following accessibility opportunities made the location and site conducive for the project:

i. Water from Lake Tana
ii. Labor from the local community
iii. Improved coffee seed varieties from the nearby ARARI center
iv. Technical support and training experts from the nearby ARARI center
v. Land lease at the shore of Lake Tana

4.4.Production Program and Capacity

The production plan is to meet distribution of 625, 000 seedlings to cover 250 hectares per year and 1250 hectare in 5 years.

250 Hectare=2,500,000m2

Recommended spacing between coffee plantation is 2mX2m=4m2

Then, to cover 2,500,000m2, we need =2,500,000/4=625,000 seedlings

The size of the nursery project site will be 50m2X50m2, part of the site will be for the nursery and significant part of it will be for pilot demonstration for coffee plantation. Therefore, the proposed site land will have reasonable capacity[5].

[5] coffee nursery plot preparation can be a raised piece of land which ideally should be 1.2 m wide and 20 cm deep consisting of fertile topsoil (50%) mixed with sand (50%) [16]. Then, a coffee seed has been sown at a depth of 1 cm flat side down with the distance between seeds and rows of 2 to 3 cm and 3 cm on the well-prepared nursery bed or polyethylene tube, respectively, American Journal of Engineering and Technology Management 2022; 7(3): 48-58 [SciencePG]

The water pump and water reservoir capacities beyond the rainy season is adequate as recommended by the agricultural experts.

4.5.Technology Selection

The appropriate technology to be deployed for this project will be determined by expert advices and allowable regulatory policies.

4.6.Organizational and Human Resource

The project organizational formation is not-for profit and community-based project which will be categorized under Civil Society Organizations (CSOs) that will be financed by multi-donors. It will have an oversight steering committee which is composed of representatives from key stakeholders such as donors, development partners, ARAB, ARARI, cooperatives/ farmers 'associations and the project manager. This committee will play key role in providing strategic direction in meeting the project objectives.

Whereas the project manager is responsible for the overall activities at all stages from project plan development, resource management, implementation, monitoring and evaluation, progress reports up to the final closure report in respect of the overall outcomes, lesson learned and highlights for prospective similar projects.

Improved-coffee Seedling Planting and Distribution

Project Organization Structure

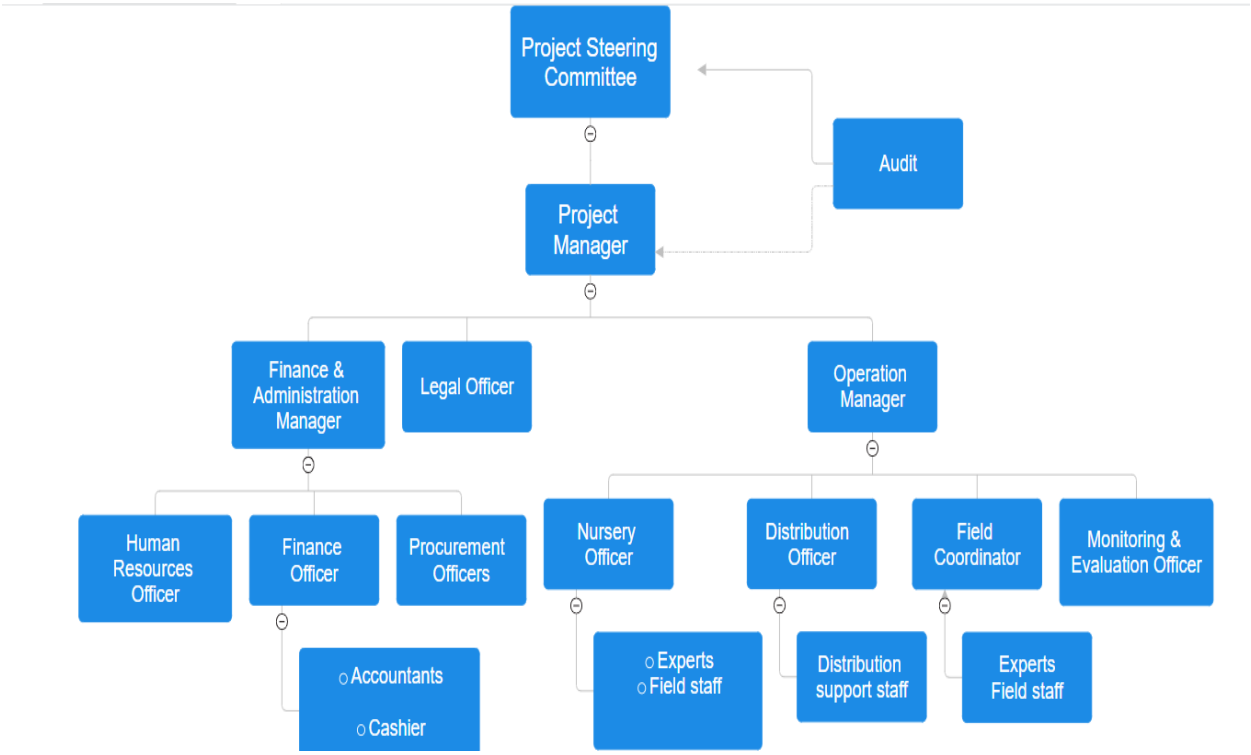

Figure 18 Organization Structure

4.7.Social Analysis

There are significant social impacts that are caused by this project with multi- stakeholders' engagement, the local community, government organizations, NGOs and private investors, to mention the major ones:

v. reduce unemployment by creating job opportunities which induces better quality of life

vi. promote the local community in decision-making processes

vii. enhance the community social bonds through shared goals

viii. knowledge and technology transfer to farmers on modern agriculture practices

4.8.Economic Analysis

The project economic impacts are mainly reflected in the improved and sustainable livelihood of the community through modern and sustainable agriculture practices which enhances high-yield and quality products that have competitive market in the long-term.

4.9.Financial Analysis

The estimated initial investment, production and distribution costs are summarized in the following table:

Table 4: Project Plan and Budget

Improved Coffee Nursery and Distribution Project **Project Preparation, Implementation and Monitoring Plan and The Corresponding Budget** **Project Period: Year 2025 to 2029**							
Objectives: Gradual replacement of disease affected indegenious forest coffee with improved varities of high-yield, disease resistant and sustainable production thereby ensure better livelihood of the community		Timeline					
	Key Activity	Year1	Year2	Year3	Year4	Year5	Total (Ethiopian Birr)
1	**Project Preparation**						
1.1	Research & Development (R&D)	360,000.00	300,000.00	240,000.00	180,000.00	120,000.00	1,200,000.00
1.2	Land lease for Pilot project & demonstration	40,000.00	60,000.00	80,000.00	100,000.00	120,000.00	400,000.00
1.3	Nursery project land preparation	80,000.00	100,000.00	80,000.00	60,000.00	80,000.00	400,000.00
	Sub-Total	***480,000.00***	***460,000.00***	***400,000.00***	***340,000.00***	***320,000.00***	***2,000,000.00***
2	**Project Implementation (Operation Costs)**						
2.1	Procurement of seeds	450,000.00	300,000.00	300,000.00	225,000.00	225,000.00	1,500,000.00
2.2	Procurement of Water pump	600,000.00	400,000.00	400,000.00	300,000.00	300,000.00	2,000,000.00
2.3	Construction of reservior	450,000.00	300,000.00	300,000.00	225,000.00	225,000.00	1,500,000.00
	Sub-Total	***1,500,000.00***	***1,000,000.00***	***1,000,000.00***	***750,000.00***	***750,000.00***	***5,000,000.00***
2.4	Training and Capacity Building	320,000.00	160,000.00	160,000.00	80,000.00	80,000.00	***800,000.00***
2.5	Project staff and distribution costs (Salaries & Wages)	200,000.00	200,000.00	200,000.00	200,000.00	200,000.00	***1,000,000.00***
2.6	Materials & equipment (Shade ,other items and overheads)	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	***500,000.00***
2.7	Monitoring and Evaluation	105,000.00	140,000.00	140,000.00	140,000.00	175,000.00	***700,000.00***
	Total	***2,705,000.00***	***2,060,000.00***	***2,000,000.00***	***1,610,000.00***	***1,625,000.00***	***10,000,000.00***

The projected income & expenditure and cash flow statement for the project period of 5 years is prepared based on multi-donors and joint funding arrangement and the estimated cost indicated above under table *3*

Table 5: Projected Income & Expenditure Statement

Improved Coffee Nursery and Distribution Project Projected Income & Expenditure Project Period: Year 2025 to 2029							
Objectives: Gradual replacement of disease affected indegenious forest coffee with improved varities of high-yield, disease resistant and sustainable production thereby ensure better livelihood of the community		Timeline					
Income from Potential sponsors:		Year1	Year2	Year3	Year4	Year5	Total (Ethiopian Birr)
The Diaspora Community (20%)		595,100.00	453,200.00	420,000.00	338,100.00	341,250.00	2,147,650.00
The local community (4%)		162,300.00	123,600.00	100,000.00	80,500.00	81,250.00	547,650.00
Religious Relief Organizations (15%)		459,850.00	350,200.00	320,000.00	257,600.00	260,000.00	1,647,650.00
Private Sector business owners (20%)		595,100.00	453,200.00	420,000.00	338,100.00	341,250.00	2,147,650.00
ARARI Projects' development partners (in-kind support, seeds & Tech.support) (20%)		595,100.00	453,200.00	420,000.00	338,100.00	341,250.00	2,147,650.00
Amhara Regional Bureau of Agriculture and Rural Development (Tech. support) (10%)		324,600.00	247,200.00	220,000.00	177,100.00	178,750.00	1,147,650.00
Cooperatives & Churches (Tech. & distribution support) (10%)		324,600.00	247,200.00	220,000.00	177,100.00	178,750.00	1,147,650.00
Other income (1%)		81,150.00	61,800.00	40,000.00	32,200.00	32,500.00	247,650.00
Total Income		***3,137,800.00***	***2,389,600.00***	***2,160,000.00***	***1,738,800.00***	***1,755,000.00***	***11,181,200.00***
Project Expenditure:							
1	**Project Preparation**						
1.1	Research & Development (R&D)	360,000.00	300,000.00	240,000.00	180,000.00	120,000.00	1,200,000.00
1.2	Land lease for Pilot project & demonstration	40,000.00	60,000.00	80,000.00	100,000.00	120,000.00	400,000.00
1.3	Nursery project land preparation	80,000.00	100,000.00	80,000.00	60,000.00	80,000.00	400,000.00
	Sub-Total	***480,000.00***	***460,000.00***	***400,000.00***	***340,000.00***	***320,000.00***	***2,000,000.00***
2	**Project Implementation (Operation Costs)**						
2.1	Procurement of seeds	450,000.00	300,000.00	300,000.00	225,000.00	225,000.00	1,500,000.00
2.2	Procurement of Water pump	600,000.00	400,000.00	400,000.00	300,000.00	300,000.00	2,000,000.00
2.3	Construction of reservior	450,000.00	300,000.00	300,000.00	225,000.00	225,000.00	1,500,000.00
	Sub-Total	***1,500,000.00***	***1,000,000.00***	***1,000,000.00***	***750,000.00***	***750,000.00***	***5,000,000.00***
2.4	Training and Capacity Building	320,000.00	160,000.00	160,000.00	80,000.00	80,000.00	***800,000.00***
2.5	Project staff and distribution costs (Salaries & Wages)	200,000.00	200,000.00	200,000.00	200,000.00	200,000.00	***1,000,000.00***
2.6	Materials & equipment (Shade ,other items and overheads)	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00	***500,000.00***
2.7	Monitoring and Evaluation	105,000.00	140,000.00	140,000.00	140,000.00	175,000.00	***700,000.00***
	Total Expenditure	***2,705,000.00***	***2,060,000.00***	***2,000,000.00***	***1,610,000.00***	***1,625,000.00***	***10,000,000.00***
	Income Over Expenditure	***432,800.00***	***329,600.00***	***160,000.00***	***128,800.00***	***130,000.00***	***1,181,200.00***

Note: (1) Development Bank of Ethiopia and Micro-Finances are considered as potential project financers and they are taken as alternative backup when the project is facing challenges of budget gaps

(2) Depreciation expense for water pump, water reservoir and equipment is not computed at this point based on the assumption that the project is financed by muti-donors'grant and all cash out-lays will be reported as current expenditure

(3) For the reason mentioned under note (2) above The projected cash flow statement can be rep-resented by the nominal positive value of Income over expenditure for the project period

4.9.5 Financial Evaluation

4.9.5.1 Net present value (NPV)

The Net present value (NPV) from the above projected cash flow statement is calculated at assumed prevailing annual interest of 12% as follows:

=NPV (12%, value1, value2, value3, value4, value5)

NPV (12%,432800,329600,160000,128800,130000) =ETB918,688.73

The interpretation of the NPV specific to this project is that the net-cash inflow (income over expenditure) throughout the project period is positive and will have a discounted cash net-inflow of ETB918,688.73 at the end of the project period at assumed cost of capital 12% per annum.

4.9.5.2 Internal rate of Return (IRR)

Logically, IRR is not applicable to such community based non-profitable project since there will not expected financial return, reasonably it shall be evaluated in terms of social Return on Investment (long-term) or social cost and benefit analysis.

4.9.5.3 Benefit Cost Ratio- Not applicable

4.9.5.4 Payback period (PBP)

Payback period (PBP) is not applicable for non-profit community based projects for which return on investment is not evaluated by the financial returns. The project investment is fully financed by donors' grants for which the expected long-term outcome are the social and environmental impact, community benefit, and specific project progress according to the financing agreements with the respective donors or joint financing arrangements.

4.9.5.5 Accounting rate of return (ARR)

Also, ARR is based on profitability, hence, it is not applicable for the project

4.9.5.6 Break-Even Analysis (BEA)

By the same token, BEA is not applicable for non-profit making projects; instead it shall be evaluated by non-monetary benefits and outcomes. The productivity and impact assessments on continuous M&E and progress reports are key performance indicators during the course of the project implementation. For instance, the improved variety coffee plant is expected to provide the first yield during the 3rd year of the project life in year 2027

Chapter 5: Conclusion and Recommendations

5.1 Summary

The project idea to initiate a community based, improved-coffee nursery and distribution was enriched in discussion with the ARARI; moreover, relevant agricultural research references are looked into in order to evaluate if this project is more viable than the other alternative of disinfecting the highly CBD affected forest coffee of Zege Peninsula monasteries in order to increase productivity.

The social, economic and market situations as well as the agronomic practices of the local community were assessed through a questionnaire. Market analysis was made to determine the project cost that will be fully financed by multi-donors.

The socioeconomic feasibility (social cost vs social benefit) analysis is given more weight than the financial project feasibility metrics since non-profit making projects shall be evaluated by non-monetary benefits and outcomes.

The expected productivity of improved coffee varieties from implementation of this project is weighed against the current yield per quintal, the result shows significant figure (300%) which implies that the long-term, sustainable socioeconomic positive impact of this project compared to the current project cost of ETB10,000,000 for 5 years is immeasurable.

5.2 Conclusion

Based on the feasibility study conducted, the project is viable to be implemented; when it is appropriately implemented, it will greatly boost the long-term economic viability of the community in the monastery of Zege Peninsula and reasonably contributes to the overall economy.

According to the structured methods and procedure to be implemented along with strong strategic leadership by a steering committee and a project manager as well as coordinated effort by its stakeholders, the proposed project will be feasible and objectives will be significantly achieved.

5.3 Recommendation

For the successful implementation of the project, alignment of the project document in line with various donors' priorities and requirements is recommended. To this end, stakeholder's analysis fact sheets need to be thoroughly examined.

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   Demelash Teferi and Kifle Belachew
   Jimma Agricultural Research Center, P.O. Box 192. Jimma, Ethiopia
   *Corresponding author: teferidemelash2008@gmail.com
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Effect of Coffee Husk Compost and NPS Fertilizer Rates on Growth and Yield of Coffee (Coffea arabica L.) at Haru

Research Sub-canter, Western Ethiopia

Gemechu Chali1, *, Tolera Abera2 , Tesfaye Wakgari3

1Ethiopian Institute of Agricultural Research, Jimma Agricultural Research Centre, Jimma, Ethiopia 2Department of Natural Resource Management, College of Agriculture, Ambo University, Guder, Ethiopia

3Ethiopia Agricultural Research Institute, Ambo Agricultural Research Canter, Natural Resource Management Research Process, Ambo, Ethiopia Email address: *Corresponding author

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Level of caffeine, trigonelline and chlorogenic acids in green coffee (Coffea arabica L.) beans from Amhara region, Ethiopia

Kasahun Wale [a b], Kassaye Tolessa [b], Minaleshewa Atlabachew [a], Bewketu Mehari [c], Melkamu Alemayehu [d], Daniel Ayalew Mengistu [e], Bizuayehu Kerisew [f]

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9. Yebirzaf Yeshiwas Melese and Semagn Asredie Kolech,

Coffee (*Coffea arabica* L.): Methods, Objectives, and Future Strategies of Breeding in Ethiopia—Review

Department of Horticulture, College of Agriculture and Natural Resources, Debre Markos University, Debre Markos P.O. Box 269, Ethiopia

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Coffee (Coffea arabica L.) Field Establishment and Management Practices in Ethiopia

Habtamu Gudisa Megersa

Ethiopian Institute of Agricultural Research, Wondo Genet Agricultural Research Center, Wondo Genet, Ethiopian

Appendices

Appendix1: Improved coffee varieties Productivity analysis

Table 6: Projected Productivity of Improved coffee varieties

Projected Productivity of Improved Coffee Varieties

Source: Ethiopian Agricultural Authority plant variety release, protection and seed quality control directorate crop variety register issue no. 25, June 2022, Addis Ababa Ethiopia	Yield/Hectare on Research Field & Farmers' field	Source: Ministry of Agriculture plant variety release, protection and seed quality control directorate crop variety register issue no. 19, June, 2016, Addis Ababa, Ethiopia	Yield/Hectare on Research Field & farmers' field	Source: Ministry of Agriculture plant variety release, protection and seed quality control directorate crop variety register issue no. 21, June, 2018, Addis Ababa, Ethiopia	Yield/Hectare on Research Field & Farmers' field
New variety		1.1 New Variety		1.1 New variety	
1.1.1. Variety name: Awada CH1 (75227 * 1377(Angafa))		1.1.1 Variety: EIAR50/CH		1.1.1 Variety: 74158*7530 (Gera coffee hybrid 1)	
1.1.1.1. Agronomic and morphological characteristics:		1.1.1.1Agronomic and morphological characteristics:		1.1.1.1Agronomic and morphological characteristics:	
▪ Adaptation:		§ Adaptation area: .		§ Adaptation area: Gera and other similar areas	
o Altitude (m.a.s.l): 1550-1750		o Altitude (m.a.s.l): 1200-1750		o Altitude (m.a.s.l): > 1750	
o Rainfall (mm): 1231		o Rainfall (mm): >1400		o Rainfall (mm): >1500	

o Temperature(Co): 10-27		o Tempera-ture(Co): 11-30		o Tempera-ture(Co): 9-12 min 26-28 max	
▪ Spacing (m) 2*2		§ Soil type: -		o Humidity (%): >50	
▪ Fertilizer rate (kg/ha): --		§ Popula-tion(trees/ha): 2500		§ Popula-tion(trees/ha): 2500	
o NPSB: 212.5		§ Spacing at field (m): 2 X 2		§ Spacing at field (m): 2 X 2	
o Urea: 62.5		§ Planting time: Start of main rain sesaon		§ Planting time: Start of main rainy sesaon	
▪ Young Leaf Color: Bronze		§ Fertilizer rate (kg/ha):		§ Fertilizer rate (kg/ha):	
▪ Growth habit: In-termiediate to open		o DAP: 312.5		o NPSB: 389	
▪ Branching habit: Many primary branches with		o Urea: 202.5		o NPS: 386	
many secondary branches		§ Years from		§ Years from	
▪ Canopy diameter(cm): 201		nursery to first crop: Three		nursery to first crop: 3	
▪ Stem and plant nature: Stiff		§ Growth habit(Can-opy nature): Medium		§ Growth habit(can-opy nature): Compact	
▪ Plant height(cm): 249.7		§ Canopy diame-ter(cm): 195		§ Canopy diame-ter(cm): 179.4	
▪ Number of main stem nodes: 30		§ Plant height (cm): 285		§ Plant height (cm): 255.4	
▪ Leaf size and shape: Long and broad		§ Stem and branch na-ture: Erect		§ Stem and plant nature: Stiff	
▪ Leaf tip color: Bronze		§ Number of main stem nodes: 40		§ Number of main stem nodes: 42	

▪ Mature leaf color: Light green		§ Leaf tip color: Green		§ Leaf size and shape: Small and elliptic	
▪ Leaf apex shape: Apiculate		§ Leaf mari-gion: --		§ Leaf tip color: Green	
▪ Stipule shape: Ovate		§ Mature leaf color: Green		§ Mature leaf color: Green	
▪ Angle of primary branches: Semi horizon-tal		§ Leaf apex shape: Acu-minate		§ Leaf apex shape: Apiculate	
▪ Fruit shape: Obovate		§ Stipule shape: Ovate		§ Stipule shape: Ovate	
▪ Fruit color: Red		§ Clayx limp persis-tence: Ab-scent		§ Angle of insertion	
▪ Seed size: Large		§ Crop pest reaction:*		of primary branches: Semi hori-zontal	
▪ Over all quality:		§ Over all quality:		§ Fruit shape: Round and medium	
o Typicity: -		o Typicity: - -		§ Fruit color: Red	
o Standard (%): 82.63		o Standard: Acceptable quality		§ Crop pest reaction:*	
o Screen size 14 (%): 91		§ 100 seed weight at		§ Over all quality:	
▪ Crop pest reaction*		11% mois-ture content (gm): --		o Typicity: - -	
▪ Yield (Q/ha):		§ Clean cof-fee yield(qt/ha)		o Standard (%): 82.5	
o Research field: 21.68	21.68	o Research field: 20.9	20.9	o Screen size 14 (%): 98.3	
o Farmers'field: 13.13	13.13	o Farm-ers'field: ---	-	§ Clean cof-fee yield(qt/ha)	

1.1.1.2. Year of release: 2022		1.1.1.2 Year of release: 2016		o Research field: 24.41	24.41
1.1.1.3. Breeder/Maintainer: WARC/Awada/JARC/EIAR		1.1.1.3 Breeder/Maintainer: Jimma ARC/EIAR		o Farmers'field: 22.5	22.5
*Moderately resistant to CBD		* Moderatley resistant to coffee berry disease & coffee leaf rust		1.1.1.2 Year of release: 2018	
		and low infection of bloch leaf miner.		1.1.1.3 Breeder/Maintainer: Jimma ARC/EIAR	
1.1.2. Variety name: Rori (75227 * 1681)				* Moderatley resistant to coffee leaf rust & resistant to berry disease	
1.1.2.1. Agronomic and morphological characteristics:		1.1.1 Variety: Melko-Ibsitu			
▪ Adaptation:		1.1.1.1Agronomic and morphological characteristics:		1.1.2 Variety: L55/01 (Limu 1)	
o Altitude (m.a.s.l): 1550-1750		§ Adaptation area: .		1.1.2.1Agronomic and morphological characteristics:	
o Annual Rainfall (mm): 1230.6		o Altitude (m.a.s.l): 1200-1750		§ Adaptation area: Limu and other similar areas	
o Temperature (Co): 10.01-27.21		o Rainfall (mm): >1400		o Altitude (m.a.s.l): 1500 - 1750	

▪ Spacing (cm) 2*2		o Tempera-ture(Co): 11-30		o Rainfall (mm): >150 0	
▪ Fertilizer rate (kg/ha): --		§ Soil type: -		o Tempera-ture(Co): 9-12 min 26-28 max	
o NPS: 212.5		§ Popula-tion(trees/ha): 2500		o Humidty (%): >50	
o Urea: 62.5		§ Spacing at field (m): 2 X 2		§ Popula-tion(trees/ha): 2500	
▪ Stem and plant nature: Stiff		§ Planting time: Start of main rain sesaon		§ Spacing at field (m): 2 X 2	
▪ Young Leaf Color: Green		§ Fertilizer rate (kg/ha):		§ Planting time: Start of main rainy sesaon	
▪ Growth habit: Open		o DAP: 312.5		§ Fertilizer rate (kg/ha):	
▪ Branching habit: Many primary branches		o Urea: 202.5		o NPSB: 389	
▪ Canopy diameter(cm): 221.8		§ Years from		o NPS: 386	
▪ Stem and plant nature: Stiff		nursery to first crop: Three		§ Years from	
▪ Plant height (Cm): 258.3		§ Growth habit(Can-opy nature): Open		nursery to first crop: 3 - 4	
▪ Number of main stem nodes : 32		§ Canopy diame-ter(cm): 215		§ Growth habit(Can-opy nature): Intermidate	
▪ Leaf tip colour: Green		§ Plant height (cm): 326		§ Canopy diame-ter(cm): 197	
▪ Mature leaf colour: Dark green		§ Stem and branch na-ture: Erect		§ Plant height (cm): 126	
▪ Leaf apex shape: Apiculate		§ Number of main stem nodes: 42		§ Stem and plant nature: Stiff	

▪ Stipule shape: Ovate		§ Leaf tip color: Bronze		§ Number of main stem nodes: 33	
▪ Angle of primary branches: Horizontal		§ Leaf mari-gion: --		§ Leaf size and shape: Medium and elliptic	
▪ Fruit shape: Obovate		§ Mature leaf color: Green		§ Leaf tip color: Dark green	
▪ Seed size: Large		§ Leaf apex shape: Acu-minate		§ Mature leaf color: Light green	
▪ Overall quality:		§ Stipule shape: Ovate		§ Leaf apex shape: Apiculate	
o Typicity: Spicy		§ Clayx limp persis-tence: Ab-scent		§ Stipule shape: Ovate	
o Standard (%): 81.27		§ Crop pest reaction:*		§ Angle of insertion	
o Screen size 14 (%): 95.75		§ Over all quality:		of primary branches: Semi erect	
▪ Crop pest reaction*:		o Typicity: --		§ Fruit shape: El-liptic and medium	
▪ Yield (Q/ha):		o Standard: Acceptable quality		§ Fruit color: Light red	
o Research field: 24.64	24.64	§ 100 seed weight at		§ Crop pest reaction:*	
o Farmers'field: 14.37	14.37	11% mois-ture content (gm): --		§ Over all quality:	
1.1.2.2. Year of release: 2022		§ Clean cof-fee yield(qt/ha)		o Typicity: --	
1.1.2.3. Breeder/Main-tainer: WARC/Awada/JARC/EIAR		o Research field: 19.3	19.3	o Standard (%): 82.5	
*Moderately resistant to CBD		o Farm-ers'field: ---	-	o Screen size 14 (%): 95	

		1.1.1.2 Year of release: 2016		§ Clean coffee yield(qt/ha)	
		1.1.1.4 Breeder/Maintainer: Jimma ARC/EIAR		o Research field: 22.8	22.8
		*Moderatley resistant to coffee berry disease & coffee leaf rust		o Farmers'field: 10.7	10.7
		and low infection of bloch leaf miner		1.1.2.2 Year of release: 2018	
				1.1.2.3. Breeder/Maintainer: Jimma ARC/EIAR	
		1.1.1.1Agronomic and morphological characteristics:		* Moderatley resistant to coffee leaf rust & berry disease	
		§ Adaptation area: .			
		o Altitude (m.a.s.l): 1200-1750			
		o Rainfall (mm): >1400			
		o Temperature(Co): 11-30			
		§ Soil type: -			
		§ Population(trees/ha): 2500			
		§ Spacing at field (m): 2 X 2			

		§ Planting time: Start of main rain sesaon			
		§ Fertilizer rate (kg/ha):			
		o DAP: 312.5			
		o Urea: 202.5			
		§ Years from			
		nursery to first crop: Three			
		§ Growth habit(Can-opy nature): Medium			
		§ Canopy diame-ter(cm): 221			
		§ Plant height (cm): 314			
		§ Stem and branch na-ture: Flexi-ble			
		§ Number of main stem nodes: 46			
		§ Leaf tip color: Light bronze			
		§ Leaf mari-gion: --			
		§ Mature leaf color: Green			
		§ Leaf apex shape: Acu-minate			
		§ Stipule shape: Ovate			

		§ Clayx limp persis-tence: Ab-scent			
		§ Crop pest reaction:*			
		§ Over all quality:			
		o Typicity: --			
		o Standard: Acceptable quality			
		§ 100 seed weight at			
		11% mois-ture content (gm): --			
		§ Clean cof-fee yield(qt/ha)			
		o Research field: 20.1	20.1		
		o Farm-ers'field: ---	-		
		1.1.1.2 Year of release: 2016			
		1.1.1.5 Breeder/Mai ntainer: Jimma ARC/EIAR			
		*Moderat-ley resistant to coffee berry dis-ease & cof-fee leaf rust			
		and low in-fection of bloch leaf miner			
Summary					
Average yield per hec-tare on Research field	21.98				

Average yield per hectare on farmers' field	15.18				

Note: For the purpose of this project, as per the information from ARARI, the practical yield is 12 Quintal per hectare which is realistic; this approach is recommended by the conservative business principle so as to avoid uncertain gains.

Appendix2: Questionnaire

ሚያዚያ 21 ቀን 2016 ዓ.ም

ይህ ቃለ መጠይቅ በዘጌ ሊመሰረት የታሰበውን የተተሻሻለ የቡና ዝርያ ችግኝ ማፍያና ማከፋፈያ ፕሮጀክት በተመለከተ ለግብዓት እንዲረዳ የተዘጋጀ ነው።

ስምና ማንነትዎን መግለፅ አይጠበቅብዎትም

ቃለ መጠይቁን ሞልተዉ ሲጨርሱ በቴሌግራም አድራሻ +25377069549 ይላኩ::

እናመሰግናለን!

1. የእርሶን የእድሜ ክልል ያመልክቱ (ዓመት)

☐20-30 ☐31-40 ☐41-50 ☐ከ50 ዓመት በላይ

2. በዘጌ የቡና ግብርና መሬት አሎት? ☐አዎ ☐የለኝም

3. የቤተሰዎና የርሶ ዋናው የኑሮ የገቢ ምንጭ ምንድን ነው?

☐የቡና ምርት ☐ከማገዶ እንጨት ሽያጭ ☐ሌላ ምንጭ

4. የዘጌ የቡና ምርት ከጊዜ ወደ ጊዜ እየጨመረ ነው ወይስ እየቀነሰ?

☐እየጨመረ ነው ☐እየቀነሰ ነው

5. ለቡና ግብርና ምርት መቅነስ ዋናው ችግር ምንድን ነው?

☐የደን መጨፍጨና የአፈር ለምነት መቀነስ

☐ግብርናው በተፈጥሮ ዝናብ ብቻ ጥገኛ በመሆኑ

☐የቡና በሽታ በመስፋፋቱ

☐በሁሉም ምክንያቶች

6. ስለተሻሻለና ዘመናዊ ግብርና ስምተው ያውቃሉ?

☐አዎ

☐አላውቅም

7. ከአሁን በፊት የተሞከሩ ዘመናዊ የቡና ግብርና ስልጠናና ትግብራዎች ነበሩ?

☐አዎ

☐አላውቅም

☐አልነበሩም

8. የተሞከሩ የቡና ግብርና ስልጠናና ትግብራዎች ስኬታማ ነበሩ?

☐አዎ

☐አላውቅም

☐አልነበሩም

9. ስለተሻሻለና ዘመናዊ የቡና ግብርና ትምህርትና ትግበራ ዝግጁ ነዎት?

☐አዎ

☐አይደለሁም

10. በዘጌ የቡና ግብርና መሬት በዓመት በአማካይ በ 1ሄክታር በኩንታል በግምት ምን ያህል ምርት ይሰበስባሉ?

ከ1-2 ኩንታል በሄክታር

ከ2-3 ኩንታል በሄክታር

ከ3-4 ኩንታል በሄክታር

ከ4-5 ኩንታል በሄክታር

ከ5-6 ኩንታል በሄክታር

11. በዘጌ በአማካይ የ1 ኩንታል የተዘጋጀ የቡና ምርት የመሸጫ ዋጋ በብር ምን ያህል ይሆናል?
    ☐25,000-30,000

    ☐30,000-35,000

    ☐35,000-40,000

    ☐40,000-45,000

    ☐45,000-50,000

12. ባሁኑ ወቅት የዘጌ የቡና ምርት በገበያ ላይ ተወዳዳሪነቱና ፍላጎቱ ምን ያህል ነው?
    ☐ከፍተኛ

    ☐መካከለኛ

    ☐ዝቅተኛ

    ☐በጣም ዝቅተኛ

Appendix3: **Coffee Research Achievements in Ethiopia**

Considerable research and extension efforts have been exerted on coffee by focusing on developing high yielding, CBD-resistant, and widely adaptable to different agroecologies. Several (41–37 pure lines and 4 hybrids) improved coffee varieties were released and have been disseminated for production in different coffee growing zones ([MDPI] [Ref.])

Table 1. Released coffee varieties registered in Ethiopia from 1986–2018.

NO.	Variety/Cultivar	Year of Released	Yield(q/ha)		Canopy	Breeder/Maintainer
			On Station	On Farm		
1	741	1977/78	12.2	6–7	Open	JARC/EIAR
2	744	1979/80	16.6	8–9	Open	JARC/EIAR
3	7440	1979/80	16.2	8–9	Intermediate	JARC/EIAR
4	7454	1980/81	18.3	8–9	Intermediate	JARC/EIAR
5	7487	1980/81	23.8	9–10	Intermediate	JARC/EIAR
6	74,110	1978/79	19.1	9–10	Compact	JARC/EIAR
7	74,112	1978/79	18.1	9–10	Compact	JARC/EIAR
8	74,140	1978/79	19.7	9–10	Compact	JARC/EIAR
9	74,148	1979/80	18.0	6–7	Compact	JARC/EIAR
10	74,158	1978/79	19.1	9–10	Compact	JARC/EIAR
11	74,165	1978/79	17.3	8–9	Compact	JARC/EIAR
12	754	1980/81	14.8	7–8	Compact	JARC/EIAR
13	75,227	1980/81	17.9	8–9	Open	JARC/EIAR
14	Dessu	1982	20.0		Open	JARC/EIAR
15	Ababuna (741 × Dessu) *	1997	23.8	15.5	Open	JARC/EIAR
16	Melko-CH_2 (7395 × Dessu) *	1997	24.0	13.1	Intermediate	JARC/EIAR
17	Catimor J-19	1997				JARC/EIAR
18	Catimor J-21	1997				JARC/EIAR
19	Gesiha	2002				JARC/EIAR

NO.	Variety/Cultivar	Year of Released	Yield(q/ha)		Canopy	Breeder/Maintainer
			On Station	On Farm		
20	Me'oftu	2002				JARC/EIAR
21	Gawe *	2002				JARC/EIAR
22	Angafa	2006				JARC/EIAR
23	Yachi	2006				JARC/EIAR
24	Buno-washi 2–05 (7416)	2006				JARC/EIAR
25	Mocha (H-739/98)	2010				JARC/EIAR/MCARC/OARI
26	Bultum (H-857/98)	2010				JARC/EIAR/MCARC, ORARI
27	Mocha (H-739/98)	2010				JARC/EIAR/MCARC/OARI
28	Mercha-1 (H-823/98)	2010				JARC/EIAR/MCARC, OARI
29	Harusa (H-674/98)	2010				EIAR/MCARC/OARI
30	Menesibu (W78/84)	2010				JARC/EIAR
31	Sende (W92/98)	2010				JARC/EIAR
32	Challa (W76/98)	2010				JARC/EIAR
33	Haru-1(W66/98)	2010				JARC/EIAR
34	Koti (85257)	2010				JARC/EIAR
35	Odicha (974)	2010				JARC/EIAR
36	Fayate (971)	2010				JARC/EIAR
37	Tepi HC5	2016	20.3			JARC/EIAR
38	Melko-Ibsitu	2016	19.3			JARC/EIAR
39	EIAR50/CH	2016	20.9			JARC/EIAR
40	L55/01 (Limu 1)	2018				JARC/EIAR
41	74,158 × 7530 (Gera coffee hybrid 1) *	2018				JARC/EIAR

*, hybrid varieties; EIAR = Ethiopian Institute of Agricultural Research; JARC = Jimma Agricultural Research Center; MCARC = Mechara Agricultural Research Center; CARC/OARI = Oromia Agricultural Research Institute; Source; MoA ([MDPI] [Ref.])

Appendix4: Improved Coffee Nursery and Distribution Project Plan

Table 7: Nursery and Distribution Plan

Improved Coffee Nursery and Distribution Project Plan

Year1 to Year 5

Objectives: Gradual replacement of disease affected indigenous forest coffee with improved varieties of high-yield, disease resistant and sustainable production thereby ensure better livelihood of the community

Goal: Distribute 625,000 seedlings annually to farmers to cover 250 hectares with improved coffee varieties		Timeline (End of year…)					
Key Activity		Year 0 (Beginning of Year1)	Year 1	Year 2	Year 3	Year 4	Year 5
1	Preparation of annual nursery & Distribution Plan	**X**					
2	Project Site and location Selection	**X**					
3	Land lease agreement for Pilot project & demonstration	**X**					
4	Procurement of seeds	**X**	**X**	**X**	**X**	**X**	**X**
5	procurement of Water pump, pipes, and accessories	**X**	**X**	**X**	**X**	**X**	**X**
6	Construction of reservoir		**X**	**X**	**X**	**X**	**X**
7	Materials & equipment (Shade, fertilizer, utilities supplies and overheads)	**X**	**X**	**X**	**X**	**X**	**X**
8	On-going trainings	**X**	**X**	**X**	**X**	**X**	**X**
9	Nursery management and seedling care , from Coffee seed germination and transplating to Secodary nursery up to distribution (<=1 year)	**X**	**X**	**X**	**X**	**X**	**X**
10	On-going R&D	**X**	**X**	**X**	**X**	**X**	**X**
11	Distribution by location as per the approved schedule (Direct distribution)		**X**	**X**	**X**	**X**	**X**
12	Distribution tracking and feed-back		**X**	**X**	**X**	**X**	**X**
13	On-going Monitoring & Evaluation	**X**	**X**	**X**	**X**	**X**	**X**
13	Project Closure						**X**