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Research Article

Analysis of Arabica Coffee Production Trend and Major Production Constraints in East and West Hararghe Zones, Ethiopia

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A B S T R A C T

This assessment was designed to generate relevant information on coffee production trends and major production and marketing constraints and to provide sufficient information and analytics for future coffee production. Focus group discussions and key informant interviews were used for primary data collection. Secondary data was collected from the Zones and Districts Bureau of Agriculture; a literature review was used for the data analysis, and pairwise ranking and the graph were used. The major coffee production and marketing constraints were disease and insect pests, poor agronomic management, land shortage, moisture stress, lack of improved varieties, extension and structure, and absence of incentives/subsidies. The major coffee marketing constraints were the lack of stable and fair market prices, involvement of illegal traders, lack of price incentives for quality production, and traders mixing Hararghe coffee with another place. Overall indicators of coffee production status and volume supplied to the national market do not show a positive trend with critical challenges/constraints. Hence, strategic and systematic intervention from the government is crucial considering the economic, cultural, social, and historical significance of the crop to the society and the country at large.

INTRODUCTION

More than 125 million people in the coffee growing areas worldwide derive their income directly or indirectly from its products in cultivation, processing, trading, transportation, and marketing (Lashermes *et al.,* 2011). Ethiopia is Africa's largest coffee producer and the world's fifth-largest exporter of Arabica coffee (USDA, 2023). Coffee is Ethiopia's number one source of export revenue, generating about 30-35 percent of the country's total export earnings. All the coffee produced in Ethiopia is of the coffee arabica variety (Abu & Torry, 2023). Coffee is Ethiopia's main export commodity, contributing to the livelihoods of more than 15 million smallholder farmers and other actors in the coffee sector. Ethiopia's coffee production is forecast at 8.25 million 60-kilogram bags (495,000 Metric ton (MT)). Exports are forecasted to reach a record 4.72 million bags (280,560 MT). Exports in 2021/22 reached 4.70 million bags (282,000 MT). Ethiopia's primary export destinations in 2020/21 were Germany, Saudi Arabia, the US, Belgium, and Japan (Abu & Elizabeth, 2022). In Ethiopia, 764,863.16 ha of land was set aside for coffee cultivation, yielding 494,574.36 tons with average productivity of 0.64 tonnes ha-1 in the 2018/19 Meher Season, with South Nation Nationalities and Peoples Regional State (SNNPR) accounting for 30% of the total production (CSA, 2019). Oromia leads Ethiopia's top 25 coffee-producing districts, with 18 of them, while the remaining top coffee-producing districts are in the South Nations, Nationalities, and Peoples Regional State (James *et al.,* 2015).

Coffee is the foundation of Ethiopia's economy, with a quarter of the population dependent on production and exports (Chemura *et al.,* 2022). It represents the major agricultural export crop, providing 20 to 25% of the foreign exchange earnings (ECFF, 2015). The coffee sector contributes about 4 to 5% to the country's Gross Domestic Product (GDP) and creates hundreds of thousands of local job opportunities

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(Tefera *et al.,* 2020). Ethiopia is renowned for its wide range of coffee varieties, favorable agroecology, and a national community well-versed in coffee production and consumption. Coffee farming in Ethiopia takes place over a vast area, under a wide variety of production systems and various growing conditions, with many different cultivation practices (ICO, 2015). These different production systems and estimated total coffee production are forest (10%), semi-forest (35%), garden coffee (50%), and plantation coffee (5 %). It is estimated that smallholder farmers produce above 90 % of Ethiopian coffee. Garden coffee farming is the only production system practiced in Hararghe zones. Best quality specialty Hararghe coffee, with high demand in local and international markets, is produced in the zones.

According to Shamil and Merga (2021), the major challenges of coffee production are low productivity due to a lack of improved varieties, diseases and pests, improper processing methods, lack of post-harvest handling such as storage facilities, climate change, land degradation, marketing. The diseases of coffee berry disease, coffee wilt disease, coffee leaf rust, coffee stem borer, and coffee berry borer are significant challenges (Ghaiwat & Arora, 2014).

Climate variability is a serious concern for the Ethiopian coffee industry. The production and productivity of coffee are highly influenced by precipitation/rainfall, temperature, soil texture, soil pH, altitude, and the like factors. Coffee will become increasingly stressed as the air temperature increases and soil moisture decreases (due to lack of rainfall), and vice versa. Many areas that are suitable for coffee growing in the present day will become less suitable in the future and, in some cases, unsuitable. Conversely, substantial areas that were previously unsuitable for coffee Arabic farming will become suitable (ICO, 2015). Many higher altitude areas will become more suitable for Arabica coffee production throughout this century. Migration to these areas will be vital for ensuring resilience in the Ethiopian coffee sector (ICO, 2015). Moisture stress problems are highly visible in Hararghe zones. Therefore, proper and optimal land suitability identification for Arabica coffee cultivation is essential to encourage production and productivity in the zones. Different factors are reported to be contributing to a serious threat of a decline in coffee production in Hararghe zones. With this threat in mind, a quick survey was initiated with the objectives of assessing the production trend of coffee in Hararghe zones, identifying the major contributing factors to the decline in coffee production, and suggesting possible solutions to reverse this declining trend.

MATERIALS AND METHODS

Study Area

A field survey was conducted in East and West Hararghe Zones to assess the major constraints/challenges in coffee production and analyze its production trend in the zones. The assessment was conducted in three districts in the East Hararghe zone, namely Bedeno, Dadar, and Gursum, and four districts in the West Hararghe zone, namely Boke, Habro, Daro Labu, and Shanan Dhugo.

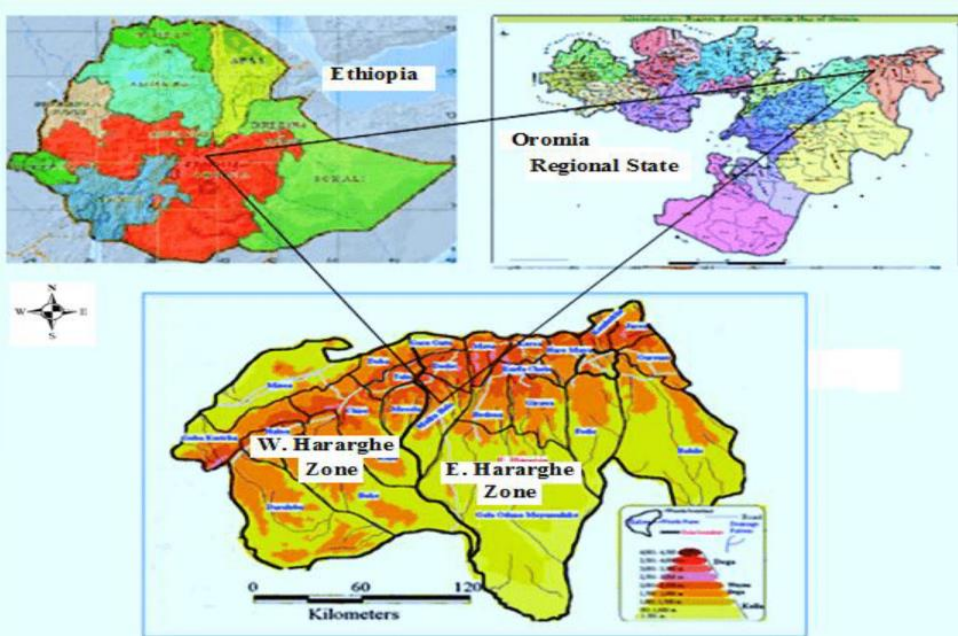

Figure 1. Map of the study area

Data Collection and Analysis

Primary and secondary data sources were used for this study. The primary data was collected using FGD, and the key informant interviews were conducted using checklists. For each district, two *Kebele* (the smallest administrative unit at the neighborhood level, essentially representing a local community within a district) were selected to conduct FGD. The number of participants in one FGD was 6-15 persons. FGD members were farmers who participated in coffee production in 2014 and who know very well about coffee production status in the "Ganda." The information was collected to assess the status of coffee production and recommend to concerned stakeholders for future improvements in the coffee sector. Secondary data was also used. The main source of secondary data was the Bureau of Agriculture from respective districts and zones. This study used secondary data from the 2005 to 2014 Ethiopian Calendar (E.C) (2013 to 2022 G.C). The Ethiopian Calendar was used for this study, which allows policymakers to understand the actual situation and intervention better. The methods of data analysis used for this study were pairwise ranking and graph for constraints and trend analysis, respectively.

RESULTS AND DISCUSSION

Coffee Production and its Trend in East and West Hararghe Zones

According to the data from West and East Hararghe Zones BoA, total coffee production for the last five-ten years shows very volatile trends (Figure 2). This can be partially due to the biennial nature of the crop aggravated by various challenges and constraints identified in this assessment. Poor agronomic management and lack of shade are the most contributing factors to inconsistent yield and volatile production trends. In the West Hararghe Zone, coffee production was below 15,000 tons from 2009-2011E.C production year, while in the East Hararghe Zone from 2004-2011E.C, coffee production was below 15,000 tons. About 53,697.8 tons of avocado were produced in the country (CSA, 2015). As indicated in Figure 2, coffee production from 2011-2013 E.C shows some increment in both the West and East Hararghe Zone. However, most farmers in the FGD said they are reducing/replacing their coffee fields with other crops, especially chat. In the field observations, in both East and West Hararghe zones, there are chat plants (local variety/indigenous spice) under coffee trees, which will replace coffee in the near future.

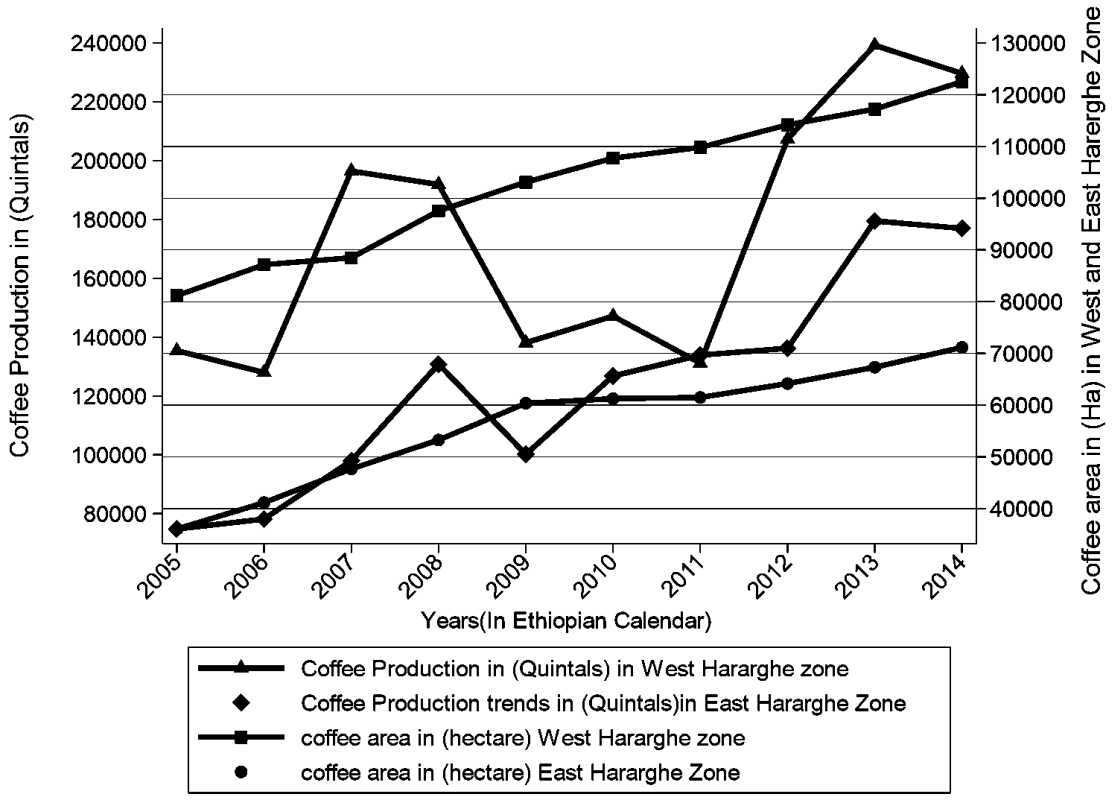

Figure 2. Coffee production in (Quintals) and area coverage in (Hectare) in West and East Hararghe zones (OboA, 2022)

Coffee productivity in East and West Hararghe zone

Coffee productivity in West and East Hararghe zones was below five quintals per hectare (Figure 3). In 2008 and 2009, coffee productivity was less than 3qt/ha. From 2011 to 2013, coffee productivity increased to some extent. However, the productivity data obtained from the zones is not identical to the amount of coffee produced divided by area coverage in respective years. Coffee productivity in the West and East Hararghe zones was below the national average (7Qt/ha) and regional average (6.8Qt/ha).

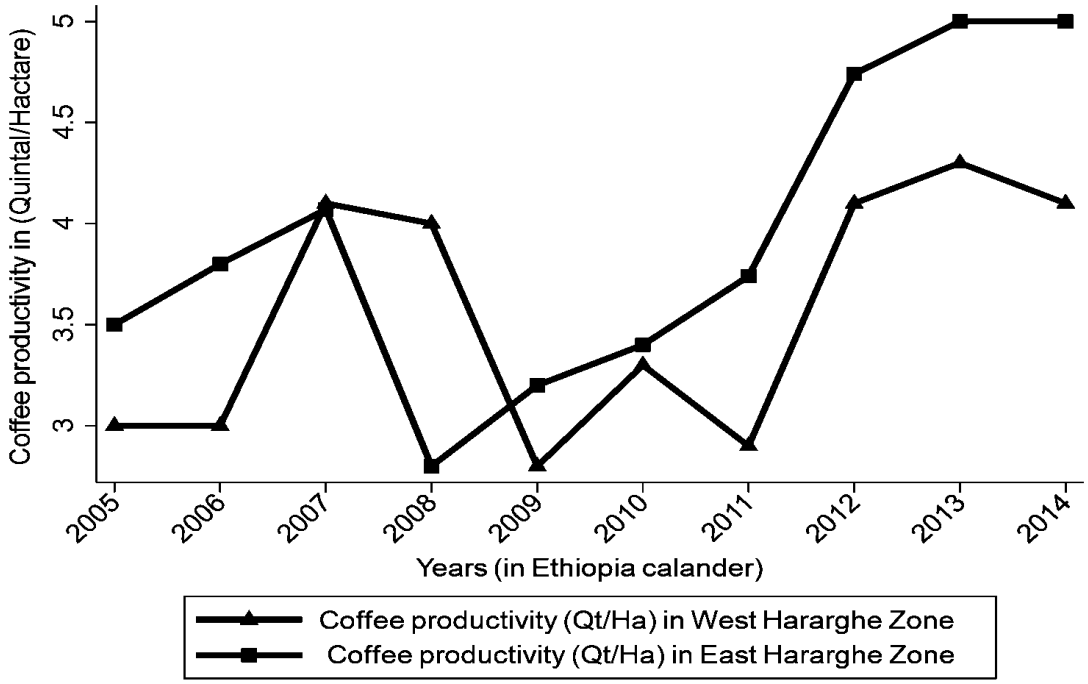

Figure 3. Coffee productivity (Qt/ha) from 2005-2014 E.C in West and East Hararghe zones (OboA, 2022)

Coffee volume supplied to central market from East and West Hararghe zones

Based on data from West and East Hararghe Zones BoA, the total coffee volume supplied to the central market shows up and down trends (Figure 4). In the West Hararghe Zone, coffee volume supplied to the central market was reduced from 2013E.C to 2014E.C by (70.8%) which means from 104,440 Qt to 30,500 Qt reductions. In the case of the East Hararghe zone, coffee volume supplied to the central market from 2013 to 2014 was reduced by (66.7%) which means from 38,120Qt to 12,700Qt. As indicated in Figure 4, coffee area coverage increased at an increasing rate in both the West and East Hararghe zones from 2005-2014E.C.

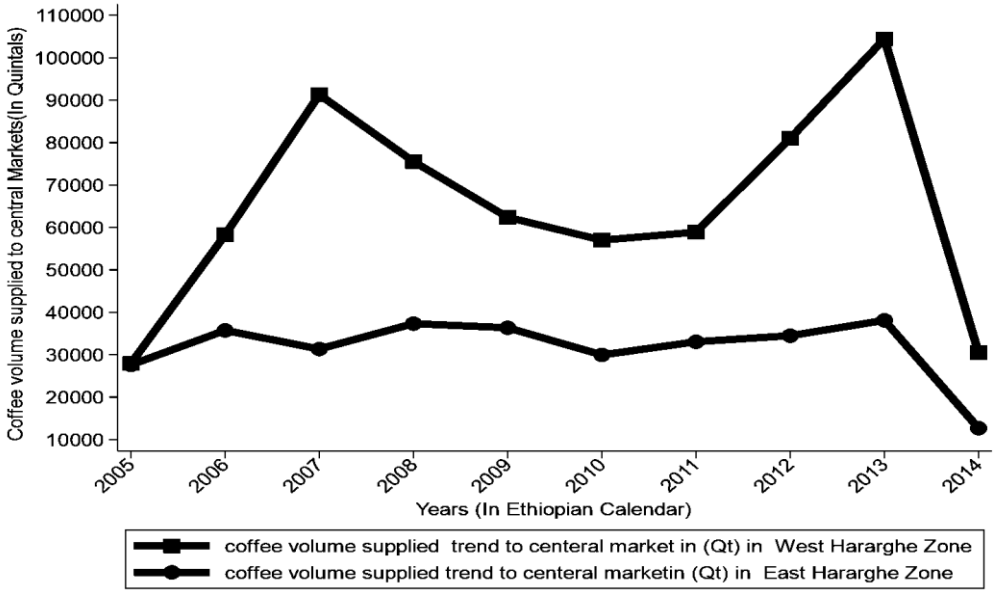

Figure 4. Coffee volume supplied to central market in (Quintals) in West and East Hararghe zones (OboA, 2022)

Coffee production in selected districts of West and East Hararghe zone

As indicated in Figure 5, coffee production shows downward trends in Daro Labu, Habro, Bedeno, and Boke districts due to different factors, while in Dadar and Shanan Dugo districts, coffee production, to some extent, shows upward trends.

Coffee productivity in selected districts of East and West Hararghe zone

Coffee productivity was between 2 and 6 quintals per hectare for the majority of selected districts. As indicated in Figure 6, coffee productivity was below six quintals per hectare in the districts except 9.22 Qt/ha in Shanan Dugo district in 2014 E.C. Compared to other districts, coffee productivity was high and stable in Daro Lebu and Dadar districts. The lowest productivity was recorded in Gursum district (1.48 qt/ha) in 2014 E.C followed by Bedeno (1.59 qt/ha) in 2005 E.C and Habro district (1.64 qt/ha) in 2013 E.C.

Coffee Volume Supplied to Central Market Selected Districts of West and East Hararghe Zone

Based on data from districts BoA, the total coffee volume supplied to the central market shows decreasing trends (Figure 7). The lowest volume supplied to the central market was 50.25 quintals in 2011 from the Gursum district. The highest volume of coffee supplied to the central market was 108,000 quintals in 2007 E.C from the Bedeno district. The majority of districts supplied less than 40000 quintals of coffee per year. In general, the volume of coffee supplied to the central market from the districts is reducing from time to time in contrast to the increasing production trend and productivity shown in Figures 2 and 3, respectively. This implies local consumption increased, the market supply volume was reduced, and available production was marketed through the black market, according to information from focus group discussions.

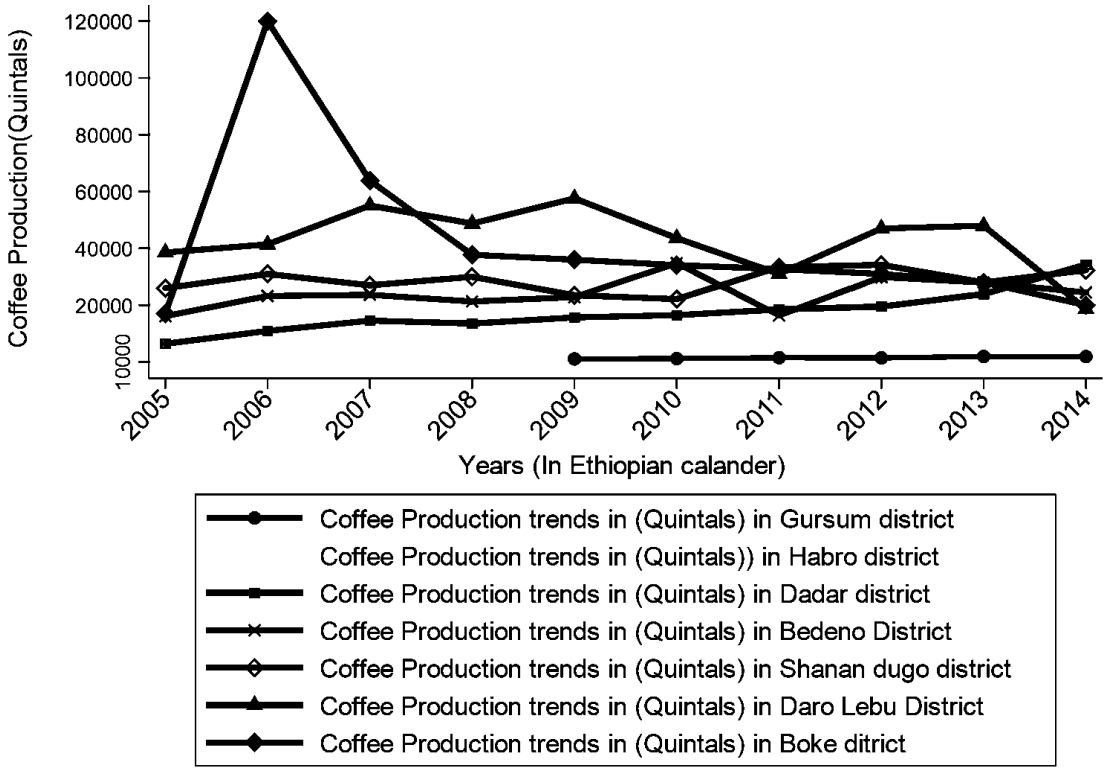

Figure 5. Coffee production trends from 2005-2014E.C in selected districts of West and East Hararghe zones (OboA, 2022)

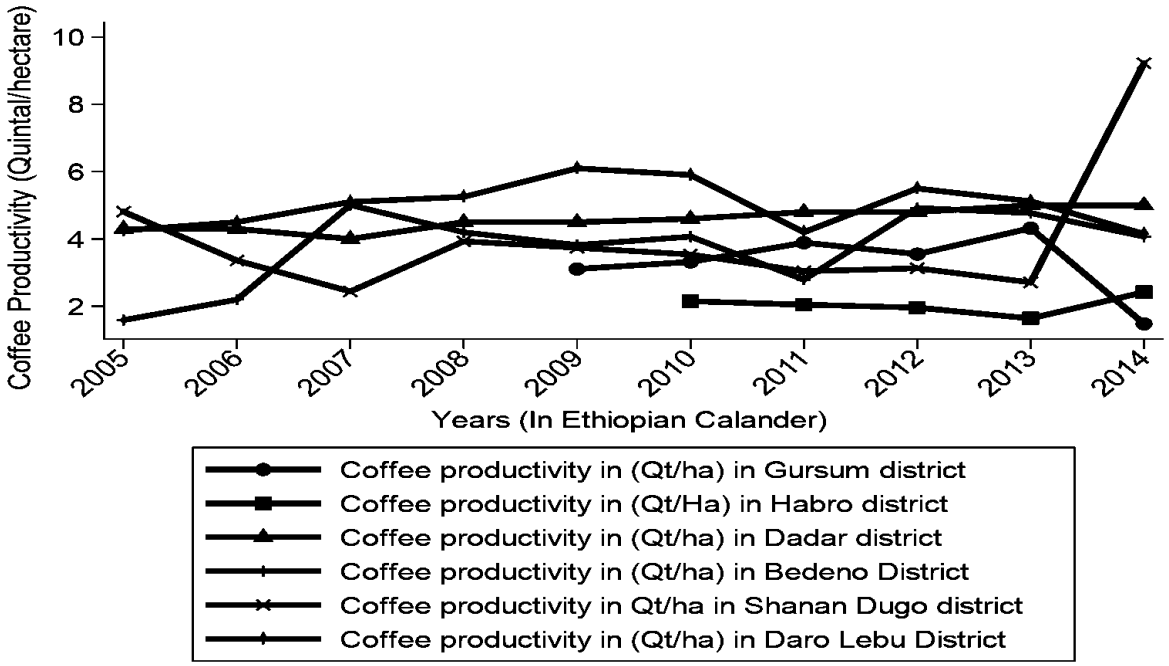

Figure 6. Coffee productivity trends from 2005-2014E.C in selected districts of West and East Hararghe zones (OboA, 2022)

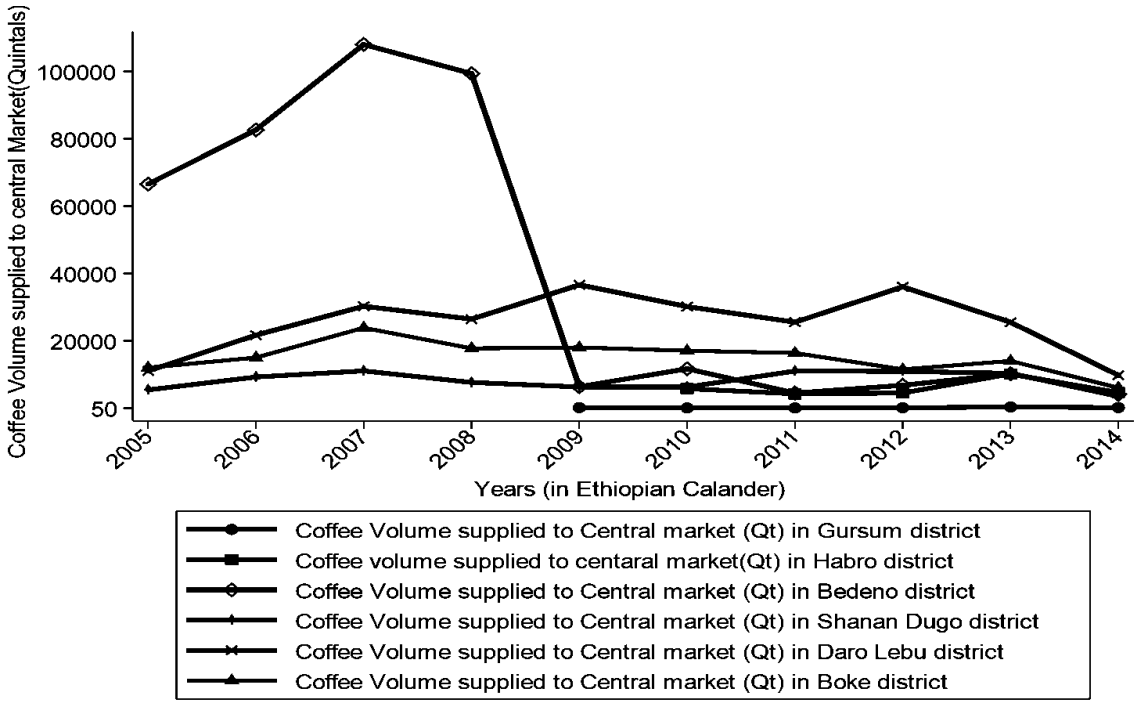

Figure 7. Coffee volume supplied to central market from 2005-2014E.C in selected districts of West and East Hararghe Zones (OboA, 2022).

Coffee Production constraints and challenges in East and West Hararghe Zones

According to the Focus group Discussion, farmers indicated that different factors, including disease and insect pests, marketing and coffee price, field management, competition with other crops/land shortage, moisture stress/climate change, lack of improved varieties, weak extension service, and its structure, absence of incentives and others are identified to be contributing to the decline and lack of farmers interest in coffee production in East and West Hararghe Zones. Similarly, Tolera and Gebermedin (2015) reported that diseases, pests, poor access to market information, lack of physical infrastructure,

improved coffee variety, and weak extension services were significant coffee constraints for production and productivity in West Hararghe Zone.

Disease and Insect pests

According to survey results, one of the most critical limiting factors in coffee production is diseases, such as coffee berry disease (CBD), which is dominant and destructive in the high and mid-altitude areas, while leaf rust and others are reported in the low altitude. Most farmers are discouraged and frustrated by the loss of their produce due to CBD after lots of hope at the fruit stage. The use of susceptible local varieties exacerbates the problem. According to the farmers of this area, when conditions are favorable for CBD development, there is total yield loss. Stem and fruit borers are also described by some farmers as problems in their fields. Disease problem is ranked first in most of the districts in the pairwise ranking of the constraints/challenges in coffee production (Tables 1, 2, 3, 4, 6, and 9). According to Hindorf & Omondi (2011), the significant diseases of coffee in Ethiopia are coffee leaf rust, *Hemileia vastatrix*; coffee berry disease, *Colletotrichum kahawae* and coffee wilt disease and gibberella xylarioides (*Fusarium xylarioides*).

Poor Agronomic Management

All farmers in Focus Group Discussion (FGD) participants depicted that coffee needs intensive management compared to all other crops. In their words, "bunni akkam jirtaa mitii akkam bultee fedha" means "coffee needs good morning, not how are you". Accordingly, a good farmer should follow and manage his coffee field daily, which is not the case with other crops, including chat. Hence, some farmers in West Hararghe called the crop "gabroomfataa," which means "the crop that enslaved us" for its need for intensive management and low benefit. Contrary to this, they called chat "bilisa baasaa" which means "liberator" due to its requirement for low management and good relative benefit. With a critical labor shortage as a result of competition from other sectors, education, and low coffee prices, the farmers are losing interest and are unable to properly manage their coffee fields. Most coffee farmers are older, and the younger generations are by far less interested in coffee farming. Most farmers said that they apply organic fertilizer, mostly manure. According to FGD, the crop shows deficiency symptoms in most fields, which may be due to timing of application, nutrient content of the manure, amount applied, and others. Poor soil fertility also contributed to low yield in the area. Overall, field management is not at the required level, hence contributing to the decline. Many farmers ranked poor field management as a key factor in coffee production decline. (Tables 1, 2, and 4).

Competition with other crops/land shortage

According to FGD results, there is an extreme land shortage in Hararghe, with an average land holding of 0.25ha per family. In such extreme conditions, farmers adapted to the situation through intercropping, looking for high-value crops, irrigation, and others. It is natural to go for maximum benefit in such conditions. According to the farmers interviewed, with the current price and challenges on coffee production, it is more profitable to produce chat than coffee. This criterion ranked first or second in districts where chat farming is highly profitable. (Tables 6, 7, 8, and 9).

Moisture stress/climate change

According to FGD information, climate change is affecting all walks of life and has a direct effect on crop production. Coffee needs a specific range of temperature and rainfall suitable for its production. With changing climate, moisture stress (rainfall pattern, amount, and distribution problems) and increased temperature affected coffee production. Previously, highly suitable areas have become less suitable, and suitable areas are becoming unsuitable. In areas where irrigation is available, there is competition for water, and priority is not given to coffee. As a result of moisture stress and increased temperature, there will be flower and fruit abortion, loss of foliage, and weakening of the tree. This leads to low and inconsistent yields. Although information from FGD revealed that shade protects coffee plants from adverse weather conditions and helps to get sustainable yield, most coffee farmers in Hararghe do not use shade trees, probably due to land shortage. There may also be competition for moisture with different intercropped plants (chat, maize, sorghum, etc) as intercropping is widely practiced in the zones. Moisture stress is critical in all the surveyed areas, although its severity is higher in low and mid-altitude areas. Farmers indicated the importance of the problem in their ranking. (Tables 2, 3, 4, and 5).

Lack of improved varieties and age of the trees

According to survey results, despite the current government effort of pruning and stamping old coffee trees, trees in some of the farms are very old and unproductive. Coffee is a perennial crop that takes a long time to develop a new variety. Even though improved varieties released by Mechara Research Center have proven to be resistant to CBD under farmers' conditions, due to weak extension services, lack of attention,

and absence of a coffee seed system, the varieties are not available to the farmers. Some farmers are still skeptical about the varieties. The effort of Mechara Agricultural Research Center and extension services at different levels (though constrained by lack of budget, structural problems, human resources, and logistics) should be appreciated for their effort in addressing this problem. The varieties have reached all the surveyed districts, but there is a critical seed shortage. The initiative being undertaken by the Bureau of Agriculture of Oromia to develop seed orchards of improved varieties in some districts is a good beginning.

Extension and its structure

Coffee is the most important commodity, with the lion's share in the country's foreign earnings. According to ENA (2023), coffee exports obtained a record 1.4 billion USD in 2022. In the key informant interviews, it was observed that the coffee extension is not empowered, lacks logistics and budget, lacks attention of leadership, and has a mandate limited to production and not quality control. The professionals and the farmers alike agreed that there is a lack of government attention to coffee in Hararghe. A typical example given by the farmers is the ongoing construction of a chat export complex at Baddeessaa town, West Hararghe, and very limited extension service on coffee compared to the previous years. Farmers in West Hararghe said, "Our effort to work on coffee is futile when government attention is on chat." The extension system is constrained by a lack of budget, human resources, and logistics. Most districts have a critical budget shortage and vehicles to transport coffee seedlings from nurseries to farmers' fields. There is no vehicle and/or motorcycle for district coffee extension workers. There is also a structural problem where quality control is the duty of non-professional institutions, and the coffee extension system is not as well-empowered as in previous years.

Absence of incentives/subsidies

According to Key informant Interviews, experiences from around the world show that most countries subsidize their agriculture. Coffee farmers in Hararghe may lose their produce due to disease, moisture stress, hail, and other conditions. Coffee prices may fail for some years due to oversupply from other countries. In some years, there may be less or no harvest due to the biennial nature of the crop. In such a scenario, there is no strategic intervention from the government to support or incentivize the farmers, which, in turn, frustrates the farmers and makes them insecure as coffee farmers. There should be different incentives/subsidies to motivate and encourage farmers. Several grants or projects helped coffee farmers as incentives/subsidies to maintain coffee production, establish nurseries for seedling preparation, and improve seed supply. Some helped the farmers to adapt to climate change and market linkages, etc.

Coffee Marketing Constraints in East and West Hararghe Zones

Despite a strong local coffee culture, branding opportunity of Hararghe specialty coffee, favorable agroecology, and unique distinct characteristics of coffee quality, East and West Hararghe zones so far failed to capitalize its coffee production potential fully. The effect of price volatility (low farm gate price) has been a direct factor in the study area. As indicated in Tables 10 and 11, the lack of stable and fair prices (low farm gate prices) is a leading challenge in reducing coffee production in both the West and East Hararghe Zone.

The involvement of illegal traders and lack of incentives for quality coffee were the second and third significant marketing constraints of coffee in the East Hararghe zone (Table 10). In the West Hararghe Zone, the lack of incentives for quality coffee and the involvement of illegal traders were the second and the third significant marketing constraints (Table 11). Ethiopian Commodity Exchange (ECX) pricing pressures on smallholders lead some to shift away from coffee production to chat towards more immediate returns. Many farmers claimed that they were not paid based on their coffee quality and reported lots of sabotage in grading and pricing. Smallholder coffee farmers in the study area have limited access to market information and lack a strong market institution. Due to the premium price and quality brand of Hararghe coffee, traders bring coffee from other places and mix it to supply the central market. This affects the price and acceptability of Hararghe coffee. It also discouraged coffee farmers in the zones. Adulteration is one of the challenges of Hararghe coffee that affects price and quality. Similarly, Berhanu (2017) and Amamo (2014) reported that coffee producers are exposed to large fluctuations in market price. Poor access to the market, little market promotion and incentive mechanisms, and low price shares and benefits (farmers) are also another coffee marketing problem in Ethiopia (Jose, 2012; Tesfu, 2012).

Table 1. Pairwise ranking of the major constraints of Coffee production in Bedeno District

Bedeno District								
Problems	**Disease and Insect pests (CBD)**	**Shortage of rainfall(Erratic RF)**	**Low management**	**Competition with other crops(khat)/land shortage**	**Low access to improved coffee varieties**	**Low attention given for coffee sector**	**Total**	**Rank**
Disease and Insect pests (CBD)		1	1	1	1	1	5	1
Shortage of rainfall (Erratic RF)	0		0	0	1	1	2	4
Low management	0	1		1	1	1	4	2
Competition with other crops(khat)/land shortage	0	1	0		1	1	3	3
Low access to improved coffee varieties	0	0	0	0		0	0	6
Low attention given for coffee sector	0	0	0	0	1		1	5

Assuming 1 is more important problem and 0 is less important problem

Data Source: (Own FGD Survey data, 2022)

Table 2. Pairwise ranking of the major constraints of Coffee production in Dadar District

Dadar District								
Problems	**Disease and Insect pests (CBD)**	**Shortage of rainfall (Erratic RF)**	**Low management**	**Competition with other crops (khat)/land shortage**	**Low access to improved coffee varieties**	**Low attention given for coffee sector**	**Total**	**Rank**
Disease and Insect pests (CBD)(1)		1	1	1	1	1	5	1
Shortage of rainfall(Erratic RF)(2)	0		1	1	1	1	4	2
Low management (3)	0	0		1	1	1	3	3
Competition with other crops(khat)/land shortage(4)	0	0	0		1	1	2	4
Low access to improved coffee varieties (5)	0	0	0	0		1	1	5
Low attention given for coffee sector(6)	0	0	0	0	0		0	6

Assuming 1 is more important problem and 0 is less important problem

Data Source: (Own FGD Survey data, 2022)

Table 3. Pairwise ranking of the major constraints of Coffee production in Gursum District

Gursum District								
Problems	**Disease and Insect pests (CBD)**	**Shortage of rainfall (Erratic RF)**	**Low management**	**Competition with other crops (khat)/land shortage**	**Low access to improved coffee varieties**	**Low attention given for coffee sector**	**Total**	**Rank**
Disease and Insect pests (CBD)(1)		1	1	1	1	1	5	1
Shortage of rainfall(Erratic RF)(2)	0		1	1	1	1	4	2
Low management (6)	0	0		0	0	0	0	6
Competition with other crops(khat)/land shortage(5)	0	0	1		0	0	1	5
Low access to improved coffee varieties (4)	0	0	1	1		0	2	4
Low attention given for coffee sector(3)	0	0	1	1	1		3	3
Assuming 1 is more important problem and 0 is less important problem								

Data Source: (Own FGD Survey data, 2022)

Table 4. Pairwise ranking of the major constraints of Coffee production in East Hararghe zone District

East Hararghe Zone								
Problems	**Disease and Insect pests (CBD)**	**Shortage of rainfall(Erratic RF)**	**Low management**	**Competition with other crops(khat)/land shortage**	**Low access to improved coffee varieties**	**Low attention given for coffee sector**	**Total**	**Rank**
Disease and Insect pests (CBD)(1)		1	1	1	1	1	5	1
Shortage of rainfall(Erratic RF)(2)	0		1	1	1	1	4	2
Low management (3)	0	0		1	1	1	3	3
Competition with other crops(khat)/land shortage(4)	0	0	0		1	1	2	4
Low access to improved coffee varieties (6)	0	0	0	0		0	0	6
Low attention given for coffee sector(5)	0	0	0	0	1		1	5
Assuming 1 is more important problem and 0 is less important problem								

Data Source: (Own FGD Survey data, 2022)

Table 5. Pairwise ranking of the major constraints of Coffee production in Boke District

Boke District								
Problems	**Disease and Insect pests (CBD)**	**Shortage of rainfall (Erratic RF)**	**Low management**	**Competition with other crops (khat)/land shortage**	**Low access to improved coffee varieties**	**Low attention given for coffee sector**	**Total**	**Rank**
Disease and Insect pests (CBD)(2)		0	1	1	1	1	4	2
Shortage of rainfall(Erratic RF)(1)	1		1	1	1	1	5	1
Low management (5)	0	0		0	1	0	1	5
Competition with other crops(khat)/land shortage(4)	0	0	1		1	0	2	4
Low access to improved coffee varieties (6)	0	0	0	0		0	0	6
Low attention given for coffee sector(3)	0	0	1	1	1		3	3
Assuming 1 is more important problem and 0 is less important problem								

Data Source: (Own FGD Survey data, 2022)

Table 6. Pairwise ranking of the major constraints of Coffee production in Shanan Dugo District

Shanan Dhugo District								
Problems	**Disease and Insect pests (CBD)**	**Shortage of rainfall (Erratic RF)**	**Low management**	**Competition with other crops (khat)/land shortage**	**Low access to improved coffee varieties**	**Low attention given for coffee sector**	**Total**	**Rank**
Disease and Insect pests (CBD)(1)		1	1	1	1	1	5	1
Shortage of rainfall(Erratic RF) (4)	0		1	0	0	1	2	4
Low management (6)	0	0		0	0	0	0	6
Competition with other crops(khat)/land shortage(2)	0	1	1		1	1	4	2
Low access to improved coffee varieties (3)	0	1	1	0		1	3	3
Low attention given for coffee sector(5)	0	0	1	0	0		1	5
Assuming 1 is more important problem and 0 is less important problem								

Data Source: (Own FGD Survey data, 2022)

Table 7. Pairwise ranking of the major constraints of Coffee production in Daro Lebu District

Daro Lebu District								
Problems	**Disease and Insect pests (CBD)**	**Shortage of rainfall (Erratic RF)**	**Low management**	**Competition with other crops (khat)/land shortage**	**Low access to improved coffee varieties**	**Low attention given for coffee sector**	**Total**	**Rank**
Disease and Insect pests (CBD) (2)		1	1	0	1	1	4	2
Shortage of rainfall(Erratic RF)(3)	0		1	0	1	1	3	3
Low management (4)	0	0		0	1	1	2	4
Competition with other crops(khat)/land shortage(1)	1	1	1		1	1	5	1
Low access to improved coffee varieties (6)	0	0	0	0		0	0	6
Low attention given for coffee sector (5)	0	0	0	0	1		1	5
Assuming 1 is more important problem and 0 is less important problem								

Data Source: (Own FGD Survey data, 2022)

Table 8. Pairwise ranking of the major constraints of Coffee production in Habro District

Habro District								
Problems	**Disease and Insect pests (CBD)**	**Shortage of rainfall (Erratic RF)**	**Low management**	**Competition with other crops (khat)/land shortage**	**Low access to improved coffee varieties**	**Low attention given for coffee sector**	**Total**	**Rank**
Disease and Insect pests (CBD)(2)		1	1	0	1	1	4	2
Shortage of rainfall(Erratic RF) (3)	0		1	0	1	1	3	3
Low management (5)	0	0		0	1	0	1	5
Competition with other crops(khat)/land shortage(1)	1	1	1		1	1	5	1
Low access to improved coffee varieties (6)	0	0	0	0		0	0	6
Low attention given for coffee sector (4)	0	0	1	0	1		2	4
Assuming 1 is more important problem and 0 is less important problem								

Data Source: (Own FGD Survey data, 2022)

Table 9. Pairwise ranking of the major constraints of Coffee production in West Hararghe zone

West Hararghe Zone								
Problems	**Disease and Insect pests (CBD)**	**Shortage of rainfall (Erratic RF)**	**Low management**	**Competition with other crops (khat)/land shortage**	**Low access to improved coffee varieties**	**Low attention given for coffee sector**	**Total**	**Rank**
Disease and Insect pests (CBD)(1)		1	1	1	1	1	5	1
Shortage of rainfall(Erratic RF)(3)	0		1	0	1	1	3	3
Low management (5)	0	0		0	1	0	1	5
Competition with other crops(khat)/land shortage(2)	0	1	1		1	1	4	2
Low access to improved coffee varieties (6)	0	0	0	0		0	0	6
Low attention given for coffee sector (4)	0	0	1	0	1		2	4
Assuming 1 is more important problem and 0 is less important problem								

Data Source: (Own FGD Survey data, 2022)

Table 10. Pairwise ranking of the major constraints of Coffee Marketing in East Hararghe zone

East Hararghe Zone								
Problems	**Lack of incentives for quality coffee**	**Involvement of Illegal traders**	**Institutional problem**	**Mixing Hararghe coffee with other place coffee**	**ECX bureaucracy and corruption**	**Lack of fair and stable price**	**Total**	**Rank**
Lack of incentives for quality coffee (3)		0	1	1	1	0	3	3
Involvement of Illegal traders (2)	1		1	1	1	0	4	2
Institutional problem (4)	0	0		1	1	0	2	4
Mixing Hararghe coffee with other place coffee (6)	0	0	0		0	0	0	6
ECX bureaucracy and corruption (5)	0	0	0	1		0	1	5
Lack of fair and stable price (1)	1	1	1	1	1		5	1
Assuming 1 is more important problem and 0 is less important problem								

Data Source: (Own FGD Survey data, 2022)

Table 11. Pairwise ranking of the major constraints of Coffee Marketing in West Hararghe zone

West Hararghe Zone								
Problems	**Lack of incentives for quality coffee**	**Involvement of Illegal traders**	**Institutional problem**	**Mixing Hararghe coffee with other place coffee**	**ECX bureaucracy and corruption**	**Lack of fair and stable price**	**Total**	**Rank**
Lack of incentives for quality coffee (2)		1	1	1	1	0	4	2
Involvement of Illegal traders (3)	0		1	1	1	0	3	3
Institutional problem (4)	0	0		1	1	0	2	4
Mixing Hararghe coffee with other place coffee (6)	0	0	0		0	0	0	6
ECX bureaucracy and corruption (5)	0	0	0	1		0	1	5
Lack of fair and stable price (1)	1	1	1	1	1		5	1
Assuming 1 is more important problem and 0 is less important problem								

Data Source: (Own FGD Survey data, 2022)

Comparative Advantages of Coffee and Chat Production in East and West Hararghe zone

Because of the increasing CBD threat, once coffee was obligatory, farmers were gradually urged to switch to other crops, predominantly in favor of Chat. For farmers in Eastern Ethiopia, basically, the income from Chat has long been a survival strategy. FGD farmers prefer chatting over coffee due to the following reasons:

It fetches premium prices both in the local and export markets. It is regarded as a poor man's crop—a low input-high cash output commodity (does well under small-scale management). It is less attacked by pests and diseases as well as other environmental stresses. It is considered a lifesaver—it comes to harvest two to three times and at any time of the year and would satisfy the household's cash requirement at different times of the year (coffee seasonally and only once every year or once in two years). Its leftover leaves and twigs are also fed to animals like goats and sheep. Unlike coffee, it has lower investment or production costs and does not necessitate basic processing before marketing (Dema, 2011).

Some of the demerits of chat expressed by farmers in comparison to coffee are: It is a highly perishable ("dead crop") unless being marketed soon enough after harvest; It is less handy to be transported safely to distant markets; Unlike coffee, it is not sold all at once in local markets, i.e., it is sold on a piece-meal basis and they cannot take it back if it is not sold at all; Due to its highly perishable characteristics, it needs a more sophisticated marketing system with a well-functioning transportation network for distant markets; Coffee is advantageous than chat to purchase a fixed asset (Oxen, house, etc). Therefore, we have several suggestions and recommendations to be implemented in the Hararghe zone, as follows:

1. **Improve farmers' access** to improved varieties and recommend agronomic packages. It is important to work on coffee seed systems that do not exist so far. Seed orchard development efforts being undertaken in some districts should be encouraged and incorporated into the system**.** Research centers should increase their effort to release more disease-resistant and high-yielding alternative varieties for the different agroecologies.
2. **Develop a coffee extension program and structure** that fits the contribution of the commodity to the national and regional economy in terms of logistics, human power, budget, and authority. Restructure the system in a way that ensures professional service in pre- and post-harvest management and quality control in the value chain of the crop. The leadership should own the challenge and work for the solution.
3. **Strengthen investment in coffee research and development** adequately so that new technologies can emerge frequently and easily reach farmers.
4. **Develop incentive mechanisms** for the farmers during the years of adverse harvest, crop failures, or low market prices.
5. **Climate change adaptation and/or mitigation mechanisms** should be in place for coffee production in Ethiopia. This must include the use of irrigational water for different commodities, water harvesting, water source development, and others.
6. **Ensure premium prices for quality products and develop quality control mechanisms** throughout the coffee marketing chain. Strong regulation and enforcement are required to control adulteration and illegal traders.
7. **Improving Market information and extension on coffee marketing** is important to benefit farmers from government vertical marketing programs.

CONCLUSION

The difference between official data on coffee production trend indication and farmers' opinions shows the need to improve data collection mechanisms at district and zonal levels. Overall indicators of coffee production status and volume supplied to the national market do not show a positive trend with critical challenges/ constraints. Hence, strategic and systematic intervention from the government is crucial considering the economic, cultural, social, and historical significance of the crop to the society and the country at large.

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