The contribution of forest coffee certification program to household income and resource conservation: Empirical evidences from Southwest Ethiopia

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ABSTRACT

Coffee certification programs are emerging as potential tools to improve livelihoods and contribute to environmental sustainability. However, these programs have faced criticism, particularly regarding their impact on participants' livelihoods and resource conservation. This study evaluates the performance of the Forest Coffee Certification Program (FCCP), implemented in the Belete-Gera forest area over the past ten years (2011–2022), focusing on its contributions to household income and its effects on resource conservation. Additionally, it investigates whether premium payments resulting from the certification have incentivized households to comply with FCCP objectives and requirements. Multiple data collection methods were employed, including household surveys, key informant interviews, stakeholder workshops, and desk reviews. Results indicate a substantial increase in the total sales volume of forest coffee and revenues, whereas the volumes of forest coffee supplied to the cooperatives showed decreasing trends over the past ten years. Consequently, the premium payment received from certified forest coffee export also showed a substantial decreasing trend. The current premium payment of $0.87 (46 birr) per kg is identified as the optimal incentive for compliance with FCCP requirements. The results also indicate that the certification program contributed to forest conservation by creating incentives that fostered a sense of ownership within the local community, particularly during the early stages of its implementation. The study concludes that improving price differentials and ensuring fairer premium distribution could strengthen the FCCP's impact on livelihoods and forest conservation. Moreover, the program needs to address the decreasing trend in forest coffee cooperative supplies to sustain its long-term benefits.

1. Introduction

Coffee is one of the most valuable agricultural commodities worldwide, ranking second in terms of trade value. Ethiopia, the birthplace of Arabica coffee, is renowned for its organic coffee production, contributing significantly to the global coffee market. For instance, in 2020/21, Ethiopia produced around 442,500 metric tons of coffee (International Coffee Organization, 2022), of which approximately 300,000 tons were exported, generating US$ 1.4 billion in revenue in the same year, according to a report of Ethiopian Coffee and Tea Authority. Coffee supports the livelihoods of millions of Ethiopians, with the country's production systems categorized into four types: forest coffee, semi-forest coffee, garden coffee, and plantation coffee (Gole, 2019; Kebede, 2012).

Forest coffee, in particular, is integral to both the economy and the environment, representing about 10% of the nation's coffee production (ECSS et al., 2019). However, forest degradation and deforestation pose

significant challenges to sustainable forest management in regions like Belete-Gera, where forest coffee is grown. In response, various certification schemes, such as Fairtrade, Organic, and Rainforest Alliance (RA), have been introduced in Ethiopia. Among these, the RA certification aims to promote sustainable coffee production practices while conserving forest ecosystems (Arai et al., 2023). The Rainforest Alliance is applied worldwide and involves certification of more than 100 different types of crops including coffee, tea, cocoa, and banana (Milder et al., 2016).

The Forest Coffee Certification Program (FCCP) using the Rainforest Alliance scheme was implemented in Belete-Gera forest area with the support of the Japan International Cooperation Agency (JICA) under the Belete-Gera Participatory Forest Management Project (JICA, 2020). The Belete-Gera forest has a unique ecosystem and biodiversity. Despite the forest ecosystem plays a critical role in harboring wild coffee Arabica, the forest has been facing deforestation and forest degradation. As a

result, a unique initiative, the FCCP is introduced to promote sustainable forest management and improve livelihoods in Belete-Gera forest areas. The primary goal of the FCCP is to incentivize forest conservation and improve the livelihoods of smallholder coffee producers by allowing them access to premium markets through certified, shade-grown forest coffee (JICA, 2020; Mitiku et al., 2017). In addition, the certification program offers training and support to coffee farmers, equipping them with improved agricultural techniques and sustainable practices. The Belete-Gera Participatory Forest Management Project has established a framework for the implementation of participatory forest management by organizing forest user associations (WaBuBs) in the Belete-Gera forest area. Since 2007, the project has supported the acquisition of international certification for forest coffee indigenous to the forest, with the international certification premium as an incentive to FCCP that has been used to promote sustainable forest management by promoting forest conservation by producers.

According to (JICA, 2020), the Oromia Wildlife and Forest Enterprise (OWFE) has been involved in the implementation of the FCCP under the coordination of JICA. The role of the OWFE in the FCCP implementation include (but not limited to): (i) Supporting certification: support coffee producers navigate the certification process, potentially collaborating with certifying organization, the RA. (ii) Promoting sustainable practices: provide training on sustainable forest management techniques to coffee producers, which involve preventing deforestation, soil conservation, and minimizing pesticide use. (iii) Monitoring and enforcement: responsible for monitoring certified areas and ensuring compliance with FCCP standards. (iv) Provide credit access for established forest coffee cooperatives as enable collect and purchase forest coffee from producers, and; (v) Receive supplied coffee from forest coffee cooperatives, process, store and export to international markets. The exported forest coffee bring premium prices and distributed among producers.

The certification program is believed to address global demand for healthy and environmentally friendly products that meet specific standards, based on the assumption that consumers are willing to pay a premium price for such products (Grote et al., 2007; Basu and Hicks, 2008; Liu et al., 2019; Abdu and Mutuku, 2021). Several studies have examined the livelihood and ecological impacts of certification programs. However, many of these studies have focused on the short-term effects of certification, without addressing its long-term sustainability (Mitiku et al., 2017; Takahashi and Todo, 2017; Ho et al., 2018; Mitiku et al., 2018; Mitiku et al., 2017). For instance, For instance, rigorous studies by Mitiku et al. (2018) and Mitiku et al. (2017) assessed the impacts of coffee certification programs on smallholder farmers' economic and welfare outcomes, including poverty, yield, income, returns to land, returns to labor, and profits in Southwestern Ethiopia; however, these studies relied on cross-sectional survey data for their analyses. Whereas, despite a study by (Arai et al., 2023) conducted in the same study area as our research, attempted to assess the long-term effects of the FCCP, this study focused solely on ecological outcomes, specifically forest ecosystem conservation, overlooking the potential economic impacts of the certification program. Furthermore, the study was limited to data from a small sample (10) of key informants involved in the certification program, which is not representative enough to draw generalizable conclusions regarding the outcomes of the certification program. Hence, to contribute toward bridging these gaps, the present study carries out a longitudinal evaluation of the FCCP, assessing its performance over a decade (2011–2022) in both forest conservation and economic outcomes such as yield, income, premium price, and its distribution among producers.

The longitudinal evaluation of the FCCP is essential as coffee prices and climatic conditions, both of which can fluctuate significantly over time, play a pivotal role in shaping the long-term sustainability and effectiveness of certification programs. By examining the FCCP's impact over a decade, this study captures how variations in market dynamics and environmental conditions influence both forest conservation and the economic outcomes for producers, providing a more comprehensive

and representative assessment of the program's long-term performance.

Moreover, in most cases, certification programs lack transparency and fairness in the distribution of premium prices among producers (Daviron and Vagneron, 2011; Ansah et al., 2020). In addition, the organizational capacity and performance of the cooperatives involved significantly affect the extent of benefits that producers derive from certifications, influencing success and impact of the programs (Jena et al., 2012; Mitiku et al., 2017). Thus, limited evidence exists on how these programs function in practice over time, particularly regarding the transparency and fairness of premium distribution, the sustainability of cooperatives involved in the certification program, and incentives for long-term forest conservation, which the present study aims to address using data from the perspective of smallholder forest coffee producers.

The current premium payment from forest coffee certification in the Belete-Gera forest areas is distributed according to the internal rules of OFWE, unions, and cooperatives. However, producers have raised concerns about the fairness of this distribution. Thus, this study examines the following key specific research questions: Is the current premium paid for forest coffee certification fair and equitable for producers who are actively conserving forests? Is the premium payment a sufficient incentive for forest conservation? If not, what amount would be a sufficient incentive? What are the trends of production and sales volume of certified forest coffee over the last ten years? How much income do producers earn from the sale of certified forest coffee? And finally, what has been the trend in the volume of certified forest coffee supplied to cooperatives over the past decade? Using a case study of the FCCP in Southwest Ethiopia, this study aims to answer these questions through a survey of the situation, primarily by conducting interviews with producers and stakeholders in the field.

The main objective of the study is to assess the performance of the FCCP in the Belete-Gera Forest in terms of its contribution to the income of participating households and its role in forest conservation over the past ten years. Moreover, the study investigates whether the premium payments resulting from the certification program have effectively incentivized participating households to comply with FCCP objectives and requirements. The remainder of this paper is organized as follows: Section two provides the framework used in this study. Section three outlines the methodology employed in the assessment. Section four presents the results and discussion of the study, and the final section provides conclusions and recommendations based on the findings.

2. Framework of the study

Certification programs in general, and coffee certification in particular, are part of voluntary sustainability standards and have become a common feature of many agricultural landscapes globally. Coffee certification encompasses a broad range of environmental, economic, and social aspects(Bray and Neilson, 2017). A number of empirical studies have been conducted to assess the impacts of certification on the environmental and socio-economic conditions of program participants, with mixed results. Most studies report positive outcomes. Most studies reported positive outcomes (Hardt et al., 2015; Takahashi and Todo, 2017; Ho et al., 2018), while a smaller proportions of studies report negative effects (Stellmacher and Grote, 2011; Jena et al., 2012; Ibanez and Blackman, 2016). Given this background, our current study aims to assess the effectiveness of FCCP in achieving its environmental and socio-economic goals, using the case study of the Belete-Gera forest area in Southwest Ethiopia. This study also provides important insights into the benefits of such certification schemes, specifically by assessing the outcomes of the FCCP in terms of its value additions and benefits from the perspectives of smallholder forest coffee producers.

This study assesses whether the implementation of the FCCP contributed to producers' livelihoods in terms of yield and income increases in the study area. As noted in the literature and program documents, the main goal of the certification program is to enhance environmental sustainability and improve the livelihoods of producers,

both socially and economically (Arnould et al., 2009). This study follows the sustainable rural livelihood framework developed by Scoones (1998) and Bebbington (1999) to analyze the effects of the FCCP on forest conservation and its contribution to producers' income, sales volume of certified forest coffee, and premium payments from certified coffee exports.

The concept of livelihood framework deals with how households or individuals utilize assets gained from certification programs to improve their livelihood strategies, which are ultimately influenced by broader institutional settings and processes (Bebbington, 1999; Bray and Neilson, 2017). A recent systematic review by Bray and Neilson (2017) adopted a similar framework in their assessment of previous studies on the impact of coffee certification on the livelihoods of smallholder farmers. The benefits that certification programs provide to producers' livelihood strategies include five types of capital: human, social, physical, natural, and financial capital. This study focuses on the latter two for two reasons: (1) the objectives of the present study align with these two livelihood capitals, and (2) the remaining livelihood capitals have been addressed by prior empirical studies conducted in the study area.

This study also adopts the concept of the 'Theory of Change,' which refers to developing a model that specifies the underlying logic, assumptions, influences, causal linkages, and expected outcomes of a development program (Rogers, 2008; Jackson, 2013). Certification programs have developed their own theories of change to provide insight into the mechanisms and processes through which certification and standards contribute to improved livelihood outcomes for producers. For instance, the RA has published its own theory of change (Sustainable Agriculture Network, 2016). Furthermore, the livelihood framework asserts that development approaches should incorporate a mix of and substitution among different types of capital, which serve not only as inputs to development but also as outputs that provide meaning and resources to people. Based on this argument, we frame the value addition from the FCCP as output resources for producers in the study area.

Although the livelihood framework is widely applied indirectly, it is rarely used directly in the impact assessment of coffee certification programs. However, it is appropriate to apply the framework to the present study. This study aims to assess the performance of the FCCP in terms of its environmental objective—forest conservation (framed as natural capital)—and its socio-economic objective, which includes production and sales volume and the premium price paid to producers (framed as financial capital). Furthermore, the framework allows for examining how patterns of capital growth and loss resulting from programs like the FCCP vary across people, places, and even within households. We categorized households into higher, middle, and lower volume producers to explore these differences. We hypothesize that producers perceive the FCCP as having had positive effects on forest conservation and contributing to the livelihoods of smallholder forest coffee producers in the study area over the past ten years of its implementation, and we provide evidence to support this hypothesis in the study.

3. Research methodology

3.1. Description of the study area

This study was conducted in Belete-Gera forest area, which is about 150,000 ha in size (Takahashi and Todo, 2017; Mertens et al., 2018) and located in Shebe Sombo and Gera districts, Jimma Zone, Oromia. A recent demarcation by the Oromia Forest and Wildlife Enterprise (OFWE) estimates the forest areas around 121,392 ha. Belete-Gera Forest comprises two main blocks: Belete forest which is located in Shabe Sombo district at 50 km from Jimma, and Gera forest located in Gera district, about 100 km from Jimma town. The forest is part of the highland rainforest, with an annual precipitation of 1500 mm and an annual average air temperature of approximately 20 °C. Belete-Gera

forest is among the moist Afromontane forests in southwest Ethiopia and recognized as one of the biodiversity hotspots, and the centers of origin and domestication of Arabica Coffee. Arabica Coffee is a native species that grows wild in the Belete-Gera forest areas. Fig. 1 presents location map of the study area.

To encourage the participation of local communities in managing Belete-Gera forest and sharing the benefits from it, the local forest management association also known as WaBuB was established by-

National Regional States of Oromia in collaboration and technical support with the Japan International Cooperation Agency (JICA). WaBuB members have the right to collect and use NTFPs such as forest coffee by protecting Belete-Gera forest, where coffee plants naturally grow without significant interruption of the natural forest ecosystem. Identifying the economic potential of forest coffee in the Belete-Gera forest, the FCCP through the technical assistance of JICA provided support to quality control leading to the acquisition of international certification from the Rainforest Alliance in 2007. Thus, eligible WaBuB members are involved in harvesting and marketing of certified forest coffee, and agreed to receive premium price as incentive for forest conservation.

3.2. Data type and sources

Both quantitative and qualitative data types were collected for this study. Quantitative data were collected from forest coffee producers regarding their production volume, sales volume, share to cooperatives, income from forest coffee production, profit, premium payment received over the past ten years, and other relevant data. Qualitative data were collected from respondents regarding their perceptions of whether premium payment were fairly distrusted among producers, whether the payments were sufficient to motivate farmers to protect the Belete-Gera forest in the past and currently, effectiveness of FCCP over the past ten years, and their recommendations for improving the FCCP in the future, and other qualitative information. Both primary and secondary data sources were used for this study. Secondary data were obtained from forest coffee cooperatives, general coffee cooperatives, and OWFE district offices to supplement the primary data.

3.3. Data collection approaches and sampling design

To achieve the objectives of this study, data were collected through in-depth household surveys with sample forest coffee producers, key informant interviews (KIIs) with knowledgeable individuals, an analytical workshop with key stakeholders, and a desk review of relevant secondary information. A draft survey questionnaire was pre-tested on randomly selected households to assess the appropriateness of the design, clarity, and relevance of the questions, as well as the time required to complete an interview. Based on the results, adjustments were made, and the final questionnaire was developed for data collection. The final data collection was conducted by five qualified and trained enumerators, including the researcher, through face-to-face interviews using a semi-structured questionnaire with the sampled households. Data collection took place from December 15, 2022, to January 7, 2023.

A multistage sampling technique is used to select the required sample households for this study. First, five forest coffee cooperatives were randomly selected from a total of seven cooperatives in the Belete-Gera forest area, of which five are located in Gera district and two in Shabe Sombo district. Thus, three forest coffee cooperatives namely Sadi, Chira and Afallo were selected from Gera district, while two cooperatives: Sabeka and Migira forest coffee cooperatives were selected from Shabe Sombo district. Second, households were stratified based on their forest coffee total sales volume and shares to the forest coffee cooperatives in the study area. Households were categorized as low (<350 kg), medium (350–600 kg), and high (>600 kg) producers, based on their average annual forest coffee total sales volume and shares to the forest coffee
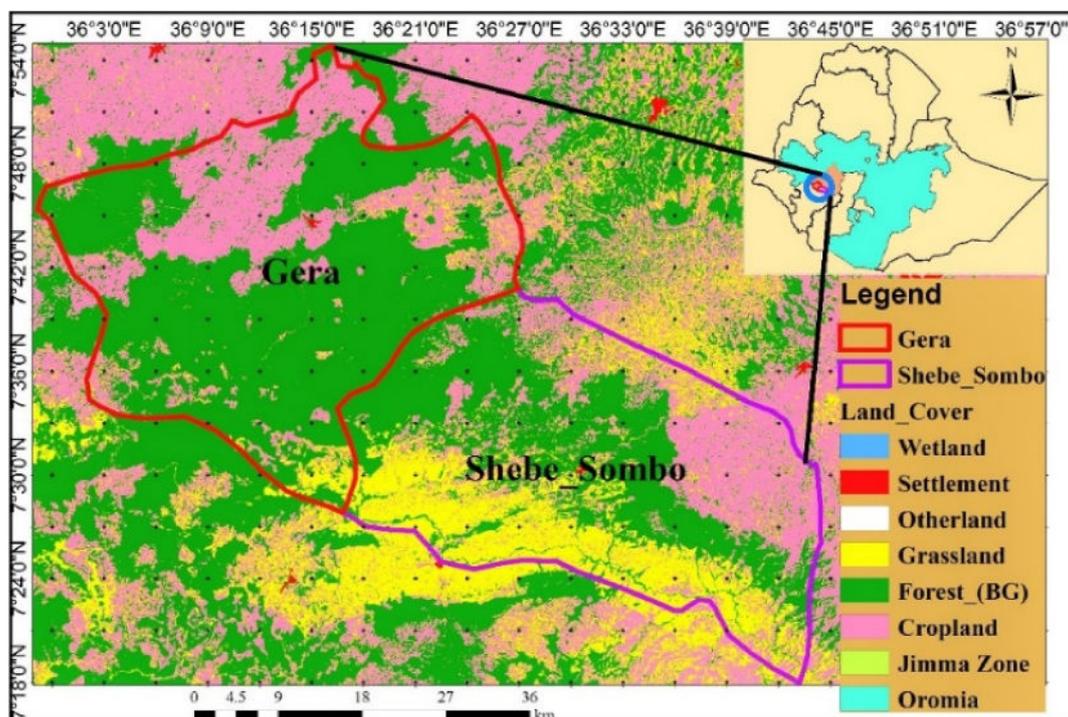
Fig. 1. Locational map of the study areas.

cooperatives. This categorization was based on data from forest coffee producers and secondary data from the respective cooperatives. The rational for stratifying households is aimed to minimize heterogeneity and ensure inclusion of the all categories in the sample. Finally, a random selection of sample households was conducted using a simple random sampling technique from each stratum (for more details, see: Table 1).

The target population for this study consists of two groups. The first group includes forest coffee producers with varying sales volumes and shares to cooperative. This group comprises both producers with expe-

Table 1
Sample distribution by target groups and sampled households in each stratum.

Districts	Target groups	Number of sampled households in each stratum			
		High	Medium	Low	Total
Gera	Total sales volume of forest coffee	14	14	15	43
	Shares volume to cooperatives	14	15	14	43
Shabe Sombo	Total sales volume of forest coffee	8	8	7	23
	Shares volume to cooperatives	8	7	8	23
Sub-total		44	44	44	**132**
	Exporter through OWFE channel	3	3	4	10
	Exporter through Kata Mudga Union	3	4	3	10
Sub-total		6	7	7	**20**
Total		**50**	**51**	**51**	**152**

Source: Authors' calculation (2023), based on data from forest coffee co-operatives offices (2023)

rience in exporting certified forest coffee and those without. A total of 132 forest coffee producers were selected from the two districts, with 86 households from Gera district and 46 households from Shabe Sombo district. A larger number of households (86) were selected from Gera due to the presence of five forest coffee cooperatives in that district.

The second group includes certified forest coffee producers who have

experience exporting through both OFWE (2016–2018) and Kata Mudga Union[1] (2019–2021). A total of 20 households were purposively selected: 10 households from the Sadi forest coffee cooperative, who supplied their coffee to the OFWE channel (2016–2018), and 10 households from the Chira forest coffee cooperative, who supplied their coffee to the Kata Mudga Union (2019–2021). This selection was made to make comparisons between the two groups regarding forest coffee export volume, income from forest coffee sales, and the amount of premium payment received through the OFWE and Kata Mudga Union channels over the specified time frames.

Different time frames were used for comparisons between the two channels, as data for OFWE channel users is only available until 2018, due to COVID-19 restrictions interrupting the uptake of forest coffee through the OFWE channel from 2019 to 2020. However, to make the values comparable, we standardized the monetary values for income and premium payments to a common point in time, adjusting for inflation. In total, 152 households from the two groups were selected, as presented in Table 1. Fig. 2 presents a schematic representation of over overall methodology used in this study. A sample size required for this study was determined using sample size determination formula developed by (Yamane, 1967). This formula is among one of the widely applied sample size determination formula in literature, and appropriate method for a simple random sampling technique, finite population with assumption of normal distribution of a population from which sample is to be drawn. Therefore, with parametric normal distribution assumption for population of this study, the method is found to be appropriate to use in this study. Hence, the representative sample size at the 95% confidence level can be determined:

$$n = \frac{N}{1 + N(e)^2}$$

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[1] Kata Mudga Union is mandated for collecting, processing and exporting certified coffee in Jimma zone. Some of the forest coffee cooperatives have been using the union as best alternative channel for exporting their forest coffee in case there exist limitation from OWFE side.
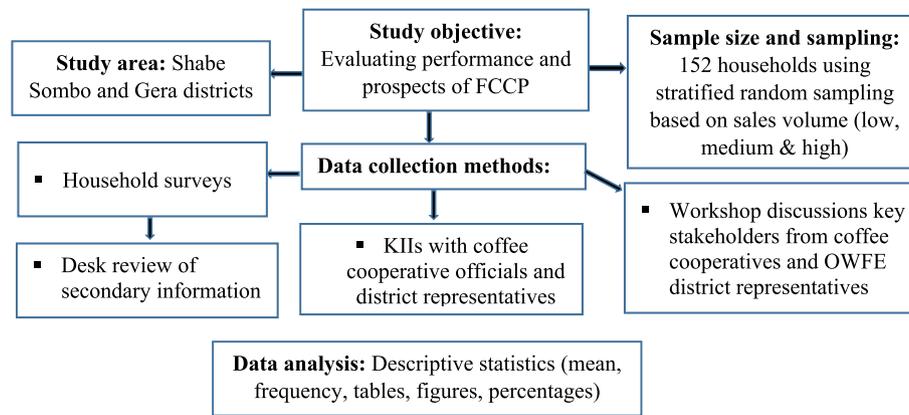
Fig. 2. Schematic diagram representation of the methodology employed in the study.

Where, 'n' represents the required sample size, 'N' denotes size of the target population, and 'e' representing the precision level. A total of 152 sample households were randomly selected through simple random sampling probability proportional to the size of households in each stratum formed (Table 1).

Fig. 2 provides a schematic representation of the data collection process employed and overall methodology used in this study, summarizing the key steps involved.

3.4. Methods of data analysis

Data collected using survey questionnaires were analyzed using descriptive statistics. Descriptive statistics was used to analyze the socio-demographic characteristics of the sampled respondents, as well as to provide graphical and tabular presentations of data on the sales volume of forest coffee, shares to forest coffee cooperatives or unions, other market channels, and premium payments received from the export of certified forest coffee. The descriptive analysis included measures such as the mean, median, percentages, and standard deviation, along with tabular and graphical presentations of data on forest coffee production, sales volume, and the average income of respondents at the beginning of the FCCP (2011) compared to the present (2022). Additionally, the analysis examined whether the FCCP contributed to producers' income from the respondents' viewpoints, along with other relevant analyses.

A total of 152 households were identified as the sample size for this study. However, nine responses were found to be incomplete and were excluded from the statistical analysis. As a result, after removing the incomplete responses, 143 respondents were considered for the analysis.

4. Results and discussions

4.1. Overview of the FCCP performance

4.1.1. Demographic and socio-economic characteristics of sample respondents

Out of the total 143 sample households, about 95.8% (N = 137) are male-headed, while female-headed households account for approximately 4.2% (N = 6). The majority of household heads (68.5%) have attended formal schooling, whereas 31.5% have not. The average total landholding per household is 3.57 ha (ha), with a minimum of 0.375 ha and a maximum of 25 ha. Additionally, the average land area under forest coffee cultivation is 2.18 ha per household, with a minimum of 0.25 ha and a maximum of 21 ha. The annual average total income per household was Birr 149,815 for the 2022 production year, with an average income of Birr 75,581 from forest coffee alone. This accounts for more than half (50.45%) of the household's total income, indicating that forest coffee contributes substantially to household income in the study area.

4.1.2. Current status of Belete-Gera forest

Households were provided different questions regarding their perception on current forest status of Belete-Gera forest, described in terms of the following indictors: undergrowth of the forest, canopy cover, regeneration of indigenous tree species, and others compared to the last ten years. The result indicated that about 50.3% (N = 72) of the respondents perceive that forest is in deteriorating condition/state, while 35.7% of the households stated that the forest is in good condition. However, the result is not in line with the finding of previous study by (Abdeta et al., 2023), in which about 21.24% and 47.67% of respondents reported deteriorating and good condition of the Belete-Gera forest, respectively.

To identify the main reasons for forest degradation and deforestation in the study area, respondents who answered "Deteriorating" to the question about the condition of the Belete-Gera forest were asked a follow-up question to state their observations. Of the 72 households who reported that the forest is in a deteriorating condition, the majority (66.67%, N = 48) indicated that coffee farm expansion within the forest is the primary reason for forest degradation in the study area (Table 2). Table 2 provides details of respondents' perceptions regarding the main causes of degradation in the Belete-Gera forest.

Moreover, key informant interviews revealed that the degradation of the Belete-Gera forest is primarily aggravated by illegal settlements from neighboring kebeles. For instance, in Walla Kebele of Gera district, illegal settlement is the most severe cause of forest degradation and deforestation in the area. The findings indicate that the Belete-Gera forest is facing significant degradation challenges and requires collective conservation efforts to protect the forest on a sustainable basis.

4.1.3. Performance of the FCCP in Belete-Gera forest areas

Households were asked to assess the strength and effectiveness of monitoring and verification on compliance with the FCCP program requirements in the study area, with three response options: (1) Poorly performed, (2) Medium, (3) Well performed. The results show that a

Table 2
Respondents' response to main reasons for the deterioration of Belete-Gera forest.

No.	Main causes/reasons for deterioration	Frequency	Percentages (%)
1	Expansion of coffee farm in the forest	48	66.67
2	Farm land expansion other than coffee farm	23	31.94
3	Illegal logging	20	27.78
4	Others[2] (illegal settlement)	18	25
5	Government programs/investments	12	16.67

[2] Other reasons were specified by respondents in identifying their perception on reasons for forest degradation and deforestation during the field survey in the study area.
Source: Field survey data analysis result (2023)

majority, 60.8% (N = 87), of respondents reported that the FCCP has performed poorly in this regard over the past ten years. About 32.9% of the total sample rated the program's performance as 'Medium', while a small proportion, 6.3%, reported that the program has 'Well performed' during this period. These findings suggest that the FCCP has underperformed in the study area over the past decade. Most respondents indicated that the program's performance was promising during the initial years of its implementation (the first three to four years), but weakened thereafter.

Moreover, to examine whether the implementation of the FCCP is related to trends in forest conditions, respondents were asked to share their observations over the past ten years. The results show that a large proportion of the sampled households (64.3%) believe that the implementation of the FCCP has positively impacted the trends in forest conditions in the study area. However, the main reasons for the decline in program performance are identified as weak monitoring and evaluation in recent years, particularly after the project's termination (with the departure of the JICA personnel who had been working on the project). Key informant interviews support this finding and further emphasize the need for a strong monitoring and control system at every level of the certification program's implementation.

4.1.4. Main benefits of the forest coffee certification program

The main benefits of the FCCP identified by the respondents are premium payments, increased income from certified forest coffee sales, and improvements in both the volume and quality of forest coffee. The reported increase in volume and quality of forest coffee in the Belete-Gera forest areas is also attributed to the organized training provided by JICA projects to forest coffee cooperative members. Almost all of the sampled respondents mentioned the premium payment from forest coffee as the primary benefit they have received from the FCCP, despite the existing gaps in program implementation and premium distribution mechanisms among participating households. They noted that the premium payment is made during a season when most households have lower income from other sources, which makes the premium payment particularly valuable to them. This finding supports the results of previous studies that have reported the potential of certification programs to support the livelihoods of smallholder farmers (Qiao et al., 2015; Vanderhaegen et al., 2018).

On the other hand, most respondents revealed that they have acquired knowledge on quality coffee production, harvesting techniques, post-harvest management, marketing, and other agricultural practices through complementary training provided by JICA projects to members of the forest coffee cooperatives in the study area. The results indicated that the training improved households' knowledge of agricultural practices, which in turn led to an increase in yield and income from these activities. Moreover, the FCCP fostered a sense of ownership of the forest among local communities living in and around the forest area, strengthening the coexistence between the local community and the forest. This is one of the non-financial benefits of the certification program, which is partially attributed to the granted access to harvest coffee in the forest and the premium payments distributed to community members subscribed to the program. These incentives motivated farmers to protect and conserve the forest. This finding aligns with the results of previous studies (Giovannucci and Ponte, 2005; Snider et al., 2017), which found that non-financial benefits are among the primary benefits of certification programs.

4.1.5. Proportions of producers receiving premium payment

The Belete-Gera forest coffee certification program has implemented premium payments from the sale of certified forest coffee, which is sold at relatively higher prices and then distributed back to eligible producers. However, there are issues regarding the fair and equitable distribution of the premium payment from the export returns of certified forest coffee for participating households. The findings indicate that, out of the total sample households, the majority, 105 (73.4%), reported

receiving a premium payment over the last ten years. The average premium received was Birr 4616 per household over the last decade for those who received the payment. In contrast, 38 (26.6%) of the households reported not receiving any premium payment during the last ten years, even though some of these producers had been supplying forest coffee to cooperatives.

The results indicate that the premium payment has not been consistently distributed to producers; its distribution has fluctuated. In some years, it is distributed, while in others it is not. This fluctuation is attributed to two main reasons: (1) Coffee supplied to forest coffee cooperatives is not fully received by OFWE as to be exported timely to fetch the premium price, in most cases. As a result, producers lose the benefits they deserve from their forest coffee; and (2) Most of the time, forest coffee cooperatives do not distribute the return from forest coffee exports to producers, as the premium is often retained for the cooperative's budget reserve or used to fund cooperative projects. Similar findings have been reported in prior studies, where cooperatives retain some or all of the price premium to fund environmental and social investments (Snider et al., 2017), cover auditing costs, implement internal control systems, and improve the cooperative itself (Vandorpe et al., 2014). However, this could lead to a lack of interest among members toward their respective cooperatives or the certification scheme (Renard, 1999). Besides, a prevalent corruption within the cooperatives is identified as a major problem in ensuring the fair and equitable distribution of premium payments in the study area, as revealed by most of the respondents.

4.1.6. Acceptable amount of premium payment to achieve FCCP objectives

To assess whether the current premium payment under the FCCP provides sufficient incentive to achieve the program's objectives, respondents were asked direct questions. The results show that the majority, 70.6% (N = 101) of the total sampled households, believe that the current premium payment is not sufficient to incentivize members to achieve the program's objectives in the current market conditions. Whereas, In contrast, less than 5% of respondents reported that the premium payment provided through the FCCP is adequate to incentivize forest conservation in the study area. These findings suggest that the premium payments from forest coffee certification have been insufficient to motivate forest communities to conserve the forest, both in the past and at present. This indicates a need for an increase in the premium payment amount for certified forest coffee in the study area.

Households who reported the premium payment as insufficient were asked to suggest an amount they believe would be sufficient to incentivize farmers to comply with FCCP requirements. Since the premium payment is based on the volume of coffee supplied to cooperatives, the amounts were provided in Ethiopian Birr per kilogram (kg) of forest coffee. The results from open-ended questions indicate that suggested amounts range from 10 to 260 Ethiopian Birr per kg of coffee supplied. To analyze these responses, the data were grouped into eight classes with 32 class intervals (width), and the results are presented in Table 3.

Using Sturges formula (Sturges, 1926), the required number of class is calculated as:

K = 1 + 3.322(log N), Where 'K' denotes the number of class for the premium payment, and 'N' represents the total number of respondents, which is 120 households with complete responses for the variable.

K = 1 + 3.322(log 120), by substituting the given values;

K = 1 + 3.322(2.08) = 7.9 ≈ 8 is the number of class for the suggested premium payment data set, and the class interval is determined by dividing the range for the calculated class interval.

Hence, Range = Highest value - Lowest values in the data set, which is 260–10 = 250. Therefore, the class interval (i) is calculated as:

$$\frac{Range}{K} = \frac{250}{8} = 31.25 \approx 32$$

The frequency distribution for the suggested premium payment amount by respondents is presented in Table 3 below.

Table 3
Estimation of mean premium payment sufficient to incentive farmers for forest conservation.

Class limits	Average premium payment per kg (X_i)	Frequency (f_i)	Total mean premium payment (Birr) per kg (f_i X_i)
10–41	21*	63	1323
42–73	55*	40	2200
74–105	94*	14	1316
106–137	0	0	0
138–169	0	0	0
170–201	200	2	400
202–233	0	0	0
234–266	260	1	260
Total		120	5499
Min 10	Max 260	Mean 46	

[*] Denotes figures for which decimal point value estimations are rounded to a nearest whole number.
Source: Field survey data analysis result (2023)

The mean premium payment that would be considered a sufficient or acceptable incentive for farmers to comply with the requirements of the FCCP is found to be 46 Birr per kg of forest coffee supplied to co-operatives, as suggested by the respondents. This accounts for about 35% of the price premium over the conventional market price of sundry coffee in 2022, which was approximately 130 Birr per kg in the study area. This is the optimal premium payment that would be sufficient to incentivize producers to comply with the certification program's requirements and motivate them to engage in forest conservation in the study area. However, if the last two premium payment values (200 and 260 Birr) are considered extreme and removed from the dataset, the mean premium price estimate reduces to 41 Birr per kg of certified coffee supplied.

A finding from prior studies conducted by (Rueda and Lambin, 2013) in Colombia examined effects of Rainforest Alliance certification program on socio-ecological systems and reported that premium payments are only one of many elements defining the success of certification program, particularly important for motivating farmers. In line with this, our finding suggests importance of improving the amount of premium price and ensure fair and equitable distribution mechanism in the study as to enable the certification program successfully achieve its objectives.

4.1.7. Fairness and acceptability of the premium distribution mechanisms

A survey result indicated that out of total sample households, almost half of or 52.4% (N = 75) of respondents expressed that the distribution mechanism of the premium from coffee certification is not fair and acceptable. The main reasons mentioned for these are absence of transparency regarding the amount of premium price (return) received from the cooperatives, corruption on distribution of premium payment in some circumstances, and untimely distribution of the premium price. Moreover, the high share of return/profit from forest coffee export for OFWE, which is about 60% (of which 30% is said to cover tax and other expenses and 30% maintained as a share of the enterprise), and only 40% is shared to the forest coffee producers. This is the main complaint raised from producers and discouraged the producers to supply their produce to the coffee cooperatives that use the OFWE marketing channel.

This finding suggests the need for improvements in the collection and exportation of forest coffee supplied by cooperatives, as well as the fair and equitable distribution of premium payments from certified forest coffee exports among producers, in accordance with the cooperatives' rules and regulations. Achieving this can be partly facilitated by ensuring the fair distribution of premium payments among producers as outlined by the cooperatives' guidelines. Additionally, results from key informant interviews indicate the need for a restructuring of the current premium payment distribution mechanism, whereby a larger share of the return from forest coffee exports should be allocated to the producers

actively involved in forest conservation. The findings further suggest the need to strengthen the monitoring and control mechanisms of the FCCP to ensure proper implementation of the program at all levels.

4.1.8. Contribution of the FCCP for forest conservation

Respondents were asked to express their perceptions and observations regarding whether the implementation of the FCCP had contributed to forest conservation over the past ten years in the study area. The results show that 76.2% (N = 109) of the total sample households perceived that the FCCP had contributed to forest conservation efforts, particularly during the early stages of the program. However, the program's contribution to incentivizing producers for forest conservation lasted only for the first four years, as premium payments weakened over time and eventually stopped in some cooperatives. This led to discouragement among forest communities, causing them to question the value of their efforts in conserving the forest, particularly in recent years.

Furthermore, the result reveals that FCCP implementation has created a sense of ownership of the forest among local communities, which encouraged better forest conservation, particularly at the initial stages of the program implementation. These findings align with prior studies on the environmental impacts of certification programs (Hardt et al., 2015; Takahashi and Todo, 2017; Vanderhaegen et al., 2018). For instance (Takahashi and Todo, 2017), examined the effect of coffee certification program on forest conservation in Belete-Gera forest and reported that the probability of deforestation of certified forest areas was 1.7% lower than those areas without such intervention. Additionally, the training provided by the certification program gave local communities access to information on the benefits of nature conservation, which likely contributed to forest conservation in the study area. However, a recent study by Arai et al. (2023) reported that certified coffee forest areas experienced deforestation due to factors such as weakened auditing processes and limited incentives for conservation.

4.2. Forest coffee production and marketing in Belete-Gera forest areas

Almost all of the sample households responded that coffee production is their main source of income. For instance, about 91.6% of the respondents ranked coffee as their primary income source, leading all other agricultural practices in the study area. The survey results further indicate that forest coffee production accounts for a larger share of the reported production, with smaller proportions of garden or plantation coffee in the study area. Producers in the study area have been supplying both wet cherry coffee and sundry coffee (locally called "*Jaanfala*[2]") to the forest coffee cooperatives. However, we found that currently, some cooperatives in the study area have stopped receiving wet cherry coffee from producers, and producers are supplying sundry coffee, although there are still some producers who continue to supply wet cherry coffee. To standardize the unit of coffee supplied to the forest cooperatives and sold at other market outlets, we converted wet cherry coffee to its sundry coffee equivalent using a locally agreed-upon conversion factor, which is used in the study area. The conversion factor is that three kg of wet cherry coffee is equivalent to one kg of sundry coffee.

Additionally, the sale volume of forest coffee, the share of volume supplied to cooperatives, and other related numerical values reported in this study are estimates, as most producers could not recall or provide exact figures for these parameters. As a result, we have used the term 'estimate (d)' throughout this paper where applicable. The following subsection presents the status of forest coffee sales volume, forest coffee income, and premium payment received over the past ten years of the FCCP implementation in the Belete-Gera forest area.

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[2] The word 'Jaanfala' in local language Afaan Oromo is the equivalent term for a sundry unprocessed coffee.

4.2.1. Comparison between the beginning of the FCCP (2011) and the (2022)

4.2.1.1. Total sales volume of forest coffee in Belete-Gera forest areas.
This section presents the total sales volume of forest coffee produced in the Belete-Gera forest area, including both sales to forest coffee cooperatives and sales to other markets such as unions, local markets, local traders, and others. The results indicate an increase in the total sales volume of forest coffee over the past ten years. Of the total sample households, about 78% (N = 112) of producers sold their certified forest coffee, either to forest coffee cooperatives for at least one season or more, over the past 12 years. The following paragraphs present trends in the total forest coffee sales volume to forest cooperatives and other markets, and perform comparisons between the time frames.

The forest coffee certification program has been implemented in the Belete-Gera forest area since 2011 G.C. However, we classified and considered sales in the first two years (2011–2012) of the program as "sales without FCCP," and sales in the last two years of the program implementation (2021–2022) as "sales with FCCP," to facilitate a comparison between the two groups. This classification is necessary to examine the effects of the FCCP on the sales volume of forest coffee in the study area over the past ten years.

The results indicate a significant increase in the average sales volume of certified forest coffee in the Belete-Gera forest area. For instance, the average estimated forest coffee sales volume increased by 52% in 2021–2022 compared to the average sales estimate in 2011–2012. This finding is consistent with prior reports that Ethiopia's Rainforest Alliance (RA) certified coffee sales accounted for 10,447 metric tons (MT) in 2022, representing a dramatic 152% increase, mainly due to a rise in global demand for Ethiopian coffee blends (Rainforest Alliance, 2021). The finding implies that the FCCP has greatly contributed to the increase in the sales volume of forest coffee in Belete-Gera forest areas. For example, the total sales volume of forest coffee increased from 49,491 kg in 2011 to 87,224 kg in 2022 (Fig. 3). This increase can be partly explained by the rise in production volume/yield resulting from producer training on coffee cultivation and improved management practices. Moreover, the spontaneous increase in coffee prices over the last ten years motivated producers to maximize their forest coffee production by expanding forest coffee cultivation into wider forest areas. This, in turn, led to disturbances in natural forests, causing problems such as forest degradation due to excessive thinning, over-planting of coffee seedlings in the forest, and hindering natural tree regeneration by removing the forest's undergrowth, complete land clearing, and, in some cases, cutting trees.

The result from key informant and field observation during our survey also reveals that expansion of coffee plantation in the forest area is causing degradation of the forest ecosystem and biodiversity. However, it should be noted that expansion of coffee plantation in the forest area may happen regardless of the forest coffee certification program, as an increase in the economic value of coffee is the main triggering factor to drive coffee expansion. The FCCP likely served as supplementary factor to the already precarious market and price conductions. Providing capacity building training to producers and strengthening forest monitoring, internal controlling systems of coffee certification will potentially overcome the aforementioned challenges. Fig. 3 presents estimated sales volume with the experienced rate of change in each consecutive production years.

The results indicate mixed outcomes, despite an overall increase in sales volume reported for most of the seasons (years). For instance, as shown in the diagram (Fig. 3), the estimated average sales volume increased by 7.7% from 2011 to 2012. However, the sales volume decreased by about 2.2% in the 2012–2013 production years. This fluctuation in sales volume may be partly attributed to potential variations in production volume from one year to another, as reported by most producers during the field survey. Nonetheless, the sales volume remained stable from 2014 to 2018, with a small proportion showing a growing trend.

4.2.1.2. Sales volume of forest coffee to the forest coffee cooperatives.
This subsection presents the share of produce supplied by producers to the established forest coffee cooperatives in Belete-Gera forest areas over the last ten years. The results indicate a declining trend in the volume of coffee shared with the cooperatives during this period. For example, the volume of forest coffee shared with cooperatives decreased from 26,589 kg in 2011 to 5299 kg in 2018, reflecting a drastic decline of 401.8% (Fig. 4).

The significant decrease in the shares volume to the cooperatives is due to the weakening of the forest coffee cooperatives' ability to buy forest coffee, and OFWE failure to receive supplied forest coffee from the corresponding cooperatives. This led to a decline, or even complete cessation, of premium payments from forest coffee, which in turn motivated producers to sell their produce to other markets, such as conventional cooperatives,[3] local traders and others. However, the findings indicate that shares volume of forest coffee to the cooperatives increased since 2019, particularly with a notable rise in 2022. This increase is associated with producers from certain cooperatives—such as Chira, Walla, and Obba forest coffee cooperatives in Gera district—supplying to the Kata Mudga Union since 2019. Fig. 4 presents the estimated sales volume of forest coffee to the cooperatives, as well as the coffee supplied to the OFWE and Union channels over the last ten years.

4.2.1.3. Sales volume of forest coffee to other markets.
This subsection presents the forest coffee sold to market outlets other than the forest coffee cooperatives. The results indicate that sales to other market channels generally increased over the last ten years in the study area. Specifically, forest coffee sales volume to other markets increased from 22,902 kg in 2011 to 61,430 kg in 2018 (Fig. 5). However, the sales volume showed a slight decrease from 61,430 kg in 2018 to 58,108 kg in 2019. Fig. 5 presents the sales volume of forest coffee to other market channels over the last ten years.

4.2.1.4. Producers income from total forest coffee sales.
Forest coffee producers in the Belete-Gera forest areas have gained a significant amount of income/revenue from forest coffee sales. The results of the study indicate that producers' total estimated mean income from forest coffee ranged from Birr 3051 to Birr 75,581 per household from 2011 to 2022, respectively (see Fig. 6). This represents an average increase of about 2377% over this period. The findings show a substantial increase in producers' income from forest coffee in the past ten years. This can be partially explained by an increase in yield and a significant rise in coffee prices over the past few years. The findings suggest that the forest coffee certification program has contributed to producers' income and improved their livelihood during its implementation. Fig. 6 presents a summary of the estimated mean income from forest coffee and the rate of change that occurred in the corresponding consecutive time frames over the past ten years.

Average estimated total income of producer in the study area is found to be Birr 149,815 per household per year in the 2022. Using the estimated income from forest coffee in the same year, which is equal to Birr 75,581 (Fig. 6); a rate of income from forest coffee sales out of total income of the household is calculated as:

$$\frac{Income\ from\ forest\ coffee}{Total\ income} * 100 = \left(\frac{75,581}{149,815}\right) * 100 = 50.45\%$$

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[3] Conventional cooperatives, also known as 'Waldaa qonna maraa' in the local language, are cooperatives that receive and purchase all agricultural products from farmers without focusing on product certification.
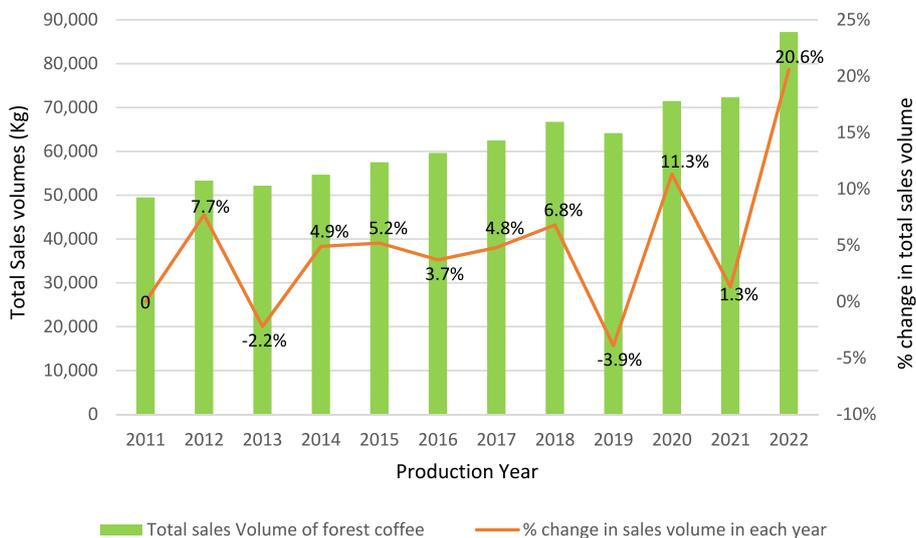
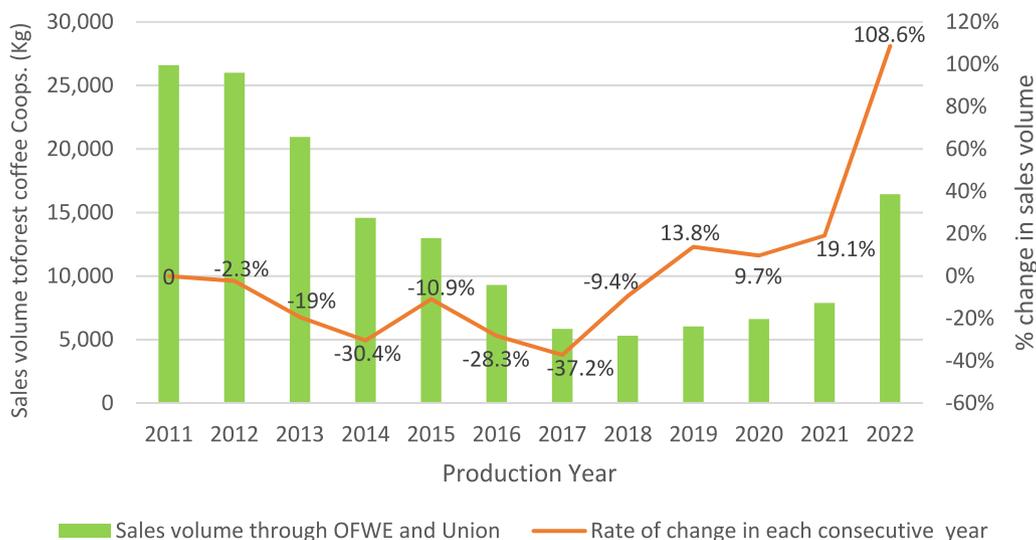**Fig. 3.** Estimated average sales volume of forest coffee over the past ten years.

Fig. 4. Estimated sales volume of forest coffee through OFWE and Union channels.

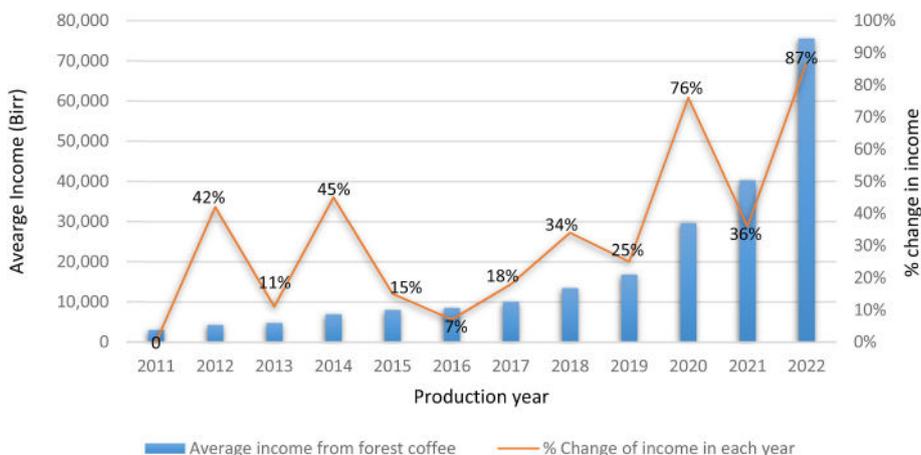**Fig. 5.** Estimated sales volume of forest coffee to other markets.

Fig. 6. Estimated mean income from forest coffee sales in the past ten years.

4.2.1.5. Rate of premium payment out of total income from forest coffee sales. The rate of premium payment out of the total income of a household is calculated by dividing the amount of premium payment received by the total income from forest coffee sales in each year. The average rate of premium payment is estimated to determine the size of the premium price received per household each year. The result indicates that the mean premium payment received by producers was at its highest level at the beginning of the certification program, reaching about Birr 636 per household in 2011 (Fig. 7). The values then started to show a significant decrease, dropping to Birr 115 in 2019. This led to a significant decrease in the rate of premium payment received during these years.

For instance, the average rate of premium payment out of total forest coffee income decreased from 20.8% in 2011 to 10.9% in the 2012 production year (Fig. 7). The finding confirms the assertion raised by most producers: the certification program performed well at the beginning, and premiums were appropriately paid to producers; however, this reversed and declined afterward.

The summary of forest coffee total sales volume, shares/sales to forest coffee cooperatives, sales to other markets, income generated from total forest coffee sales and premium payment received from certified forest coffee export with the corresponding rate of changes are present in Table 4.

4.3. Comparison between forest coffee export through OFWE and Kata Mudga Union

As described in the methods section of this study, a total of 20

certified forest coffee producers (10 from each group) who sold or supplied their produce to local forest coffee cooperatives and then to OFWE and the Union were selected for comparison. Comparisons were made based on three main parameters: sales volume of forest coffee, income obtained from forest coffee, and the rate of premium payment received as a proportion of total income from forest coffee sales (2017–2019 for OFWE and 2020–2022 for Union channels). Since the data covers different time frames, we standardized the monetary values to a common point in time, 2021, by adjusting for inflation. Table 5 presents a summary of the results for these parameters.

The results of our study indicate that the estimated sales volume of forest coffee showed an increase at the Union compared to the OFWE channel. This increase may be due to the growth of forest coffee yield over time, as the time frame for the data used in the comparison spans different years. Similarly, the findings reveal that the rate of premium payment out of total income from forest coffee sales through the Union channel is significantly higher compared to OFWE's. For instance, the rate of premium payment out of total forest coffee income is about 10% in 2020 at the Union and 3.6% at OFWE in 2019 (Table 5). This further indicates that the rate of premium payment at the Union channel more than doubled over the one-year time span. The findings suggest that the Union channel is more productive, and producers have been receiving a better premium price from forest coffee supplied to the Union compared to that from the OFWE channel.

The possible justification for the divergence in the premium payment values between the two channels might be that about 90% of the return from forest coffee export is shared with the respective forest coffee producers at the Union, while only 40% is shared with producers in the
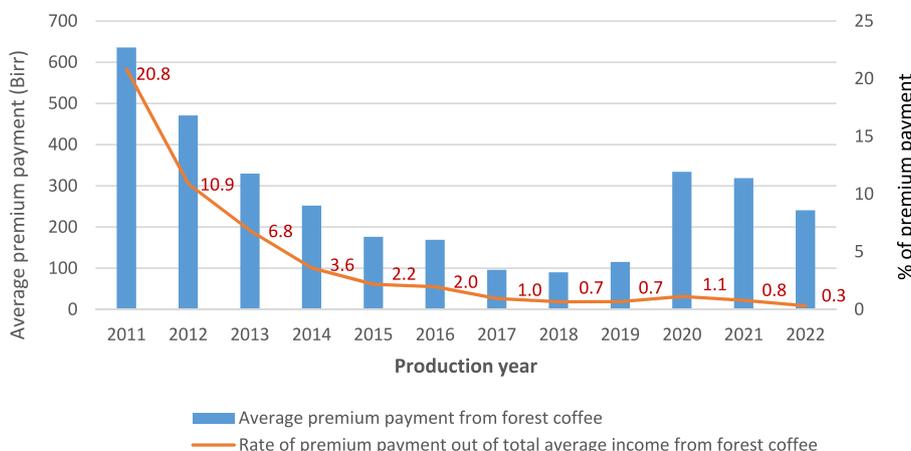

Fig. 7. Estimated average premium payment received (Birr) per household in each year.

Table 4
Summary of the estimated forest coffee sales volume, premium payment received and income from forest coffee.

Production Year	Estimated total sales volume of forest coffee (kg) per year (a)	Shares volume to forest coffee Coop. (Kg) (b)	Rate of shares to Coop. Out of total sales volume ((b/a)*100)	Sales volume to other markets (Kg) (c)	Rate of sales to other markets out of total sales volume ((c/a)*100)	Amount of premium payment received (Birr) (d)	Rate of premium payment out of total income from forest coffee sales ((d/e)*100)	Income from forest coffee sales in each year (e)	Rate of FC income out of household total income ((e/y[5])*100))
2011	49,491	26,589	53.7	22,902	46.3	90,920	21.6	421,048	2.4
2012	53,301	25,990	48.8	27,311	51.2	67,342	11.3	596,627	3.3
2013	52,134	20,946	40.2	31,188	59.8	47,118	7.0	673,551	3.6
2014	54,670	14,574	26.7	40,096	73.3	36,045	3.7	986,761	5.2
2015	57,490	12,984	22.6	44,506	77.4	25,194	2.2	1,135,138	5.9
2016	59,639	9304	15.6	50,335	84.4	24,165	2.0	1,209,411	6.2
2017	62,485	5846	9.4	56,639	90.6	13,726	1.0	1,421,204	7.2
2018	66,729	5299	7.9	61,430	92.1	12,895	0.7	1,916,211	9.6
2019	64,137	6029	9.4	58,108	90.6	16,479	0.7	2,390,445	11.8
2020	71,411	6616	9.3	64,795	90.7	47,755	1.1	4,214,110	20.3
2021	72,318	7880	10.9	64,438	89.1	45,551	0.8	5,772,262	27.3
2022	87,224	16,434	18.8	70,790	81.2	34,397	0.3	10,808,015	50.4
Total	751,029	158,491	21.1	592,538	78.9	461,587	1.5	31,544,783	13.4

Note: 'FC' denotes forest coffee.

[5] 'y' represents estimated total income of the sample households which is used for the calculation in the corresponding years. Data on household total income was collected only for the 2022 production year, which is Birr 21, 423, 549, and data for the rest of years were estimated from it by adjusting for inflation.

Table 5
Summary of sales volume, income and premium payment through OFWE and Union channels.

Years	Estimated sales volume of forest coffee (kg) (a)	Original values for income from forest coffee sales (Birr)	Income adjusted for inflation to 2021 (Birr) (b)	Amount of premium payment received (Birr)	Premium price adjusted for inflation to 2021 (Birr) (c)	Rate of premium payment out of total income from forest coffee sales (d= (c/b)*100))
Sales volume of forest coffee through OFWE						
2017	3187	69,536	75,000	5100	5501	7.3
2018	2813	81,177	86,466	4300	4580	5.3
2019	3245	129,100	134,644	4685	4886	3.6
Total	9245	279,813	296,110	14,085	14,967	5.1
Sales volume of forest coffee through Kata Mudga Union						
2020	4325	277,675	282,701	28,080	28,588	10.1
2021	4745	393,365	393,365	26,563	26,563	6.8
2022	5690	762,130	752,795	a[6]	a	a
Total	14,760	1,433,170	1,428,861	54,643	55,151	3.9

[6] 'a' indicates producers' data on the premium payment for 2022 did not obtained, as premium payment for the year is not received by forest coffee cooperatives and didn't distributed for the producers.
Source: Survey data analysis result (2023)

case of the OFWE channel. Additionally, the rate of premium payment showed a decreasing trend in both channels. This can be partially attributed to the fact that the cooperatives did not distribute the premium price for producers appropriately as they received it from OFWE or the Unions. Moreover, this may be associated with the dramatic increase in coffee prices in recent years, which contributed to an increase in producers' income, thus reducing the rate of premium payment. This is because premium amounts are not proportionally increasing over time, even as total income from forest coffee increases.

4.3.1. Comparision between different sales volume through the two channels

This subsection presents a comparison between the middle sales volume producers who used the OFWE (2017–2019) and Union (2020–2022) channels. The aim of the comparison is to examine whether the certification program favored higher sales volumes and discriminated against lower sales volume forest coffee producers in the study area. To achieve this, three middle sales volume producers (with average sales volumes ranging from 350 to 600 kg per year) were selected from each channel. Comparisons between the two groups were made regarding sales volume of forest coffee, income from forest coffee sales, and the rate of premium payment received as a proportion of total income from forest coffee sales.

The income and price premiums from forest coffee sales were adjusted to 2021 equivalent values for inflation (Table 6). The results

indicate no significant difference in sales volumes between the two channels. However, income from forest coffee and the premium payments received were significantly higher for Union channel users compared to OFWE channel users. Specifically, the rate of premium payment as a proportion of total forest coffee income was higher for Union channel users, at 10.5% in 2020, compared to 3.6% for OFWE channel users in the 2019 production year (Table 6).

Despite the values for income and premium payment are adjusted for inflation to the common time frame; to the 2021 equivalent values, only values for the amount of income and premium payment showed change in size, while values for the rate of premum payment remain the same regardless of the adjustments made. This is likely to happen due to that values for both income and the premium payment have similarly changed during the adjustment made for inlation.

4.4. Future prospects of the FCCP in Belete-Gera forest area

Coffee farm expansion in forest areas, weakened operations of forest coffee cooperatives, and the inability to fully purchase and supply forest coffee to OFWE and unions have been significant challenges for the certification program's success over the past ten years. Additionally, issues with the fair and equitable distribution of premium payments, the supply of coffee that meets FCCP quality standards, and producers withholding their coffee in hopes of better prices have hindered performance. Furthermore, the failure to attract more producers to

Table 6
Sales volume, income and premium payment for middle sales volume through two channels.

Years	Estimated sales volume of forest coffee (kg) (a)	Original income from forest coffee sales (Birr)	Inflation adjusted for income to 2021 (Birr) (b)	Original amount of premium payment received (Birr)	Premium adjusted for inflation to 2021 (Birr) (c)	Rate of premium payment out of total income from forest coffee sales (d= (c/b)*100))
Sales volume of forest coffee through OFWE						
2017	1133	24,326	26,237	1300	1402	5.3
2018	983	28,107	29,938	1100	1172	3.9
2019	1233	48,620	50,708	1750	1864	3.6
Total	3349	101,053	106,884	4150	4438	4.1
Sales volume of forest coffee through Kata Mudga Union						
2020	880	56,300	57,319	5920	6027	10.5
2021	1160	93,390	93,390	6135	6135	6.6
2022	1265	169,755	167,676	–	–	–
Total	3305	319,445	318,385	12,055	12,162	3.8

Source: Survey data analysis result (2023)

cooperative membership remains a challenge for the program. The gap in OFWE's implementation of the FCCP, specifically the timely receipt and export of forest coffee, poses a major challenge for the program's future success. Key informant interviews revealed that these gaps at OFWE are due to a lack of dedicated personnel for forest coffee marketing and limited financial and logistical resources. Moreover, some staff involved in the certification program work on an overtime basis, outside their regular duties, and their performance has not been formally evaluated, which has impeded the program's effectiveness.

Despite these challenges, there are opportunities that could contribute to the success of the certification program. Strong support from the majority of producers and other stakeholders such as cooperatives, unions and Oromia environmental protection authority at district levels indicate a positive outlook for the program's continuity. Many in the local community have expressed their desire for the continuation of the FCCP or similar initiatives in the area, which could be instrumental in the program's future success if properly managed.

The existing gap in OFWE's implementation of the FCCP, particularly regarding forest coffee processing and exportation, can be solved through three potential measures: (1) Promoting cooperatives to a union: Organizing existing forest coffee cooperatives under a union would allow them to work together and export their produce, helping to secure better returns from coffee exports. This measure is feasible and would provide a lasting solution to the challenges producers face in processing and marketing forest coffee. However, strong support from the government and assistance from development partners like JICA is essential for this to succeed. (2) Utilizing other coffee unions: Unions like Kata Mudga Union and the newly established Jimma Coffee Union (on establishment) offer alternatives to bridge the gaps in OFWE's processing and export efforts. Kata Mudga Union, for instance, has provided better premium payments to producers in Gera district over the last three years. However, its location in Agaro town may pose logistical challenges for cooperatives in Shabe district, which is outside the union's mandate area. (3) Restructuring OFWE operations: Establishing a separate structure within OFWE dedicated to forest coffee processing and export, with adequate resources and staff, could help resolve the current gaps. However, this is the least preferred option, as the increased production and distribution of forest coffee likely exceed what a single branch of OFWE can manage, making it impractical for the enterprise to allocate such substantial resources.

5. Conclusions and recommendations

5.1. Conclusions

This study evaluates the performance and future prospects of the Forest Coffee Certification Program (FCCP) in the Belete-Gera forest, southwestern Oromia, Ethiopia. The results indicate that the program initially contributed positively by increasing forest coffee sales volumes, improving producer income, and generating premium payments from

the export of certified coffee. However, producers reported that while premium payments were adequate in the program's early years, they have significantly declined over the past decade. This suggests that the program was more effective during its first three to four years, with issues emerging later, particularly regarding premium payment amounts and their fair distribution.

The study identifies two key challenges hindering the success of the prom: (i) At the Cooperative Level: Forest coffee cooperatives in both Gera and Shabe Sombo districts have struggled to purchase adequate amounts of coffee from producers, limiting the supply of certified coffee to OFWE for export. Additionally, there have been issues with the fair and equitable distribution of premium payments, with some cooperatives unable to offer better prices than conventional markets. (ii) At the OFWE Level: OFWE has faced delays in collecting, processing, and exporting forest coffee, leading to missed opportunities for higher prices and reduced benefits for producers. This has caused dissatisfaction among producers, discouraging their compliance with FCCP requirements, particularly in recent years. Furthermore, OFWE lacks a dedicated structure and resources for forest coffee processing, with staff handling these tasks as additional duties.

There is also a significant imbalance between the annual production potential of forest coffee in the Belete-Gera forest (estimated at 700 metric tons in 2020/21) and OFWE's capacity to export certified coffee (only 36 metric tons). This disparity highlights the need for increased processing capacity or alternative market channels. Moreover, OFWE's practice of setting purchase prices below local market rates discourages producers from selling to cooperatives, further impacting the effectiveness of the program. In conclusion, addressing these challenges requires improving OFWE's capacity to process and export certified coffee in a timely manner, exploring alternative market channels to accommodate the growing production potential, and ensuring fair and competitive pricing to motivate producers to continue participating in the certification program, thereby contributing to forest conservation in the Belete-Gera forest.

5.2. Recommendations

Based on the findings of this study, several key recommendations are made to improve the performance of the Forest Coffee Certification Program (FCCP). Re-establishing forest coffee cooperatives at the Kebele level is crucial, as current cooperatives cover wide geographic areas, making management difficult. By keeping the number of cooperative members manageable, cooperatives can better ensure collective action and streamline operations. Additionally, forming professional cooperative committees is key to fostering strong governance and accountability. The certification program needs to be implemented as planned, with a focus on strengthening monitoring and internal controls to meet its objectives and improve performance. Increasing the premium payment to $0.87/kg (46 birr/kg) is critical to providing producers with sufficient incentives for forest conservation, encouraging long-term

commitment to the program. Formal recognition of farmers' efforts in forest conservation through additional rewards or public acknowledgment, beyond financial incentives, would further motivate participation.

To support these efforts, implementing data tracing systems for producers is essential to track production volumes, management techniques, and premium payments over time. Addressing operational gaps at OFWE, particularly regarding the processing and export of forest coffee, is critical for ensuring that producers receive the benefits they deserve, which would restore confidence in the program and motivate adherence to sustainable practices. Moreover, promoting existing cooperatives to union status could significantly bridge current operational gaps, allowing cooperatives to take full ownership of forest coffee processing and export. Finally, an integrated approach, that links forest coffee harvesting, marketing, premium payments, and conservation, and conservation in which producers well recognize that their income and premium payments from forest coffee are directly tied to sustainable forest management, is essential. However, achieving this requires comprehensive capacity-building initiatives on suitable forest coffee collection, coffee marketing, forest conservation, for all actors in the program, from local to national levels.

CRediT authorship contribution statement

Diriba Abdeta: Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Data curation. **Alemayehu N. Ayana:** Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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