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# Tef value chain analysis in western Oromia, Ethiopia: evidence from Tef producers and traders

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## ABSTRACT

Tef is an important crop for stable food and income source of Ethiopian farmers, especially in western Oromia. Despite the importance of the crop in the study areas, several of constraints hamper crop production and value chain development. This study was analysed the Tef value chain in selected zones of western Oromia to identify major Tef value chain actors, assess major constraints and opportunities of Tef, and estimate the margin of channels. The important data was collected through surveys, key informants' interviews, and focus group discussions. The data were analysed by analytical and descriptive statistical tools. In the study areas, there are eight different distribution channels with different market profits and margins. The margin result shows that cooperatives (86.62%) and direct wholesalers (83.92% and 83.24%) were recorded as higher producer shares. Shortage of inputs, untimely supply of input, poor soil fertility, disease and lodging, limited market information, and weed infestation were reported as main constraints reducing Tef productivity. From this result, any concerned bodies should focus on increasing the productivity and market supply through strengthening farmer's skills and knowledge, empowering women farmers, solving market problems, soil fertility, input supply systems, promotion of value-added practices, and other recommendations are suggested.

**Keywords:** Actors, Enablers, Supporters, Tef, Value chain, Western Oromia

## INTRODUCTION

Agriculture has a significant contribution to Ethiopia's economy in terms of population employment (80%), Gross Domestic Product (GDP) (42%), and foreign exchange earnings (70%). (Abate TM, et al. 2019) Smallholders' farmers of Ethiopia are most cultivating cereals, legumes, vegetables, fruits, and cash crops based on rain-fed. This crop production is a major contributor to GDP, accounting for approximately 28% of the sub-sectors of agriculture. Among the above crops, cereals production and marketing are the most significant livelihood strategy (food and income source) for millions of Ethiopian smallholder farmers (Abiyot T et al. 2018)

Among the cereals crop, Tef is the first cultivated crop in case of land allocated and several farmers' participation in Ethiopia. Currently, the crop is cultivated by other countries of the world and it is elevated as a global crop. The wide-scale farming of crops is related to its tolerance

to diverse environmental constraints and nutritious value. It shows that Tef production is the most significant source of livelihood as food security and wellbeing status for smallholder farmers in the country for home consumption and market. In western Oromia, Tef is the greatest cultivated crop for food security and cash crop following coffee. It is the first crop amongst the cultivated crops by farmers in terms of land coverage and total production contribution in the West Shewa zone (CSA, 2021). The crop is the second importance in the East Wollega zone by land coverage and total production following maize (Ademe A et al. 2017).

It is the first crop grown by farmers in terms of land coverage and second in terms of production following maize in the Horro Guduru Wollega zone. It tells that Tef is vital for all livelihood activities in case of economic, socially acceptance, technically feasible, and an environmental friend in the areas. Urban population more voluntarily eat Tef than rural population which trusting on

national population consumption data, urban consumption per capita is as high as 61 kg per year and 20 kg per capita per year in rural areas (Erokhin V et al. 2020).

This tells that Tef is an economically superior good that is relatively more consumed by the rich than by the poor (Anteneh A et al. 2020). Even though having this importance, the Tef continues to face several of problems. The main ones are poor adoption of improved varieties, poor production management practices, poor soil fertility management, high weed infestation, limited production input, and limited market facilities resulting in low participation of the farmers in the value chain of their products. Understanding these problems different research centers, NGOs, and districts extension offices had been tracking lot efforts to improving Tef productivity by developing technologies and disseminating them to the agro ecological contexts of their mandate areas. To reverse this condition and enhance Tef production and productivity in areas among sounds for the development of a well-performing marketing system that satisfies consumer demands with the minimum margin between producers and consumer prices. Integrated value chains offer better opportunities for transforming agriculture because they have the potential of intensifying market opportunities and enhancing incentives for private investors to assume long-term investments in agribusiness and agro-processing from the initial production or design stage to final delivery to the consumer and can be local, national, regional, or international in scope which defined as a sequence of target-oriented combinations of production factors that create a marketable product or service from its conception to the final consumer (Aweke CS et al. 2020). The value chain is important in the enforcement of standards, with each player ensuring that the product originating from the previous stage and doubling Tef production. Actors in the value chain are connected by the run of resources, materials, and information that goes to the production and trade of particular products. Thus, a value chain is a linked chain of organizations, resources, and knowledge streams elaborated in the creation and delivery of value to the end consumers. Value chain approaches provide a systematic process to improve market linkage and identify key constraints with appropriate solutions for smallholder farmers. These constraints and solutions require coordinated responses by different actors in the chain which is essential to the understanding of markets, their relationships, the participation, and critical constraints that limit the growth of agricultural production and consequently the competitiveness of smallholder farmers (Awotide BA et al. 2016). To improve the existing Tef production and marketing system, this study was tried to fill the research gap of the Tef value chain by investigating the existing value chain actors with core value chain function, estimating market margins of actors, and assessing

production and marketing constraints and opportunities of each value chain function (Ayele T et al. 2021).

## MATERIALS AND METHODS

### Research Methodology

**Description of the study areas:** The study was conducted in East Wollega, Horro Guduru Wollega, and West Shewa zones. In these zones, mixed crop-livestock agriculture is the backbone of the communities. The major crops grown in the area are maize, Tef, wheat, barley, bean, pea, nug, potato, tomato, onion, coffee, etc. Three districts, namely, Horro, Guduru, and Jimma Rare were selected from Horro Goduru Wollega zone. Horro district is located 320 km west of Finfinne (the capital city of Ethiopia) with geographical coordinates of 09034' N and 3706' E latitude and longitude, respectively, at ranging altitude 1540 to 2844 meters above sea level. The agro-ecology of the district was highland (43%), midland (55%), and lowland (2%) with an average of 1566 mm annual rainfall. The monthly average temperature of the district varies from 10°C-25°C (Barretto R et al. 2021). Guduru district is located 372 km west of Finfinne (the capital city of the country) with geographical coordinates of 09030' N and 37035' E latitude and longitude, respectively at an average altitude 1969 meters above sea level. The agro-ecology of the district was highland (18%), midland (62%), and lowland (20%) with the average monthly varying from 1450-2500 mm annual rainfall. The monthly average temperature of the district varies from 19°C-22°C. Jimma Rare district is located 243 km west of Finfinne (the capital city of Ethiopia) with geographical coordinates of 09010' N and 37020' E of latitude and longitude, respectively, at ranging altitude 1540-3047 meters above sea level. The agro-ecology of the district was highland (45%), midland (52%), and lowland (3%) with monthly average rainfall varying from 1450-2500 mm. The monthly average temperature of the district varies from 18°C-25°C (Bekele A et al. 2019).

**Two districts were selected from the east wollega zone name:** Jimma Arjo and Gudeya Bila. Jimma Arjo district is located 372 km west of Finfinne (the capital city of Ethiopia) with geographical coordinates of 09030' N and 37035'E latitude and longitude, respectively a mean of altitude 1969 meters above sea level. The agro-ecology of the district was highland (18%), midland (62%), and lowland (20%) with an average of 2417 mm annual rainfall. The monthly average of the temperature the district varies from 12°C-22°C. Gudeya Bila district is located 274 km west of Finfinne (the capital city of the country) with geographical coordinates of 09017' N and 37001'46" E latitude and longitude, respectively with a ranging in altitude 1100-2400 meters above sea level. The agro-ecology of the district was highland (18%), midland (56%), and lowland (26%) with the average monthly varying from 1000-2200 mm annual rainfall. The

monthly average temperature of the district varies from 19°C -28°C (Bekuma Abdisa T et al. 2022).

**Similarly, two districts were selected from the west shewa zone name:** Cheliya and Danno. Cheliya district is located 175 km west of Finfinne (the capital city of Ethiopia) with geographical coordinates of 09000' N and 37029' E latitude and longitude, respectively, with a range of altitude 1300-2039 meters above sea level. The agro-ecology of the district was highland (75%), midland (20%), and lowland (5%) with annual ranges of rainfall 1000 mm-2000 mm. The monthly average temperature of the district varies from 8°C-28°C. Danno district is located 260 km west of Finfinne with geographical coordinates latitude ranges from 08034'-08056', 37008'-37029' and 1600-1880 meters above sea level latitude, longitude, and altitude, respectively. The agro-ecology of the district was highland (5%), midland (75%), and lowland (20%) with the average monthly varying from 900-2400 mm annual rainfall. The monthly average temperature of the district varies from 18°C-30°C (Birhanu A et al. 2020).

**Data and data collection methods:** For this study, primary and secondary data sources were used. The primary data both qualitative and quantitative types were collected from Tef producers, traders, input suppliers, supporters, and influencers/enablers. The qualitative data like current status Tef production and marketing situation, constraints, opportunities for chain improvement were collected by focus group discussion and key informant interviews from DAs, experts, traders, input suppliers, and farmers using checklists. The quantitative data on household demographic and socio-economic characteristics, Tef farm field characteristics (inputs and prices, field management and status), amount produced, amount sold, institutional factors, varieties used, market outlets, marketing costs, and Tef grain price were collected from prospective actors using semi-structured questionnaires. The secondary data on population size, lists of kebeles, list of licensed Tef traders, amounts of product in the districts, available books, journals from Agriculture and natural resources offices, cooperatives agencies, Central Statistics Agency, trade and market development offices at zonal, district and kebele levels and different websites (Danso-Abbeam G, et al. 2018).

**Methods of sampling:** A multi-stage sampling design was used to select appropriate sample households.

- Three zones of wester Oromia which included East Wollega, Horro Guduru Wollega, and West Shewa were sampled purposively based on their proximity and existence of Tef production and marketing access.
- Seven districts were sampled randomly from those potential districts of Tef production in selected zones.

- From each district two kebeles were sampled randomly from those potential for Tef production kebeles and have access to market kebeles.
- From those kebeles 245 sampled households were sampled randomly based on probability proportional to size using a simple formula cited by Awake, et al. Lastly, 43 traders and supporters/enablers (5 collectors, 4 wholesalers, 7 cooperatives, and 5 retailers, 15 supporters and enablers (experts) and 7 input suppliers) were sampled purposively based on the availability of actors.

**Methods of data analysis:** The collected data were analysed by using descriptive statistics like means, standard deviation, frequencies, and percentages and analytical tools such as chain map, economic parameters (market profit and gross margin), and chain governance (information flow and linkage between actors) based on data available. The performance of channels (gross market margin) was estimated by analysis of costs and margins of marketing agents in different channels, and market integration. This performance of channels (gross market margin) was estimated by the following formula.

$$TGMM = \frac{CP - FP}{CP} \times 100$$

Where,

TGMM is total gross marketing, CP is consuming price and FP is farm gate price.

$$GMM_p = \frac{CP - MGM}{CP} \times 100$$

Where,

GMM<sub>p</sub> is producer margin or share in the consumer price and MGM is marketing gross margin.

## RESULTS AND DISCUSSION

**Households and farm characteristics:** Table 1 result shows that among the sampled households 89.80% were male-headed while 10.20 female-headed. From sampled households, 34.06% received off/non-farm income which supports Tef production and marketing activities such as input purchase, labour rent for production, and harvesting. If reinvested in value chain activities, it increases Tef production and marketable surplus which increases the probability of market entry and level of market participation. Regarding access to credit for the households, 75.10% were exposed to access credit which is important for investment in Tef production and marketing processes to promoting Tef production. Increased Tef production increases Tef marketable surplus which turns in, increases the tendency for market entry and the extent of market participation.

Extension service was enhancing farm production and marketing through the mastery of skill and knowledge of the farmers in using recommended input and management, thus increasing Tef marketing. The result shows that 77.55% were exposed to extension services. This result showed that only 24.04% of sampled

households were received market information (price and buyers). This result reflects a wider human resources base for decision-making of increasing marketable surplus by seeking better price information. Regarding own transport service, 64.08% of sampled households were owned transport (donkey and horse) which reflects that farmers who own transport service were chosen better market received price. Out of the total sampled

households, 21.63% were a used improved variety (Kena and Guduru) which increases the productivity of the crop whereas; the majority of the farmers were used local variety.

**Table 1:** Households and field characteristics (dummy variables).

| Variables                                       | N   | Percentage |
|---|-----|------------|
| Sex of household's head (male)                  | 220 | 89.8       |
| Off/non-farm income (received)                  | 81  | 34.06      |
| Access to credit (accessed)                     | 184 | 75.1       |
| Extension service (received)                    | 190 | 77.55      |
| Access price and buyer's information (received) | 59  | 24.08      |
| Access own transport (owned)                    | 157 | 64.08      |
| Improved variety (used)                         | 53  | 21.63      |

Table 2 presented a descriptive mean of continuous variables such as education level of household, age of household head, household size, land cultivated by sample households, land allocated for Tef, total Tef produced, amount of Tef sold, the distance of the nearest market, and livestock holding (TLU) variables contribute to Tef value chain activities. The result shows that the education level of the household head was 4.36 years and the average age of the household head was found 47.51 years. Education and high age (as experience) may increase Tef productivity and marketing through the mastery of skills and knowledge which increases Tef marketing. The average household size was 6.93 persons per household head which were used as availability of labour required for Tef production and marketing activities. The total cultivated average land

3.04 hectares while 1.07 hectares were allocated for Tef production. Farm field is a key factor required for Tef production and marketing activities. From this Tef farm field, 11.38 quintals of Tef were produced and 5.39 quintals were supplied to the market. The average nearest market reported by farmers was 46.76 minutes walking. Farmers in the study areas were sold their product through rural and urban collectors, wholesalers, retailers, and consumers while few farmers were sold to cooperatives in the area. The sampled households were own 10.47 TLU livestock which used as a key factor for Tef production (purchasing inputs) and marketing activities.

**Table 2:** Households and field characteristics (continuous variables).

| Variables                                  | Minimum | Maximum | Mean  | Std. Dev. |
|--|---------|---------|-------|-----------|
| Education level of household head (year/s) | 0       | 15      | 4.36  | 3.09      |
| Age of household head (years)              | 25      | 80      | 47.51 | 10.8      |
| Household size (persons)                   | 2       | 19      | 6.93  | 2.34      |
| Total cultivated land (hectares)           | 0.5     | 16      | 3.04  | 1.6       |

|                                      |      |      |       |       |
|--------------------------------------|------|------|-------|-------|
| Land allocated for Tef (hectares)    | 0.25 | 3.5  | 1.07  | 0.54  |
| Total Tef produced (Quintals)        | 5    | 49   | 11.38 | 6.43  |
| Amount sold (Quintals)               | 1    | 35   | 5.39  | 4.93  |
| Distance of nearest market (minutes) | 5    | 240  | 46.76 | 37.73 |
| Livestock holding (TLU)              | 1    | 30.5 | 10.47 | 5.54  |

**Mapping the Tef value chain:** The main functions in the Tef value chain are inputs, production, marketing, and consumption. The value chain map helps us to understand how different businesses interconnect potential value chain actors. This Tef market mapping has three interlinking components include value chain actors, enabling environment, and service providers. Value chain actors who are participated directly in the value chain development of Tef and presented as follow:

**Input suppliers:** Input is one of the most important factors in Tef farming activities used by Tef producers. Among these inputs seed, fertilizer (Urea and NPS), agro-chemicals (Round up, 2-4-D and Pallas) are the major ones that producers used for Tef production. These inputs were provided by cooperatives, district agricultural development, research centers, traders, and farmers are the major inputs sources in the study areas.

**Producers:** They are smallholder farmers of the study zones who produce Tef for market and/or consumption. This smallholder farmer is explained as a family owned enterprise that produces crops or livestock on two or fewer hectares. Tef producers are important actors who accomplished most of the value chain functions right from farm inputs preparation from other sources to post-harvest handling and marketing. Smallholder farmers are the main actors of the chain by participating in both the product supply to the market and purchasing basic inputs from input suppliers. Among others activities land preparation, sowing, fertilizer application, weeding, harvesting, post-harvest handling, and marketing were mainly undertaken by Tef producers.

**Collectors:** These are actors in the Tef value chain who collects Tef from smallholder farmers in the village, kebele, and/or district and sell product to wholesalers and consumers in districts and zones market. Collectors were buying, assembling, transporting, packing, and selling to wholesalers and consumers.

**Wholesalers:** They are significant actors in the Tef value chain and participated in buying a relatively large volume of Tef from collectors and/or producers and selling the product to retailers and consumers. Wholesalers have

relatively strong working capital, better storage house, communication access, and govern (price-setting and volume) the Tef value chain in the study areas.

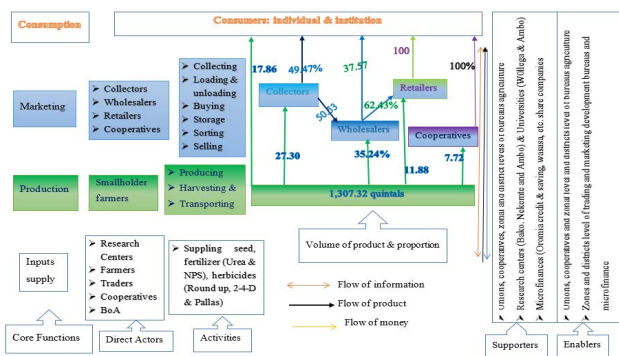
**Retailers:** They have purchased the product directly from producers at districts and zones markets and wholesalers at storage and provided it to consumers. They have limited working investment operate on a small scale related to other Tef traders of the study areas.

**Cooperatives:** These actors play a key role in Tef value chain development by promoting producers to produce more by providing input and buying Tef product at a relatively better price in the kebele and resale Tef product to consumers in the districts and zones. The result shows that cooperatives are unable to break the trader network and lack the bargaining power to decide on Tef price. Management committee members of cooperatives lack skills in business management, market linkage, and lack of working resources. As result, farmers organized in the cooperative were forced to sell their products to different traders in the areas.

**Consumers:** These actors are the end-user of the Tef value chain. Tef is consumed in the form of injera in different hotels, restaurants, and individual consumers. This shows that the marketed Tef reaches consumers through direct producers, collectors, wholesalers' retailers, and cooperatives. Rural people who visit the markets, travellers, urban people, and institutions are the main consumers' Tef product informs of injera in the villages, districts, and zones town.

**Chain supporters/enablers:** In the study areas zonal and district levels of different bureaus were supporting and influencing Tef value chain in one or another way. The supporters and enablers were providing supportive services including improved Tef varieties, training and advice, market information, chemicals, fertilizers, credit, and other agricultural inputs for Tef producers and traders. These services were provided by unions, agricultural and natural resource offices (zones and districts level), primary cooperatives, research centers, universities, cooperative agency office, and microfinances and facilitate sustainable development of

value chain including unions, agricultural and natural resource offices (zones and districts level), trade and market development office (zonal and district level), and micro finances (Oromia credit and saving; wassail share companies). These supporters and enablers have a big impact on the value chain understanding the trend that are affecting the entire value chain, examining the power, and interesting that are driving change and supported by business and extension services. These are individuals or institutions that are engaged either in financing or supporting the main actors of Tef value chain from other enterprises and support organizations which shape the value chain environment and conditions. They don't participate directly in the Tef value chain, but indirectly facilitate the main actors in Tef chain to make their task effective and practical. These supporters/enabler's services are beyond the direct control of economic actors in the value chain (Figure 1).



**Figure 1:** Tef value chain core functions, actors with activities, and flow of output.

**Marketing channels of Tef value chain:** This analysis of Tef marketing channels provides a systematic knowledge of the flow of goods or services from their production to the end-users. In this study Tef marketing channel for this study was designed based on the volume of flow of product passing through different routes during the 2020/21 cropping season. Figure 1 shows marketing channels of Tef in the study areas starting with the collection of Tef moving to the end-users. The market channels performance in the study areas was evaluated by considering association costs, returns, and marketing margins of Ethiopian Birr (ETB) per quintal. Total costs (production costs and marketing costs) were used. The marketing margin of the actors was calculated using the average price of Tef for each actor. In order to indicate the distribution of marketing costs and margins, eight (8) Tef marketing channels were identified and the amount of Tef transacted in these market channels.

**Channel I: Producers–consumers:** This channel was the shortest channel which is producers directly sold to the consumer at different market days. It represented 17.86% of the total Tef marketed which was 233.49 quintals during the survey period. The channel was the second most important marketing channel in terms of volume supplied.

**Channels II: Producers–collectors–consumers:** In this channel rural collectors were buying Tef product from Tef producers and sold to consumers. It amounted, 13.51% of Tef marketed at which supplied 176.56 quintals during the survey period. It was the third most important marketing channel in terms of volume supplied and the largest channel in terms of market routes.

**Channel III: Producers–collectors–wholesalers–consumers:** In this channel, wholesalers were bought Tef product from collectors and supplied to consumers which is about 5.18% (67.75 quintals) of the total Tef supplied to the market during the survey period. The channel was least in terms of volume supplied and the largest channel in terms of market routes.

**Channel IV: Producers–collectors–wholesalers–retailers–consumers:** In this channel, wholesalers were bought Tef product from collectors and sold it to retailers then the retailers were sold this product to consumers almost 8.61% (112.59 quintals) of total Tef product marketed. The only difference in this channel from channel III was that wholesalers sold the product to retailers and retailers sold it to consumers.

**Channel V: Producers–wholesalers–consumers:** The wholesalers were bought Tef product from producers and supplied to consumers in this channel. It accounted, 13.24% (173.08 quintals) of Tef total marketed during the survey period and the fourth most important channel in terms of volume supplied to the market.

**Channel VI: Producers–wholesalers–retailers–consumers:** In this channel, wholesalers were bought Tef product from Tef producers and supplied it to consumers which was 22% (287.61 quintals) of the total Tef supplied to the market during the survey period. The channel was the first most important channel in terms of volume supplied to the market.

**Channel VII: Producers–retailers–consumers:** In this channel retailers were bought Tef product from producers and supplied it to consumers. It accounted, 11.88% (155.31 quintals) of total Tef supplied to the market during survey period.

**Channel VIII: Producers–cooperatives–consumers:** In this channel, cooperatives were bought Tef product from producers and sold to consumers. It amounted, 7.72% (100.93 quintals) of total Tef supplied to the market during the survey period. The channel was the second least important channel in terms of volume supplied to the market.

According to agriculture and cooperative experts' information on technical production practice, the quantity of Tef flow, price, and buyers to farmers. Market prices (money) have flowed to producers through collectors, wholesalers, cooperatives, retailers, and consumers. Concerning the payments methods for the farmers, the traders made direct payments while cooperatives made late payment after receiving money from buyers/unions.

**Tef marketing costs and margin analysis:** The average cost of Tef production per quintal was 2,315 ETB which includes land rent, inputs cost, production activities cost, and transporting cost which is different depending on the market distance. The Tef producer's market profit was the highest in channel VIII when farmers sold their product to cooperatives which was 415 ETB while taking the lowest market profit from channel III and IV when they sold their product to collectors then collector sold it to consumer and retailer which was accounted 293 and 298 ETB respectively. These results showed that as market routes increased then producer market profit was decreased which is in line with as results which indicated as market channel largest market profit of producer fairly low. The producer shares from channel VIII was higher whereas the producer shares of channel III and IV were lower than the other channels (Table 3).

Regarding traders (collectors, wholesalers, retailers, and cooperatives), the highest market profit and share of

collectors have occurred in channel II following channel III which accounted, 492 and 18.34% respectively. In cases of wholesaler market profit and share were existed in channel VIII following channel VI which represented 325 and 245 ETB respectively whereas higher collector share occurred in channel IV following channel V which accounted, 19.68% and 16.08% respectively. In this result, retailers have collected a larger market profit and share in channel VII which amounted 365 ETB and 16.76% respectively. Concerning cooperative, the market profit and shared presented were fairer related to market profit and shared of other channels. These results in line with Lee (2018) result revealed that the numbers of marketing channels decrease the marketing profit and shared were improved.

**Table 3:** Tef marketing margin for different channels and actors (Birr/ton).

| Actors      |                 | I     | II    | III   | IV    | V     | VI    | VII   | VIII  |
|-------------|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Producers   | Selling price   | 2,750 | 2,858 | 2,858 | 2,858 | 3,000 | 3,050 | 3,055 | 3,075 |
|             | Production cost | 2,315 | 2,315 | 2,315 | 2,315 | 2,315 | 2,315 | 2,315 | 2,315 |
|             | Marketing cost  | 58    | 225   | 250   | 245   | 325   | 350   | 365   | 345   |
|             | Total cost      | 2,373 | 2,540 | 2,565 | 2,560 | 2,640 | 2,665 | 2,680 | 2,660 |
|             | Market profit   | 377   | 318   | 293   | 298   | 360   | 385   | 375   | 415   |
|             | GMMp (%)        | 100   | 81.66 | 76.7  | 75.71 | 83.92 | 81.33 | 83.24 | 86.62 |
| Collectors  | Selling price   |       | 3,500 | 3,426 |       |       |       |       |       |
|             | Total cost      |       | 3,008 | 3,083 |       |       |       |       |       |
|             | Market profit   |       | 492   | 343   |       |       |       |       |       |
|             | GMMp (%)        |       | 18.34 | 15.25 |       |       |       |       |       |
| Wholesalers | Selling price   |       |       | 3,726 | 3,601 | 3,575 | 3,550 |       |       |
|             | Total cost      |       |       | 3,581 | 3,476 | 3,250 | 3,305 |       |       |
|             | Market profit   |       |       | 145   | 125   | 325   | 245   |       |       |
|             | GMMp (%)        |       |       | 8.05  | 19.68 | 16.08 | 13.03 |       |       |
| Retailers   | Selling price   |       |       |       | 3,775 |       | 3,750 | 3,670 |       |
|             | Total cost      |       |       |       | 3,656 |       | 3,625 | 3,305 |       |

|              |               |   |       |      |       |       |       |       |       |
|--------------|---------------|---|-------|------|-------|-------|-------|-------|-------|
|              | Market profit |   |       |      | 119   |       | 125   |       | 365   |
|              | GMMp (%)      |   |       |      | 4.61  |       | 5.63  |       | 16.76 |
| Cooperatives | Selling price |   |       |      |       |       |       |       | 3,550 |
|              | Total cost    |   |       |      |       |       |       |       | 3,325 |
|              | Market profit |   |       |      |       |       |       |       | 225   |
|              | GMMp (%)      |   |       |      |       |       |       |       | 13.38 |
|              | TGMM (%)      | - | 18.34 | 23.3 | 24.29 | 16.08 | 18.67 | 16.76 | 13.38 |

**Main Tef value chain actors’ constraints and opportunities:**

Several constraints and opportunities were explained by different actors through face-to-face interviews and focus group discussion and presented in Table 4. The advantages of value chain analysis in this study were identified bottlenecks of the value chain development from input supply to consumption level (Fayso T et al. 2018). In the input supply shortage of input (seed), untimely supply of input, shortage of capital, and information gaps between farmers and input suppliers were identified and ranked. In the study areas, Tef seed is only available by research centers and has no seed dealers. Regarding farm level, the main constraints faced by farmers were high price of input, shortage and untimely supply of input (seed, fertilizer, and chemical), poor soil fertility, disease, and lodging problems, weed infestation, and poor infrastructure (road) also summarized and ranked. The average yield of Tef reported by producers was 11.38 quintals per hectare which is less than the national average yield and Oromia

regional average yield which are 17.56 and 17.90 quintals per hectares respectively (CSA, 2021). This shows that the above constraints were contributed to the reduction of Tef productivity and marketable surplus in the areas (Fentie A et al. 2019). Concerning traders’ poor transport facility, computation of unlicensed traders, grain price and buyer fluctuation, capital shortage, and limited access to credit services for traders were identified and ranked as main constraints of traders. This result shows that the lack of agricultural policies and strategies that create and sustain an enabling environment and support of promoting greater integration of smallholder farmers into the markets are the main problems that limit smallholder farmers’ access to the Tef market in the areas. Besides, the constraints, opportunities of Tef value chain mentioned by actors, and direction for main constraints were presented (Gebre GG et al. 2020).

**Table 4:** Summary of constraints and opportunities along tef value chain actors.

| Constraints  |                                       | Rank | Opportunities   | Interventions  |   |
|--------------|---------------------------------------|------|---|--|---|
| Input supply | Untimely supply of input              | 2    | Sources seed supply                                   | Provide inputs (seed, fertilizer, and chemicals) on time and enough amount requested input suppliers from importers. |   |
|              | Shortage of input                     | 1    | Chemicals and fertilizer source                       |  |   |
|              | Shortage of capital                   | 3    | Credit availability                                   |  | Credit availability for input suppliers.                |
|              | Information gap                       | 4    | Research source                                       |  | Strengthen linkage between farmers and input suppliers. |
| Production   | Disease and lodging problem           | 4    | Government support research and chemical availability | Awareness creation and develop tolerant/resistance varieties should give attention by researches.                    |   |
|              | Shortage and untimely supply of input | 2    | Enabling environment policy by government on inputs   | Provide inputs (seed, fertilizer, and chemicals) on time and enough amount requested by producers.                   |   |



|           |   |   |  |   |
|-----------|---|---|--|---|
|           | Poor market information                     | 6 | Favorable climate condition for tef production   | Strengthen linkages among input suppliers, producers and buyers on price information and price setting. |
|           | High price of input                         | 1 |  |   |
|           | Poor infrastructure                         | 7 | Availability daily laborer                       | Road construction for rural farmers and maintained the old.   |
|           | Weed infestation                            | 5 | Good initiation on soil fertility for production | Used appropriate herbicide for weed and lime application/other soil management for soil improvement.    |
|           | Poor soil fertility                         | 3 |  |   |
| Marketing | Grain price and buyer's fluctuation         | 3 | Government investment on infrastructure          | Strengthen cooperatives and establish well linkage between producers and cooperatives.                  |
|           | Poor transport facility                     | 1 | Establishment of cooperatives                    | Road construction and maintenance for the old one.  |
|           | Capital shortage and limited credit service | 4 | High market demand of Tef product                | Credit availability with amount needed by traders specifically for crop trading purposes.               |
|           | Presence of unlicensed traders              | 2 | Establishments of credit providers               | Control unlicensed traders and improve farmers bargaining power by supporting licensed traders.         |

### **Agriculture and Natural Resource Development Office**

- Strengthening the training and advice on Tef production managements. The extension services and education help farmers can easily and practically recognize the difference in productivity and production possible obtained through the adoption of appropriate agronomic practices and varieties.
- Building the ability/skill of development agents on Tef disease management to provide appropriate advice for farmers concerning Tef disease.
- Major constraints and agriculture office interventions were identified and ranked. Therefore, these constraints need effective policies and strategies that create and sustain an enabling environment for integrating smallholder farmers into markets.

- Disseminated improved varieties and empowering women farmers need attention to enhance Tef value chain activities.
- Marketing linkages (communication) between farmers and cooperatives to be essential to enhance Tef production and market surplus.

### **Marketing and Cooperative Office**

- Continuous awareness creation on the linkage between farmers and cooperatives, who take over the roles of traveling unlicensed traders.
- Strengthening the cooperatives management members on business market information and working capacity (storage and transport facilities to add value and gain better market price for farmers).

- Provide extension service for traders and delivery market information for farmers on product price and bargaining power (Goerzen A, et al. 2021).

### Research Centers and Universities

- Develop high yielder varieties with disease resistance/ tolerance for farmers.
- Strengthening districts' agricultural experts and development agents on disease occurrence and better crop production managements to provide appropriate advice for farmers' Tef disease and production management (harvesting and post-harvesting) handling (Hailua G, et al. 2015).

### CONCLUSION

In the study areas, there are various actors elaborated in the Tef value chain playing different roles. The major ones are input suppliers, producers, collectors, wholesalers, cooperatives, retailers, and consumers. The Tef flow has eight market channels that link farmers directly through collectors, wholesalers, retailers, cooperatives, and consumers. Concerning marketing margin and profit across the Tef chain high producers share was occurred from cooperative (86.62%) and direct wholesalers (83.92%) and retailer (83.24%) buyers with different market profit. The traders also received different market profit and their shares in this value chain. This suggests that the distribution of Tef value shares was inefficient in all channels except channel I (direct supply to consumers). Different Tef value chain actors had different constraints. In input suppliers' shortage of input, untimely supply of inputs, shortage of capital, and information gaps between with farmers were reported as main constraints. Regarding farmers (productivity) high price of input, shortage and untimely supply of input, poor soil fertility, disease and lodging problems, weed infestation, and poor infrastructure were reported and poor transport facility, computation of unlicensed traders, grain price and buyer fluctuation, capital shortage and limited access to credit services were reported by traders. For these constraints, different opportunities and interventions were identified and recommended in the areas.

### RECOMMENDATIONS

Based on the findings, the following recommendations are possible areas of interventions for different stakeholders that support Tef value chain in the areas.

### DECLARATION OF INTERESTS' STATEMENT

The authors declare no conflict of interest.

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