


ANALYSIS OF TEFF MARKET CHAIN: EVIDENCE FROM SOUTH GONDAR ZONE, ETHIOPIA

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Highlight

The authors have identified current overview of teff market chain. The actual marketing flaws and tackling strategies for sustainable, good performing and innovated teff marketing are well organized.

Abstract

Dera is one of the potential districts in teff production. Nonetheless, there are some restraints and prospects in teff commercialization still unaccustomed. This study initiates to examine the teff market chain in the Dera district. It concentrates to synthesize the behavior, transparency, and effectiveness of teff market expending data from different sources. It involved teff producers, wholesalers, retailers, rural assemblers, cooperatives, urban assemblers and processors. The data investigation engaged expressive inferential statics & SCP model. Concerning marketing, the result indicates that producers supplied to the market via rural retailers, wholesalers and directly to consumers 57.7% of teff produced in 2017 cropping season. There are eleven marketing channels in transferring 2268 Quintals of teff from farmers to different intermediaries until reaching end buyers. The market structure of teff is weakly oligopolistic, implying that the market is not competitive. The producers' share of margin for the teff market accounts 68.96% associated with a 31.04% total gross margin. The marketing channel with more teff supplied can have a high or low marketing margin depending on the presence of value-adding market agents in the track. It implies that the channel with more teff supplied is not necessarily the channel in which the highest market margin. The marketing agents in the study area incur primary transaction costs like packing, loading and unloading, storage, transportation, communication and other personal costs. Therefore, improved bargaining power, access to accurate market information and infrastructural development are essential for a better performing teff market.

Keywords

structure; conduct; performance; market Margin; concentration ratio.

Introduction

Teff is an indigenous cereal crop to Ethiopia. Some scholars affirm that it was derived from the Arabic word tahf, a name given to a similar wild plant used by Semites of south Arabia during the time of food insecurity [1]. Based on linguistic, historic, geographic and botanical notes, teff is assumed to have originated in northeastern Africa. The current area of cultivation is probably not the initial one of domestication; domestication probably occurred in the western area of Ethiopia, where agriculture is precarious and semi-nomadic [2], [3]. Teff is among Ethiopia's

prominent returns generating cash crops grown. It is highly essential in terms of either coverage or worth of yield [4]. It comprised the principal portion of production region (28.5%) in 2013, tailed by maize (20.3%) and the second production quantity. It covers 24.02% of land under cultivation by cereals (first among all cultivated crops in terms of land coverage) and contributes 17.57% to grain production, second next to maize in terms of total grain production [5].

According to Amentae [6], there is potential for teff to be the second gift of Ethiopia to the world after coffee. Quality is the leading aspect of every food product market usually assessed by origin. Teff color is also a demanding discrepancy most people focused in Ethiopian teff market. *Magna* (super white), white, Sergegna (mixed), and red teff considered the famous teff colors by farmers, traders and end-users [7]. Moreover, physical presence, shells, smell, roughness, and dietary superiority were prevalent factors, Minten et al. [8] also judge teff's quality.

The market participation decision of teff farmers is influenced significantly and positively by the perception of farmers on the lagged market price of teff, family size, the land allocated for teff production, ownership of transport equipment, and agroecology farmers. Family size, agroecology, distance to the nearest market, farm size, tropical livestock unit (TLU), the income obtained from other farming and off-farm activity and farmers' perception towards farm gate price affect the intensity of teff market participation. Among the factors significantly and hardly affecting the power of teff market surplus are age, family size, number of livestock owned, agroecology, distance to the nearest market, and perception of farm gate price whereas, farm size allocated for teff production and income from off-farm and other farming activities influences positively. Teff farmers decision to augment further value affected negatively by their time of life. Antagonistically, market proximity, agricultural familiarity, schooling position, extension service and credit access affect definitely [9].

The livelihood system of the residents of South Gondar districts is both crop and livestock production. Agriculture in the Dera district is mainly dependent on rainfall, though various surface and groundwater resources are available to maximize water utilization for Agriculture. The main crops cultivated by farmers in the district are teff, finger millet, maize, sorghum and rice in *Woinadega* (midland) areas; and *Dega* (highland) areas of the district, barely, wheat and teff are grown. Barely, finger millet & maize are mainly used for household consumption while teff, oilseeds and horticultural crops are marketed, making up an essential source of cash income for farmers [10].

Dera district stands 1st in teff production from the south Gondar zone [11]. Almost all the 29 rural kebeles are potential teff producers. However, there are significant constraints concerning agricultural production in the study area. These include high fertilizer price, loss of soil fertility, shortage of land, use of low yielding poor local variety and crop pest (because of continuous sole cropping of the same ground repeatedly). Besides, teff producer's marketing problems are underestimated price setup by a wholesaler (Selling agricultural products at low prices), selling farm outputs in the harvest time for loan repayment, lack of government intervention and weakness of cooperatives [12].

Farmers need immediate income to compensate for fertilizer, seed, and children's stationery fees in the study area. Moreover, the lack of storage options sometimes forces farmers to sell crops at harvest time when the price is low. At present, only some intermediaries further process teff produce to powder and Injera. The nutrient-packed small grains of teff does not acquired the prospect of being used as an industrial crop [13].

Evidence acquired from DDAO [14] illustrated how teff yield predominantly bruised by pre-and post-harvest losses. Shattering is a reason for momentous loss of produce in teff; better to harvest the crop on time. On the other hand, during threshing, considerable yield losses are incurred. Since the thresh perform on the ground, the quality of the teff grain is adversely affected as the grains mix with the soil, sand and other foreign matter, which ultimately affects the market value of teff. These problems, in sum, deteriorate the surplus of teff to be value-added and supplied to the market that improves the livelihood of farmers and profitability of each teff market chain actor [12].

Researchers have done studies of the cereal sector, looked at cereal market chains [15], [16]; however, their study mainly concentrated on the role that intermediaries play in the build-up of market prices [17], [18]. Their result misses the organized illustrations of basic marketing transparency, behavior, efficiency and sustainable promotion of innovated marketing with comparative studies. Gabre-Madhin [15] found that brokers are vital in the functioning of the cereal markets in Ethiopia. They deliver many services (especially on search and aggregation functions), and farmers might or might not select to use them based on the type of services they provide. Indeed, the study did not consider the negative aspects of brokers. A stretched chain irrespective of visible values is nor worthy. Thus, in this study the real advantages of these actors have been described.

Several authors had also found a relatively unsophisticated teff marketing chain in their study. There are no interlinked transactions with buyers of the produce. The role of credit is minor. Most of the transactions are cash transactions [4], [7], [8] Significant efforts in checking quality and quantity come to mind at each transaction along the chain since the absence of organized grading and standardization.

Mirie et al.[19] brought deprived performance of teff market chain. However, researchers were cramped to inspect an insufficient numbers of evaluating criteras due to inadequate size of sample (1.6% of the total population) limited chain actors and limited data. Thus, leaving the gaps in the literature that this study proposes to fill. Unlike previous market chain studies, we increase the sample size and comprise additional chain actors like processors. We also include Degree of market transparency and term of payment to analyze structure and conduct of teff market.

Teff production is a potential for many farmers for additional income [11], despite the crop not being given the adequate policy attention. Adequate information concerning the analysis of the teff market chain that guides the proper participation of smallholder farmers and other actors in the teff market chain is still missing. The produce flows from producers to the final consumers stretching long chains without creating value additions, which is against the fair benefit of producers. Even though farmers produce the teff grain well, they do not bother about quality, standard, improved variety and post-harvest handling. They follow the traditional production, harvesting, collection, and handling. There have not been well-established linkages among traders and processors.

Therefore, this study intends to identify teff market chain actors and their roles. It also investigates the teff market concentration, behavior and profitability that gives an enhanced revelation and possible upgrading strategies from the basis of smallholder farmers advantage.

Methods

- The Research Area

Dera is amongst districts in *the* south Gondar zone in Northwest Ethiopia. It is bordered to the south by the Abay River, which separates it from the East Gojjam; to the west, it is bordered by Lake Tana, to the north by Fogera, to the northeast by East Estie; and to the east by West Estie. The *district* covers 158,948 ha, of which 35% is plain, 20% is mountainous, 18% is gorges, and 27% is undulating. The altitude of the district ranges from 1,560 m to 2,600 m above sea level, while the annual average rainfall is 1,250 mm. Regarding agroecology, 85% is *Woinadega*(Midland) while 15% is *Dega* (highland) [14]. There are 32 *kebeles* in the *district*, of which 29 are rural and three are town *kebeles*. The district's total population is 279,845, of which 142,851 are male and 136,994 are female. The number of households in the district is 69,961, 58,767 are male-headed, and 11,194 are female-headed [14].

The district experiences annual rainfall ranging from 1000– 1,500mm, which puts it among the relative moisture sufficient district in the country. It has one long rainy season, "*kiremt*", which lasts from June to September. The main crops cultivated by farmers in the district are teff, finger millet, maize, sorghum and rice in *Woinadega* (midland), and Barely wheat and teff are grown in *Dega* (highland) areas. Households also grow crops like Irish potato, onions, tomato and sugarcane, and fruit, such as mango, orange and spice, and chili pepper. Oil Seeds, such as oats, flax and nigger seed, are also cultivated using irrigation during the dry season. Barely, finger millet and maize are mainly household consumption items while teff, oilseeds and horticulture crops are marketed, making up an essential source of cash income for farmers [10]. Figure 1 shows the geographical location of the research area.

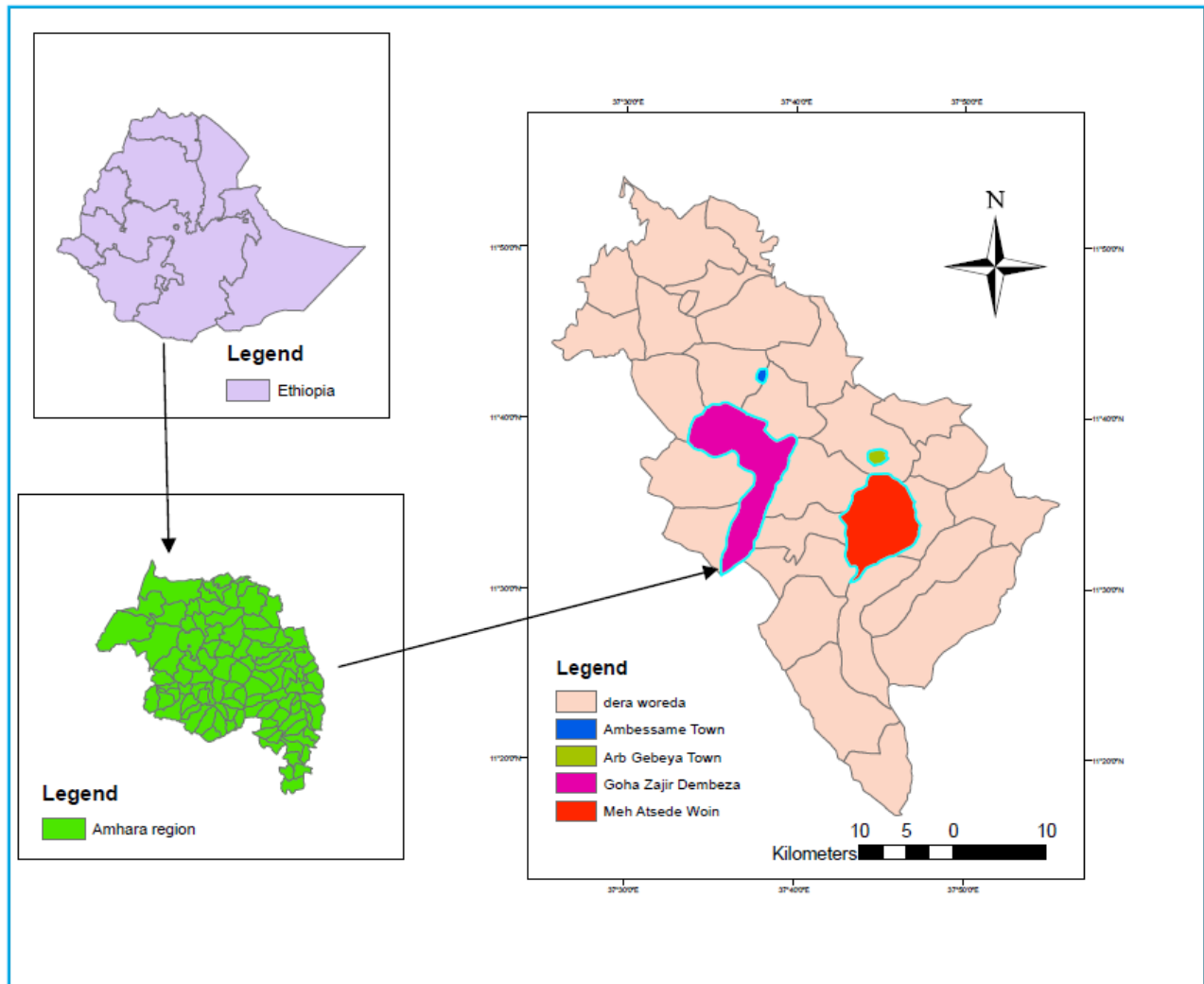


Figure 1. Location of the Research Area. Source: [14].

- Data Types Sources and Method of Collection

The research deployed primary and secondary data sources which can be quantitative or qualitative. Household surveys, focus group discussions, key informants and personal observations were sources of the preliminary data. In contrast, district agriculture office, trade and industry, Amhara regional agricultural research institute, and CSA were sourcing the secondary data. Quantitative data were information about quantities, information that could be measured and written in numbers, including household socioeconomic variables like age, family size, and economic factors. Qualitative data was information about qualities that could not be measured, focusing on the respondents' expressions and feelings.

- Sample Size and Sampling Technique

This study employed a three-stage sampling procedure to select respondents. In the first stage, Dera is chosen among 13 districts of the South Gondar Zone. The underlying principle for the choice was ranking in crop production. Dera stands first in teff production compared with the rest of the districts. In the second stage, discussing with the agriculture and natural resources development office, two *kebeles* carefully chosen from the Dera district tracing their teff yield and volume of marketing supply. In the third stage, using probability proportional to size (PPS), the number of respondents were selected from each sample *kebele* sample frame using a simple random sampling technique.

Accordingly, using a formula developed by [20], 171 teff producers were identified as $n = \frac{N}{1+N(e)^2}$ where:

n = size of the research sample

N = size of the entire population (overall number of households in the selected *kebeles*)

e = precision level.

There were 2136 and 2797 households in Meha-Atsedeweyine and Goha kebeles, respectively. In determining the required sample size, we use a 95% confidence level, with a 0.5 degree of variability and a 7.5% level of precision. The number of male-headed and female-headed households was 1867 and 269 and 2462 and 335 in Meha-Atsedeweyine and Goha *kebeles*.

Respondent farmers

$$(1) \quad n = \frac{4933}{1+4933(0.075)^2} = 171$$

The number of traders and extra intermediaries fixed purposively by using the list of each actor of identified *kebeles*. The targets were licensed traders as it was challenging to identify the unlicensed ones. Thus, their number depended upon the availability of the licensed ones. When they were few, all of them were capable of selection. Based on this, three wholesalers, 11 rural retailers, seven urban retailers, one rural assembler, one cooperative, ten urban assemblers and three processors (small *Injera* shops) were selected purposively.

- Methods of Data Analysis

We used descriptive and inferential statistics and econometric analysis for data analysis. Both techniques were employed using Microsoft office excel 2016, SPSS 26 and STATA (Statistical & Qualitative Data Analysis Software) 15 statistical software packages.

- Descriptive Statistics

This method explained and interpreted the data obtained from sampled households and traders' socioeconomic characteristics. It employed tables, figures and graphics. Tables describe mean, minimum, maximum, frequency, percentages, and standard deviations. Moreover, we calculated Concentration ratios, market shares and market margins to describe the teff market structure, conduct and performance. Appropriate statistical tests such as t-test (for continuous variables) and (Chi-square test) for discrete variables were employed to compare and test the mean or proportion difference between selected characteristics.

- Structure Conduct Performance Analysis

The model was actively used to illustrate the basic overview of market structure conduct and performance [21]. Several authors employed this model to evaluate the vegetables, teff and pepper respectively [19], [22], [23].

Structure: In analyzing the market structure of teff buyers/sellers, concentration ratio, degree of marketing transparency, and entry and exit barriers were applied. Concentration Ratio can be illustrated by the formula:

$$(2) \quad C = \sum_{i=1}^r S_i$$

Where S_i = the percentage market shares of the i^{th} firm and r = the upper ranked firms that the ratio calculated

$$(3) \quad S_i = \frac{P_i}{\sum P_i}$$

Where S_i is teff market share, P_i - the quantity of teff held by buyer i and $\sum P_i$ - Overall volume of teff held.

This method is very important in showing the major share of products and actors influencing the market. However, this method cannot quantify market power directly. A concentration ratio of 50% or above for the first big four firms in the trade point toward a strong oligopoly. Simultaneously, a 33%-50% point out a frail oligopoly, while the rest smaller amount represent a competitive business [24].

Conduct: Environments illustrating the marketing behavior of farmers and other traders believed to direct the conduct of market. Nevertheless, a commonly accepted measures to investigate the conduct of market, the behavior of the teff market is examined by producer farmers and traders way of getting price data, price-setup, buying and reselling approaches [25].

Price is the prime element responsible for producers' choice to whom and which market to distribute their goods. The main determinants of price as a single buyer, single seller, local assemblers or through negotiation of seller and buyer are analyzed. Factors affecting the price setup like supply and demand conditions, informal price restraints like cut-price (*Waga Koreta* locally) are synthesized. The basis for price differentiation and the impact of the physical location of the market on prices and marketing arrangements are also addressed to analyze price setting. In ascertaining the obtaining and marketing system, the home of product, the presence of accredited and unknown trading actors which disturb the bargaining power, the nature of the buying/selling in the market, the type of channel chosen, and the incidence of unethical trading practices were seriously analyzed. The term of payment is investigated whether an immediate transaction in the spot market, futures market or contract farming form of relations of sellers and buyers) was also assessed. A timely payment can play an indispensable role in improving the social relations of the traders and the producer society and vice versa.

Performance: Analysis market margin executed to estimate the profitability of the teff market. It is an interesting measure of market performance [26]. It is the value of the difference price between farmers and consumers [27]. The producers' share is commonly calculated as the ratio of farmers' price to end-users (retail) price [28]. Mathematically, producers' share articulated as:

$$(4) \quad P_s = \frac{P_x}{P_r} = 1 - \frac{MM}{P_r}$$

Where:

- PS = Producers' share
- P_x = Farmers' price of teff
- P_r = consumer price of teff
- MM = marketing margin.

The total marketing margin was calculated using the following formula:

Marketing margin:

$$(5) \quad TGMM = \frac{\text{End Buyer Price} - \text{Farmer's Price}}{\text{End Buyer Price}} * 100$$

The producer's margin or share in the consumer price GMM_p is calculated as:

$$(6) \quad GMM_p = \frac{\text{Price Paid by End Buyer} - \text{Gross Marketing Margin}}{\text{Price Paid by End Buyers}} * 100$$

The consumer price share of market intermediaries is calculated as:

$$(7) \quad GMM = \frac{SP-BP}{EBP} * 100$$

Where:

GMM = Gross Marketing Margin (%)

SP = Selling price at each level

BP = Buying price

EBP = End buyer price

$$(8) \quad NMM = \frac{\text{Gross Margin} - \text{Marketing Cost}}{\text{Price Paid By End Buyer}} * 100$$

Where NMM: is Net Marketing Margin

For the research, GMM was deliberately used instead of NMM, since it was challenging to approximate the implicit costs suffered during the teff deal.

Results and discussion

- Socioeconomic Characteristics of Teff Traders

Sex, age, and educational status of household heads describe the demographic characteristics of traders. The result specified that the age of the respondents was 37.94 years old on average dictating they were young. Urban retailers were young, 25 years old on average, while urban assemblers (53) were premature. The study also inference that most traders were males (77.7%). Most sample traders account for rural retailers (30.6%), followed by urban assemblers (27.8%) as depicted in table 1.

Table 1. Demographic characteristics of teff traders. *Source: Survey results of authors' research.*

Type of trader	Sex of trader			Age of Trader			
	Male	Female	Total	Min	Mean	Max	St. Dev
Wholesaler	2 (7.1)	1 (12.5)	3 (8.3)	35	38	41	3
Rural retailer	7 (25)	4 (50)	11 (30.6)	35	38.45	50	5.87
Urban retailer	6 (21.4)	1 (12.5)	7 (19.4)	28	38.86	53	10.14
Rural assembler	1 (3.6)	0	1 (2.8)	50	50	50	0
Urban assembler	10 (35.7)	0	10 (27.8)	25	34.5	48	7.38
Cooperative	1 (3.6)	0	1 (2.8)	44	44	44	0
Processors	1 (3.6)	2 (25)	3 (8.3)	34	37.33	40	3.06
Total	28(77.8)	8 (22.2)	36 (100)	25	37.94	53	7.383

Note: values in parenthesis represent percentage.

The formal educational status of sample teff traders ranges from zero to higher education as some urban assemblers and retailers were graduated from university. In contrast, some others can read and write using their knowledge of religious education. The average educational level of the sample traders was primary education (7.84). Based on the categorization of schooling, 27.8% of the dealers followed primary education, whereas only the 9% joined diploma and university. Urban assemblers (29.4%) pursued formal education finishing secondary and preparatory

school, followed by rural retailers (23.5%). However, traders were participating in teff trade simply by looking at their elder families and parents' particularly few retailers, as presented in table 2.

Table 2. Educational Status of teff traders. *Source: Survey results of authors' research*

Type of trader	Educational status of trader					Total
	Informal Education	Grade 1-4	Grade 5-8	Grade 9-12	Higher education	
Wholesaler	0	1 (33.3)	0	2 (11.8)	0	3 (8.3)
Rural retailer	2 (66.7)	1 (33.3)	4 (40)	4 (23.5)	0	11 (30.6)
Urban retailer	1 (33.3)	0	1 (10)	3 (17.6)	2 (66.7)	7 (19.4)
Rural assembler	0	0	0	1 (5.9)	0	1 (2.8)
Urban assembler	0	1 (33.3)	3 (30)	5 (29.4)	1 (33.3)	10 (27.8)
Cooperative	0	0	0	1 (5.9)	0	1 (2.8)
Processors	0	0	2 (20)	1 (5.9)	0	3 (8.3)
Total	3 (8.3)	3 (8.3)	10 (27.8)	17 (47.2)	3 (8.3)	36 (100)

Note: values in parenthesis represent percentage.

- Teff Marketing Participants, their Roles and Linkages

Different marketing actors in each teff marketing channel participated in buying and selling teff starting from producers to final consumers as described below.

Producers: This group of people is involved in the manufacture and distribution of teff on the market. They transport teff to the nearest marketplaces using either head or back loading or donkeys, covering a distance of 111.32 minutes on average. They sell the products to assemblers (rural and urban assemblers), cooperatives, retailers, wholesalers and consumers. Table 3 shows the distribution of actors concerning the volume of teff transacted to different marketing agents. Accordingly, wholesalers, rural retailers and consumers were the major buyers from producers.

Table 3. Proportion of teff transacted by teff producers based on the market outlets/Agents.

Source: Survey results of authors' research

Market outlet/agents	Percentage share
Rural assembler	5.46
Urban assembler	13.84
Wholesaler	25.01
Rural retailer	23.95
Consumer	28.77
Cooperative	3.00

Rural assemblers/Farmer traders: These groups of marketing agents play an essential role in connecting the teff producers in the study area with actors in different stages of the teff marketing channel as they have immediate contact with farmers who supply teff to the market. They buy teff from the local market and resell it for urban assemblers, retailers and wholesalers in local and district markets for a profit. According to discussions made with them, these traders are usually part-time traders, and most of them are young and with small family sizes who themselves are producers. Key informants also said that actors collect teff from different small markets using their local network and knowledge and sell it back at the similar or other markets/day and benefit from providing the products for actors in the next stage the market channel.

Urban assemblers: These players play an important role in the market chain, and most of them in the research region are men. They serve the chain by buying, storing and selling the teff from farmers and village collectors to retailers, wholesalers and consumers in the district and rural markets. Their capital is not much high since most of them collect teff and sell to wholesalers and retailers on the same day, but they are more full-time traders than village collectors. Sometimes, they add value to the product through weaving, storage, and separating adulterated teff and the like. These assemblers also supply their teff for hotels & restaurants and consumers when needed, sometimes as a supplement.

Brokers: These players are commission-based agents who operate on behalf of other market participants. They do not possess ownership of the product. Mainly, they play a facilitation role in creating fertile ground (time and place) for buyers and sellers together. However, there is no broker in the study area for a purpose; instead, they bring transport services like trucks and Isuzu and sometimes disseminate market price information to marketing agents. They are crucial in getting teff from the district market to the regional market. They receive money from each trader based on the quantity of quintals (1 birr per quintal) (i.e., around Birr 45 every one Isuzu).

Wholesalers are teff marketing chain market actors who buy teff in larger quantities than the rest of the market actors and resale the items to urban retailing dealers and, in some cases, to customers. These wholesalers are found in the district capital market and purchase teff from farmers, urban assemblers, and sometimes from retailers. Wholesalers buy teff from retailers since retailers cannot sell in the district market because consumers can purchase teff directly from farmers as producers surround the market. Hence, teff purchased from different sources is stored in one place (warehouse) mixed to meet the teff grain uniformity. Then, the stored teff is supplied to the high demand regional markets (Bahir Dar, Woreta and Dessie) on urban retailers.

Retailers in the teff marketing chain are those actors who perform the final marketing function by connecting consumers with other teff traders in most cases and, in some cases, producer farmers. These retailers are full-time traders and operate in rural and urban markets.

Rural retailers: Market participants link other market chain actors to end-users put their destination in the district town. They buy teff from farmers in the market and selling and purchasing center on the days other than the market. According to discussions with district trade and marketing development personnel, the biggest problem is that retailers sell teff to wholesalers inversely. It isn't easy to get many buyers as most district consumers purchase from producers as several producer farmers surround the rural market. They also sold teff to urban retailers and consumers.

Urban Retailers: These retailers sell teff to end-users (consumers and processors). They are located in the regional market and buy the product from wholesalers, urban assemblers, or rural retailers. Urban retailers are characterized by owning or renting shopping centers where buying and reselling functions occur.

Processor: These marketing agents play an essential role in marketing and processing. Processors include small *Injera* shops, cafes, restaurants, and hotels that make value additions to teff grain as they milled and backed to soft *Injera*. They buy teff from rural and urban retailers and process and sell *Injera* to consumers.

Cooperatives: Cooperatives are farmers' associations that supply agricultural inputs to farmers and buy their output at harvest. They sell the product they purchased to different traders, hostels and humanitarian associations and get income. The members of the cooperatives get benefit from their cooperative as a dividend.

Consumers: In the teff's market channel consumers are the end-users [17]. They mostly buy teff from different marketing channel actors such as producers, retailers, processors, and urban assemblers. These market actors participate in the marketing chain by purchasing either raw teff grain or processed teff *Injera* directly for their consumption or indirect supply to café and restaurants, hotels, hostels and humanitarians. Teff consumers included producer farmers (partial users of their produces), rural and urban dwellers (buying from producers, wholesalers or

- Teff Marketing Channels

The teff market channel displays the numerous marketing actors, their interactions, the alternatives open to these actors in terms of purchasing or selling teff, and the expected proportion of teff transacted over the different passages. There are eleven different types of teff marketing channels. During the primary season (Meher), total production and the amount of teff marketed were 3931 quintals (Qt) and 2268Qt, respectively, in the sample *kebeles* of Dera district. Rural consumers play a significant role in buying teff from farmers and about 71% of the produce was sold in different outlets. The 25.01%, 23.95% and 13.84% of farmers' products acquired by wholesalers, rural retailers and of urban assemblers, correspondingly.

The remaining 5.46% and 3% of farmers' produce transacted through rural assemblers and cooperatives. Figure 2 shows different marketing routes used in the transaction of teff from their point of production to the end-users (consumers) in the study area. The virtual channels involved in the movement of teff in the study area are listed as follows.

Channel I: producer-rural assembler-wholesaler-urban retailer-consumers (123.82Qt).

This channel sells its teff to consumers through rural assemblers, wholesalers, and then urban assemblers. A total of 123.82Qt teff was exchanged in this channel which stands 8th in terms of quantity of teff sold. It comprises 5.5% of teff marketed in the whole chain.

Channel II: producer-wholesaler-urban retailer-processor-consumers (250.09Qt):

This channel is the second most crucial channel next to the shortest producer to consumers channel in terms of volume of teff marketed. It is carried out via wholesalers, urban retailers, and most value-adding actors (processors). This channel accounts for 11.03% of the total transaction in the market chain that transfers 250.09Qt.

Channel III: producer-wholesaler-processor-consumer (233.91Qt).

In this channel, wholesalers directly buy teff from producers and sell to processors before the product reaches the final end-users via processors. It comprises 233.91Qt of teff transacted in the study area in the survey period that accounts for 10.31% of the quantity marketed in the chain. Considering the volume of teff transacted, it is the third most crucial channel compared to other teff market channels.

Channel IV: producer-urban assembler-wholesaler-consumers (120.55Qt).

This channel is the channel producers sell the teff they produce to urban assemblers that supply to wholesalers before reaching the consumers. It transfers 120.55Qt that comprises 5.32% of total teff transacted in the whole teff market chain, which is the ninth important channel in terms of the total volume of teff marketed.

Channel V: producer-urban assembler-wholesaler-urban retailer-processor-consumer (95.06Qt).

This channel incorporates urban assemblers, wholesalers, urban retailers and processors as intermediaries to transit the producer's teff to the consumers. However, this is the second channel next to channel VI in transferring the lowest amount of teff from producers to consumers, accounting for 4.19% of the total volume of teff marketed in the study area in the survey period. It stands 10th in transacting teff among other teff marketing channels.

Channel VI: producer-urban assembler-urban retailer-consumers (79.61Qt).

This channel stands last in terms of the volume of teff transacted from all channels which pass urban assemblers and urban retailers one after the other, starting from producers and ending in consumers. It transfers 79.61Qt of teff, accounting for 3.51% of the overall quantity of teff sold. The little book could be due to the distance of the nearest output market, and the time urban assemblers buy teff was in the morning mainly.

Channel VII: producer-rural retailer-wholesaler-urban retailer-consumers (219.82Qt).

In this channel producers sell their teff produced to rural retailers, which in turn supplied to wholesalers, and wholesalers sell to urban retailers after giving some better value additions like the place and time values before enriching teff to consumers. This route transacted 219.82Qt of teff, accounting for 9.69% of the total amount and ranking fourth in terms of size.

Channel VIII: producer- rural retailer-processor-consumers (139.33Qt).

In this channel, producers sell their teff produced to rural assemblers, which in turn sell to processors, and after the row grain is processed, it is reached to ultimate consumers. In this channel, 139.33 Qt of teff is supplied, comprising 6.14% of the overall amount of teff supplied to the market. It is the sixth most crucial teff market channel in quantity sold.

Channel IX: producer-rural retailer-consumer (215.30Qt)

This channel is where producers sell their teff to rural retailers in which rural retailers' transit to final consumers. It transfers 215.3Qt of teff, and it is the fifth most crucial channel considering volume that accounts for 9.49% of the entire produce.

Channel X: producer-cooperatives-urban retailer-consumers (138.01Qt)

The channel producers sell their teff products to consumers via cooperatives and urban retailers' one after the other. In this channel, 138.01 Qt of teff is supplied, comprising 6.09% of the total volume of teff marketed. It is the seventh most important teff market channel in quantity marketed.

Channel XI: Producer-consumer (652.5Qt)

It is the channel producers sell their teff directly to consumers. The result in figure 2 indicates that 652.5Qt teff was transacted in this channel, accounting for 28.77% of the total volume of teff transacted in the chain. An enormous volume of teff transacted in this channel. The information from critical informants also shows that teff producer farmers found surrounding the market and supply more to consumers. However, this does not mean the nearest output market is in the shortest distance but a relatively better market distance than other market centers. Besides, it's clear evidence of teff Injera's popularity among city dwellers.

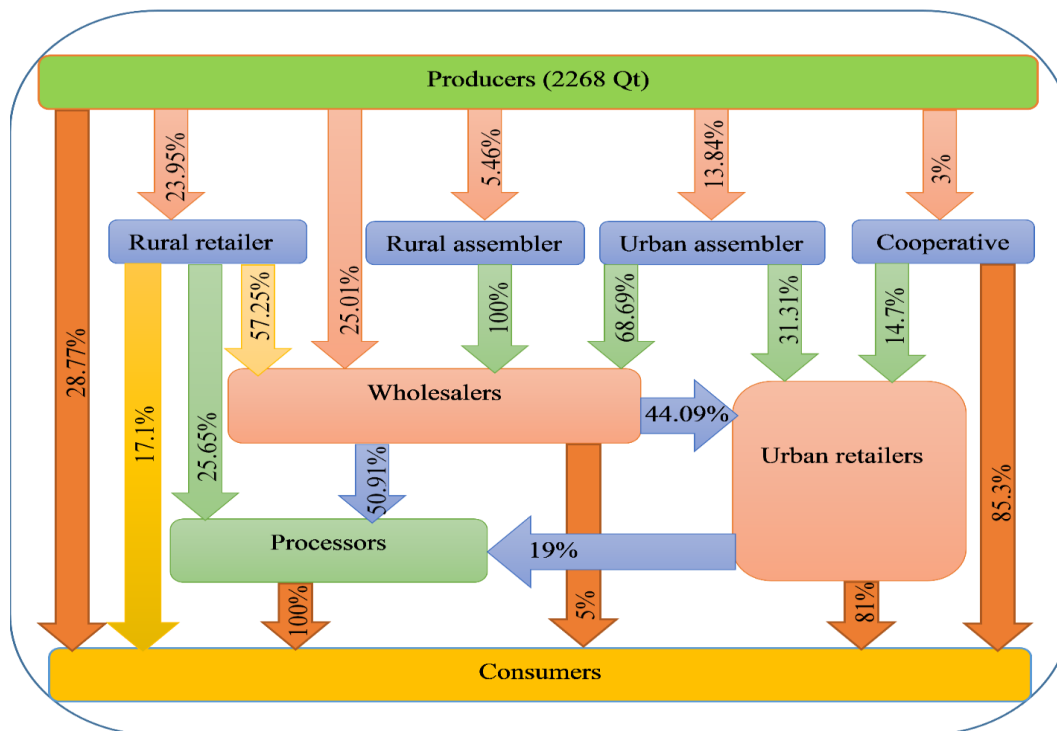


Figure 2. Teff marketing channel. Source: Survey results of authors' research.

- Teff Market Structure, Behavior, and Performance

Structure of Teff Market

The structure of a teff market refers to firms' size and market share, relative ease of free entry and exit from the marketing chain, degree of product differentiation, and market transparency among the marketing participants within a given subsector [29]. To assess the market structure of teff in sampled markets, researchers looked at concentration ratio, prospective entry and exit obstacles, level of product diversity and access to teff market data.

Concentration Ratio: According to Kohls et al. [24], market concentration is the portion of industry sales made by the most prominent firms, which dictates imperfect competition. The most common way of expressing the concentration ratio is using the four largest firms (CR4). The concentration ratio of teff merchants was estimated. Table 4 shows that 11.1 percent of the four largest traders account for 35.46 percent of total teff purchase, indicating a weak oligopoly market structure. The result showed a better competition in the teff market compared to other authors [19], [30], who found a strong oligopoly teff and potato market respectively. The market structure for teff is not a competitive that shows teff traders were relatively less concentrated in the area.

Table 4. Concentration ratio of traders in sampled markets. *Source: Survey results of authors' research*

No of Trader (A)	Cumulative Frequency (B)	% of traders ($C = \frac{A}{\text{No. of Trader}} * 100$)	Cumulative % of trader ($D=B/36*100$)	Quantity Purchased (in No)(E)	Total Quantity Purchased (F=A*E)	% Share of Purchase (G=F/2268)	Cum. of % Purchase
1	1	2.78	2.78	265	265	11.69	11.69
1	2	2.78	5.56	212	212	9.35	21.04
1	3	2.78	8.33	199	199	8.81	29.86
2	5	5.56	13.89	127	254	11.23	41.09
1	6	2.78	16.67	121	121	5.34	46.42
1	7	2.78	19.44	116	116	5.14	51.57
1	8	2.78	22.22	97	97	4.32	55.88
1	9	2.78	25	95	95	4.21	60.09
1	10	2.78	27.78	94	94	4.16	64.25
1	11	2.78	30.56	71	71	3.16	67.42
1	12	2.78	33.33	71	71	3.15	70.56
1	13	2.78	36.11	58	58	2.56	73.13
1	14	2.78	38.89	54	54	2.40	75.53
1	15	2.78	41.67	53	53	2.34	77.87
1	16	2.78	44.44	50	50	2.20	80.07
1	17	2.78	47.22	42	42	1.87	81.95
2	19	5.56	52.78	37	74	3.24	85.18
1	20	2.78	55.56	33	33	1.48	86.67
1	21	2.78	58.33	27	27	1.18	87.85
4	25	11.11	69.44	26.5	106	4.68	92.53
1	26	2.78	72.22	25	25	1.09	93.62
1	27	2.78	75	21	21	0.94	94.55
1	28	2.78	77.78	18	18	0.82	95.37
1	29	2.78	80.56	17	17	0.76	96.13
2	31	5.56	86.11	16	32	0.14	97.54
1	32	2.78	88.89	13	13	0.58	98.12
1	33	2.78	91.67	13	13	0.57	98.69
2	35	5.56	97.22	10	20	0.89	99.59
1	36	2.78	100	9	9	0.40	100
		100			2268		

Degree of Marketing Transparency: One of the characteristics of a perfectly competitive market structure is availability and easy dissemination of market information. The presence of important information about market price, supply and demand, and traders' satisfaction with this information play a critical role in any market structure. According to information gained from the Dera district trade and marketing development office, there is an organized price information center summarizing the weekly price of crops. But traders have no culture of using this information by looking forward price board rather sell and buy their product at the current market price. It is a fact that traders in the study area are not aware of the modernized price information center. The findings of the survey show that 53% and 47% of traders get market information through (personal observation & from other teff traders) and telephone respectively though about 44% of the traders were not satisfied by the knowledge and the reason behind that was the flexibility of teff price even within a day. Among sampled traders, 65% of them replied that teff market price is volatile within the same market center and market day and indicated this as a big problem in receiving information on cost, supply and demand for teff in the study area. It demonstrates how opaque the market is.

- Conduct of Teff Market

Market conduct refers to the marketing actors' exchange practice and pricing behavior to adjust the marketing atmosphere viable to sell and buy [25]. It is vital to examine the influence of the existing market structure and the negotiation capacity of market participants. In this study, the teff market conduct has been analyzed using information like selling and buying behaviors and the price-setting strategy of sampled traders.

Producers and Traders Price Setting Strategy: The way a market price is set up is a crucial factor in making sellers and buyers agree on any market price. According to the findings of this survey, 41% of the households traded teff at agreed market price. In comparison, 26% and 33% of households sold their teff on the price set by buyers and with bargaining, respectively. The chi-square test, on the other hand, reveals an abundant variation at a significance level of less than 1%. It confirms that few households bargain on the market price while others take home to sell on another market day (67%). The result also depicts that 53% of the sampled traders set teff price by the market while 47% of buyers and 25% of sellers replied that they agreed upon negotiation. This figure is aligned with the founding of Legese [31] on Teff. In Aribgebya, 28.6% of sampled traders accepted market prices, while 42.9% set market prices by themselves. This result is consistent to Geremewe [30] though the extent varies. Table 5 describes the pricing strategy of producers and traders.

Table 5. Pricing strategy in teff market in the study area. *Source: Survey results of authors' research*

Variable	Categories	Name of market				Total	χ^2 Value
		Anbessame	Aribgebya	Woreta	Bahirdar		
Traders buying price set up	Negotiation b/n the seller and me	4(36.4)	7 (50)	3 (60)	1 (50)	15 (46.9)	0.897
	by the market	7(63.6)	7 (50)	2 (40)	1 (50)	17 (53.1)	
Traders selling price Set up	by the market	8(72.7)	4 (28.6)	4 (80)	1 (50)	17 (53.1)	9.064
	by purchasers	1 (9.1)	6 (42.9)	0	0	7 (21.9)	
	Negotiation b/n the buyer and me	2 (18.2)	1 (28.6)	1 (20)	1 (50)	8 (25)	
Producers selling prices set up	Buyers	9 (9.3)	36 (48.7)			45 (26.3)	33.66***
	Set by market	48 (49.5)	22 (29.7)			70 (40.9)	
	Negotiation	40 (41.2)	16 (21.6)			56 (32.8)	

Note: (Values in parenthesis are percentages, (***) significance level at less than 1%

The number of marketplaces visited per week by the traders in the sale of teff ranged from one to three. As shown in table 6, retailers (56% of traders) were better at visiting many markets to sell their teff. However, the variation was insignificant, depicting that most traders go to least one product market.

Table 6. Number of markets visited by traders per week. *Source: Survey results of authors' research*

Type of trader	Number of marketplaces the trader visited			Total	χ^2 Value
	1	2	3		
Wholesaler	2	0	1	3	23.54***
Rural retailer	5	5	1	11	
Urban retailer	0	1	6	7	
Rural assembler	1	0	0	1	
Urban assembler	8	2	0	10	

(***) shows significance level at less than 1%

Term of Payment: Concerning the payment strategy, the household survey result depicted that 80.7% of sample producers sold their teff in cash on the spot market, whereas 7.6% reported that they received the money on other days after the transaction. The other part of producers (11.7%) has replied that they take their money after some hours of exchange within the same marketing day as indicated in table 7. These are producers who sell their teff to assemblers since some of the assemblers collect teff from producers and submit to wholesalers and gain the money from wholesalers who in turn paid to producers. Term of payment for traders and processors was hand to hand in cash at the time of transaction.

Table 7. Payment time in teff marketing. *Source: Survey results of authors' research*

Payment Categories	Description	
	Frequency	Per cent
As soon as the transaction takes place	138	80.7
After some hours of the transaction	20	11.7
On other days after-sale	13	7.6

- Performance of the Teff market

Marketing Costs of Traders: The marketing cost of teff trade for various marketing actors is calculated and presented in Table 8. The highest average marketing cost of the trader category is registered by the cost of storage loss (24.38 birr/quintal), followed by the price of truck rent (17.28 birr/quintal). It supports the reality that most traders are victims of lack of own trucks for transporting teff and the storage loss is also apparent because of solid mouse ordinary in every store. The storage loss is also due to diseases by red teff worm lowering the quality of teff as fluctuating markets restrict traders to store teff for a more extended period. Cost of sack, loading and unloading and communication prices are valuable as they have a significant contribution to the marketing cost involved in teff trade. Urban retailers and wholesalers incur the highest marketing cost in teff trading business, accounting for 87.84 and 79.30 birrs per quintal, respectively, following processors (350). The average transaction cost of teff from the production site to the end-users is 113.49 birr per quintal. The higher the marketing cost by actors in marketing channels, the lower the relative competence of the marketing channel in the market chain as actors with higher prices are unviable to resist in the track.

The teff market chain actors' average selling price and market margins were 1427.14 birr and 12.45 birr per quintal. Processors, on the other hand, had the greatest market income and annual earnings share of 51.57% and 76.05%, respectively. It is the fact that processors add more value than other chain actors in the supply of teff to consumers.

Table 8. Marketing costs and benefit shares of Traders (Qt). *Source: Survey results of authors' research*

Cost items (Mean birr per Qt)	Type of Trader							Total
	Wholesaler	Rural retailer	Urban retailer	Rural assembler	Urban assembler	Processor	Cooperative	
Sack	10	8.91 (1.044)	9.71 (0.756)	10	9.2 (1.03)	9.33	10	9.31 (0.96)
Packing	2	2	2	2	2	1.33	2	2
Loading & unloading	10	10.18 (0.603)	10	10	10	0	10	10.06 (0.35)
Storage	0	0	0.29 (0.756)	0	0.45 (0.96)	0	0	0.2 (0.65)
Storage loss	30 (5)	25.36 (2.27)	31.14 (5.08)	20	17.30 (4.03)	20	18	24.38 (6.66)
Cost of cart	0.67 (1.16)	1.64 (0.809)	0.86 (1.07)	0	1.2 (1.03)	0	0	1.19 (0.99)
Truck	15 (13.23)	11.82 (11.46)	23.57 (11.07)	23	19 (10.49)	0	25	17.28 (11.46)
Communication	4.84 (0.35)	3.66 (1.1)	3.85 (0.43)	1.96	2.04 (0.43)	128.33	2.05	3.25 (1.18)
Personal expense	6.79 (0.45)	6.29 (0.77)	6.42 (0.86)	3.92	4.51 (0.95)	191.67	2.83	5.74 (1.24)
Total Cost	79.30	69.86	87.84	70.88	65.69	350	70.88	113.49
Average selling price	1284	1253	1376	1200	1217	2400	1260	1427.14
Average marketing Margin	5.26	8.61	6.69	5.81	5.66	44.94	10.17	12.45
% share of margin	6.04	9.88	7.68	6.67	6.49	51.57	11.67	100
Average Profit margin	18.7	63.47	40.07	9.12	21.31	704.25	69.12	132.29
% share of profit	2.02	6.85	4.33	0.99	2.3	76.05	7.46	100

Note: Values in the parenthesis represent standard deviations.

Marketing Margin: Every point of the sales channels takes a portion of the total weighted average selling price, which is known as the marketing margin [32]. The margin should cover the costs of moving the product from one phase to the next while also creating a clear benefit to the marketing actors involved. Table 9 summarizes the marketing margins received by each teff market actor in different channels. The overall gross marketing margin, or the total consumer price remaining for each actor, for Channels 5 and 9 was the largest and lowest, respectively. The producers' gross market margin is most elevated in channel nine (89.27%), indicating the best teff market channel to participate, leaving the shortest producer-consumer track (channel XI), while the lowest producer share

of margin is in channel V (46.33%) which is not recommended to enter as their benefit decreases. Producers also have a considerable margin in channels IV, I, VII, X and VI. The share of producer pricing grows in a small number in the route since value-adding marketing players stretching the chain are not there. Even though the number of intermediaries in channels III, IV, VI and VIII is similar, the producer margin is different. In channels III and VIII, the presence of processors (add higher value, incur high cost and get a most prominent share of consumers price) strictly lowers the producers' benefit. On the other hand, the channel with more teff supplied does not necessarily bring the largest share of producer market margin. Channel II stands first in marketing the enormous amount of teff despite channel nine, which was the fourth in dealing many quantities of teff bring highest producer share of margin without considering channel XI (producer sold to consumer directly). Hence, producers should be aware of marketing value-added teff in the shortest market channel if the number of intermediaries increases in the chain, the share of producers' price from end-buyers price becomes smaller.

Next to producers, the uppermost total profit is maintained by processors in the eighth channel (47.71%), followed by the third channel, while the best and worst net marketing margin is in the eighth channel by processors and seventh channel by wholesalers, respectively.

Table 9. Teff Marketing margins of various marketing channels. *Source: Survey results of authors' research*

Market Margin	Marketing channels									
	I	II	III	IV	V	VI	VII	VIII	IX	X
Total Gross Margin	18.60	52.38	52.38	12.85	53.67	19.19	18.60	53.33	10.76	18.60
Gross Market Margin of Rural Assemblers	5.81									
Gross Market Margin of Urban Assemblers				6.11	3.25	7.63				
Gross Market Margin of Rural Retailers							9.45	5.63	10.76	
Gross Market Margin of Urban Retailers	6.39	3.67			3.67	11.56	6.39			
Gross Market Margin of Wholesalers	6.39	6.04	5.54	6.74	4.08		2.76			8.43
Gross Market Margin of Processors		42.67	46.83		42.67			47.71		
Gross Market Margin of Cooperatives										10.17
Gross Market Margin of Producers	81.40	47.62	47.62	87.15	46.33	80.81	81.40	46.67	89.27	81.40
Net Marketing Margin of Rural Assemblers	0.66									
Net Marketing Margin of Urban Assemblers				0.96	0.51	2.86				
Net Marketing Margin of Rural Retailers							4.37	2.71	5.19	
Net Marketing Margin of Urban Retailers	0.01	0.01			0.01	5.17	0.01			12.22
Net Marketing Margin of Wholesalers	0.63	2.74	2.24	0.53	0.78		-3.00			
Net Marketing Margin of Processors		28.08	32.25		28.08			33.13		
Net Marketing Margin of Cooperatives										5.02

Wholesalers get the lowest benefit in the seventh channel of table 9, having only 2.76% of consumers' price. It is because of the inverted and illegal flow of teff from retailer to wholesaler. The impure, shelled, not graded, low-quality teff was sold to wholesalers at a relatively high price. Local retailers have no access to retail in the district market since local consumers were better to purchase teff from producers rather than retailers. Then wholesalers are obligated to sell this low-quality teff to urban retailers mixing with the better quality at a lower price made them incur a loss.

The study's findings revealed that the chain's total gross marketing margin was 31.04%, associated with 68.96% of producers' share of margin. The total Gross marketing margin of teff is low compared to that of chickpea (45.8%) and relatively better than that of hot pepper (29%), according to Tefera [33] and Tesfaw et al. [23] respectively.

Marketing Profit: Marketing profit is the difference in selling and purchasing price, including other transaction costs by each market participant and market channel. It is gained by transferring a product in different channels using marketing intermediaries. As shown in Table 10, the marketing profit gained by processors in the eighth channel is attractive. The lowest market profit in the seventh channel by wholesalers is not good looking as discussed above in the marketing margin part. Urban assemblers and urban retailers receive the best marketing profit in the fourth and tenth channel by having (39.31 and 168.16 birr per quintal) selling teff directly to wholesalers and consumers. Profits of urban retailers were low except in the tenth channel compared to other marketing actors mostly (0.1 birr/quintal), and this indicates that urban retailers purchase teff usually from wholesalers and rural retailers in which the price variation is tiny (just for only retailing).

Wholesalers uphold their exciting profit in the second channel (65.7 birr/quintal) comparing other media they participate in since they purchase marketable quality teff from producer farmers directly by themselves. In general, traders in the research area found the teff market channel to be fascinating, whereas the seventh channel was unsatisfactory and unadvisable. This result is in line with that of Hailegiorgis et al. [34] who found that traders can get better margin when they purchase the product directly from farmers to add values and supply to end users.

Currently, there are some visible limitations in the teff market chain which needs to be attempted by applying important strategies.

Limitations

- High transaction cost and inverted flow of products
- Price fluctuations
- Low performance
- Traditional marketing system

Strategies

- Promoting digital and online marketing as part innovation.
- Getting Value addition technologies and awareness creation.
- Contract farming for farmers sustainable price guarantee and traders bulk purchase.
- Auditing and inspection for some corrupted brokers that hinder competitiveness of the teff market.

Table 10. Teff marketing traders profit in different marketing channels. *Source: Survey results of authors' research*

Marketing actors		Marketing channels									
		I	II	III	IV	V	VI	VII	VIII	IX	X
Rural assembler	Purchase price	1120									
	Market cost	70.88									
	Selling price	1200									
	Market profit	9.12									
Urban Assembler	Purchase price				1112	1112	1112				
	Market cost				65.69	65.69	65.69				
	Selling price				1190	1190	1217				
	Market profit				12.31	12.31	39.31				
Rural Retailer	Purchase price							1120	1120	1120	
	Market cost							69.86	69.86	69.86	
	Selling price							1250	1255	1255	
	Market profit							60.14	65.14	65.14	
Urban retailer	Purchase price	1288	1288			1288	1217	1288			1120
	Market cost	87.84	87.84			87.84	87.84	87.84			87.84
	Selling price	1376	1376			1376	1376	1376			1376
	Market profit	0.16	0.16			0.16	71.16	0.16			168.16
Wholesaler	Purchase price	1200	1143	1143	1190	1190		1250			
	Market cost	79.30	79.30	79.30	79.30	79.30		79.30			
	Selling price	1288	1288	1276	1276	1288		1288			
	Market profit	8.7	65.7	53.7	6.7	18.7		-41.3			
Processor	Purchase price		1376	1376		1376			1255		
	Market cost		350	350		350			350		
	Selling price		2400	2400		2400			2400		
	Market profit		674	774		674			795		
Cooperative	Purchase price										1120
	Market cost										70.88
	Selling price										1260
	Market profit										69.12

Impact

The findings of this study are crucial for the local market sustainable development as it infers the fruitful aspects of building efficient teff market. It is also critical for the scientific community in sharing international experiences of market chain analysis considering essential methodologies.

The type of market in the area is weakly oligopolistic in which few individual traders control the flow of teff. This requires government agencies to work hard in creating a competitive and efficient market which includes creating a conducive environment for new entrants by shortening the stretched license procedure and dealing it in one place as it lowers the transport and other unofficial costs. To have a conducive teff market, the bargaining power of producers must be enhanced by supplying quality products with agreed-upon prices with wholesalers.

The highest average marketing cost of the trader was due to the traditional storage followed by infrastructure, typically road construction, even to have a better renting price of trucks and Isuzu. Hence, giving traders opportunities to have a modernized storage area/shed/shed/ at least in a group is better. The inverted flow of teff

from retailer to wholesaler must be stopped, which is illegal and irrelevant. The trade and industry office had a better train and advised rural retailers who collect and mix adulterated and quality teff to pass to wholesalers.

Conclusions

The market received 57.7% of the total teff produced in the research area, which was allocated from farmers to producers. The most important marketing actors of the teff market chain were producers, rural retailers, urban retailers, rural assemblers and urban assemblers, processors (small *Injera* shop, café and restaurant) and cooperatives. About eleven marketing channels were identified in transferring 2268 Qt teff from producers to final consumers, of which four are dominant. Among them, rural retailers, wholesalers and consumers held the higher share in purchasing teff from the farmer and transferring to end buyers.

The concentration ratio in the Anbessame market for teff was 35.46%, indicating a weakly oligopolistic market which makes it less competitive and ineffective. It is coupled with the critical entry barriers of the teff market, such as more prolonged procedural license, lack of adequate capital, high tax rate, and price fluctuation. The problem of getting timely and relevant market information was found to be a severe problem which in turn was reflected in price setting and mode of payment, making the market conduct that is skewed to one of the market actors, especially to the traders. In this regard, teff's market behavior reveals that producers' selling prices were decided by the market (41%), through seller-buyer bargaining (33%), and simply by consumers (26%). However, few households negotiate on selling price as the major turn it back to sell on another market day at better price (67%). The maximum number of markets visited by traders was three days a week and was by urban traders typically.

The total gross market margin for teff was 31.04%, with 68.96% of the margin going to the producers. This margin varies by channel, with the biggest overall gross marketing margins in channels II, III, V, and VIII, respectively, accounting for 52.38%, 52.38%, 53.67%, and 53.33%. The result shows that the producer share itself varies along channels, with the highest producer share in channel IX (89.24%). Processors have the largest net marketing margin (33.13), while wholesalers have the lowest (-3.0) due to the inverted and unlawful flow of teff from retailer to wholesaler. Moreover, the channel with more teff supplied is not necessarily the channel in which the highest market margin is recorded. The highest market margin depends on the presence of value-adding market actors in the channel.

Conflict of Interest

There is no conflict of interest to declare.

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