



Research Article

Market chain analysis of Teff in Tole Woreda, Ethiopia

Tariku Legese Dibaba*

Department of Agricultural Economics, College of Agriculture, Oda Bultum University, Ethiopia

Received: 05 November, 2020

Accepted: 21 January, 2021

Published: 22 January, 2021

*Corresponding author: Tariku Legese Dibaba, Department of Agricultural Economics, College of Agriculture, Oda Bultum University, Ethiopia, Tel: +251912282198; E-mail: obseeabdi12@gmail.com

Keywords: Market chain analysis; Multivariate probit; OLS; Outlet choice; Tole; SCP; Teff

<https://www.peertechz.com>



Check for updates

Abstract

Teff accounts for the largest share of the cultivated area and the major cash crops grown mainly for market in the study area. But the nature of the product and lack of proper functioning marketing system often resulted in lower producers' price. The current research attempted to analyze the market chain of teff in Tole woreda Oromia Region of Ethiopia with specific objective of assessing the structure-conduct-performance paradigm of teff, identifying major factors influencing market outlet choice of teff producing farmers and to determine factors affecting amount of market supply of teff by farm households in Tole woreda. Data for the study were collected from both primary and secondary sources. The primary data were generated from farmers and traders survey. A total of 122 teff producing sample households from four teff producing kebeles of the woreda and 42 teff traders from six teff marketing town were surveyed. Both descriptive and econometrics analyses were conducted. The structure-conduct-performance approach was used to evaluate teff market performance. The Market concentration ratio of largest four firms at the woreda level was 59.44% which indicated oligopolistic market structure. The econometric model results indicated that the amount of teff supply to market was significantly affected by age, educational status, total land holding, amount of credit used for teff production, number of oxen owned by household, lag market price of teff and Distance from home to all weather road at 1, 5, 10% significance level. The multivariate probit model results indicated that age, sex, educational status, frequency of extension contact, off-farm activities, total land allocated for teff, access to information and family size significantly influenced teff producer's choice of market outlets for their produce. Thus, the government and concerned stockholders should expand equal accessibility of infrastructures such as road and transportation facilities to reducing transaction to promote the effective marketing of teff product supply through all outlets.

Introduction

Background of the study

Ethiopia produces more cereal crops than other agricultural products with Cereals account for more than 60% of rural employment, 81% of total cultivated land, more than 42% of atypical household's food expenditure and more than 60% of total calorie intake [1]. Out of the total grain crop area in the country, 81.27% (10.22million ha) was under cereals. Cereals Teff is the first In Ethiopia area coverage and production. The scientific name of *teff* is *Eragrostisteff* (Zucc.) (Vavilov, 1951). In oromia regional state, the land allocated for the production of *teff* in the year 2017 was 1,441,029.78ha. Moreover, the regional production of *teff* in the year 2017 was 24,737,963.79 quintal with the productivity of 17.17qu/ha which is greater than the productivity of the country 16.64qu/ha [2].

Teff is the highest-priced cereal grown in the country due to long marketing chain with little or no value addition. The National *teff* Strategy has been prepared following a value

chain approach, which includes coordination of all steps in the chain, adding value at each stage, and a marketing approach to address local, national, and international consumer demand [3].

Ethiopian agriculture sector continues to face a number of problems and challenges until now. The major ones are absence of well-functioning markets and adverse climatic conditions need mention [4]. The nature of the product and lack of proper functioning marketing system often resulted in lower producers' price. According to Efa, et al. [5] poor market linkages, collusion of buyers on price setting, high transport cost and access to nearest market are the major marketing problem.

Some research conducted on marketing participation of smallholder farmers in different teff producing areas. Mohammad (2011) and Azeb [6] conducted a study on market chain of teff, wheat and analyses of the teff market participation of farm households respectively. But they fail to study the farmer's market outlet choice of teff and no such



previous studies have been conducted in Tole woreda. This study therefore, has attempted to contribute in filling the information gap by identifying factors affecting *teff* market supply and market choice outlet of farmers in Tole woreda.

Research methodology

Description of the study area: Tole Woreda is located in South west from capital city Addis Ababa and East from the administrative town, Woliso. Bantu is the *Worde* administrative town since 1936 and it is located at 85 km to the south west of Addis Ababa and 80 km to the East from the zonal administrative town Woliso. The *woreda* has 24 *kebeles* (22 rural and 2 urban *kebeles*). Tole woreda is located between 8° 28'N- 8° 47'N and 38° 17' 1/2 E- 38° 29'E and its total area is 41,019 hectares which is only 6% of the zonal area. It is bordered on the southwest by Kokir, on the west by Bacho, on the northwest by Elu, on the northeast by the Awash River which separates it from Sebeta hawas, and on the east and south by Kersana Kondaltiti. The Population projection values of 2017 population census report, the total population of Tole woreda is 80,199, of whom 40,551 were men and 39,648 were women, 4,202 of its population were urban dwellers. The elevation of the area ranges between 2100- 3080 masl (OWUDB, 2017). Tole woreda has only Dega (temperate climate) and Woina Dega (sub-tropical climate) agro climatic zone, which accounts 20% and 80% respectively. It experiences average temperature between 18°C and 20°C and annual rainfall varies between 1600 and 2000mm.

Climate: Tole woreda has good climatic conditions and this is an opportunity for cereal crops. The elevation of the area ranges between 2100- 3080 masl (OWUDB, 2017). Tole woreda has only Dega (temperate climate) and Woina Dega (sub-tropical climate) agro climatic zone, which accounts 20% and 80% respectively. It experiences average temperature between 18 and 20°C annual rainfall varies between 1600 and 2000mm the main rainfall starts in June and ends in September. In the woreda Vertisols (Black basaltic soils), Nitosols (Red basaltic soils) and Cambisol (Shallow and sandy soils with coarse texture) type of soils are mainly identified (OWUDB, 2017).

Land use: Tole Woreda has various land use types that could be classified into arable land, irrigated land, grazing land, common land, land covered by water, land used for social service and forest land. The woreda has a total area of 41,019 ha of which 28,843.74ha arable land, 348ha forest land, 212.68ha covered by water, 572.44ha common land, 437.93ha land used for social service and 1776.4ha grazing land [6].

The farming system is characterized by mixed crop-livestock farming. Farmers produce different crop enterprises in the rain-fed farming in order to secure their family food supply and also cover various household expenses. The major crops grown in the woreda include *Teff*, wheat, barley, rough pea and maize. *Teff* and wheat are the major sources of daily food of the population [6] Figure 1.

Data types, sources and methods of data collection

Qualitative and quantitative data were estimated to get the overall picture of *teff* producers and traders in the study area.

Sources of data

Primary and secondary sources of data were used. Primary data sources were smallholder farmers randomly selected from different rural *kebeles*, and traders at different levels ranging from farmer traders to regional level wholesales. The source of secondary data list of different and relevant published and unpublished reports as well as bulletins from CSA.

Sampling technique and sample size

Sampling techniques: In this study a multi stage sampling procedure was used to select the rural *kebeles* and sample households. Tole woreda was purposively selected based on its potential production of *teff* from the SW Shewa zone. In the first stage, Tole woreda *kebeles* were stratified into producer and non-producer of *teff*. Since three *kebeles* were town *kebeles* they are not produce *teff* and three *kebeles* were found in Dega agro climate almost all of them participated in producing barley and inset rather than *teff*. Totally Out of the 24 *kebeles* in Tole woreda and 5 *kebeles* did not produce *teff* whereas 19 *kebeles* were *teff* producer. In the second stage 19 *teff* producer *kebele* is purposively selected. From these *teff* producing *kebeles* 4 *kebele* were selected randomly. Since the population and area of production were homogeneous to producer the selected *kebele* was almost representative to the woreda. In the third stage, sample respondents households was randomly taken from each selected *kebeles* probability proportional to the size of their sample *teff* producer distribution. The study was also target to trader of the *teff* in the study area. The sites for the trader were towns market in which a better sample of *teff* traders existed. On the basis of flow of *teff*, 6 markets (kusaye, Habebe, Bantu, Asigor, Sebeta and Alemgena) were selected. The sample size determination was employed using the formula given by Yamane [7].

$$n = \frac{N}{1 + N(e)^2} = \frac{13572}{1 + 13572(0.09)^2} = 122 \quad (1)$$

Where: n= the sample size needed.

N= the total number of *teff* producer households in the woreda which were 13572.

e = margin of error and for this study 9% was be used to obtain manageable sample size.

Generally, from 6 regional wholesalers, 27 farmer traders, 14 urban wholesalers 4 regional retailers, 18 urban retailers 4, 17, 7, 3, and 9 were selected randomly based on probability proportional to size in the selected market. In addition, 2 commission men were randomly taken which make the total 42 participants.

Methods of data collection

Primary data was collected using semi-structured questionnaires from *teff* traders and *teff* producers and interview from key informative. The key informant was done by interviewing in-personal the people like leaders of each of the *kebele*, DAs and woreda trade, industry and urban development.

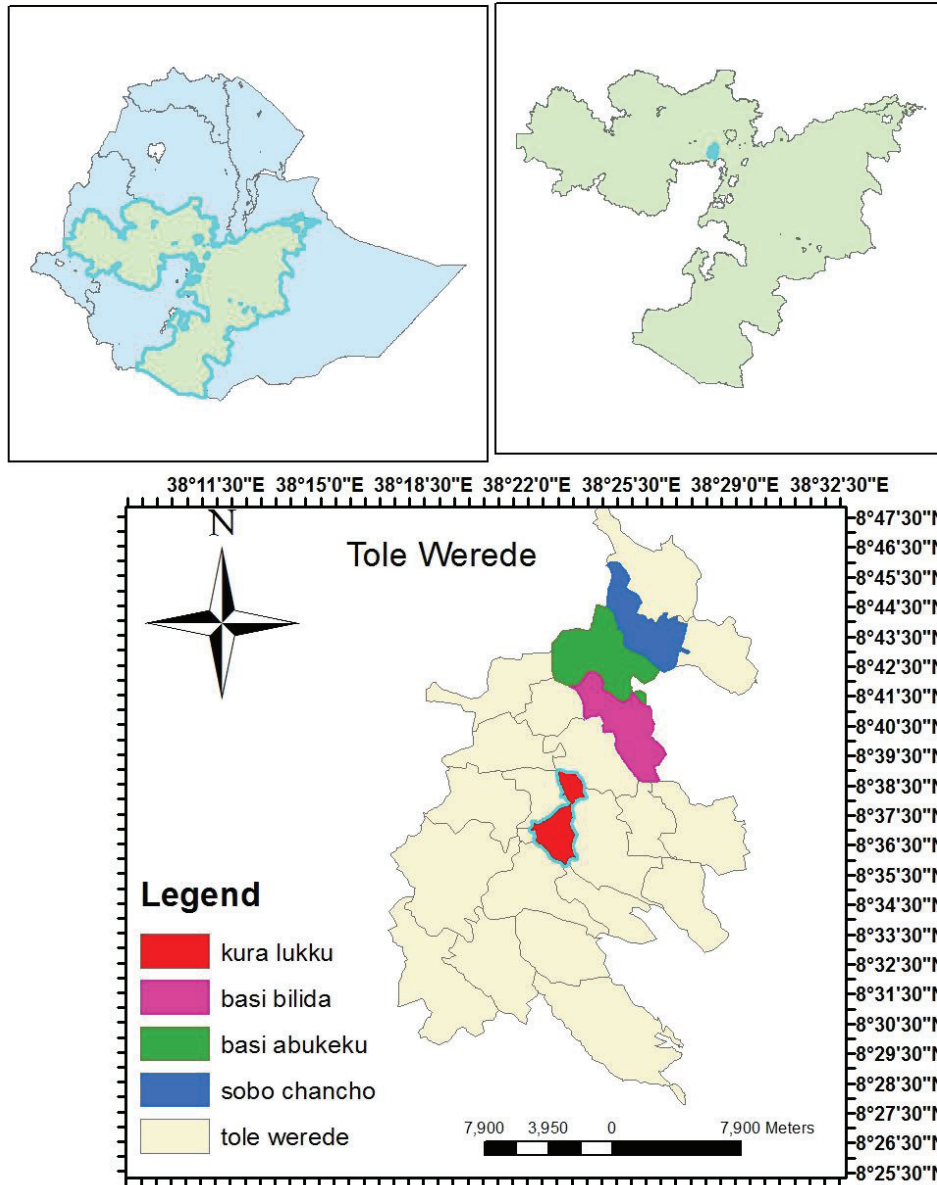


Figure 1: Map of the study woreda.

Methods of data analysis

For these study two types of data analysis, namely descriptive statistics for qualitative data and econometric analysis for quantitative data were used for data analysis.

Descriptive statistics

Descriptive statistics such as mean, standard deviation and percentage have been used in the process of examining and describing household characteristics, marketing functions and trader characteristics.

Structure conduct performance (S-C-P) model

This approach was developed in the United States as a tool to analyze the market organization of the industrial sector

and then it was applied to assess the agricultural marketing system [8]. The model examines the fundamental relationships between market structure, conduct and performance.

The producers' share is the commonly employed ratio calculated mathematically as, the ratio of producers' price (ex-vessel) to consumers' price (retail). Mathematically, producers' share can be expressed as:

$$PS = \frac{Px}{Pr} = 1 - \frac{MM}{Pr} \tag{2}$$

Where: PS = Producers' share Px = Producers price of teff

Pr = Retail price of teff which is consumer price MM = marketing margin



Total Gross Marketing Margin (TGMM) is always related to the final price paid by the end buyer and is expressed as percentage [9].

$$TGMM = \frac{\text{end buyer price} - \text{first seller price}}{\text{end buyer (consumer) price}} \times 100 \quad (3)$$

The TGMM is useful to calculate producer's gross marketing margin (GMMp) which is the portion of the price paid by the consumer that goes to the producer. The producer's margin is calculated as:

$$GMMp = \frac{\text{end buyer price} - \text{total growth marketing margin}}{\text{end buyer price}} \times 100 \quad (4)$$

$$NMM = \frac{TGMM - \text{marketing cost}}{\text{producers price}} \times 100$$

Where: NMM=Net Marketing Margin

To find the benefit share of each actor the same concept was applied with some adjustments. In analyzing margins then, marketing margin at a given stage (GMM) was computed as

$$GMM = \frac{\text{selling price} - \text{buying price}}{\text{consumer price}} \times 100 \quad (6)$$

Econometric analysis

Econometric model for the amount of teff market supply :

Different models can be employed to analyze the determinants of market supply. The commonly used ones are multiple linear regression, Tobit and Heckman's sample selection models. In the study area all *teff* producers participate in the market by supplying their produce and therefore there is no clustering of *teff* producers in *teff* market participant and non-participant. Thus, for this study, multiple linear regression models was used to identify determinants of *teff* marketed supply. In matrix form was specified as:

$$Y = \beta X + U_i \quad (7)$$

Where Y = Total teff supplied to the market

β = a vector of estimated coefficient of the explanatory variables

X = vector of explanatory variables

U_i = disturbance term

Determinants of market outlet choice

Multivariate probit model (MVP) was applied for household variation in the choice of a market outlet and to estimate several correlated binary outcomes jointly. The market outlets had been categorized into four groups: wholesaler, farmer traders, retailers and consumer market outlets. Each farmer can use one or more marketing outlets or several combinations of different outlets which maximize the expected utility and due to this there was some overlapping and many farmers sell on more than one market outlet.

Results and discussion

Demographics and socioeconomics characteristics of households

In this study, based on the result of the survey, both male headed household and female headed household participated in production of *teff* (Table 1). The survey result showed the total sampled population of *teff* producers was 81.1% of male-headed household and 18.9 % of female-headed indicating that male headed households dominate *teff* production as expected.

The educational background of the sample household heads was believed to be an important role adoption of new yield enhancing technology and crop pattern. Further, it was assumed that household head with good education level and had better understanding about the prevailing market scenario. About 41.8% household heads were illiterate. However, 15.6%, 26.2%, 13.1% and 3.3% had basic education, primary, secondary school and higher education respectively Table 2.

The survey on this major demographic factor, measured in years, provided a clue on working ages of households. The average household head's age was 42.93, which ranges between 22 and 82 years, where largest proportions of the household head was within the productive age (amid of 15

Table 1: Sample distribution of *teff* traders.

Market	Traders	Number of traders	No. traders selected
Kusaye	Farmer trader	10	7
Habebe	Farmer trader	12	8
Bantu	Farmer traders	5	2
	R. wholesalers	6	4
	R. retailers	4	3
Asgori	Wholesalers	8	4
	Retailers	4	2
Sebata	Wholesalers	4	2
	Retailers	6	3
Alemgena	Wholesalers	2	1
	Retailers	8	4
Total		69	40

Table 2: Sex and educational status of *teff* producing households.

Variables	Total household	%
Sex		
Male	99	81.1
Female	23	18.9
Education		
Illiterate	51	41.8
Basic education	19	15.6
Primary education	32	26.2
Secondary education	16	13.1
Higher education	4	3.3
Access to extension service		
Yes	71	58.2
No	51	41.8
Access to credit		
Yes	38	31.1
No	84	68.9
Access to information	103	84.4

Source: Own survey result (2018)

and 64 years). A family size was ranging between (1-11) was observed in the sampled farming households; the available data indicated that average family size in each household was 5.82. Availability and adequacy of road was important prerequisite to link producers with markets in reduced transaction costs. The assessments on this continuum, measured in kilometer where most households could access the entry within 3.54 km on average was approximately one hour of normal walk.

Teff marketing channels

The analysis of marketing channel intended to provide a systematic knowledge of the flow of the goods and services from its origin of production to the final destination of ultimate consumers. The survey result of sampled respondents depicts, out of 4442.5 quintals of *teff* produced, 2262 quintals 50.32% of *teff* marketed. Even though the *teff* channel in Tole woreda was complicated, the major channels of *teff* identified during the survey were explained as follows Figure 2:

Analysis of structure, conduct and performance of teff

Structure of the *teff* market: The structure of the *teff* market is characterized using indicators such as, market concentration, the degree of transparency (market information) and entry conditions.

Degree of market concentration: The analysis of the degree of market concentration was carried in Bantu markets, where regional wholesales, Regional retailer and farmer trader of the commodities were significantly involved. The result of sample market *teff* traders' concentration ratio was found to be 59.44%. The result showed that, the *teff* market concentration ratio in the study area illustrated the presence of strong oligopoly market structure.

Barrier to entry and exit: With the presence of very high barriers to entry, established firms are difficult to stay longer in business. In this study educational background of the traders and lacks of working capital were used to analyze barriers of *teff* market entry and exit.

Level of education: The trader's survey result showed that, about 5.3% of the respondents were illiterate; while the remaining 39.5, 44.7 and 10.5% of traders have attended formal school with the level of primary, secondary and basic education respectively. The majority of the traders were entitled to formal educations which confirmed that trader's educational background seem to be a barrier to entry into *teff* trade.

Lack of working capital: Working capital refers to the amount of money required by *teff* traders to enter into the trading business. According to the survey result, about 71.1% of the sample traders identified that lack of capital was one of the major entry barriers to enter in to *teff* trading. 18.4% also reported that the combination of capital shortage and some government policy on tax were major barriers to enter *teff* trading.

Market: There were no agreement upon procedures for analyzing the elements of market conduct. In this study conduct of *teff* market was analyzed in terms of the trader's price setting, purchasing and selling strategies.

Producers' market

The date from Tole Industry and Urban development Office pointed out that, supply of *teff* occurs mainly from half of November to end February. But the supply started declining in the year from May to September. It is also reported that, all farmers supply their *teff* produce in a year. Simultaneously, all of *teff* producers sold their products on cash basis.

Producers price setting strategy

According to the survey result, price of the product was set by market 69.7%, through negotiation and market 25.4%. The remaining 2.5 and 1.6% of farmer respondents reported that the selling price of their product was set by themselves, traders and market price of that time respectively. The selling strategy of the respondent farmers was open to any buyer.

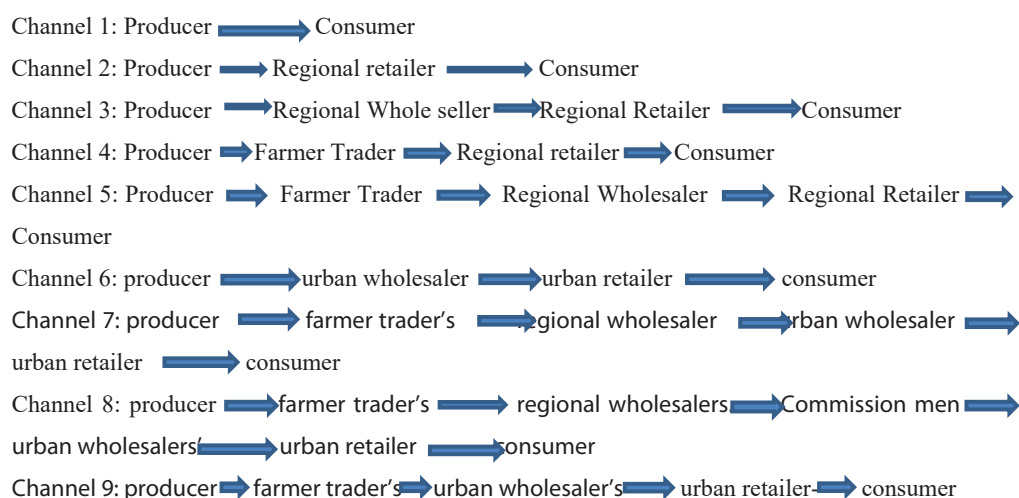


Figure 2: Teff market channel in the study area.



Traders' market

Place to sell: According to the result of survey, all teff traders purchased teff from farmers at the market place.

Selling and buying strategy

Based on the data from sample trader's survey, about 64.8% and 28.9% of respondents reported that buying price was set by the negotiation with supplier for market price of that day and the remaining 5.3% set by negotiation with other traders. On other hand, the survey result revealed that about 84.2% of traders responded that selling price was set by market. While the rest of 15.8% of the respondents said that selling price was set by negotiation with buyer and the market respectively. According to the assessment 5.3% and 50% of traders attracted their suppliers by Gave better price relate to other and offering credit service when they need respectively. Similarly, 44.7% of traders used a combination of offering credit service when they needed and fair scaling approaches to attract their suppliers.

Market performance

Marketing performance of *teff* markets were analyzed by considering associated costs, returns and market margins by taking into consideration the associated market costs for key marketing channels. Based on production costs, marketing costs and purchasing prices of the major market participants along the channels, margins at farmer, farmer traders, wholesalers, regional and urban retailer's levels were estimated and analyzed. The methods employed for analysis of performance in this study were channel comparison, profit share and marketing margin.

Production Cost, Marketing costs and benefit shares of actors in teff marketing channel

Though *teff* producers received different prices as sold to regional whole sellers, regional retailer, urban wholesalers and consumer, the average price was taken on analysis of benefit share of the actors (Table 3). Accordingly for the producers, ploughing, draft power, sowing and weeding cost had got the biggest percentage share of cost of production (21.68%) and followed by land rent cost and harvesting, threshing and container cost which were (21.62%) and (19.93%) respectively Tables 4,5.

In a way of passing product from one actor to another, the actors improved the product quality by sorting, cleaning and creating time utility as well as incur some costs. Compared to producers (96.24%), traders (farmer trader (0.67%), regional wholesalers (1.44%), regional retailer (0.31%), urban wholesalers(1.02%), and urban retailers (0.35%) operating expense is only 3.76% of the total cost but their share of profit margin were 18.31%, 23.50%, 11.19%, 24.29%, and 6.78%, respectively and that of producer was 15.93%. The profit share of farmer trader was (18.71%), regional wholesalers (22.72%) regional retailer (11.67%), urban wholesalers (24.55%), and urban retailers (6.70%). selling traders took 84.85 % share of margin. While

producers, performing all the work of producing quality *teff* and bearing the associated risks, took only 15.15% share of margin.

Marketing margins of teff in different channels

By taking the average sales prices of different participants in the *teff* market chain (producers, farmer traders, regional wholesalers, regional retailer, urban

Table 3: Demographics and Socioeconomics Characteristics of Households.

Variables	Average
Age	42.93
Family size	5.82
Distance to all weather	3.84
Distance to market	3.18
Types of land owned	
Rent land	0.96
Share landa	0.175
Owen land	2.09
Land allocated for teff	2.19

Source: Own survey result (2018)

Table 4: Average production cost/quintal (birr) of *teff* producers in 2017/18.

Input name	Cost/qu	%
Fertilizes (DAP+Urea) per quintal	275	15.68
Herbicides in liter per quintal	7	0.41
Insecticides in liter per quintal	18	1.03
Improved seed of <i>teff</i> per quintala	98	5.59
Labor force per quintal		
✓ Ploughing, draft power sowing and Wedding	371	21.68
✓ Harvesting , threshing and Container(Sack)	344	19.93
Transporting per quintal	31	1.77
land rent per quintal	346	21.62
Other cost (food &drink)	263	12.29
Total production cost	1753	100.00

Source: Own survey result (2018)

Table 5: Average *teff* marketing costs and benefits of actors per quintals.

Marketing cost in channel	Produce	Farme Trader	Regiona w.seller	Regional retailer	Urban W.selle	Urba retail
Purchasing price	00	1898	2013	2168	2119	2332
Production cost	1753	.00	00	00	00	00
Marketing cost						
Storage loss and storage cost						
Sorting, remixing and fill in the sacks	4.15	1.01	.56	–	1.2	3.25
Loading-Unloading	0.50	1.20	2.12	3	2.17	0.25
Transport	6.00	7.00	15.00	–	8.30	0.25
Information cost	.20	.54	.70	0.5	.95	0.75
Electricity cost	–	–	–	0.57	–	0.5
Tax fee	–	–	.35	0.92	0.37	0.75
License fee	–	–	.62	0.42	0.25	0.47
Commission fee	–	–	5.00	–	5.00	–
Personal travel & other	5.00	2.61	2.0	0.25	0.5	0.25
Subtotal mrking cost	15.85	12.36	26.38	5.66	18.74	6.47
Total cost (pro + mkt)	1768.85	12.36	26.38	5.66	18.74	6.47
Total cost (%)	96.24	0.67	1.44	0.31	1.02	0.35
Sale price	1894	2060	2221	2267	2334	2392
Market margin	141	162	208	99	215	60
% share of margin	15.93	18.31	23.50	11.19	24.29	6.78
Gross Profit	125.15	149.64	181.62	93.34	196.26	53.53
% share of profit	15.65	18.71	22.72	11.67	24.55	6.70

Source: Own survey results (2018)



wholesalers and urban retailers) the marketing margins of *teff* was calculated as follows Table 6.

GMMp, GMMft, GMMrws, GMMrr, GMMuws and GMMur are gross marketing margins of producers, farmer trader, regional whole seller, regional retailer, urban whole seller and urban retailers respectively (Table 7).

The survey results showed that, the total gross marketing margin (TGMM) was highest in Channel VIII and IX and was 20.91 and 20.98% respectively (Table 7). From all actors, producers have got highest GMM in channel I when sell direct to consumer but this channel conveys limited amount of *teff* marketed. Again the second largest producers GMM when producer sell to retailer in channel II. However, rural retailers in channel III and V had got the lowest GMM which was accounted for 1.42 percent each.

Analysis of econometric results

Factors Affecting Marketed Supply of Teff to market: Multiple linear regression models were employed to identify the factors. Based on the regression results, the coefficient of determination R² was 0.6504 indicating that a combination of independent variables in the regression model explained 65.04% of the variation in the dependent variable with the remaining 34.96% for uncontrollable factors in the regression model Table 8.

Total land allocated for teff: As expected the total land holding of farmers was significantly and positively influences *teff* market supply at 1% significant level. This indicated that

Table 6: Average price of *teff* at different market levels, % share from consumer price and gross profit in 2017/18.

Marketing channel participant	Selling price/ qu	% share of GMM	Gross profit birr/qt	% share of profit
Producers				
Farmer traders	1894	15.93	125.15	15.65
Regional wholesale	2060	18.31	149.64	18.71
Regional retailers	2221	23.50	181.62	22.72
Urban wholesalers	2267	11.19	93.34	11.67
Urban retailers	2334	24.29	196.26	24.55
Urban wholesalers	2392	6.78	53.53	6.70

Source: Own survey result 2018

Table 7: Marketing margins of *teff* in different channels.

Market margin (%)	I	II	III	IV	V	VI	VII	VIII	IX
TGMM	00	12.31	16.96	19.85	18.30	18.66	20.38	20.91	20.98
GMMp	100	87.69	83.04	80.15	81.7	81.34	79.62	79.09	79.02
GMMft	---	--	----	10.16	8.61	----	8.33	8.33	7.85
GMMrw	---	----	15.54	8.27	8.27	----	4.96	5.17	----
GMMrr	---	12.31	1.42	8.14	1.42	----	----	----	----
GMMuw	---	----	----	---	---	11.79	4.76	4.25	10.30
GMMur	---	----	---	----	----	6.87	2.83	2.83	2.83
Gmmcom	----	----	-----	----	-----	-----	---	0.33	-----

Source: Own survey result (2018)

Table 8: Determinants of amount of *teff* supply to the market by producers.

Variables	Coef.	Robust Std. Err.	T	P> t
Age of household head (AGE)	-.2520362	.1091669	-2.31	0.023
Number of Oxen (NOX)	1.563016	.7120841	2.19	0.030
Education level (EDUHHH)	1.324538	.796024	1.66	0.099
Family size (FMSZ)	-.3710262	.5823387	-0.64	0.525
Sex of household head (SEX)	-2.405324	2.576976	-0.93	0.353
Income from non-farm activity	.0000447	.0000633	0.71	0.481
Frequency of extension contact	-.2235822	.4193454	-0.53	0.595
Amount of credit used for <i>teff</i>	.0009319	.0004529	2.06	0.042
Distance from road	-.9448672	.4918895	-1.92	0.057
lag Price of <i>teff</i>	7.879225	2.42725	3.25	0.002
Own transportation facilities	-1.065889	1.746525	-0.61	0.543
Total land allo <i>teff</i> in Ha	7.859287	2.000736	3.93	0.000
_cons	-5.647146	8.752618	-0.65	0.520
Number of observation				122
F(13, 108)				9.19
Prob > F				0.0000
R-squared				0.6504
Root MSE				10.902

Note: Dependent variable was amount *teff* supplied to the market Source: Own Survey result 2018

the larger hectare of the land size that households had more land allocated for *teff* production and more would be the volume of *teff* marketed. The regression coefficient showed that an increase in land holding of household by one hectare increases the *teff* market supply by 7.85 quintal keeping all other factors held constant. This result was in agreement with the finding of Jaji, et al. [9] implies that on average, increase in the farmers' farm size by one hectare resulted in increase the quantity of pineapples supplied to market holding other things remains constant.

Education level of HHH: Education showed positive effect on *teff* quantity sold with significance level at 10%. On average, if *teff* producer education level increased by one, the amount of *teff* supplied to the market increases by 1.32 quintal if other thing remains constant. The result further indicated that, education has improved the producing household ability to acquire new idea in relation to market information and improved production, which in turn enhanced productivity and thereby increased market supply of *teff*. This was in line with Addisu [10].

Amount of credit used for *teff*: The amount of Credit that farmers used for *teff* production significantly and positively influenced the *teff* market supply of farmers. As the amount credit used for *teff* production increased by one birr, the quantity of *teff* supplied to market increased by 0.093 kilograms, keeping all other factors held constant. This could be explained by the fact that credit is an important institutional service to finance poor farmers for input purchase. Similar results were by Jaji, et al. [9] who found increased in household head's access to credit and increased the pineapple market supply.

Distance from home to all-weather road: The distances of farmer's home from the all-weather road was significantly



and negatively affect the teff supply to market. The results also show that farness of households settlement from all-weather road translates to reduction in volume of teff sold. One km increase in distance to all-weather road decreases the volume of teff output sold by about 0.94 quintal, when other factors are remained constant. In line to this, Mebrahatom [11], found that distance from homestead to all weather roads decrease the quantity of teff sold.

Age of household head: inverse of expected age of the household head significantly and negatively influenced teff market supply. An increase in the age of household head by one year decreased the teff market supply by 0.28quintal, keeping other things constant. Getahun, et al. [12], showed that household's tendency to participate in banana marketing decreases as farmer gets older and older.

Number of Oxen: As expected Ownership of oxen also significantly and positively affected the teff market supply. An increase in ownership of an ox had also strong positive response for increasing volume of teff production and then quantity of teff supply to market. The result of survey also showed that the quantity of teff supplied to market increased by 1.56 quintal from owning one more ox, keeping other things constant. This was in agreement with previous studies conducted by, Berhanu and Moti [13] on Commercialization of smallholders of teff.

Lagged price of Teff in the market: The coefficient of the price of teff which showed a positive relation to the quantity of teff sold or supplied to the market and highly significance at 1% level. The positive and significant relationship between the variables indicated that as the price of teff at market rose, the quantity of teff sold also rose, therefore an increase the quantity of teff sold per household per year was observed. The coefficient of the variable also confirmed that a unit price increase in the teff market directed to the household an increase yearly teff sales by 7.88 quintals, keeping other factors constant. Jaji, et al. [9] also obtain similar results on the market supply of pineapple in Malaysia.

Determinants of teff producers' market outlets choice

The Wald test ($\chi^2(53) = 192.35, p = 0.000$) was highly significant at the 1% level, which indicated that the subset of coefficients of the model was jointly significant and that the explanatory power of the factors included in the model was satisfactory. Furthermore, results of likelihood ratio test in the model ($LR \chi^2(6) = 36.2808, p > \chi^2 = 0.0000$) was statistically significant at 1% level, indicating that the independence of the disturbance terms (independence of market outlets choice) was rejected and there were significant joint correlations for two estimated coefficients across the equations in the models. The likelihood ratio test of the null hypothesis of independence between the market outlets decision ($\rho_{21} = \rho_{31} = \rho_{41} = \rho_{32} = \rho_{42} = \rho_{43} = 0$) was significant at 1%.

Separately considered, the ρ values (ρ_{ij}) indicated the degree of correlation between each pair of dependent variables. The ρ_{21} (correlation between the choice for wholesaler and farmer traders outlet) and ρ_{32} (correlation between the

choice for retailer and wholesalers outlet) were negatively interdependent and significant at the 1% probability level indicating a competitive relationship of wholesaler outlet with farmer traders outlet and retailer outlet while ρ_{43} (correlation between choice of consumer and retailer outlet) were positive and statistically significant at 10% level of significance indicated complementarity relationships between retailer and consumer outlet. This showed that in teff marketing producers used farmer trader's outlets as substitute for wholesaler outlets, and wholesaler outlets as substitute for retailer outlets in Tole district. The simulation results also indicate that the probability that teff producers choose wholesaler, farmer trader, retailer, and consumer market outlet were 69.57%, 65.67%, 45.08% and 49.18% respectively Table 9.

Family Size (Fmlys): Family size was positively and significantly associated with selling teff to wholesalers and consumer at 10% significance level. As the family size increased by one person the probability of choice of wholesale and consumer outlet choice increased by 11.2% and 9.5% respectively. This may implied that large household size was an indicator of labour availability which enables farmers to produce more teff and sell to wholesaler outlets and also deliver it to the final consumer. Similar results was reported by Fikru, et al. (2017) who found that family size was positively and significantly influences the choice of wholesale market than other market.

Sex of Households (SHH) sex of the house hold head was positively and significantly associated with use of wholesaler's outlet at less than 1% significance level and negatively associated with the consumer market outlet choice at 5% significance level. It was also interesting to note that male head producers were more likely to deliver teff to wholesale outlet than female head households. Being a male household increase the probability of wholesale market outlet choice by 12.73% and being a female increase the probability of rural consumer market outlet choice by 8.16%. Findings from other studies for Fischer and Qaim [14] determined factors that affect group membership in Kenya and also showed that female farmers were more likely to join a marketing group than male farmers, thus would most likely sell to a marketing group or cooperative.

Education level of households (Edu): Education level of households had negative significant effect at less than 10% probability level on choosing of retailer outlet. The negative relationship between education level and selling to retailer outlet could be explained by the fact that being educated enhances adoption of new technology to boost their productivity of the production. The result showed that, if the educational level of the household was increased by one, the probability of retailer choice decrease by 16%. The study conducted by Chala. and Chalchisa [15] found that literacy decreases of the probability in choosing the retailer channel for vegetables marketing and increases in choosing wholesaler market channel.

Access to market information (Aceinf): Access to market information was also positively and significantly associated with the likelihood of choosing retailer outlets and negatively



Table 9: Determinants of teff producers market outlet choice.

Variable	Wholesalers			Retailers			Farmer traders			Consumers		
	Coef	RSE	P	Coef	RSE	P	Coef	RSE	P	Coef	RSE	P
Sex HH	.127	.354	.000	-.213	.342	.533	.045	.338	.894	-.816	.339	.016
Age HH	-.042	.012	.001	-.031	.013	.021	.035	.014	.012	.010	.014	.447
Edu	.182	.115	.114	-.323	.133	.016	.012	.119	.918	-.054	.117	.642
Fmlys	.112	.060	.060	-.034	.069	.591	.043	.056	.454	.095	.056	.093
Tollteff	.509	.241	.035	-.022	.189	.905	-.093	.155	.551	-.342	.218	.117
Ox	-.056	.044	.201	-.010	.047	.713	-.015	.050	.762	.056	.046	.222
Tqusol	-.015	.014	.262	.003	.016	.850	-.005	.013	.696	.024	.016	.140
Frexco	.136	.058	.022	-.009	.070	.894	.061	.183	.738	-.040	.192	.831
Accre	-.262	.298	.379	-.380	.122	.209	-.313	.277	.258	.348	.279	.214
Aceinf	-.488	.243	.045	.599	.323	.064	.012	.335	.971	-.015	.016	.354
Dsmr	-.109	.105	.184	.072	.122	.556	-.040	.096	.676	-.006	.094	.945
Dsro	.068	.083	.412	-.019	.100	.849	.141	.074	.056	-.071	.082	.389
Offar	-.022	.070	.748	.128	.077	.095	.014	.069	.836	-.065	-.070	.353
Cons	-.385	.693	.578	1.711	.825	.156	-1.68	.788	.032	.409	.723	.571

Estimated correlation matrix

	Y ₁	Y ₂	Y ₃	Y ₄
Y ₁	1.0000			
Y ₂	-0.676***(.114)	1.0000		
Y ₃	-0.003(.181)	-0.449***(.153)	1.0000	
Y ₄	0.124(.156)	-0.165(.152)	0.075*(.151)	1.0000

Likelihood ratio test of $Y_{21} = Y_{31} = Y_{41} = Y_{32} = Y_{42} = Y_{43} = 0$

chi2 (6) = 36.2808 Prob > chi2 = 0.0000

*, ** and *** imply level of significance at 10, 5 and 1% respectively. RSE is robust standard error, Y₁=Farmer traders, Y₂=Wholesalers, Y₃=Retailer and Y₄=Consumer Source: own survey results (2018)

significantly associated with the choice of wholesaler’s outlet at 10% significance level. The result showed that as the farmers access to market information the probability of choosing the wholesalers market decreased by 48.8% and increased the probability of choice of retailer by 59.9%. The findings of Kassa, et al. [16] confirmed that market information has a positive and significant effect on retailer and consumer channel choice decision of milk producers.

Land allocated for teff (tollteff): Finally, as expected, those farmers who allocated more land for teff production positively and significantly associated with choice of wholesalers outlet at 10%, significance level. Increase of land allocated for teff by one hectares increase the probability of producer choice wholesale market outlet by 50.9%. similar results was observed by Getachew and Nuppenau (2009) who found that large land allocated for banana positively and significantly affects the proportion sold through wholesale market outlets.

Distance to all weather roads: was found to have a significant and positive effect in the decision of choosing farmer traders outlet. The assumption was that the closer a household farm or house to all weather road, the more would be the transportation facilities access and less transport cost. As the distance from all-weather road increase by one kilometer the probability of farmer choice farmer trader’s market outlet increase by 14.1%. This result confirmed the finding of Shewaye [17] that distance to all weather roads was found to have a significant and positive effect in the decision of farmers in choosing rural assemblers haricot bean market outlet.

Age of respondents (Age): The variable was positively and significantly related to the use of farmer trader’s market channel at 1% significant level and negatively associated to the

wholesale and retail market choice outlet. As the age of teff producer increase, the probability of farmer’s choice the farmer trader’s market outlet is increase by 3.5% whereas there was a decrease probability to choice wholesalers and retailers outlet by 4.2% and 3.1% respectively.

Income from of/non-farm activities: Contrary to prior expectation, availability of off/nonfarm income has positive and significant relation with the choice retailer outlet at 5% probability level. From the study, producers with availability of off/non-farm income had capacity to transport their product alternatives outlets. Similar study conducted by Addisu [10] confirmed that farmers who have access to off/non-farm income had less possibility to choose rural collector outlet compared to those without access to off/nonfarm income.

Frequency of extension contact: Number of extension contact had positive and significant influence with wholesaler outlet choice decision at 5% significance level. Those who were visited more by extension agent were more likely to deliver teff via wholesaler outlets than households less visited by extension agent. The result showed that as the extension contact of farmers increased by one the probability of choice the wholesale market increased by 13.6%. Sultan [18-22] frequency of extension contact positively and significantly affected the accessibility of wholesales market outlet choices as compared with assembler market outlet choices of wheat producers [23,24].

Conclusion

Market chain analysis of the study area revealed that, the main actors in the chain were producers, farmer traders, urban wholesalers, urban retailer, regional wholesalers, regional



retailers and commission men. The four firm's concentration ratio (CR₄) indicated that the four largest traders handled 59.44% of the total volume of purchased teff. Suggesting that, the structure of the teff market in the study area was somewhat strong oligopoly feature.

Multiple linear regression models were run to identify determinant of volume of *teff* marketed. Age of household head, education of house hold head, number of oxen farmers owned, amount of credit that farmers used for teff production, distance from road, total land farmers owned and lag price teff was found significant. The multivariate probit model applied in this study was specifically intended to investigate factors influencing the teff farmers in choosing marketing outlets. The study also showed that the teff producer farmers in the study area made their choice of market outlets for their produce based education level of households, sex of households, age of house hold, family size, access of off/non-farm income, frequency of extension contact, land allocated for *teff* and distance to all weather roads.

Recommendations

The government should establish cooperatives among teff producing areas to minimize the existing strong oligopoly market structure. Strengthening the existing credit institutions and simplify way of provision for farmers in the area will help farmers to boost their supply. The concerned authority should be able to increase the awareness of households about the importance of education and about the school age at which their children should join the school. Government intervention should be needed for the expansion of schools in which the communities would be equally benefited.

Expanding equal accessibility of infrastructures such as road and transportation facilities to reducing transaction costs needs government intervention to promote the effective marketing of teff product supply through all outlets. Providing appropriate market information is another essential component for teff producer to choose appropriate market outlet. Therefore, putting in place and strengthening reliable institutions for conveying timely and adequate market information for teff producers was very essential. Improve extension system which focused on market extension and linkage of farmers with markets is necessary to ensure a reliable market outlet for producers of the study area.

References

1. Birara E (2017) Teff Production And Marketing In Ethiopia Bahir Dar University Ethiopia. Radix International Journal Of Research In Social Science 6.
2. CSA (Central, Statistical Agency (2017) Agricultural sample survey report on Area and production of major Crops (private peasant holdings, meher season 2016 / 2017; Addis Ababa Ethiopia, the FDRE statistical bulletin I.
3. Engida E, Minten B, Tamru S, Kuma T (2013) Ethiopia's Value Chains on the Move: The Case of Tef Addis Ababa, Ethiopia. [Link: https://bit.ly/3qzN0Su](https://bit.ly/3qzN0Su)
4. Eman B (2010) Market Assessment and Value Chain Analysis in Benishangul Gumuz Regional State, Ethiopia; Final Report, SID-Consult-Support Integrated Development. Addis ababa. [Link: https://bit.ly/3o7k0jd](https://bit.ly/3o7k0jd)

5. Turaa EG, Goshub D, Demisie T, Kenead T (2016) Analysis of Teff Value Chain in Bacho and Dawo Districts of South West Shewa, Ethiopia. Journal of Agricultural Economics and Development 5: 020-032. [Link: https://bit.ly/3sOzY5m](https://bit.ly/3sOzY5m)
6. Bekele AH, Melaku CT, Asha LD (2017) Determinants of smallholder farmers in teff market supply in ambo district, west shoa zone of oromia, Ethiopia. International Journal of Advanced Research in Management and Social Sciences 6. [Link: https://bit.ly/3pe6gVu](https://bit.ly/3pe6gVu)
7. Twoar (2017) Tole Woreda Office of Agriculture and Rural Development. Bantu.
8. Yamane T (1967) Statistics: An Introductory Analysis, 2nd Ed., New York: Harper and Row. [Link: https://bit.ly/3c7NVWp](https://bit.ly/3c7NVWp)
9. Mendoza G (1995) A Primer on marketing channels and margins. Lyme Rimer Publishers Inc, USA.
10. Pomeroy RS, Trinidad AC (1995) Industrial Organization and Market Analysis: Prices, Products, and People: Analyzing Agricultural Markets in Developing Countries. Lynne Reinner Publishers, Boulder. London.
11. Jaji K, Man N, Nawi NM (2018) Factors affecting pineapple market supply in Johor, Malaysia Department of Agribusiness and Bioresource Economics, Faculty of Agriculture, Universiti Putra Malaysia (UPM), 43400 Serdang, Selangor, Malaysia. International Food Research Journal 25: 366-375.
12. Addisu H (2016) Value Chain Analysis Of Vegetables: The Case Of Ejere District, West Shoa Zone, Oromia National Regional State Of Ethiopia. A Thesis Submitted To School Of Agricultural Economics And Agribusiness, Postgraduate Program Directorate. Haramaya University, Haramaya.
13. Medhane M (2014) Determinants Of Commercialization Of Teff And Its Factor Productivity Outcome: The Case Of Tahtay Qoraro Woreda, Northwest Zone of Tigray Regional State, Ethiopia M.Sc. Thesis.
14. Getahun KE (2017) Determinants of Smallholder Market Participation Among Banana Growers In Bench Maji Zone, Southwest Ethiopia International Journal Of Agricultural Policy And Research 5: 169-177. [Link: https://bit.ly/362DzTK](https://bit.ly/362DzTK)
15. Gebremedhin B, Jaleta M (2010) Commercialization of smallholders: is market participation enough?. AAAE third conference/AEASA 48th conference, September 19-23, Cape Town, South Africa. No. 96159. African Association of Agricultural Economists (AAAE) and Agricultural Economics Associa. [Link: https://bit.ly/2YgjGEB](https://bit.ly/2YgjGEB)
16. Fischer EA (2011) Linking Smallholders to Markets: Determinants and Impacts of Farmer Collective Action in Kenya. World Development. 40: 1255-1268. [Link: https://bit.ly/3sGZSrT](https://bit.ly/3sGZSrT)
17. Hussen CH, Fana C (2017) Determinants of Market outlet Choice for Major Vegetables Crop: Evidence from Smallholder Farmers' of Ambo and Toke-Kutaye Districts, West Shewa, Ethiopia. International Journal of Agricultural Marketing 4: 161-169. [Link: https://bit.ly/3qlVxCl](https://bit.ly/3qlVxCl)
18. Kassa T, Haji J, Tegene B (2017) Determinants of honey producer market outlet choice in Chena District, southern Ethiopia: a multivariate probit regression analysis. Agricultural and Food Economics. [Link: https://bit.ly/2Y1ygzF](https://bit.ly/2Y1ygzF)
19. Shewaye A (2016) Econometric Analysis of Factors Affecting Haricot Bean Market Outlet Choices in Misrak Badawacho District, Ethiopia. International Journal of Research Studies in Agricultural Sciences (IJRSAS) 2: 6-12. [Link: https://bit.ly/39ST023](https://bit.ly/39ST023)
20. Sultan UM (2016) Analysis Of Wheat Value Chain: The Case Of Sinana District, Bale Zone, Oromia Region, Ethiopia Msc Thesis Haramaya University. [Link: https://bit.ly/3qLKgkP](https://bit.ly/3qLKgkP)
21. Federal DR (2014) Population Projection of Ethiopia for All Regions at Woreda Level from 2014-2017.
22. Sikawa Y, Mugisha J (2011) Factors influencing south-western uganda dairy



farmers' choice of the milk marketing channel: a case study of kirihura district-south western uganda 1. [Link: https://bit.ly/3qMMgJT](https://bit.ly/3qMMgJT)

23. Asefa S, Mulugeta W, Hadji J (2016) Determinants of Farmers' Preference to Coffee Market Outlet in Jimma Zone: Developing Country Studies 6. [Link: https://bit.ly/3iF55M3](https://bit.ly/3iF55M3)

24. Vavilov NI (1992) Origin and Geography of Cultivated Plants. Articles and Lectures of Vavilov 1924–1940, first collected and published in book form in Russian in 1987 (Cambridge: Cambridge University Press).

Discover a bigger Impact and Visibility of your article publication with Peertechz Publications

Highlights

- ❖ Signatory publisher of ORCID
- ❖ Signatory Publisher of DORA (San Francisco Declaration on Research Assessment)
- ❖ Articles archived in worlds' renowned service providers such as Portico, CNKI, AGRIS, TDNet, Base (Bielefeld University Library), CrossRef, Scilit, J-Gate etc.
- ❖ Journals indexed in ICMJE, SHERPA/ROMEO, Google Scholar etc.
- ❖ OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting)
- ❖ Dedicated Editorial Board for every journal
- ❖ Accurate and rapid peer-review process
- ❖ Increased citations of published articles through promotions
- ❖ Reduced timeline for article publication

Submit your articles and experience a new surge in publication services
(<https://www.peertechz.com/submission>).

Peertechz journals wishes everlasting success in your every endeavours.

Copyright: © 2021 Dibaba TL. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.