Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.8, No.17, 2017

Factors Affecting Market Outlet Choice for Wheat in Sinana District, Bale zone, Ethiopia

Sultan Usman[1*] Jema Haji[2] Eluid Brachi[3]
1.Oromia Agricultural Research Institute, Sinana Agricultural Research Centre
2.School of Agricultural Economics and Agribusiness, Haramaya University,
P.O. Box 138, Dire Dawa, Ethiopia
3.International Center for Tropical Agriculture, CIAT, Kigali, P.O Box 1269, Rwanda

Abstract
Sinana is one of Bale zone districts which are particularly known for their extensive wheat production. Wheat is an important crop for its contribution as an income support and used for consumption to a large proportion of the rural households. However, enhancing wheat producer farmers to reach markets and actively engage in the markets is a key challenge influencing wheat production in Sinana district. Therefore this study was undertaken to identify factors influencing wheat market outlet choices in Sinana district of Bale zone. Data were collected from120 randomly selected wheat producers. Descriptive and multinomial logit model were used for analysis. The multinomial logit model result indicated that the likelihood to choose wholesalers market outlet was significantly influenced by frequency of extension contact, distance from market place, own price of the commodity and membership to cooperative compared to accessing assemblers wheat market outlet. The likelihood of accessing cooperative wheat market outlet was significantly influenced by price given to the commodity and distance from market place compared to accessing assembler market outlet. The likelihood of accessing processors market outlet was significantly influenced by price of commodity, ownership of transportation facilities and distance of processors from production place. Therefore policy implications that consider decision of farmers in participation of value added wheat producing to enhance value creation and improve market share and profitability of the smallholder farmers shall be an important.
Keywords: Market outlets, wheat market outlet choices, Wheat belt, Multinomial logit, Bale

Introduction

In Ethiopia, cereal production and marketing are the means of livelihood for millions of small holder households and it constitutes the single largest sub-sector in economy. Wheat is among the most important cereal crops in Ethiopia, ranking fourth in total cereals production 13.25% (1.63 million hectares) next to maize, sorghum and teff (CSA, 2012/13). The development policy of Ethiopia has placed emphasis on increasing agricultural production to serve as a base for rural development. Even though there has been an increase in agricultural production, there were drawbacks in the absence of many households participation in the markets. The lack of market participation that many agricultural households face is considered to be a major constraint to combating poverty (Best *et al*., 2005). This shows that an efficient, integrated and responsive market that is marked with good performance is of crucial importance for optimal allocation of resources and stimulating households to increase output (FAO, 2003).

Bale zone is particularly known for its extensive wheat production and sometimes called "wheat belt'' of Ethiopia. There are also different market outlets chosen by households for selling their produce. This implies that each alternative marketing outlet choice entails different private costs and benefits, and hence different utility, to a household decision maker. The basic question to ask is factors influencing farmer's choice of wheat market outlets in the study area. Although the area is interesting, there are hardly any publications done on wheat market outlet choices in Ethiopia. Additionally, it is prudent to note that none of past studies identified factors affecting wheat market outlet choices in Sinana district despite the high potential of wheat production and marketing in the study area. Therefore, this study focused on identifying factors influencing wheat market outlet choices, in order to narrow the information gap and contribute to an understanding of the challenges and assist in developing improved market development strategies to the benefit of smallholder farmers, traders, and other market participants. The result of the study can also assist in developing improved market development strategies to benefit all stakeholders that are participating in wheat value chain study area.

Methodology

An overview of Sinana district

Sinana district is located in the north western part of Bale zone. The total area of the district is about 1168 km^2. The district has 20 peasant associations. The altitude of the district ranges from 1650 to 2950 m a.s.l. From the total area of the district about 73.54 % is plain land, 3.7% is hills, 9.6 % is mountains, 12.3 % is rugged and 0.86 % is gorge. The annual average temperature is 16.5^{o}c where as the minimum and maximum temperature is 9^{o}c and 23^{o}c respectively. The annual average rainfall is 1105mm where as the minimum and maximum rainfall is 1060

and 1150mm respectively (BOFED, 2009). Farmers in the district experienced mixed farming system of both crop and livestock. The major crops produced in the district are wheat, barley, pulses and oil crops. Rainfall pattern of the district is characterized by bi-modal rain fall distribution. The district has two distinct seasons, i.e. Belg which extends from March to July and Meher which extends from August to January (BZADO, 2012).

The presence of Sinana Agricultural Research Center (SARC) and Oromia Seed Enterprise creates good opportunity for the farmers in the study area. Farmers in the study area have access to improved agricultural technologies mainly because of their proximity to Sinana Agricultural Research Center and Oromia Seed Enterprise, Bale branch compared to others which are far from these institutions.

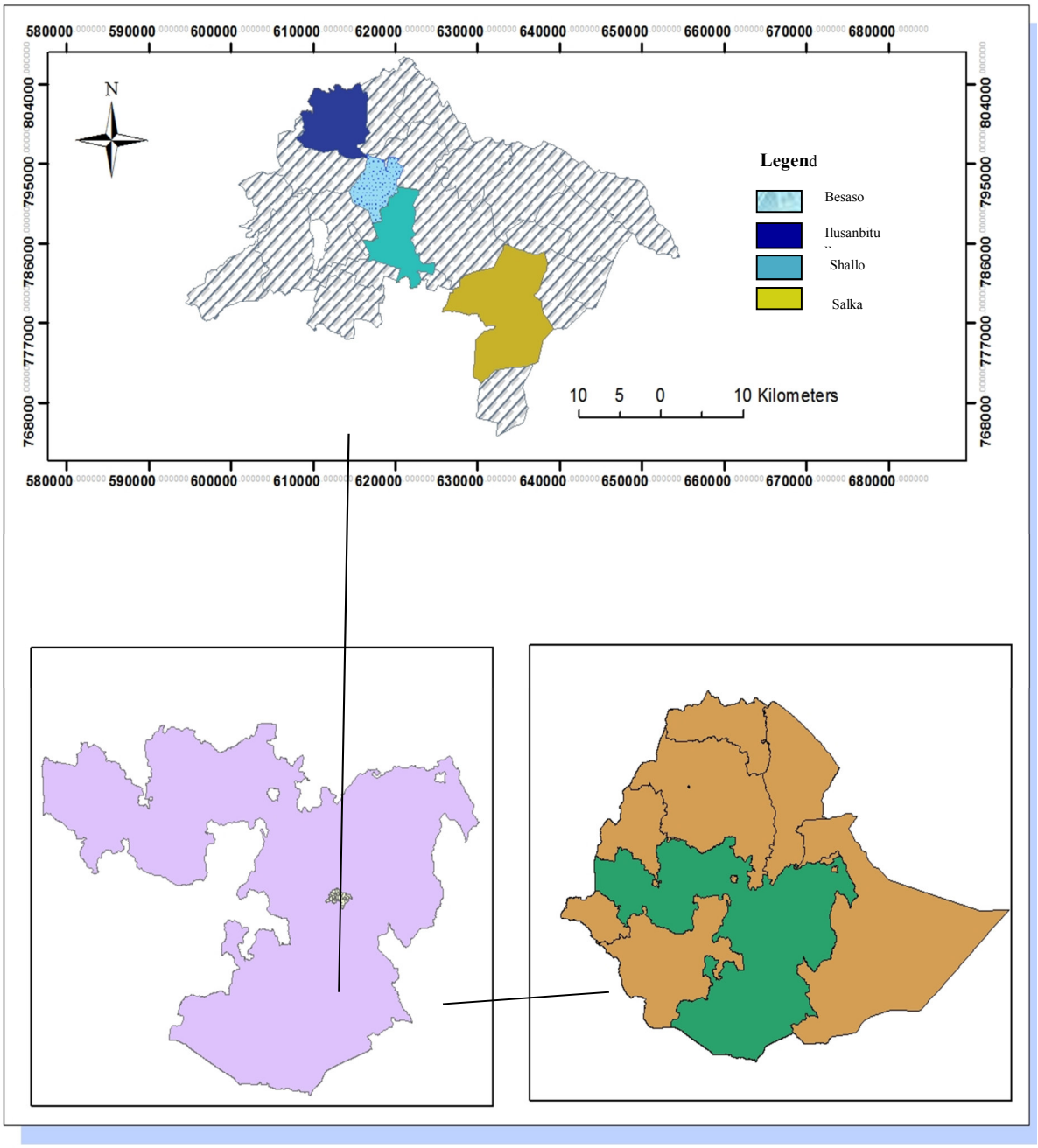

Figure: Map of the study area

Sampling procedure, Method of Data Collection and Data Sources

The data for this study were collected from primary and secondary sources. Formal and informal sample survey methods were used to collect both primary and secondary data. Primary data were collected from producers, wholesalers, assemblers, retailers, processors in Robe town, cooperative at each kebele and agricultural input suppliers.

In addition to farmer households, sample wholesalers, assemblers, millers, and retailers were interviewed.

The lists of wholesalers, millers and retailers were obtained from the district Office of Trade and Industry (OoTI). Based on the number of wholesalers available in the district, ten wholesalers and ten assemblers were selected randomly. Since processing/milling of wheat is only conducted in zonal town Robe, all five flour mills available in Robe town were interviewed. In addition, 10 wholesalers, 10 assemblers and 5 retailers from the four peasant associations were randomly selected and interviewed. Finally four cooperatives, one from each PA were interviewed.

A multistage purposive random sampling procedure was used to select representative households in the study area. In the first stage, Sinana district was selected purposely as it has maximum area under wheat production in the study zone. In second stage out of 20 PAs of Sinana district, four Kebeles were selected randomly as all kebeles are producers of wheat in the district.

To identify factors affecting wheat market outlet choices, multinomial logit model was used. If there are a finite number of choices (greater than two), multinomial logit estimation is appropriate to analyze the effect of exogenous variables on choices. The multinomial logit model has been widely used by researchers such as Schup *et al*. (1999), and Ferto and Szabo (2002). It is a simple extension of the binary choice model and is the most frequently used model for nominal outcomes that are often used when a dependent variable has more than two choices.

Data Analysis

To identify factors affecting wheat market outlet choices, multinomial logit model was used. If there are a finite number of choices (greater than two), multinomial logit estimation is appropriate to analyze the effect of exogenous variables on choices. The multinomial logit model has been widely used by researchers such as Schup *et al*. (1999), and Ferto and Szabo (2002). It is a simple extension of the binary choice model and is the most frequently used model for nominal outcomes that are often used when a dependent variable has more than two choices.

This study assumes that farmer's decision is generated based on its utility maximization. This implies that each alternative marketing outlet choice entails different private costs and benefits, and hence different utility, to a household decision maker. The analytical model is constructed as follows. Suppose that the utility to a household of alternative *j* is U_{ij}, where j = 0, 1, 2…. From the decision maker's perspective, the best alternative is simply the one that maximizes net private benefit at the margin. In other words, household *i* will choose marketing outlet j if and only if $U_{ij} > Uik$, ….. ≠ K. It is important to note that household's utility cannot be observed in practice. What a researcher observe are the factors influencing the household's utility such as household and personal characteristics and attributes of the choice set experienced by the household. Based on McFadden (1978), a household's utility function from using alternative j can then be expressed as follows:

U (Choice of j for household i) = $U_{ij} = V_{ij} + \varepsilon_{ij}$

Where,

U_{ij} is the overall utility,

V_{ij} is an indirect utility function and

ε_{ij} is a random error term.

The probability that household i select alternative j can be specified as:

$P_{ij} = Pr\ (V_{ij} + \varepsilon_{ij} > Vik + \varepsilon_{ik}\ )$

$P_{ij} = Pr\ (\varepsilon_{ik} < \varepsilon_{ij} + Vij - V_{ik}\ ,\quad K \neq j)$

Assuming that the error terms are identically and independently distributed with type i extreme value distribution, the probability that a household chooses alternative j can be explained by a multinomial logit model (Greene, 2000) as follows:

$$P_{ij} = \frac{\exp(\beta_j X_{ij})}{\sum_{j=0}^{J} \exp(\beta_j X_{ij})}$$

X_{ij} is a vector of household of the i^{th} respondent facing alternative j

β_j is a vector of regression parameter estimates associated with alternative j.

Following equation (9) above, we can adapt the MNL model fitting to this study can be expressed as follow:

$$P(Choice_{ij} = j) = \frac{\exp(\beta_j X_{ij})}{\sum_{j=0}^{J} \exp(\beta_j X_{ij})}$$

Where,

i represents i^{th} farm household, and i=1,2,3,…,154.

j represents different marketing outlets, j=1 for sale to wholesalers, j=2 for sale to cooperatives j=3 for sale to

assemblers and j=4 for sale to processor.
P = represents the probability of wheat marketing outlet j to be chosen by farm household i;
$CHOICE_{ij}$ = j means that wheat marketing outlet j is chosen by farm household i;
X_i = is independent variables
It is a common practice in econometric specification of the MNL model to normalize equation by one of the response categories such that βj = 0. In this regard, the MNL model can alternatively be specified as follow:

$$P_{ij} = \frac{\exp(\beta_j X_{ij})}{\sum_{j-1}^{J-1} \exp(\beta_j X_{ij})} \quad (11)$$

The coefficients of explanatory variables on the omitted or base category are assumed to be zero.
The probability that a base category will be chosen can be calculated as follows:

$$P_{ij} = \frac{1}{\sum_{j-1}^{J-1} \exp(\beta_j X_{ij})} \quad (12)$$

The marginal effects of the attributes on probability of choice are determined by differentiating equation 12.

$$\delta_j = \frac{\partial P_j}{\partial X_j} = P_j = P_j \left[\beta_j - \sum_{j=0}^{J} (P_j)\left(\beta_j\right)\right] \text{ for j=1, 2, 3… J} \quad (13)$$

Where,
P_j is the probability that farmers choose market outlet j
β_j is a vector of regression parameter estimates associated with alternative *j* .
In the case of this study, farmers have four market outlets to sell most of their wheat produce, *J* = 4, and the alternatives *j* = 1, 2, 3, 4 represent sale outlets to wholesalers, cooperatives, assemblers and to processors, respectively. The dependent variables (the marketing outlet (CHOICE) chosen) in the analysis are measured by the probability of selling wheat to either of these markets outlets.

Dependent variable
Market outlets are those pathways where agricultural products pass through to reach end users. In this regard, it is a categorical variable that represents wheat market outlets in the study area. It assumes 1 for wholesalers, 2 for cooperatives, 3 for processors and 4 for assembler's market outlet choices available for farmers to sale.

Explanatory variables used in MNL model
Family size: This is a continuous independent variable that is measured in the number of members in a household. Household size increases domestic consumption requirements and may render households more risk averse. Controlling for labor supply, larger households are expected to have lower market participation. Lapar *et al*. (2003), Edmeades (2006) and Berhanu and Moti (2010) found out negative relationship between household size and market participation of households. Therefore, it is hypothesized that it will affect accessing cooperative wheat market outlet choice positively as compared with accessing other wheat market outlets.
Access to extension services: This is a dummy independent variable taking the values 1 if the wheat producer farmers have access to extension services and zero otherwise. It is expected that wheat extension service widens household knowledge with regard to use of improved wheat technologies. Birhanu (2013) found that access to dairy extension services such as dairy technology information, training, field days, field visits and field tours received by households positively and significantly affected accessing cooperative milk market outlet as compared with accessing individual consumer milk market outlet .Different studies conducted previously revealed that extension agent visits had direct relationship with market outlet choices (Holloway and Ehui, 2002; Rehima, 2006). Thus access to wheat extension service is hypothesized to affect accessing cooperative wheat market outlet choice positively as compared with accessing other wheat market outlets.
Distance to nearest market: This is a continuous independent variable measured in kilometre. The closer a household to the nearest urban center, the lesser would be transportation costs, loss due to spoilage and better access to market information and facilities. Berhanu and Moti (2010) found out negative relationship between market participation and distance to the nearest urban market center. Therefore, households who are at far away from urban center are hypothesized to affect the likelihood of accessing cooperative wheat market outlet positively as compared with accessing other wheat market outlets.
Membership to cooperative: This is defined as dummy variable that takes 1 if the household is member of cooperative and 0 otherwise. Farmers who are members of cooperative are supposed to sell to cooperative rather than other market outlets. Abraham (2013) found that membership to cooperative affects negatively and was significant related with retail outlet choice. His result indicated that those households who were members of cooperatives the probability of choosing collector outlet decreased by 23.4% compared to base category. Hence, membership to cooperative is hypothesized to affect accessing cooperative market outlets positively as compared

to accessing other market outlets.

Income from non/off farm activities: This is treated as a dummy variable and measured as 1 if the household obtained income from off/nonfarm activities, and 0 otherwise. Rehima (2006) found that if pepper producer have non-farm income, the amount of pepper supplied to the market decreases. Again, farmers who gain more income from non/off farm income want to supply their vegetable to any nearest market outlet with low price than to go far. Therefore it is hypothesized that off/non-farm income influence market outlet choice decision of wheat producers positively.

Access to credit: This is a dummy variable that takes 1 if the household takes loan and zero otherwise. Access to credit would enhance the financial capacity of the farmer to purchase the inputs, thereby increasing production and market share size. Therefore, it is hypothesized that access to credit would have positive influence on level of production and sales. Alemnewu (2010) and Muhammed (2011) found that if pepper and teff producer gets credit, the amount of pepper and teff supplied to the market increased. Due to these, it is hypothesized that access to credit will have influence on wholesale market outlet choice decisions.

Ownership of market transport facilities: Specifically vehicles, carts and transport animals would be used to measure the availability of produce transportation facilities by households. In cases where households owned transportation facilities, the variable took the value of one, and zero if the household did not own any form of transport facility. This variable is expected to have influence on the market outlet choice of wheat producers positively. The availability of transportation facilities helps reduce long market distance constraint, offering greater depth in marketing choices (Jagwe *et al*., 2007).

Own price of the commodity: It is continuous variable, which is, price given for the commodity with different market outlets per quintal. Each market outlet average price will be asked. According to Birhanu (2013) price offered by milk market outlet per liter of milk significantly and negatively affected accessing cooperative milk market outlet as compared with accessing individual consumer milk market outlet. Hence, it is hypothesized that price given by market outlets can negatively affect cooperative market outlet choice.

Results and Discussion

Multinomial logistic regression was used to analyze factors affecting choice of wheat marketing outlets with four alternative categories. If there are a finite number of choices (greater than two), multinomial logit estimation is appropriate to analyze the effect of exogenous variables on choices. The model was tested for the independence of irrelevant alternatives (IIA) assumption based on Hausman test. The possible heteroscedasticity and multicolleaniarity problems are also corrected. The command robust (in Stata) was used to correct for heteroscedasticity. There is no multicolleaniarity problem because the result of VIF is less than 10 for all variables.

Producers choose their marketing plans and assess outside options that are available before participating in any marketing outlet. The producer's choice of a marketing outlet is based on utility maximization among the existing alternatives. After identifying choices of outlets, they choose where and for who to sell based on comparative advantage in bargaining and accessibility of outlets for farm products.

The alternative "assembler" was used as a base category. This implies that the discussion of the results focuses on the impact of the explanatory variables on a use of cooperatives, assembler and processors category relative to use of wholesalers (the base category). The result of MNL and its marginal effect is explained below in Table 11.

Distance from market place: Distance from the closest market place positively and significantly affected accessing millers/processors market outlet as compared with accessing assembler market outlet. It also affected wholesaler market outlet negatively and significantly. The marginal effect indicates that probability of choosing millers/processors increases by 0.02% as compared with accessing assembler market outlet for a unit decrease in kilometre. The likelihood of accessing wholesaler market outlet decreases by 0.4% for a unit increase in kilometre from market place.

Table --: Results of Multinomial Logit and marginal effects for choice of wheat market outlets

	Coefficient	Robust Std.err	p-value	dy/dx	Robust Std.err	p-value
Wholesalers						
FREXTNCO	0.85*	0.452	1.88	0.211	0.112	1.89
COPMEMB	1.223*	0.725	1.69	0.307	0.180	1.7
PRICE2006	0.068***	0.016	4.26	0.017	0.004	4.36
OWNTRAN	-0.771	0.712	1.08	-0.182	0.178	-1.02
ACCECRE	0.464	1.684	0.28	0.102	0.423	0.24
OFFARMI	0.657	0.644	1.02	0.156	0.159	0.98
DISTMRK	-0.168*	0.099	-1.71	-0.040	0.025	-1.64
FAMILSZ	-0.065	0.086	-0.76	-0.015	0.022	-0.72
Constant	-55.02***	11.523	-4.78			
Cooperatives						
FREXTNCO	0.076	0.480	0.16	-0.008	0.012	-0.72
COPMEMB	-0.099	0.644	-0.15	-0.017	0.023	-0.73
PRICE2006	-0.030*	0.017	-1.75	-0.001	0.001	-1.41
OWNTRANS	-0.936	0.981	-0.95	-0.012	0.024	-0.52
ACCESSCRE	1.190	1.033	1.15	0.022	0.039	0.56
OFFARMINC	0.678	0.650	1.04	0.008	0.014	0.49
DISTMRKT	-0.150*	0.091	-1.64	-0.001	0.002	-0.60
FAMILSZ	-0.094	0.113	-0.83	-0.001	0.003	-0.48
Constant	20.314	12.933	1.57			
Processors						
FREXTNCO	-1.418	0.896	-1.58	-0.000	0.00008	-0.25
COPMEMB	-0.609	1.794	-0.34	-0.000	0.00006	-0.25
PRICE2006	0.107***	0.021	4.99	8.170	0.00000	0.25
OWNTRANS	-2.957**	1.478	-2.00	-0.0003	0.00012	-0.24
ACCESSCRE	1.671	1.586	1.05	0.0002	0.00007	0.22
OFFARMINC	-0.469	1.224	-0.38	-9.070	0.00004	-0.21
DISTMRKT	1.404*	0.787	1.78	0.0002	0.00006	0.28
FAMILSZ	0.069	0.210	0.23	1.160	0.00001	0.18
Constant	-95.29*	20.587	-4.63			

Number of observation =120, Log pseudo likelihood = -68.51***, Pseudo R^2 = 0.49, Wald chi -square(24) = 74.27, ***, ** and * are statistically significant at 1%, 5% and 10% respectively

Source: own computation from survey result

Frequency of extension contact: Frequency of extension contact positively and significantly affected accessing wholesales market outlet choices as compared with assembler market outlet choices at 10% probability level. The marginal effect result shows that the likelihood of accessing wholesale market outlet choice increases by 21.1% as compared to assembler market outlet choices for a unit contact of extension services.

Own price of the commodity: It is continuous variable, which was, price given for the commodity with different market outlets per hundred kilograms. Hence, it was hypothesized that price given by market outlets can negatively affect cooperative market outlet choice. Price offered by wheat market outlet per kilogram significantly and negatively affected accessing cooperative wheat market outlet as compared with accessing assembler wheat market outlet. It also affected wholesaler and processor wheat market outlets positively and significantly at 1% probability level respectively. The marginal effect result shows that the likelihood of accessing cooperative wheat market outlet decreases by 0.1% for a birr increase per kg, the likelihood of accessing wholesaler outlet increases by 1.07% for a birr increase per kg and the likelihood of accessing processor outlet increases by 81.7% for a birr increase per kg of wheat as compared with accessing assembler wheat market outlet. The study by Birhanu (2013) also found out that price offered by milk market outlet per liter of milk significantly and negatively affected accessing cooperative milk market outlet as compared with accessing individual consumer milk market outlet.

Membership to cooperative: It influences positively and significantly wholesaler market outlet as compared to accessing assemblers wheat market outlet. The likelihood of accessing wholesaler market outlet increases by 30.1% for those persons who were member of cooperatives as compared to base category.

Ownership of market transport facilities: This variable affects negatively and significantly accessing processors wheat market outlet. Ownership of market transport facilities decreased the likelihood of choosing processors market outlet by 0.03% compared to accessing assemblers' market outlet.

Conclusion and Implication

The study was conducted in Bale highland of Oromia region, South Eastern Ethiopia with objective of identifying factors affecting wheat market outlet choices. In order to undertake this research, data were collected from 120 farm households and analyzed using descriptive statistics and multinomial logit model. Since wheat is major crop which is produced for consumption and marketing purpose in Bale highland, producers choose their marketing plans and assess outside options that are available before participating in any marketing outlet. The producer's choice of a marketing outlet is based on utility maximization among the existing alternatives. After identifying choices of outlets, they choose where and for who to sell based on comparative advantage in bargaining and accessibility of outlets for farm products.

Results from the discrete model (multinomial logit model) indicated that the likelihood to choose wholesalers market outlet was significantly influenced by frequency of extension contact, distance from market place, own price of the commodity and membership to cooperative as compared to accessing assemblers wheat market outlet. The likelihood of accessing cooperative wheat market outlet was significantly influenced by price given to the commodity at different outlets as compared to accessing assembler market outlet. Similarly the likelihood of accessing processors market outlet was significantly influenced by price of commodity given at different market outlets, ownership of transportation facilities and distance of processors from production place.

Improving the households' educational background and equipping them with some technical skills through extension education would help to increase delivery of quality products across wheat value chain. Therefore, as one factor to improve farmer's knowledge in wheat market outlet choice, extension education should be redesigned and strengthened its implementation strategies to train and qualify more producers with appropriate modern skills that help to sustain production and marketing. Additionally, giving training for cooperative members on pricing system and awareness creation on importance of cooperative can strengthen producers bargaining power and can help them in selection of appropriate market outlet choices.

Smallholder farmers are not a homogenous group; they differ in their resources and capabilities. The household economic portfolio provides a link between smallholders' resource levels and their abilities to respond to participate in wheat market value chain opportunities. They may be unable to invest in agricultural upgrading due to shortages of working capital and lack of liquidity for longer term upgrading investments. Therefore, it is important to create credit access and simplify way of provision for farmers because it will help farmers to participate in wheat production and marketing activities which will increase their income.

Acknowledgement

I would like to express my indebtedness to the many individuals and organizations that have helped me in this work, though it cannot adequately be conveyed in few sentences. My heartfelt appreciation and gratitude goes to Dr. Peter Thorne and Dr. Kindu Mokonin African RISING Ethiopian highland coordinators for facilitating financial support from the project and friendly guidance during the research work. I would like to extend my thanks to Sinana Agricultural Research Centre, Oromia Agricultural Research Institute for providing me the chance to pursue the study and African RISING Project, Ethiopia, for financial support it expended to cover the research cost.

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