Food Science and Quality Management
ISSN 2224-6088 (Paper) ISSN 2225-0557 (Online)
Vol.64 2017

Determinants of Beekeepers Market Outlet Choice of Honey: In Case of Masha Woreda Sheka Zone, Southwestern Ethiopia

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Abstract
Apiculture sector has crucial role in improving the livelihoods of farmers through family income, employment generation, and poverty alleviation as well as to improve nutritional status of the family in Masha Woreda. This study aimed at identifying determinants of the beekeepers market outlet choice. The primary data for this study were collected from 147 beekeepers and analyzed using application of appropriate statistical tools. There were four honey market outlet choices in the study area such as Tej (locally prepared drink) makers, Retailers, Cooperatives and Processor. The Multivariate probit model result showed that the market outlet choice of the farmers affected by age of the HH head, education level of the HH head, HH adult equivalent, extension service, distance to the nearest market, membership in cooperative, information access, credit access and mode of sale. Therefore, policies promoting farmers access to extension service, credit and market information access, and cooperative development are recommended to improve beekeepers income in the study area.
Keywords: Market outlet, Multivariate probit model

1. INTRODUCTION

Apiculture is currently one of the most widespread agricultural activities carried out throughout the world. There are approximately 56 million beehives in the world, which produce an estimated 1.2 billion tons of honey. About a quarter of the honey produced is traded and 90% of the exportation is made from around 20 countries that produce honey. Average honey production per hive is 20 kg throughout the world, and this figure is 33 in China, 40 in Argentina, 27 in Mexico, 64 in Canada, 55 in Australia, 40 in Hungary, and 16 kg in Turkey. These countries are also the highest honey exporting countries in the world. The countries that are the best honey importers are Germany, the United States of America (USA), Japan, England, Italy, Switzerland, France, Austria and other European countries (Kizilaslan, 2007).

In Ethiopian, only about 10% of the honey produced in the country is consumed by the beekeeping households (MoARD 2003). The remaining 90% is sold for income generation and of this amount, it is estimated that 80% is used for *tej* brewing (Hartman 2004). According to Assefa (2011), domestic honey consumption is increasing due to highly increasing demand for *tej*, increased consumption of processed table honey in most urban areas and increased demand for honey in the local industries. According to Legesse (2014) the whole domestic honey market lacks proper structure and legality. It is of lengthy chain of actors that widens the access of producers to bigger and better paying markets. So, the beekeepers complain the business as not rewarding and even lacking market for their product, while the consumers see the ever increasing price of honey as unfair. Moreover, the market faces challenges like smuggling that pushes the legal actors out of market. In many cases, adulteration of honey has been a frustrating factor for both the producers and legal buyers and sellers as the traceability and accountability is far from practicability. Therefore this study was focused on assessing determinants of beekeepers market outlet choice of honey.

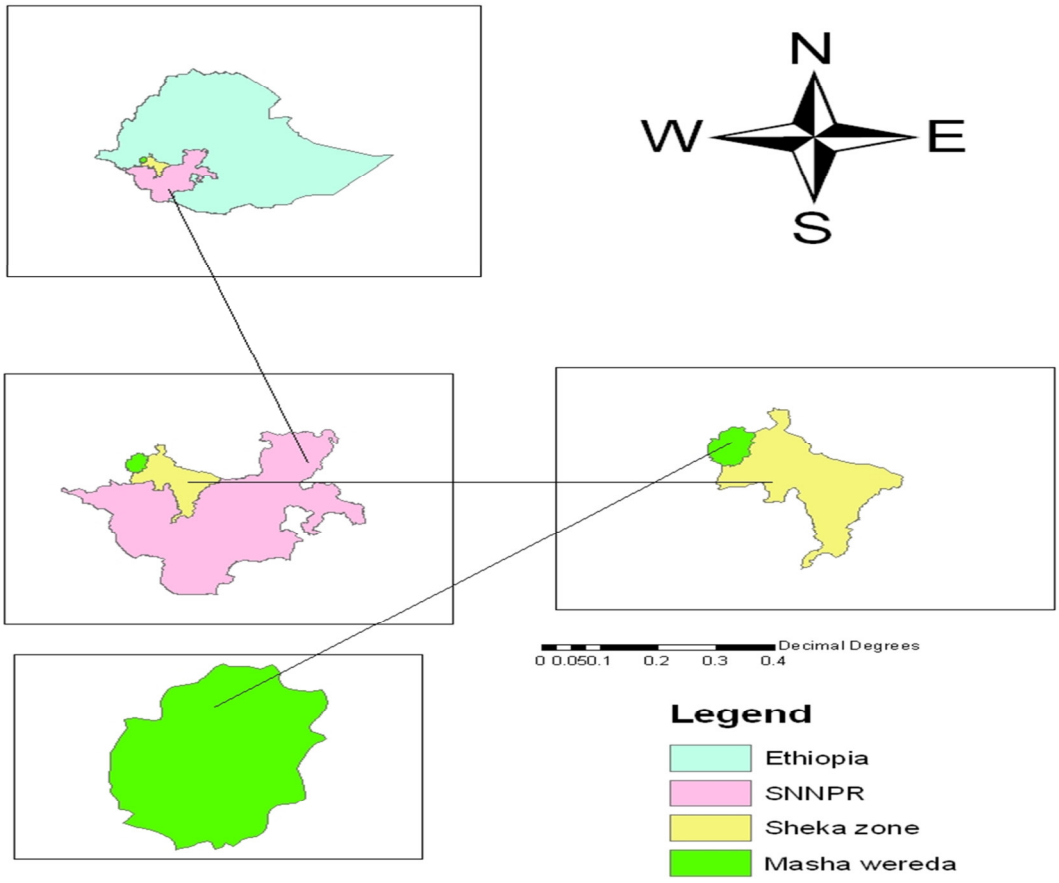
2. METHODOLOGY OF THE STUDY

2.1. Description of Study Areas

This study was conducted in Masha Woreda of Sheka Zone Southwestern Ethiopia. Sheka Zone covers a total land area of 2175.25 km2. Out of this land area, 47% is covered by forest including bamboo trees. This Zone has both highland and lowland types of land features. Highlands account about 2/3 of the total area of the Zone and the rest is covered by lowlands. It is one of the almost all year rainfall receiving area with heavy rain lasting for about 8-10 months of the year. Sheka Zone has three Woredas (districts), namely Masha, Andiracha and Yeki. In total the Zone has 56 rural Kebeles, 5 urban Kebeles and 2 chartered towns or city administrations, Teppi& Masha. Masha Woreda has a total land area of about 90,802.82 hectares. Out of this land area about 23.9% is cultivated, 2.8% is grazing land, 40.5% is covered by forest, 5.5% arable land, 5.9% non-arable land and 21.4% is settled land area. This Woreda lies between 1600-2400m above sea level and receives 2000mm rainfall. Agro climatically, the area is largely Woina dega type comprising about 75% of the total area, 22% and 3% are in Dega and kola types (CSA, 2002).Masha woreda is located at 676km southwest of Ethiopia from Addis Ababa along Addis-Jimma road. Masha woreda is notable for its relatively high forest cover as compared to other parts

of Ethiopia. The forest is the major source of livelihood of the people in the area. Due to high level of dependency on forest resources, the local communities have developed traditional management practices based on religious taboos and customary tenure rights. Such management practices have sustained the forests for centuries and contributed to the better condition of the forests in the area. In general, the area is characterized by dense forests and woodlands that contain diverse plant species that provide surplus nectar and pollen to foraging bees (Tadesse and Masresha, 2007).

Map of the study area



2.2. Sampling Procedure and Sample Size Determination

A three-stage sampling procedure was employed to select a specific honey producer household. First, one potential honey producer woreda were selected purposively from three woredas in the zone. Second, out of 19 kebeles in the district three Kebeles were selected purposively based on the presence of large number of honey producers. Finally, simple random sampling was used to select 147 representative households. The sample size of the beekeepers was determined by using Yamane (1967) formula to calculate sample size.

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

Where; where n is the sample size, N is the population size which is 234, and e is the level of precision which is ±5%.

Table 3. Name of the kebeles and samples were taken

No	kebeles	No of household	Honey producer households	Sample size was considered
1	Beto	504	62	39
2	Keja	1311	103	65
3	Uwa	610	69	43
	Total	2425	234	147

2.3. Types, Sources and Method of Data Collection

Both quantitative and qualitative data were used to find out necessary results from this study. The study used

both primary and secondary data sources. The secondary sources of data were journals, books, internets browsing, reports of national policy, regional, zonal and Woreda. While primary data sources includes agricultural office, Marketing and cooperative office, trade and industry office, agriculture department, trade and industry department, key informants, Development Agents (DA) and beekeepers. Finally, participatory rapid appraisal tools were conducted. The data were collected using informal and formal surveys. Data were collected from key informants by using a checklist. The formal survey was undertaken through formal interviews and questionnaires with selected beekeepers.

2.4. Methods of Data Analysis

2.4.1. Descriptive statistics

Data collected through structured and semi-structured questionnaire survey was coded, entered, edited and analyzed by using both SPSS version16 and STATA. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to analyze the survey data collected from beekeepers.

2.4.2. Econometrics analysis

To identify determinants of beekeepers market outlet choice of honey, Multivariate Probit model was used. Farmers choose a mix of outlets to deal with a multitude of market outlet choices, so the market outlet choice of farmers is inherently multivariate (Dorfman, 1996). A shortcoming of most of the previous studies on market outlet choice is that they do not consider the possible inter-relationships between the various choices. These studies mask the reality faced by decision-makers who are often faced with market outlet alternatives that may be chosen simultaneously and/or sequentially as complements, substitutes, or supplements. Such choice analysis is possible when other market choices decisions are made exogenously. This suggests that the number of market outlet choices may not be independent, but path dependent. Some recent empirical studies of market outlet choice decisions assume that farmers consider a set (or bundle) of possible market choices and choose the particular outlet bundle that maximizes expected utility. Thus, the market outlet choice decision is inherently multivariate and attempting univariate modeling excludes useful economic information contained in interdependent and simultaneous market outlet choice decisions. In this paper, multivariate probit (MVP) econometric technique was adopted, which simultaneously models the influence of the set of explanatory variables on each of the different outlet choices. In contrast to MVP models, univariate probit models ignore the potential correlation among the unobserved disturbances in the outlet choice equations, as well as the relationships between the choices of different market outlets. The multivariate probit econometric model is characterized by a set of binary dependent variables. Generally, the multivariate probit model can be written as:

$$y^{*}_{1i} = \beta_1' X_{1i} + \varepsilon_{1i}$$

$$y^{*}_{2i} = \beta_2' X_{2i} + \varepsilon_{2i}$$

$$\vdots$$

$$y^{*}_{Mi} = \beta_M' X_{Mi} + \varepsilon_{Mi}$$

Here, there was m=1… M equations and i=1... N observations. For the latent dependent variables, we assume that:

$$y_m = \begin{cases} 1 & \text{if} \quad y^{*}_m > 0 \\ 0 & \text{otherwise} \end{cases}, \quad m = 1, \ldots, M$$

Moreover, Xmi are vectors of exogenous variables, m the associated parameter vectors and $1i$… are error terms distributed as multivariate normal with variance-covariance matrix V, where V has values of 1 on the leading diagonal and correlations $\rho jk = \rho kj$ as off-diagonal elements for $j, k = 1, \ldots, M$ and $j \neq k$. In the study area there were four market outlet choices as dependent variables such as tej makers, cooperatives, traders and processor.

For both methods, STATA software was employed.

3. RESULTS AND DISCUSSIONS

3.1. Demographic Characteristics of Sample beekeepers

Table 2: The mean values and t-test results of independent continuous variables

Variables	Tej makers(52)		Cooperatives(46)		Traders(26)		Processors (23)		F-test
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Age	49.2	13.8	43.5	10	39.2	12.1	38.4	12.4	26.22**
Family size	5.7	2	5	2.1	6	2.8	6.1	2.2	62.22***
Adult equivalent	2.3	2	3.2	2.1	4.1	2.7	4.5	2.3	76.75***
Distance to market	5.3	1.2	1.2	2.6	6	1.8	6	1	96.89***

*** refers significance at 1%, **, significance at 5% and *significance at 10%

Source: Own computation from survey result, 2015.

Four major honey market outlets were identified as alternatives to beekeepers to sell the majority of their honey. These were tej makers, cooperatives, traders and exporter. Results indicated that out of an average 185.48kg of honey produced per year/HH by sampled households, 14.5kg was home consumed. About 89.3% of the total honey produced per year was accessed by alternative honey market outlets. Out of the total sample respondents who sold honey, 35.4%, 31.3%, 17.7% and 15.6% had access to tej makers, cooperatives, traders and processor respectively. Table 8 and 9 describe characteristics of sample beekeepers across marketing outlets.

Table 2 shows, farmers those who sell to tej makers are relatively older than framers who sell to other market outlets. In addition, farmers those who sell to processors are relatively far from market place than those who sell to other market outlets.

Table 3.Percentage characteristics of beekeepers by honey market outlets

Variables	Tej makers		Cooperatives		Traders		Processors		F-test
	N	%	N	%	N	%	N	%	
Education									1.8
Literate	18	34.6	22	47.8	11	42.3	10	43.5	
Illiterate	34	65.4	24	52.2	15	57.7	13	56.5	
Extension service									77.93**
Frequent	20	38.5	33	71.7	17	65.4	13	56.5	
Non frequent	32	61.5	13	28.3	9	34.6	10	43.5	
Information access									36.55***
Yes	23	44.2	39	84.8	18	69.2	15	65.2	
No	29	55.8	7	15.2	8	30.8	8	34.8	
Cooperative									136.59***
Yes	8	15.4	46	100	6	23	8	34.8	
No	44	84.6			20	77	15	65.2	
Mode of sale									80.22***
Cash	52	100	16	34.8	26	100	23	100	
Credit			30	65.2					
Credit access									33.99***
Yes	4	7.7	29	63	5	19.2	4	17.2	
No	48	92.3	17	37	21	80.8	19	82.8	

*** refers significance at 1%, **, significance at 5% and *significance at 10%

Source: Own computation from survey result, 2015

Table 3 shows, farmers those who sell to cooperatives are relatively had frequent extension contact, better access to market information and credit. In addition, they are a cooperative member and they sell their product in a credit base as compared with farmers those who sell their product to other market outlets.

3.2. Econometrics Results

Table 4. Coefficient estimates of the multivariate probit model (standard errors in parenthesis).

Variables	(1) tej makers	(2) cooperatives	(3) traders	(4) processor
age	0.00957***	0.00704	0.0109	-0.00209
	(1.0208)	(0.0172)	(0.0159)	(0.0171)
adueqva	0.193	0.283**	-0.0625	-0.0244
	(0.116)	(0.130)	(0.102)	(0.101)
edleve	-0.390**	0.264**	0.115**	0.160*
	(0.190)	(0.159)	(0.137)	(0.143)
ext	-0.808***	0.852***	0.356**	0.255
	(0.642)	(0.529)	(0.504)	(0.538)
dista	-0.133	0.0245	-0.142	-0.141**
	(0.168)	(0.143)	(0.129)	(0.137)
coop	-0.164	0.542***	0.00816	0.570
	(0.619)	(0.931)	(0.552)	(0.537)
info	-0.0329**	0.739***	0.0784**	0.337**
	(0.681)	(0.673)	(0.631)	(0.645)
credit	-0.269	0.476**	-0.230	0.144
	(0.559)	(0.634)	(0.553)	(0.548)
training	-0.523	-0.416	0.316	-0.420
	(0.599)	(0.535)	(0.516)	(0.569)
mode	0.0589**	-0.387*	0.0275*	0.149**
	(0.205)	(0.204)	(0.185)	(0.187)
Constant	2.821**	-1.462	-0.217	-0.838
	(1.333)	(1.127)	(0.968)	(1.054)
Log pseudo likelihood= -286.313				
Correlation coefficient	21= 0.0445***			
31= -0.165***	32= 0.295**			
41=			42=	-0.0009**
43=0.367				

*** p<0.01, ** p<0.05, * p<0.1

Result showed that age of the HH head affect the tej maker outlet choice positively and significant at 1%.

Age of the household head (age): As the age of the household head increases they tended to produce and sell more unprocessed (crude honey) to the tej makers.

Household adult equivalent (adueqva): HH adult equivalent affect the cooperative outlet choice positively and significant at 5%. Adults have an access to market information and knowledge about the use of cooperative through training and different social networks than old peoples.

Education level of household (edleve): The education level result indicates that, literate household's sale their honey to cooperatives, traders and processor outlets because literate HHs can get market information easily than illiterate HH and they can understand the market outlets needs regarding the type of their honey(processed or crude honey).

Access to extension service (ext): Extension access result indicate that those HHs who have an access of extension service sale their honey to cooperative and trader market outlets because they can get market information from the DAs. On the other hand the HHs those who do not have an extension access sale their honey to the tej maker market outlet.

Membership in cooperative (coop): Membership in cooperative has positive effect on cooperative market outlet choice. The HHs who is cooperative membership is expected to get information and training through their cooperative and supposed to sell honey for cooperative rather than selling to other market outlets.

Access to market information (info): Information access affects the cooperative, trader and processor market outlets positively and the tej maker outlet negatively. Through their cooperatives farmers get market information of different outlets such as the purchasing price and the kind of honey needs.

Access to credit (credit): Credit access affects the cooperative outlet positively. Farmers who are a cooperative member can get credit from heir cooperative and they sale their honey to their cooperative to get dividend and price premium.

Mode of sale (mode): Mode of sale is another factor that affect the tej maker, trader and processor outlets positively and cooperative outlet negatively. In the study area farmers sale their honey both in cash and credit. Mostly cooperatives purchase honey in credit from their members and in cash from non-members. Some farmers choose other outlets than their cooperatives to sale honey for their argent needs. Regarding the correlation coefficients, there was a significant correlation between cooperative and tej maker outlets, trader and tej maker outlets, trader and cooperative, processor and cooperative outlets.

4. SUMMARY, CONCLUSSION AND RECOMMENDATIONS

4.1. SUMMARY AND CONCLUSSION

The main factors which affect the beekeepers market outlet choice were analyzed by using multivariate probit (MVP) model. The results suggest that farmers' personal characteristics influence their choice, and that more educated and skilled farmers are less likely to choose tej maker outlet and more likely to choose cooperative, trader and processor market outlet. The other personal factor is the age of the HH head the older the HH head choose the tej maker outlet than the other outlets. Also, the higher in terms of adult equivalent in the HH choose the cooperative outlet. The other determinant of the choice is the access of extension service, the HHs who has an extension service are more likely to choose the cooperative and trader market outlet and less likely to choose the tej maker outlet. If the farmers are far from the market the likelihood of choosing the processor market outlet is less. Cooperative members HHs are more likely to choose the cooperative outlet. Access to information is other determinant of the market outlet choice, the HHs who has an information access are more likely to choose the cooperative, trader and processor outlets and less likely to choose the tej maker outlet. The HHs who has credit access is more likely to choose the cooperative outlet. Mode of honey sale is the other determinant of market outlet choice, if the mode of sale is in cash base the HHs are more likely to choose the tej maker, trader and processor outlet and less likely to choose cooperative outlet.

4.2. RECOMMENDATIONS

The result of the MVP model indicates that the farmer's market outlet choice was affected by different factors such as membership in cooperative, extension service, credit access and information access. Therefore, these factors must be promoted by developing beekeepers awareness about the use of cooperative membership. In addition government must give special attention to financial institutions and extension service access.

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/atrho21	.0857587	.1825904	0.47	0.639	-.2721119	.4436293
/atrho31	-.1669068	.1536712	-1.09	0.277	-.4680968	.1342832
/atrho41	.1335128	.1739768	0.77	0.443	-.2074755	.4745011
/atrho32	.3042565	.1459989	2.08	0.037	.0181039	.5904091
/atrho42	-.0009158	.158882	-0.01	0.995	-.3123189	.3104872
/atrho43	.3854021	.1581191	2.44	0.015	.0754944	.6953098
rho21	.0855491	.1812541	0.47	0.637	-.2655888	.4166482
rho31	-.165374	.1494685	-1.11	0.269	-.4366603	.1334819
rho41	.1327251	.1709121	0.78	0.437	-.2045489	.4418289
rho32	.295203	.1332759	2.21	0.027	.0181019	.5301897
rho42	-.0009158	.1588819	-0.01	0.995	-.3025452	.3008803
rho43	.3673897	.1367769	2.69	0.007	.0753513	.6013823

Likelihood ratio test of rho21 = rho31 = rho41 = rho32 = rho42 = rho43 = 0:
chi2(6) = 14.2786 Prob > chi2 = 0.0267