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The Drivers of Commercialization of Edible Wild Fruits in Kenyan Dry lands

Ng'eno Vincent[1], Nyangweso P. M[2], & Mengist C[3]

[1,2,3] Department of Agricultural Economics and Resource Management, Moi University, Kenya
*E-Mail: vcngeno@gmail.com / ngenota@yahoo.com

Abstract

Commercialization occurs both between households within the same community, as well as between households and external markets. The drivers of commercialization at household and community level are not yet well understood. The trend in commercialization is increasing in most of the agricultural products, both in terms of the range of products involved, the number of participants and the value traded, while commercialization of wild fruit and its products still absent or extremely limited. Therefore, the main objective of this paper was to find the drivers governing the commercialization of edible wild fruits in Kenyan dry lands and to give recommendations on the possible prime movers to a commercialization of edible wild fruits among pastoralists in Kenya. An ordinal logistic regression model of binary choice was used as the major analytical tool. Therefore, this research concluded that establishing or improving the storage facility, improving transportation or road network and establishing the fruit nursery are the key factors that can motivate the community to commercialize and proper utilization this potential resource.

Keywords*: Commercialization, Edible wild fruits, Pastoralist, Logit Model.*

Introduction

The livelihoods of most rural African communities regarded as being predominantly subsistence-based since they are dependent on agriculture and natural resources such as wild fruit and other wild plant products. Thus, there is a need to improve the utilization of these resources by

incorporating in commercial networks. The commercialization of wild fruit used to be absent or extremely limited. This was due to a combination of factors that differed from place to place, or community to community including cultural taboos against selling of products from wild resources, absent or distant markets, limited consumer demand and sufficient cash income from other sources, lack of knowledge on how to handling after harvesting, no storage, e.t.c. The trend in commercialization is increasing in most of the agricultural products, both in terms of the range of products involved, the number of participants and the value traded, while commercialization of wild fruit and its products still absent or extremely limited.

Commercialization occurs both between households within the same community, as well as between households and external markets. The drivers of commercialization at household and community level are not yet well understood. Arnold and Townson (1998) argue that when examining social differentiation and resource use, it is important to distinguish between households engaged in the trade of natural plant products because they lack alternative means of livelihood and those that are responding to market opportunities. Both instances represent a diversification in livelihood and resource use, but the first concerns a coping strategy involving less advantageous markets (Ellis, 1999), whereas the second concerns an adaptive strategy involving more advantageous markets. A product which is commercialized involves many participants in its production and more attention will be given from both government and private sectors in order to increase its production. In most cases a fruit which is not known in the market is considered food for backward. Therefore, the main objective of this paper was to find the drivers governing the commercialization of edible wild fruits in Kenyan dry lands and to give recommendations on the possible prime movers to a commercialization of edible wild fruits among pastoralists in Kenya

Methodology
Sources of Data
The data used in this analysis were collected from the East Pokot, West Pokot and Central Pokot districts of Kenya. Pokot people inhabit the area. Traditionally, the Pokots are nomadic pastoralists whose lifestyle is rapidly changing to sedentary mixed farmers, especially in areas where conditions permit. Like many other arid and semi arid areas in the country, the area has been experiencing rapid population growth for both human and livestock. Physical infrastructure is such as roads, telecommunications,

hospitals and schools are poorly developed. The harsh climatic conditions over most of the area and difficult terrain make a large proportion of the district inaccessible. Traditional pastoral mobile lifestyle is practiced by most of the community members. The sustainable utilization of natural resources in the district is hampered by mainly socio-economic and technical capacity. The greatest challenge is endemic poverty, a socio-economic factor which has led to over utilization of natural resources to meet basic needs.

In each of the randomly selected districts, ten villages and ten pastoralists were randomly selected. In all, 150 pastoralists participated in the survey. Structured questionnaires designed to capture information on a range of potential indicators related to commercialization of wild fruits were administered between October 2011 and December 2011 by trained enumerators directly supervised by the 'principal investigator.

Data Transformation and Analysis

Binary logit regression model was used in this study. The dependent variable "commercialization" assumes the value 1 if the pastoralist is willing to sell edible wild fruits and 0 otherwise. The model in its empirical form is based on the assumption that the probability of commercialization, P_i relies on a vector of known variables X_{ij} and a vector of unknown, β.Thus:

$$P_i = F(Z_i) = F(\alpha + \beta X_i) = \frac{1}{(1 + \exp(-Z_i))} \dots\dots\dots\dots\dots\dots\dots.(1)$$

Where:

$F(Z_i)$The standard normal density function for the possible values of the index Z_i;
P_i the probability of commercialization
β^i Regression parameters to be estimated;
X_i set of explanatory variables
α = regression intercept, and
$\beta X_i =$ a combination of explanatory variables, such that:

$$Z_i = \log\left(\frac{P_i}{1 - P_i}\right) = \alpha + \beta_i X_i + \cdots + \beta_n X_n + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. \ (2)$$

Where:

i =1, 2 …. N are observations;

Z_i the natural logarithm of choice for the ith observation;

X_n the nth explanatory observation; and

$\varepsilon =$ the error or disturbance term.

Results and Discussion

The drivers considered in this study were availability of wild fruit, lack of storage, transport problem, lack of seed/seedlings, and lack of technology and the nature of the alternative economic activity. Each factor has three categories such as agreed, neutral and disagreed. Concerning the variable availability of the wild fruit, the result indicated that about 55.1% of   respondents agreed that availability of the fruit has an effect on commercialization while about 37 % of them disagree on this idea. Considering the variable lack of storage facility, about 56.4% of the respondents agreed that lack of storage is one of the factors that affect commercialization of wild fruit while 32.1% disagree indicating that it is not the one (it does not have an effect on commercialization). Lack of proper transportation has an equal percentage for agreed and disagreed as a factor that contributes to commercialization. Lack of modern technology for harvesting, storing and processing has about 60.3% of the respondent those who agreed while 32.1% of them disagreed. Considering the variable lack of seedlings, about 48.7% of the respondent agreed that it is the factor that affects commercialization and 39.7% of them stated that it is not the factor that affects the commercialization. Lack of alternative economic activities was considered as an important factor for commercialization by 51.3 % of the respondent while 41% of them disagreed.   In summary considering all the variables the majority of the respondents seemed to agree that these factors are important in the commercialization of the wild fruit in the study area (Figure 1)
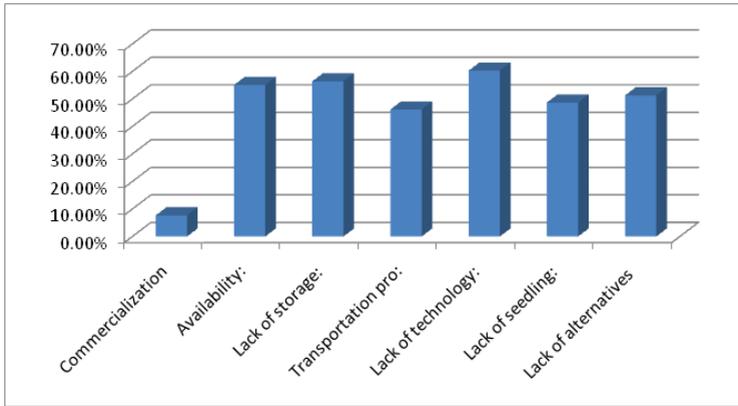
Figure 1: Factors Important in Commercialization of Wild Fruit

Model Fitting Information

The results from model fitting provide results of ordinal logistic regression versus reduced model (intercept) with logit link function. The -2Log likelihood of the model with only intercept is 39.533 while the -2Log-Likelihood of the model with intercept and independent variables is 24.888. The difference (Chi-square statistics) is 39.533- 24.888 = 14.645. It indicates the presence of a relationship between the dependent variable and combination of independent variables.

Goodness-of-fit

Pearson is widely used in statistics to measure the degree of the relationship between the linear related variables. Deviance is a likelihood-ratio test used under full maximum likelihood. The deviance can be regarded as a measure of lack of fit between model and data. It helps us to test whether the observed data were consistent with the estimated values in the fitted model. The results showed that the Pearson's chi-square, (X^2 = 50.92 with degrees of freedom of 39 and p = .096) for the complete model with the logit link indicated that the observed data were consistent with the estimated values in the fitted model.

Pseudo R-Square

The model-fitting statistic, namely the pseudo R square, measured the success of the model in explaining the variations in the data. The pseudo R square was calculated depending upon the likelihood ratio. For example,

the McFadden's R square compared the likelihood for the intercept only model to the likelihood for the model with the explanatory variables in order to assess the model goodness of fit. The interpretation of pseudo R square in the ordinal regression model was similar to that of the R square (e.g., Coefficient of the Determination) in the linear regression model. The pseudo R square indicated that the proportion of variations in the outcome variable was accounted for by the explanatory variables. In this study the pseudo R squares was found to be for McFadden (0.35), Cox and Snell (0.17), and Nagelkerke (0.41) in the complete model.

Parameter Estimates

Using the complete model with the logit link, to build the ordinal regression model, the commercialization of wild fruit was found to be significantly associated with some of explanatory variables. Table 1 show that the threshold of the model equation was significantly different from zero and substantially contributed to the values of the response probability in different categories. In addition, the commercialization of wild fruit was significantly associated with the four explanatory variables (e.g., availability of the fruit; lack of storage; transport problem and lack of tree seedling). Of these significant explanatory variables, three of them have positive regression coefficients, indicating that these variable have a positive relationship with the commercialization of the wild fruit(i.e. the improvement of these variables will motivate or create conducive environment for commercialization of the wild fruit in that area which will have a multiplicative impact on the economy of the community. An explanatory variable who has a negative regression coefficient indicates that it has a negative relationship with the dependent variable. In this study the variable fruit availability was found having a negative coefficient indicating that, as the availability of the fruit increases, it discourages the commercialization of the wild fruit production. This is due to the fact that there is on demand of the fruit in that area.

The result of the ordinal regression analysis of the commercialization of wild fruit is presented in Table1. The sign of all the parameters are as expected showing the impact of each variable on commercialization. In this ordinal regression model our dependent variable is commercialization of wild fruits and the independent variables (the factors that affects the commercialization of the wild fruit) which were considered in this study are availability of the wild fruit, lack of fruit storage facility, transportation problem, lack of quality seed/seedlings, lack of modern technology and lack of alternative economic activity.

Table 1: Parameter estimates for drivers of commercialization of wild fruits

Parameter	Estimate	Std. Error	Wald	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Distance to the market	-3.943	1.711	5.312	0.021	-7.297	-.590
Lack of storage facility	20.914	1.677	155.500	0.000	17.627	24.201
Transportation problem (Poor road network)	18.017	1.861	93.720	0.000	14.369	21.665
Lack of harvesting and processing technology	-2.908	1.904	2.333	0.127	-6.639	0.823
Lack of seeds/seed-lings	18.321	1.202	232.300	0.000	15.965	20.677
lack of alternative economic activity	-4.134	2.253	3.367	0.067	-8.550	0.282

The result (Table 1) indicates that lack of storage facility, transportation problem and lack of seed/seedlings are statistically significant at 1% level of significance. Their estimated regression coefficients were found to be -3.94, 20.91, 18.01 and 18.32 respectively. The estimated regression coefficient of the availability of wild fruit which is -3.94 indicates a negative relationship between the availability of wild fruit and commercialization. This result is logical and also in agreement with economic theory. When a particular commodity is found in abundant, its demand reduces resulting to fetch a low price. Thus, negative sign of the coefficient of availability of wild fruit is due to the fact that during harvesting season there will be a lot of fruit and everybody has a free access because the wild fruit is a common property resulting very low demand in the local market. During this time there may be few or no buyer of wild fruit, depending on the type of the fruit. This condition discourages and is an obstacle for an individual or the community to commercialize such a wild fruit. To motivate the wild fruit commercialization, the stack holder or the participant need to get incentive. Therefore, there is a need to establish efficient market system. Thus, an efficient market has to be created, expanded both locally and other area or regions.

Policy Implications and Concluding Remarks

This study revealed that there is no ready market in the study area. During the harvesting season, everybody in the area has full access to the fruit and collect whatever the amount he needs for himself and for his family. Since it is a communal property nobody wants to buy, instead goes to the forest and collect these fruits. When we talk about commercialization, one of the strong reasons that an individual gave was, no buyer because everybody has it. Thus, the negative coefficient of availability of wild fruit which was found to be -3.94 indicates that a one unit increase in the availability of wild fruit would have an effect on commercialization of the fruit by 3.94%. Therefore, to create market outside the region or attract customers to the region should be one of the key strategies for commercialization and proper exploitation of the economic potential of wild fruit.

The result showed that a 1% improvement in storage facility results in an average improvement of 20.91% in commercialization of wild fruit. In the study area, it's evident that during the season when the fruit is ready, there is a considerable loss of fruit due to lack of proper storage. These considerable losses of fruits reduce the quantity and quality of fruit available for consumption and sale within the season and during off seasons. Researches indicated that fresh fruit incur direct or indirect nutrient and general quality loss due to mishandling or lack of proper storage (Leakey *et al*, 2004). Hughes and Haq, 2003) reported post-harvest losses of fruit to be between 40 and 60%. Kordylas (1990) estimated post-harvest fruit loss to be 5 - 25% in developed countries compared to as much as 20 - 50% in developing countries. In developing countries these losses are attributed to a lack of knowledge in fruit handling, lack of storage facility and marketing. Therefore, according to the finding of this research, there is a need to establish storage facility to motivate commercialization of wild fruit.

The third factor considered was the transportation problem which was found that a 1% improvement in current transportation facility results in an average improvement of 18.01% in commercialization of wild fruit. In the study area, means of transportation or road network was mentioned as one of the key problems which led to fruit losses and discourage commercialization of the fruit. These considerable losses of fruits reduce the quantity and quality of fruit available for consumption and sale. It is normal that fresh fruits incur direct or indirect nutrient and quality loss from the field to the consumer if there is no effective transportation system that enables to transport the fruit to its destination on time.

The ordinal regression result also showed that lack of seed/seedlings

significantly contributed for commercialization at 1% level of significance. It was found that a 1% improvement of the current availability of seed/seedlings will improve commercialization of wild fruit by 18.32%. Thus, developing a strategy and policy that help to improve the availability of seedlings will motivate the community to plant and protect the fruit tree. It is also important to train the local or the community how to raise the wild fruit tree nursery. This can be one of the opportunities to create self-employment and generate income.

Therefore, this research concluded that establishing or improving the storage facility, improving transportation or road network and establishing the fruit nursery are the key factors that can motivate the community to commercialize and proper utilization this potential resource.

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