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Economic Contribution of Bamboo Production and Marketing, in Case of Hula Woreda, Sidama Zone, Southern Ethiopia

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Abstract

Despite becoming one of Ethiopia's fast growing and most valuable forest, bamboo's role in livelihoods and rural development is poorly understood. Hence, the general objective was to examine economic contributions of bamboo production and marketing for livelihoods of rural households. To attain this objective, both quantitative and qualitative data from 300 households were collected through structured questionnaires, focus group discussion and key informant interviews using multi-stage sampling technique in 4 Kebeles in Hula Woreda, SNNPR, Ethiopia. Both descriptive statistical tools and binary logit regression model were used to analyze relationship between variables. Binary logit regression model was employed to find out the relationship between dependency level of households on bamboo for their livelihood and some selected socio-economic factors. According to the results, the area of land covered by bamboo has been decreasing from time to time and about 75 percent of respondents said that the area of land covered by bamboo has been decreasing. Bamboo culms and products marketing systems were informal. Bamboo producers simply display their products, mostly on road-sides, and interested buyers buy them. Information helps farmers to get better price to their product, to increase quality and quantity of the bamboo product. And only 7 percent farmers have full access for information on how to supply, where to sell and the level of demand for their bamboo products. This shows there was lack of adequate market information on the marketing of bamboo products they produce in this area. Therefore, the focus on the development of conservation and processing methods and appropriate production system and marketing can enhance the utilization of bamboo resources.

Key words: Bamboo; binary logit model; information; livelihood; marketing; production.

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1. Introduction

In the World about 1.5 billion people depend on bamboo for their daily lives. The same source indicates that over 20 million tons of bamboo are collected and utilized annually. Global bamboo trade is estimated to be between 1.5 to 2.5 billion USD. Bamboo contributes between 4-7% of the total tropical and subtropical timber trade [1]. Bamboo is a versatile and multifaceted non-timber plant. There are 60 to 90 genera of bamboo with over 1,200 species [2]. In Ethiopia, only two bamboo species are growing and both are endemic to Africa (Kassahun, 2000). These species are Yushania alpina k. Schum (highland bamboo) and Oxytenanthera abyssinica (A. rich) Munro (lowland bamboo). Ethiopia has over one million hectares of highland and lowland bamboo resources, which account for about 67% of African bamboo resources and more than 7% of the world total area covered by bamboo [3].

Bamboo is mostly distributed in tropical and subtropical zones between 46 degrees North and 47 degrees South in Asia, Africa and America [1]. It is one of the fastest-growing plants on Earth; it has been measured as fast as 100 cm (39 in) in a 24-hour period. Bamboo is also known to be able to grow over 30 meters (98 ft) tall. The maximum size measured in the indigenous bamboo forests of Ethiopia was 23 m and 20 cm in height and diameter, respectively [4].

Almost every product which is now produced from woody species can be effectively produced from bamboo including panels, boards, flooring, roofing, pulp and paper, fabrics and cloth, charcoal, oil, gas and even vegetables - bamboo shoots [5]. With modern processing techniques, bamboo can be transformed into many products that compete directly with wood products in price and performance. Bamboo is also an environmentally friendly plant, for example it serves as net carbon sink, and produces 35% more oxygen than woody plant [1]. Bamboo agro forestry requires only a modest capital investment and generates steady income to producers and retailers. Over 600 million people around the world generate income from bamboo. Hundreds of millions of people in the world live in bamboo houses. In many parts of Africa, the rural poor are dependent on bamboo for their shelter and daily uses [3]. Therefore, it is labor intensive and contributes significantly to employment opportunities. There has been a growing awareness in recent years that bamboo is a vital component of development and an effective means to improve the livelihoods of rural poor people. Despite its important role and good potentials, the bamboo production and marketing system are not adequately market-oriented. The general objective was to examine economic contributions of bamboo production and marketing for livelihoods of rural households. Similarly, this study contributed to the understanding of economic contribution of bamboo within resource use in rural households in Hula *Woreda*, while contributing to the empirical literature with respect to African bamboo in general, and Ethiopian bamboo forest in particular as background information for those who would like to conduct related research on the same area.

2. Description of the study area

Hula Woreda is one of the 77 woredas in the Southern Ethiopia. It is one of the 19 woredas and 2 town administration in the Sidama Zone. Its distance from Hawassa city is 95 K.M. In additions it has 31 Kebeles

and, it is bordered on the south by the Oromia Region, on the southwest by Dara, on the west by Aleta Wendo, on the northwest by Dale, on the north by Shebedino, on the northeast by Arbegona, and on the east by Bensa.

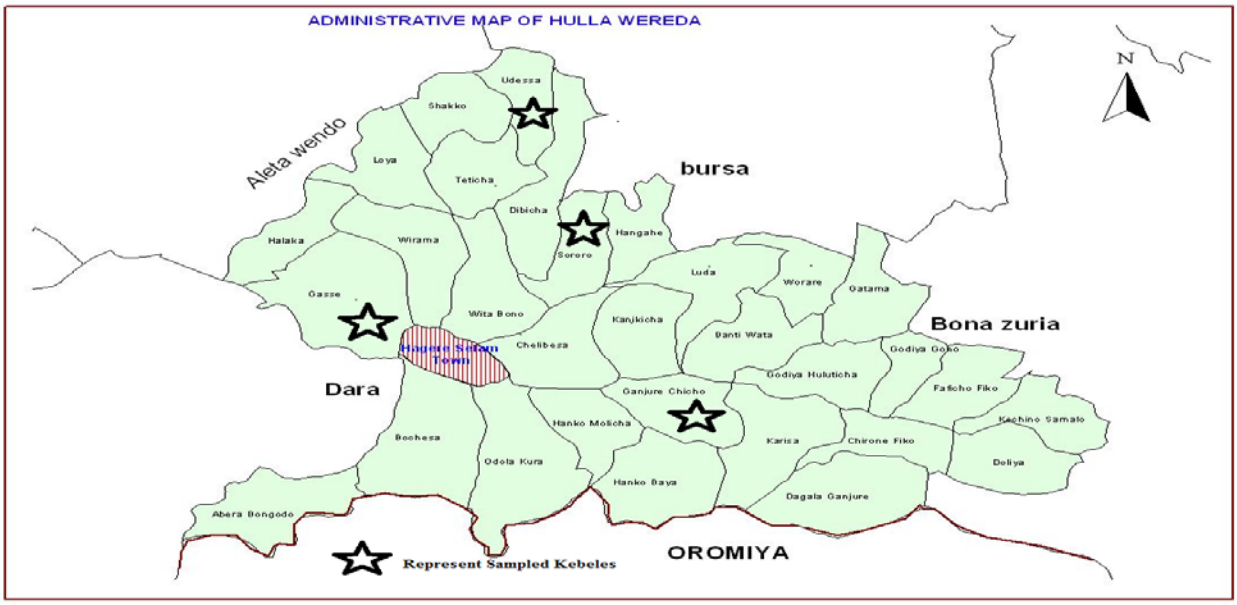

Figure 1: Administrative map of Hula Woreda

Source: Sidama zone finance sector

3. Material and methods

In this study the different data collection methods employed were primary data collection instruments from different sources and secondary data derived mainly from Agriculture and Rural Development offices at each level, thesis, journals and unpublished documents. Researcher used primary data source to gather actually information from respondents. Group discussions were held during the survey with 10-15 key informants consisting of elder people, local administrators and development agents. The data that collected from different sources were analyzed by descriptive statistical and econometric methods. The descriptive method includes percentages, frequencies, tables etc. This study used binary logistic regression model to identify sources and factors affecting households' livelihood dependency on bamboo products. The logistic regression technique was used when the dependent variable is dichotomous (binary) in which case the event either "occurs" or "does not occur" [6, 7]. In this study, the dependent variable is households' dependency on bamboo products for their livelihood. Households are either dependent or not dependents on bamboo for their day to day activities. For more than one independent variable, that is for K independent variables $(X1, X2, \ldots\ldots Xk)$, the binary logit model can be written as:

$$Z(x) = \{\text{Exp}\,(B0 + \Sigma Bi * xi)\} / \{1 + \text{Exp}\,(B0 + \Sigma Bi * x1)\} \qquad (1)$$

Derivation of the logit model can be performed as follows:

$$\text{Let } p = \frac{\exp(z)}{\{1+\exp(z)\}} \quad (2)$$

$$1 - p = \frac{1}{\{1 + \exp(z)\}} \quad (3)$$

$$\frac{p}{1-p} = \exp(z) = \text{odds} \quad (4)$$

Taking the natural logarithm of the above would result:

$$\frac{p}{p-1} = e^{B_o X_o} * e^{B_1 X_1} * e^{B_2 X_2} * \dots\dots\dots\dots e^{B_n X_n} \quad (5)$$

$$ln\left[\frac{pi}{1-pi}\right] = B_o + B_1 X_1 + B_2 X_2 + B_3 X_3 \dots\dots B_n X_n \quad (6)$$

Where p = chance of being dependent on bamboo for livelihood

1−p = chance of being non dependent on bamboo products

$\ln[pi/(1-pi)]$ = is the probability of the event occurring or dependency on bamboo with odds of non-utilization of bamboo.

Xi = $X_1, X_2, X_3 \dots\dots\dots\dots\dots X_n$: are the independent variables used in the model.

Bi = $B_1, B_2, B_3 \dots\dots\dots\dots\dots B_n$: are the regression coefficients.

3.1. Sample size determination

The following formula was used in the determination of sample size [8]:

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

Where; n is the sample size needed, N is the household population size (=48147), and e is the desired level of precision (in this case, e= 6%) with the same unit of measure as the variance and ^{2} is the variance of an attribute in the population.

Then, the sample size (n) was calculated as follows,

$$n = \frac{48147}{1 + 48147(0.06)^2} = 276$$

Considering 10 % non-response rate, the sample size; n = 276 +28 =304

Therefore, a total of 304 households were selected for the study. These households were selected from selected

four Kebeles by using systematic random sampling method.

3.2. Sampling techniques

A multi-stage stratified sampling technique was used to select sample farmers in Hula Woreda. In the first stage, study Woreda was purposively selected based on the extent of bamboo production. In the second stage, Hula woreda was grouped into three livelihood zones based on the way of living. These livelihood zones are bamboo Livelihood Zone (BLZ), *enset* Livelihood Zone (ELZ) and wheat-barley Livelihood Zone (WBLZ). In the third stage, four Kebeles namely, Gasse and Udessa from bamboo Livelihood Zone (BLZ), sororo from *enset* Livelihood Zone (ELZ) and Ganjure Chicho from wheat-barley Livelihood Zone (WBLZ) were selected by discussing with agricultural extension service officers based on the amount of bamboo production. From Gasse, Udessa, sororo and Ganjure Chicho Kebeles, 100, 90, 57, and 57 households respectively were taken by using systematic random sampling method and total of 304 households were sampled. The sample size was distributed in each sample Kebele based on the house population size and dependency level on bamboo production.

4. Results and discussion

Table 1 shows binary logit regression results that check whether farmers depend on bamboo for their livelihood or not against socioeconomic and institutional variables that affect farmers' livelihood dependency on bamboo. Binary logit model regression results showed that seven out of ten variables were statistically significant at influencing farmers' dependency on bamboo for their livelihood. These include marital status, family size, grower, training, membership to cooperatives, selling and livestock whereas households head's age, education and distance to market were not significantly related to households' bamboo income. These variables were selected on the basis of theoretical explanations and the result of various empirical studies. In this study, married farmers were found to be more likely dependent on bamboo for their livelihood than other single and widowed counterparts with positive coefficient 0.0124. As farmers became married, probability of farmers' dependency on bamboo for their livelihood increases by a marginal factor of 0.005, keeping all other independent variables constant. According to focus group discussion, the reason was that married farmers are more likely to attend meetings, frequent follow ups and supervisions of other farmers' bamboo forest and they have even more social relationships than single and widowed counterparts. Family size was found to be a significant determinant of farmers' dependency on bamboo for their livelihood in the study area. The positive coefficient for household size was found to be 0.7043 and statistical significant at five percent level of significance. As the family size increases by one unit, keeping all other independent variables constant, probability of farmers' dependency on bamboo for their livelihood increases by a marginal factor of 0.017. This shows that as the number of family size increases the probability of being dependent on bamboo for their livelihood increases. The pull source of large family size was generally recognized from focus group discussions. Focus group discussion members indicated that people in this area prefer to have more children as an old age security and looking for their labor. That might be to have equitable labor distribution among farming activities. Farmers who have an experience of growing bamboo were more dependent on bamboo for their livelihood than non growers of bamboo. The positive coefficient for bamboo growers was found to be 0.3619 and statistical significant at 1 percent level of

significance. As farmers become growers of bamboo, probability of farmers' dependency on bamboo for their livelihood increases by a marginal factor of 0.012, keeping all other independent variables constant. Similarly Farmers who have bamboo selling experience were more dependent on bamboo for their livelihood than those who have no selling habit of bamboo. The positive coefficient for selling bamboo was found to be 0.1041 and statistical significant at 1 percent level of significance. As farmers more selling habit of bamboo, probability of farmers' dependency on bamboo for their livelihood increases by a marginal factor of 0.0451, keeping all other independent variables constant. Training farmers about farm management is important for farmers to improve their skills and practices and to have knowledge confirmed by professionals and extension officers. It was positively related with dependency of farmers on bamboo for their livelihood at 5 percent level. It was established that participating in farmers' training program increased the probability of being dependent on bamboo for livelihood by 0.0566 marginal factors, keeping other independent variables constant. Trainings helped farmers to obtain information and to correct misconception concerning bamboo usage. Membership to cooperatives was also found to be positively related and significantly affecting probability of being dependent on bamboo for livelihood at 5 percent level. Farmers` organizations played an important role in organizing members agriculture oriented cooperatives and enhancing bamboo conservation and production. TLU was found to be statistically significant and had positive relationship with dependency of farmers on bamboo for their livelihood at five percent level of significance. As the number of livestock expressed in tropical livestock unit (TLU) increases by one unit, keeping other independent variables constant, probability of farmers' dependency on bamboo for their livelihood increases by 0.058. The positive value of regression coefficient (B= 0.303) indicates that as the number of other animals in TLU increase, the probability of being likely to fall on bamboo for their livelihood increases.

Table 1: logistic regression of factors influencing livelihood dependency on bamboo

Variable	Coefficient	Standard error	z-value
Age	0.0191	0.0535	0.36
Marstatus	0.0124*	0.0062	1.97
Famlsize	0.7043**	0.3373	2.09
Grow	0.3619***	0.1391	2.60
Training	4.1350**	1.6457	2.51
Edu	0.0696	0.2389	0.29
Membcoop	4.1492**	1.6638	2.49
Selling	0.1041***	0.0487	2.14
Dismkt	-0.0110	0.0355	-0.34
Livestock	0.3030***	0.0685	4.42
_Cons	1.0526*	0.6218	1.69
Log likelihood = -82.8283	Pseudo R2 = 0.3298	Number of obs = 300	
LR chi2(11) = 81.51	Prob > chi2 = 0.0000		

***, ** and * indicate level of significance at 1, 5 and 10 percent, respectively.

Table 2: The marginal effects of explanatory variables on bamboo livelihood

variable	dy/dx	Standard error	z-value	At mean (X) value
Age	0.0006	0.0030	0.20	35.202
Marstatus *	0.0050	0.0014	3.50	0.8039
Famlsize	0.0170	0.0073	2.33	6.5196
Grow *	0.0120	0.0063	1.90	0.8896
Training*	0.0566	0.0102	5.53	0.6519
Edu	0.0002	0.0019	0.13	4.2022
Membcoop*	0.0348	0.0040	8.57	0.6593
Selling *	0.0451	0.0077	5.82	0.7696
Dismkt	-0.0075	0.0097	-0.78	0.9215
Livestock	0.0585	0.0060	9.68	5.5931

(*) is for discrete change of dummy variable from 0 to 1

5. Conclusions

In study area *Yushania alpina* is planted on privately owned land at homesteads, along road sides, farm boundaries, along stream and river banks, around church compounds and on up slope plantation or around farm areas as live fences.

Bamboo can be used for construction, pulp, board, food, fuel, medicine, utensils and crafts. The main reason why bamboo was preferred were those: it is the fastest growing tree, it can give high economic returns, it is multi-purpose and gives output to many products, it can stabilized gullies and is good for soil fertility maintenance.

The major driving forces for the disappearances of the bamboo forests are conversion to agricultural land and bamboo forest being common pool for all individuals for last times, increase of population growth, environmental change and unsustainable cutting for sale, house construction, fencing and low replanting habit local bamboo in the study area.

Bamboo culms and products marketing systems are large informal. They simply display their products, mostly on road-sides, and interested buyers buy them. The demand of bamboo culms and products are greater than the supply.

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