Analysis of the Determinants of Savings among Gum Arabic Collectors in Selected Local Government Areas of Adamawa State, Nigeria

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Abstract: The study analyzed the determinants of savings among gum arabic collectors in selected local Government Areas of Adamawa State, Nigeria through a questionnaire survey administered on a sample of 100 gum arabic collectors obtained through a multi stage sampling technique. Data collected were analyzed using descriptive and production function analysis). Results of the analysis revealed that total income, consumption and saving derivable from gum collection were ₦2, 137,139.20, ₦739, 141.76 and ₦1, 397,997.44, respectively while the average propensity to consume and save was 0.4625 and 0.5375. The estimated regression analysis showed that about 60.33 percent of variability of farmers' saving is attributed to the specified explanatory variables in the model. Education, experience and membership of saving association had significant and positive effect on the saving behaviours of gum Arabic collectors while household size showed a significant and inverse relationship ($p>0.1$) with savings.

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1. Introduction

Households saving play an important role in the economic development of both developed and developing nations, due to its significance influence on the circular flow of income in the economy (Iyoha *et al.,* 2003).Savings are important means of improving well-being, insuring against times of shocks, and providing a buffer to help people cope in times of crisis (Rutherford, 1999; Zeller and Sharma, 2000). The sustenance of household savings increases the possibility of future investment both at the micro and macro- levels in the economy. Economic theory postulates that households' saving is the difference between households' income and consumption. Household income is aggregate income a household earns from all sources in a particular period. Consumption on the other hand, is the total amount of goods and services that is consumed by households during a particular period. Savings influence growth of the economy, as higher savings lead to capital accumulation and hence economic growth. The agricultural sector's productivity for instance, is largely depended upon the proportion of income farmers save from their farming activities (Adeyemo *et al.,* 2005; Awe and Ayeni, 2010). .In Nigeria, saving mobilization among small scale farmers is low and this is evidence in inability of them to expand scope of production and adopt innovations. This should be a source of concern to policy makers, since about 70 of Nigeria's population are engaged in agricultural activities (IFAD,2000). The sustainability of the agricultural industry could be jeopardized if the small scale farmers are not given due attention as they are engine growth of the sector providing food and industrial raw materials in Nigeria (ADB, 2000 and ADF, 2000). Keynes (1936) stated that savings depend upon disposable income. Duesenberry (1949) proposed that consumption/ saving was a function of the ratio of current income to previous level of income. Friedman (1957) hypothesized that household savings was based on permanent income. Ando and Modigliani (1963) postulated that households were net dis-savers in their early and old age but they saved more in their middle age. Apart from income, other variables might be responsible for inability of gum arabic farmers and collectors to sufficiently save part of their revenue from gum business.

Several studies have revealed that poor rural people in developing countries like Nigeria do save part of their earned income (Wright 2000; Ashraf *et al.*, 2003; Siyanbola *et al.*, 2005, Ezedima *et al.,* 2005). Orebiyi (2005) studied determinants of saving mobilization by farmer's cooperators in Kwara State Nigeria, using multiple-regression and descriptive statistics techniques; the results revealed that household size, farmer's expenditure and membership experience are major determinants of saving. Adeyemo *et al.,* (2005) examined the pattern of saving and investment among cooperators farmers

in south western Nigeria and reported that income, loan repayment and amount of money borrowed are significant variables that influenced saving pattern. Ayanwale *et al.,* (2000) in their study on rural savings in Osun state Nigeria, asserted that saving behaviour of rural farmers in developing nation is less depended on the absolute aggregate income but more on the relationship between current and expected income, the nature of business, household size, wealth and age. A study on analysis of savings determinants among agro-based firm workers in Nigeria by Akpan *et al.,* (2011) reported that income, tax, job experience, education, family size and membership of a social group influence saving attitude of workers.

Forest related activities specifically the Non-Wood Forest Products (NWFPs) of gum arabic is a money spinner for small scale farmers in the gum arabic belt of Nigeria especially at off farm period. Natural gums and resins are among dry land resources in Sub-Saharan Africa that contribute to improved livelihoods of local communities in terms of food security, income generation and foreign exchange earnings. These resources also contribute to the amelioration of the environment (Centre for International Forest Research, CIFOR, 2007). FAO has adopted a working definition in which "Non-Wood Forest Products (NWFPs) consist of goods of biological origin other than wood, derived from forests, other wooded lands and trees outside forests" (FAO, 1999). Many NWFPs have both social and economic benefits to rural communities. Some of these commodities also play an economic role to the national and international economies. Meanwhile, various services from forests and allied ecosystems provide many social and economic benefits to rural people. Plant gums are usually water soluble compounds made up of polysaccharides and small quantities of protein and mineral salts (cations). Plant gums from trees are of two types: exudates (ooze from the tree/shrub as a result of injury) and seed gums (isolated from the endosperm portion of some seeds). Exudate gums are the main forms produced in Africa. One of such most important commodities is Gum arabic, a dried exudate obtained from the stems and branches of *Acacia senegal* or *A. seyal* (FAO, 1998). The two species are native to the hot and dry regions of Africa. *A. senegal* is found in a belt some 300 km wide immediately south of the Sahara desert from Mauritania and Senegal in the West to the Horn of Africa. From the Horn of Africa, it extends southwards through Tanzania to the Southern Africa countries of Angola, Namibia, Zimbabwe, Botswana and South Africa (Natal and Transvaal). *A.seyal* extends from Dakar in Senegal to the Horn of Africa and southwards to Tanzania.

In terms of production, Sudan is the principal producer accounting for over 50% of the world production followed by Chad and Nigeria, which account for the bulk of exported volume, are putting in place aggressive programmes at the level of production and post harvest handling to improve quality and value of the traded commodity. Gums (especially gum arabic) are one of good examples. They are ancient commodities that have remained important articles of commerce on the international market to the present day. For example, gum arabic accounts for about 10% of the approximately 500,000 MT hydrocolloid trade on the international market. With improved production, post harvest handling and aggressive marketing, the traded volume is bound to increase from the current 55,000 – 60,000 MT to 100, 000 MT by 2010 (Dondain, 2001).

Management of the resources for gum production is well developed and clearly demonstrates how forests can be sustainably managed. Over the years farmers have developed an agro forestry system known as gum gardens in which gum trees are grown on farm plots at a spacing of 4 x 4 meters. During the first 4-5 years agricultural crops are planted between the lines thereby supplying the farmers with food (Giroh *et al.,* 2008). Gum production begins after the fourth year of planting and continues annually until the trees are twenty to twenty five years. Meanwhile, animals are allowed to graze under the trees when they have grown big thereby providing fodder. The trees are then harvested for wood fuel and other farm activities, the land left fallow for sometime and the cycle repeated. This system ensures optimum and sustainable use of natural resources since crop production during the initial years and gum production and livestock grazing form productive components. The use of gum arabic has been widely reported in industrial application (food and beverages, pharmaceuticals, cosmetics, textiles). The Acacia trees are also Nitrogen - fixing and hence improve soil fertility. Other uses include provision of pods for livestock feed, shelter belt planting to control desertification and provision of timber. It is an important revenue earner for the country and employer of labour for rural people who are engaged in production and gum collection (Giroh *et al.,* 2010).

Seven out of the 19 species of Gum arabic reported in Nigeria were found in the northern Guinea and Sudan savanna areas of Adamawa State. The rainfall regime of these zones ranged from 900 – 1100 mm and 700 – 900 mm per annum with rainfall duration of 4- 5 and 3- 4 months (Giroh *et al.,* 2010). Gum arabic production in Nigeria has been low arising from lack of capital to boost production, use of improved planting materials amongst other factors.

To harness the current potentials for gum arabic production and export, its production must be improved. Production must shift from the traditional form to the use of cultivation in organized plantation with intercrop based combination for maximum economic benefit. Considering the importance of gum arabic production, the study focused specifically on analysis of the determinants of savings and consumption among gum arabic collectors in selected local Government Areas of Adamawa State, Nigeria with the specific objectives to examine the socio-economic characteristics of gum arabic collectors and determine factors that affect their saving behaviour amongst them.

2. Methodology

2.1The study area, data collection and analysis

The study was conducted in the Northern Guinea Savanna Zone of Adamawa State purposively selected for concentration of Acacia species and large collectors of the gum arabic. Data were collected using multi stage and random sampling technique.

Three Local Government Areas noted for the concentration of gum arabic collectors namely Demsa, Numan and Lamurde were selected from the Northern Guinea Savanna zone. Three (3) villages each were selected from each of the Local Government Areas and used for this study. One hundred and eighty (180) gum arabic collectors were randomly selected and administered structured questionnaire out of which one hundred and fifty (100) were recovered and used for analysis. Baseline information on the socio-economic characteristics, savings, income, consumption and other relevant economic data were collected for analysis.

The study was based on the premise that some variables that affect saving also affect consumption of gum collectors (Koutsoyiannis, 1977; Akpan *et al.,* 2011).

Sav = *f* (Inc, Tax, Age, Exp, Edu, Moa, Hhs) (1)

Con = *f* (Inc, Tax, Exp, Edu, Nfe, Hhs, Fmi, Vfo) (2)

Inc = Sav + Con (3)

Where: Sav = Households saving defined as Income – Consumption in (₦); Inc = Income of ith collector defined as farm income + income from gum (₦);Age = Age of ith respondent in years; Exp = Experience on job measure in years;Edu = Educational qualification of respondent in years; Hhs = Household size in number; Fmi = Income of other family members (₦);Nfe = Expenditure, defined as Household non-food expenditure (₦);Vfo = Value of Farm output of respondent in (₦) and Moa = Membership of contributory Association in Years (A local contribution group among respondents).

In order to evaluate factors influencing savings, data were subjected to production function analysis. Four functional forms (linear, semi-log, exponential and double log function) were fitted to the data. Double log function gave the best fit and was used for analysis stated as:

$\text{Log } Y_s = \beta_0 + \log \beta_1 X_1 + \log \beta_2 X_2 + \log \beta_3 X_3 + \log \beta_4 X_4 + \log \beta_5 X_{5+} \log \beta_6 X_{6+} \log + \mu$ (4)

Where: Y_s = saving index of the ith collector in naira, X_1 = gum collected in kilogramme, X_2 = age of farmer in years, X_3 = education measured in years spent in school; X_4 = farm experience in years; X_5 = family size; X_6 = membership of saving association and μ_1 = the error term (was assumed to have zero mean and constant variance).

β_0 = A constant, β_1, β_2 …. B_3 are regression coefficients to be estimated.

3. RESULTS AND DISCUSSION

3.1 Socio- economic analysis of gum arabic collection.

Data in Table 1 is the summary of selected variables of gum collectors. Respondents had 3 and 10 people as minimum and maximum household sizes with a mean family size of 7 people. Family size has been found to be a source of labour for many production activities as well as a propelling factor for family heads to devise means of livelihood. Analysis based on experience of the respondents also revealed a mean experience of 12 years with a maximum of 16 years while the minimum experience of 5 years. The mean age was 36 years with a maximum of 51 years. Gum harvest and collection especially among the young poses no difficulty in terms of distance because they are for energetic but might be difficult for the elderly collectors. Wide variations are observed in quantities collected and revenue accrued with corresponding consumption and saving among respondents. This result shows that gum collection is a profitable venture and employer of labour in the study area and validates earlier studies conducted by FAO (2003) which revealed that non woody forest products (NWFPs) contributed to the economic development of some local communities and national economies. It could be inferred from Table 1 that gum collectors earned additional income from gum collection at lean periods of primary activity (farming). The additional income could lead to the propensity to save and consume.

Table 1: Summary of descriptive statistics of selected variables

Variables	Unit	Mean value	Minimum value	Maximum value
Family size	Number	7	3	10
Experience	Years	12	5	16
Age	Years	36	21	51
Output of gum	Kilogramme	135.6	182.56	748.68
Income from gum	Naira	21,371.39	10,567.58	41,906.48
Amount consumed	Naira	7,391.42	5,350.98	17,959.92
Amount Saved	Naira	13,979.97	9,652.54	39,625.76

Source: Field survey, 2010

3.2 Determinants of savings and income derived from gum collection

Total income, consumption and saving derivable from gum collection were ₦2,137,139.20, ₦739, 141.76 and ₦1,397,997.44, respectively(Table 2). The average propensity to consume and save was 0.4625 and 0.5375. This shows that substantial portion of income was saved. Experts have advocated that with solvency, farmers are likely to expand their scope of production and adoption of farm innovations. Giroh *et al.,* (2005) found out in their studies that gum collectors channeled their additional income towards saving, purchase of food stuff, livestock and payment of fees for their children.

Table 2: Distribution based on proportion of income consumed and saved from gum collection by respondents

Income Range(₦)	Total Income (₦)	Total consumption(₦)	Total Savings(₦)
≤ 20,000	569,587. 20	170,876.16	398,711.04
20001– 30,000	817,217. 60	245,165.28	572,052.32
3001– 40,000	151,670. 40	143,501.12	8,169.28
> 40,001	598,664. 00	179,599.20	419,064.80
Total	2,137,139.20	739,141.76	1,397,997.44

Source: Data Analysis 2011.

The estimated regression analysis is shown in Table 3. The Double log function was chosen as the lead equation because it exhibited better diagnostic test statistics than other models fitted to the data. The adjusted R^2 of the lead equation indicates that, about 60.33 percent of variability of farmers' saving is attributed to the specified explanatory variables in the model. This shows that, the specified explanatory variables were important determinants of household saving among respondents. The F-statistic value of 5.45 is statistically significant (p> 0.01) suggesting that the R^2 is significant and the estimated double log regression equation has goodness of fit. The empirical results show that quantities of gum collected has a significant positive effect ((p> 0.01) on the savings of the respondents. This implies that as the farmers' quantity of gum collection increases, the tendency of the respondents to save increase too.

Education has a significant positive effect (at 1% significant level) on saving of gum Arabic collectors in the study area. This means that saving is predominant among respondents that attained some forms of formal education suggesting that they can access financial facilities; adopt improved technology in their farming activities. The result indicates that, a unit increase in education will likely result to a saving of ₦0.72 every period of gum collection. Orebiyi (2000) reported a positive and significant relationship between education and savings. The coefficient for experience in gum Arabic collection is positive and statistically significant(p>0.05) This implies that about 24 kobo is saved by respondents for every one year experience on gum collection job. This means that older respondents have higher tendencies to save than those that are new on the job. Household size has a significant negative effect (p>0.1) on saving of respondents. This suggests that, a farmer with a large household will likely channel more of his income to food consumption expenditure rather than to save. This also implies a lower well-being for a farmer with a larger household size. On the other hand, a farmer with a smaller family size will have high tendency to save.

The result is in line with empirical results reported by Orebiyi (2000) and Akpan *et al.,* (2011) in Nigeria. The coefficient for membership of saving association (Msa) is positive and statistically significant (p>0.1) suggesting one of the determinants of saving among the respondents in the study area. The result reveals that a farmer will likely save about ₦0.61 every month from his total income from gum collection if such a farmer belongs to a local contributing group. Rural farmers have devised means of sourcing for credit for production through

community based rotatory credit associations usually referred to as local bank or bank for the poor.

Table 3: Result of regression analysis on determinants of savings amongst respondents

Variable	Coefficient	Standard error	t.statistics
Constant	4.480537	0.789481	5.675298***
X_1 Gum collected in kilogramme	0.095920	0.013835	6.933140***
X_2 Age of farmer(years)	0.136128	0.427363	0.318529
X_3 Education(years spent in school)	0.718050	0.229090	3.134357***
X_4 Farm experience(years)	0.239601	0.104679	2.289108**
X_5 Family size	-0.161599	0.084166	-1.920003*
X_6 Membership of saving association	0.613802	0.369594	1.660746*

R^2 0.6199 R^2 adjusted 0.6033 F. value 5.45******, ** and *, respectively, represents significance at the 1% 5%, and 10% levels.

4. Conclusion

Gum collection was found to increase savings among income of collectors. Policies on free or subsidized education, birth control and intensive awareness on the need for moderate family size especially in the rural areas through the on-going family planning programme in the country should be strengthened. This will reduce dependent ratio of children on parent while increasing the aggregate family income. Gum Arabic collectors should be encouraged for cooperative societies to enable them access credits form banks as this will encourage the accumulation of social capital in form of savings.

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