Multinomial Logit Estimation of Income Sources by Watermelon Farmers in Northeastern Nigeria

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Abstract— The main objective of the research was to use multinomial logit model to estimate income sources of watermelon farmers in northeastern Nigeria. A total of 434 farmers were sampled through multi-stage sampling procedure covering three Local Government Areas of Yobe state, Nigeria. The sources were personal savings, friends and relatives, Bank loans and cooperative/thrift societies. The results revealed that farm size, age and level of education were significant at 5% probability level and positively influenced the utilization of income from friends and relatives. Farmers' level of education, total cost of production and farm size significantly influenced farmers to obtain loans from banks. The marginal effects were 0.0504, 2.75 and 0.0038 showing the degrees of probabilities the variables can influence bank loans. Watermelon farmers can only obtain loans from cooperative and thrift society based on their farm size, total revenue, age, total cost and their level of output. These variables were significant at 1% and 5% probability levels with appropriate signs. The study concluded that 60% of the farmers fund their farm through personal savings and was difficult to get bank loans. It was recommended that micro-savings be encouraged among farmers and cooperative/thrift societies should be encouraged and adequately developed through the Non-Governmental Organizations.

Keywords— income, Sources, Utilization, Farmers, Nigeria

I.   INTRODUCTION

The survival strategies among rural households of developing countries are intertwined with agricultural activities. But financing the sector at the rural base level is a major predicament to both individuals, cooperate bodies and government (Tiku and Enoibor, 2012).

It is recognized that increase in finance and investment are needed at all the food chain, with special interest in increasing the access to finance by the agricultural households and communities that are most vulnerable to food insecurity and poverty. Source of agricultural financing is imperative to the development of agrarian economy, through financial services ranging from short-medium and long-term loans to leasing, to crop and livestock insurance, covering the entire agricultural value-chain in inputs supply, production and distribution, wholesaling, processing and marketing (Miller and Jone, 2010) .

The agricultural sub-sector is saddled with peculiar risks, risks that can hardly be diversified, calculated or quantified making it almost near impossible for commercialization. This factor has left rural farmers at the mercy of their little income and most times informal sector financing (Emmanuel and Enimus, 2015).

The need to finance agricultural activities is primarily to alleviate poverty among the rural poor in developing economy where 70% and above are employed. Fassil and Mekonnen (2016) observed that farm households diversify their income sources for at least two reasons: pull factors and push factors. The pull factor is diversification undertaken for asset accumulation objectives, whereas push factor is diversification undertaken to reduce vulnerability and build resilience to shocks. Increase financial support to agriculture could lead to capital accumulation. According to Jhingan (1999) in Emmanuel and Enimus (2015), the vicious Cycles of poverty in under-developed countries can be broken through capital accumulation. It is capital formation that leads to utilization of available resources. Thus, capital formation leads to increase in the size of the national output, income and employment, thereby solving

the problems of inflation and balance of payment and making the economy free from the burden of foreign debts. Muhammed and Haruna (2015) stressed that agriculture is and will continue to be a major building block in the achievement of the Millennium Development Goals (MDGs). Agricultural based small scale business (ASSBS) include businesses that engage in the supply of Agricultural inputs, services to farming/Agribusiness, trading produce, storing and transportation, processing and retailing of farm produce. Recent statistics shows that agricultural production needs to increase by 70 percent by 2050 in order to feed the world, while demographic growth, climate change and urbanization put pressure on available cultivable land (Muhammed and Haruna, 2005).

To support the laudable importance of agriculture in Nigeria, Adegoke, *et al* (2015) revealed that the Central Bank of Nigeria has established a USD 350millon risk sharing facility to reduce the risk of farmers and agribusinesses. It will also reduce interest rates paid by farmers from 18% to 8%. The Federal Government is also recapitalizing the Bank of Agriculture (BoA) to lend at single digit interest rates to farmers. Financial services include weather index-based insurance Schemes as proposed by Government, because many farmers will not be able to afford the cost of insurance premiums. In addition, subsidies were proposed to support and reduce the high fixed cost of insurance products. Area-based food insurance scheme is expected to be established in areas prone to floods. All this laudable programmes has remained on paper and implementation is near zero.

In 2017, cost of importation of food items into Nigeria remain very high, most homes go to bed hungry and agricultural productivity in the country is unsustainable. It is on the bases of this that Emmanuel and Enimus (2015), reechoed the Neo-classical growth theory of convergence thesis in conjunction with Cobb-Douglas production function, where output is a function of labour, capital and the level of technology and there are constant to each factor separately. Solow in 1956 opened a new chapter in development economics by pioneering an economic growth model based on the assumption that increasing capital accumulation and technical efficiency are the sources of economic growth. According to Thirwall (1999), capital accumulation is as much the endogenous consequences of growth as the exogenous cause growth.

In the Harrod-Domar model, the prime mover of the economy is investment and it has a dual role: create demand and capacity (Jhingan, 2007).

It is based on these roles we make attempt to investigate the level of involvement of commercial banks and other informal financial institutions in promoting the production of watermelon in the northeast of Nigeria.

The significant of the study is to underscore reasons that most watermelon farmers in the country are faced with the problem of sourcing for income to finance their agricultural activities. They rely on informal sources which are very precarious, unstable and un-assured. The findings will help the researchers to unravel the major determinants of farmers' choices of income source, which is very critical in agricultural development of the country.

The description of watermelon and the nutritional importance show that watermelon (*Citrullus lanatus*) is a member of the Cucurbit family (Cucurbitaceae). The crop is grown commercially in areas with long frost free warm periods. Seed requirement is 3kg/ha. Nutritionally, an average fruit is made up of 93% water by weight and about 7% consists of small amount of protein, fat, mineral and vitamin (Adekunle *et al*, 2003). The major components of the fruits are carbohydrates and vitamins.

Table.1: Nutritive Value Per 100kg edible portion

Nutrients	Calories
Energy	16.0 kcal
Protein	0.2 g
Fat	0.2 g
Carbohydrates	3.3 g
Calcium	11.0 mg
Phosphorus	12.0 mg
Iron	7.9 mg
Thiamine	20.0 µg
Riboflavin	40.0 µg
Vitamin C	1.0 mg

Source: Adekunle *et al*, 2003

Generally, the study will uncover the necessity of agricultural financing; it is an attempt to recognize the financial needs of the entirety of agricultural value chain in watermelon production. The study will advance knowledge of identifying the income gaps among farmers which is a major force that drives agricultural processes.

The paper is an exposition of how watermelon farmers do respond to their specific requirements for obtaining credit supply. It is a tailored approach designed to monitor the dynamics of farmers' choices in sources of income to finance production in the face of limited assistance from government and the unwilling nature of commercial banks to make agricultural financial supply to the farmers a priority.

The specific objectives of the study are to:

i.   identify the major sources of income to watermelon farmers;

ii. estimate the determinants of the choice of the source of income; and

iii. make policy recommendations for the enhancement of watermelon production in the area.

II. MATERIALS AND METHODS

Study area: the research was conducted in the 2015 and 2016 farming season in Yobe State northeast of Nigeria. The State was carved out from Borno State on 27th August, 1991. The State is predominantly a rural State with only five medium size fairly populated towns viz: Damaturu, Potiskum, Gashua, Nguru and Bunu Yadi. The State has 17 Local Government Areas (L.G.As.). The study was conducted in three LGAs. Purposive sampling method was used to select Bade, Nguru and Potiskum LGAs because the form the major watermelon producing fringe of Lake Chad agro-ecological zone.

Data Collection: primary data was collected from watermelon farmers and traders in Bade, Nguru and Potiskum using a structured questionnaire. The questionnaire was administered by qualified enumerators drawn from Federal University, Gashua, Yobe State and the State ministry of Agriculture. The multistage procedure was employed to select respondents randomly among the watermelon farmers. Proportionality factor was applied to select the respondent in relation (ratio) to the sample frame obtain from the water melon farmers association. With this, Hundred and thirty (130) farmers from the 10 political wards of Bade, One hundred and forty (140) farmers from the 10 political wards of Nguru and One hundred and sixty four (164) farmers from 10 political wards of Potiskum, making a total of four hundred and thirty four (434) respondents used for the study.

Table.2: Variables used in the multinomial logit model

Variable Name	Nature of Variable	Unit	Variable description
Dependent variable sources of income	Discrete	1	Personal savings
		2	Friends and relatives
		3	Bank loans
		4	Cooperative/thrift society
Independent variables			
Output	Continuous	100Kg = 40 fruits of watermelon	Total output is meant to be an asset/incentive to attract bigger loans from banks
Years of farming experience	Continuous	Years= No. of years spent in cultivating watermelon	It was hypothesized to positively/negatively influence a household to use a better source of income to improve on his production.
Household size	Continuous	No. of persons living together	It was hypothesizes to positively influence better sources of income. As more persons in a household will mean more family labour and higher productivity.
Total cost	Continuous	Total cost of production	In Naira: it is expected that the higher the cost of production the higher the demand for money.
Revenue	Continuous	Total revenue minus total variable cost	It was hypothesized that higher revenue will lead to better standing in the bank to obtain better financial assistance.
Age	Continuous	No. of years of the household head	Age of household can be a proxy to experience and was hypothesized to positively influence a household to select a given source of income.
Level of education	Continuous	Schooling No. of years	Education of household head in years was hypothesized to influence the farmer, more years in school meant higher probability to select a higher source of income.

Source: Survey data, 2017

Analytical Framework: The descriptive statistics: that is the use of Tables, Charts and graphs was employed to describe socio-economic characteristics of the respondents. In order to determine the factors that influence the choices of sources of income, the multinomial logit was employed. Choices involving more than two alternatives can be best explained by probit or logit model and predict the probability that an individual with certain set of characteristics chooses one of the alternatives. The models could be multinomial logit, conditional logit and multinomial probit. In this case the multinomial logit was used. The four sources of income available to watermelon farmers identified were: Personal Savings, Bank Loans, Friends and relatives and co-operative/thrift societies.

Since we are dealing with categorized dependent variable, numerical values were assigned to the qualitative variables (dummies)

  1 = Personal Savings

2 = Friends and Relatives

3 = Bank Loans   4 = Cooperatives/Thrift Societies.

The farmer has four alternatives having no particular ordering. The probability that the ith farmer uses alternative j is P_{ij} = ρ [individual I chooses alternative j].

Setting up the model structure

Assuming a single explanatory factor X_i in the multinomial logit specification (Hoffman and Duncan, 1988)[10] the probabilities of individual I choosing alternative j = 1,2,3, and 4 are:

P_{11} = $$\frac{1}{1 + exp(\beta_{12} + \beta_{22}x_i) + exp(\beta_{13} + \beta_{23}x_i)}, j = 1 \ldots\ldots\ldots\ldots\ldots\ldots 1$$

P_{12} = $$\frac{exp(\beta_{12} + \beta_{22}x_i)}{1 + exp(\beta_{12} + \beta_{22}x_i) + exp(\beta_{13} + \beta_{23}x_i)}, j = 2 \ldots\ldots\ldots\ldots 2$$

P_{13} = $$\frac{exp(\beta_{13} + \beta_{23}x_i)}{1 + exp(\beta_{12} + \beta_{22}x_i) + exp(\beta_{12} + \beta_{23}x_i)}, j = 3 \ldots\ldots\ldots\ldots 3$$

P_{14} = $$\frac{exp(\beta_{14} + \beta_{24}x_i)}{1 + exp(\beta_{12} + \beta_{22}x_i) + exp(\beta_{14} + \beta_{24}x_i)}, j = 4 \ldots\ldots\ldots\ldots 4$$

The parameters specific to the 1st, 2nd, 3rd and 4th alternative sources of income are β_{11} and β_{21}, β_{12} and β_{22} and β_{14} and β_{24} respectively. To solve an identification problem and to make the probabilities sum to one, the parameters of the last (j^{th}) or the most frequently use source of income set to zero. In this case personal savings was set to zero.

In this report 434 farmers were investigated, our objective is to understand the determinants that lead a farmer to use a particular source of income against other alternatives. The factors included in the explanatory variables are output of the farmer, years of farming experience, household size, total cost of production, revenue generated, age of the farmer and level of education.

P_{ij} = ρ[individual use of income alternative j] we consider that

Y_{i1}, Y_{i2}, Y_{i3} and Y_{i4} are personal savings, friends and relatives, bank loans and thrift societies as indicators of source of income by individual i. If personal savings is used;
Y_{i1} = 1, Y_{i2} =0, Y_{i3} = 0 and Y_{i4} = 0 ……………………………….5

If friends and relatives is used
Y_{i1} =0, Y_{i2} = 1, Y_{i3} = 0 and Y_{i4} = 0……………………………….6
If Bank loans
Y_{i1} =0, Y_{i2} =0, Y_{i3} = 1 and Y_{i4} = 0………….........................7
If cooperative /thrift societies
Y_{i1} =0, Y_{i2} =0, Y_{i3} = 0 and Y_{i4} = 1…………. ……………..…...8

Generally, the Multinomial logit defines probabilities as a function of X_i of unknown parameter μ
P_1 = ($P_5 X_i$, Ө) ………………………………………………….9
In the standard MNM, the probability function defined as by Maddala (1983)[11], Wanyaina *et al* (2010)[12], the reference source of income is Personal Savings. Hence, for each source of income there are 4 – 1 =3.

A farmer is likely to use at least more than one income source depending on his socio-economic characteristics. The decision to use a particular source of income is a behavioural response arising from a set of alternative and constraints facing the farmer. In this study, the alternative is as earlier defined.

III.   RESULTS AND DISCUSSION

The socio-economic factors among farmers that influences the use of particular sources of income for water melon production in Yobe State is presented in Table 2. The variables also used in the model in Table 3 reveals the percentage of sources of income utilized by farmers. Personal savings rank highest 59.45% among alternative sources of financing watermelon in Yobe State as revealed in Table 3. The impact of Bank loan is very small as it is hardly accessed by farmers in the study area. Reasons might not be far from factors of illiteracy, ignorance, interest rate, administrative bottlenecks, cultural barriers etc.

Table.3: Distribution of watermelon farmers by source of income

S/No.	Source of income	No. of respondents	Percentage
1	Personal Savings	258	59.45
2	Friends/Relatives	77	17.74
3	Bank loans	35	8.06
4	Cooperatives/Thrift Society	64	14.75
	Total	**434**	**100**

Source: Survey data, 2016

The religion factor is also very opposed to loan collection in the areas. The people of the area are predominantly Muslims and they seldom take credit facilities that have to do with interest payment. That is why the result shows that 91.94% of source of financing watermelon production in Yobe State surround personal savings, friends/relatives and thrift societies.

The descriptive statistics of the respondents and its implications is given in Table 4. It revealed that the average output of watermelon in the study area is 882644.2kg per hectare and the mean farmer's years of experience is 14 years. This means that watermelon farmers in Yobe State have sufficient farming dependence to guide them take sacrosanct decision in terms of where, when and how to obtain credit facilities in funding watermelon production. The Table 4 equally shows that the average household size is 16 persons. This figure agreed with the practice of polygamy in the area where a man is permitted to marry up to four (4) wives despite their socio-economic statues.

Table.4: Descriptive statistics on sample characteristics of watermelon farmers

Variables	Variable description	Mean	Std. Deviation
Sincome	Sources of income	1.797235	±1.100238
Outpkg	Output	882644.2	1174024
Yrsfexp	Years of farming experience	14.19816	10.32911
Hhs	Household size	16.23963	15.31298
Fsize	Farm size	3.814516	4.48807
Tcost	Total cost	142190.9	92971.23
Revenue	Revenue	1277539	2498079
Age	Age of farmer	39.72333	12.23625
Ledu	Level of education	8.605991	5.396009

Source: Survey Data, 2016.

The average farm size is four (4) hectares. This is possible because Yobe State has large expand of Sahel Savannah land, which most times left uncultivated. So, farmers take advantage of the availability of land in the area to cultivate large farm size without necessarily having a corresponding harvest per unit area. This study negated some literatures that conclude that most arable crops are cultivated within 1 to 2 hectares of land in Nigeria (Amalu, 2005).

The Table 4 further revealed that the average age of household head is 40 years. The implication is that most farmers are in their active age and they have the capacity to access financial facilities to boast their production if given opportunities. In this age bracket they have acquired sufficient experience in life to take risks in farm management decisions, including acquisition of farm income financing and risk taking. The Study agreed with Reddy *et al.*, (1990) that agricultural production is confronted with risk and uncertainty condition, as agricultural production being biological and seasonal in nature.

The study revealed that average revenue is ₦1277539 and average cost of production is N142190.9 making about 88.9% profit. This is possible because the cost of maintaining watermelon farm in the study area is quite low and the existence of high patronage for it an attractive means of income. The average schooling period is 8 years. The meaning is that most watermelon farmers stop schooling after primary school and 2 years of possible Arabic education or the entire six years in Arabic education and no higher school. The implications are that majority of the respondent can only read and write in Hausa and Arabic but little western education literacy. This has affected farmers greatly, because illiteracy inhibit farmers from accessing bank loans and instill in them fear of expansion in their scope of business and acquisition of modern technologies and innovations. The importance of education in capacity building cannot be overemphasized in this regards as nobody or a nation can grow above his/her level of education.

Multinomial logit Results

Friends/relatives: The result of multinomial logit revealed in Table 5that factors that influence watermelon farmers to get their sources of income from friends and relatives include age and level of education and farm size; there are significant at 5%,5% and 1% probability level respectively. The result of the marginal effect in Table 6 also revealed that level of education was positive and significant at 5% implying that a 1percent increase in the level of education of the respondent increases the probability of the farmer getting credit facility from friends and relatives by 0.45percent. As farmer get older the chances of getting loans from friends and relatives decreases by 0.17%, this is understandable because as farmers get older they tend to have accumulated resources that can sustain their farming cost, equally they become more risk conscious and avoidance. Meanwhile, increase in farm size will open up more opportunities for farmers to get loans from friends and relatives by probability level of 4%.

Bank loans

The level of education, total revenue and farm size where significant at 5% probability level as revealed in Table 5

and 6. The marginal effect of the level of education was negatively related to bank loans. The inverse relationship exhibited show that an increase in the level of education by 1%, the probability of obtaining loan by watermelon farmers from banks reduces by 0.38%. The result is in disagreement with a priori expectation. It is expected that increase level of education should get the farmers more opportunities to gravitate towards obtaining loans from banks. The negative sign may not be unconnected to the earlier reasons tied to their religion and cultural belief and other discouraging element from the bank especially the area of insufficient initial bank deposit and collateral facilities. More so, total cost was significant at 10% showing that the marginal effect was positive, an increase in total cost by 1% will increase the probability of farmers obtaining bank loan by 9%. Farm size is also very critical in farmers getting loans from banks. Farm size was positively significant at 5%, revealing that a unit increase in farm size will bring about 0.038% probability of getting loan from the bank.

Table.5: Multinomial logistic regression results

Friends and Relatives

Variables	Coeff.	STD Error	Z	P>/Z/
outpkg	2.48e-07	1.78e-07	1.39	0.165
hhs	.0123315	.0110369	1.12	0.264
ledu	-.0619127	.0343521	-1.80	0.071
yrsfexp	-.0068663	.0285903	-0.24	0.810
age	.0294865	.0153734	1.92	0.055
tvc	5.39e-06	3.50e-06	1.54	0.123
tr	-3.81e-08	1.30e-07	-0.29	0.770
fsize	-.353887	.0958012	-3.69	0.000
cons	-1.803768	.8246075	-2.19	0.029

Bank loans

Variables	Coeff.	STD Error	Z	P>/Z/
outpkg	-2.76e-07	2.21e-07	-1.25	0.211
hhs	-.0161975	.014204	-1.14	0.254
ledu	.0856162	.0422189	2.03	0.043
yrsfexp	.0413835	.0311402	1.33	0.184
age	.0109238	.0191073	0.57	0.568
tvc	.0000103	3.42e-06	3.00	0.003
tr	1.20e-08	9.91e-08	0.12	0.904
fsize	-.1795159	.0994485	-1.81	0.071
cons	-3.9317	1.067693	-3.68	0.000

Co-operative/Thrift Society

Variables	Coeff.	STD Error	Z	P>/Z/

outpkg	-6.84e-07	2.75e-07	-2.48	0.013
hhs	-.0081796	.0114432	-0.71	0.475
ledu	.0364356	.033604	1.08	0.278
yrsfexp	.0352179	.0245082	1.44	0.151
age	.0353457	.0151214	2.34	0.019
tvc	.0000136	3.56e-06	3.81	0.000
tr	1.49e-07	6.80e-08	2.19	0.028
fsize	-.4499722	.1258513	-3.58	0.000
cons	-3.337394	.8662805	-3.85	0.000

(sincome==1 is the base outcome) LR chi2(24) =   85.36 Prob> chi2 =   0.0000

Log likelihood = -307.45366   Pseudo R2   =   0.1219

Table.6: Marginal Effect (probabilities) After Multinomial Logit

Variable	Personal income	Friends/ Relative	Bank loan	Cooperative/Thrift Society
Output	-6.840e-7*	-9.13e-07*	-3.95e-07*	-8.80e-09*
Yrsexp	-.0003005**	-.0044289**	.0021825**	.0044956*
Hhs	-.0013792**	-.004744*	.0012356**	-.0018822*
Fsize	.0399668***	-.0112483***	.0003832**	-.0172e07**
Tcost	8.09e-07*	-9.66e-07*	2.75e-09***	5.03e07*
Revenue	-4.80e07*	-2.66e-07*	8.56e08***	1.16e-07*
Age	-.0017693**	.0044965**	-0006271*	.0012642*
Ledu	.0045307**	-.0032717**	-.0050494*	.00982*

N/B *, **, and *** = Significant at 1%, 5% and 10% respectively

Source: Survey data, 2016

Cooperative/thrift society

The result of the multinomial logit shows that output, age, total cost, total revenue, and farm size was significant at 1% probability level respectively. The marginal effect indicated that a 1% increase in output will lead to a less than 8% decrease in the use of cooperative/thrift society as a source of income to support the farming activity. Age had a positive coefficient and a 1% increase in age will lead to 1.3% probability of obtaining loan from cooperative/ thrift society. Meanwhile, total cost was positively significant and the marginal effect revealed that a 1% increase in total cost will result to a 5% probability of getting credit facilities from cooperative/ thrift society. Total revenue also had a positive sign shows that a 1% increase in total revenue will provide a 12% probability of farmers to obtain loans from cooperative/thrift society. Finally, Farm size equally had a significant influence on farmers collecting loans from cooperative/ thrift societies. A unit increase in farm size will lead to a less than 0.19% probability of farmers obtaining loans. The implication is that as farmers get larger farm land, the expansion will necessitate farmers to source for bigger and more stable sources of income to finance their farms.

IV.   DISCUSSION

The current findings revealed that personal savings ranked highest as of source income in financing watermelon production activity in the study area. The result is in consonant with Fassil and Mekonnen (2016). Their study on the determinants of off-farm income diversification show that personal income accounted for 51%. They opined that reduction in poverty can only be achieved through removal of entry to barrier to off-farm activities (access to finance, market, education and infrastructure) needs to overcome and expanded by government.

The study equally discovers that accessibility to loan facility is very difficult. Kirsten and Moldenhauer (2006) acknowledges this, when they carried a survey in South Africa, with a conclusion that households have multiple livelihood strategies with agriculture generally playing a small role in the house income generation thereby needing external interventions. But Nandudu (2017) echoed that banks still don't trust farmers with agricultural loans. Smallholders' farmers have to look for alternatives of financing if they are to increase production and upgrade to commercial farming.   "Providing credit to small holders farmers involves large transaction cost for a financial institution. This makes it hard to asses a farmer who is relying on his collateral to get loan because he or she may

not be sure of what he will get to pay the loan, making it more risky" (Nandudu 2017).

The current research unravel that education is very imperative in decision making on choices of loan for agricultural activities and poverty reduction. The finding is in agreement with Janjua and Kamal (2011) on the study of the role of education and income in poverty alleviation. They concluded that income growth plays a moderately positive role in alleviating poverty, but that income distribution does not play a key role in poverty alleviation in the sample overall. Secondly, it concludes that education is the most significant contributor to poverty alleviation.

Education is important mechanism for enhancing both the financial and physical health of the farmers Feinstein *et al*, (2006), concluded that there are substantial and important causal effects of education on health productivity. Shirazi (1994) investigates the incidence of poverty and socioeconomic profiles of the poor in Pakistan, and concluded that as the educational level of the head of the household increases the probability of that household being poor decreases.

The study also discovers that cooperative society is vital among water melon farmers in Yobe State. The relevant of cooperative in a system is a function of its viability. Most farmers with sizable land holders, years of farming experience and adequate output had access to credit facilities from cooperative/ thrift society. Bello (2005) discussing the role of cooperative societies in Economic development posited that for over 160 years now cooperative societies have been an effective way for people to exert control over their economic livelihoods as they play increasingly important role in facilitating job creation, economic growth and social development. Underscoring the importance of cooperatives Najamuddeen *et al* (2012) appealed to government to intensify its effort in financing capacity building and provision of technical facilities to cooperative societies.

V.   CONCLUSION

From the foregoing, the probability of getting money from friends and relatives depends on age, farm size and level of education. Obtaining loan from bank has to do with farmers' level of education, total cost and farm size indicating their repayment ability. The cooperative/thrift societies can give loans to watermelon farmers on the basis of their output, age, farm size, total cost and total revenue; equally all these are indicators for possible repayment of the credit facility. It is concluded here that 60% of the watermelon farmers gets their money from personal savings to fund their farm activities.   Majority of watermelon

farmers (92%) fund their farms from informal sources and only 8% can have access to banks loans.

RECOMMENDATIONS

From the finding, it is recommended that micro-finance banks, Bank of Agriculture and Commercial banks should make loans available to watermelon farmers by using their farm lands as colla teral, and encouraging opening of micro-saving accounts to improve on their bank relationship and familiarization of banking formalities. NGOs should educate the farmers on the benefit of cooperative societies. The farmers could pool their sources together to take the advantage of economies of scale in terms of buying inputs and marketing their produce.

Government should establish factories that can utilize the watermelon and if possible convert it into juice and other derivatives. With this the farmers can be sure of ready market and banks could be willing to give loans to farmers because default rate of repayment will be reduced.

REFERENCES

[1] Adegoke, J., Ibe, C. and Araba, A. (2015). A Report by Advisory Committee on National Agricultural Resilience Framework in Nigeria. Federal Ministry of Agriculture and rural Development Pp: 65 Garki, Abuja: Green Ink, www.fmard.gov.ng

[2] Adekunle, A.A., Fatunbi,A.O.,Adisaando, S. and Adeyemi, A. (2003). Growing watermelon Commercially in Nigeria. An illustrated guide IITA/FAO Publication www.fao.org/sd/erp//w/kit/bwks-illust.guidebook

[3] Amalu, U.C (2005). Poverty Alleviation and Agriculture in Sub-Saharan African: The Nigerian Experience. *J.food Agri. and Envi. 3(2): 230-236 Helsinki Finland: WFL Publisher.*

[4] Bello, D.A. (2010). The Role of Cooperative societies in Economic Development Online at http://mpra.ub.uni-muechende/23161. MPRA paper no.23161 Date download 15/07/2017

[5] Emmanuel, OE and S.Enimus (2015). Financing Agriculture to support Economic Development in Nigeria: the need to bank to Re-strategies. Proceedings of 29th Farm Management Association of Nigerian

annual National conference (Ed) Haruna, U., Izge,A.U., Abdulhamid, A. IIiyasu, A., AbdurrahmanS.L andKatanga, Y.N Agriculture: A Renewed focus for Economic Development in Nigeria. 23rd -26th November, 2015. PP 582-587

[6] Fassil, E. and E.Mekonne (2016)..Determinants of off farm income diversification and its effect on rural household poverty in GamoGofa Zone,Southern Ethiopia. *J. Dev. Agric. Econ. 8(10):217-227. DOI: 10.4897/JDAE 2018-0736, 471CD8760570, ISSN: 20069774*

[7] Jhingan, ML.2007. Macro-economic theory, 11th revised Edition,Delhi: Vrinda publication (p) Ltd.8187125454 pp:60 ISBN: 8187125454

[8] Feinstein L., Sabates,R., Anderson T.M. Sorhaindo, A. and Hammond, C. (2006). Measuring the effects of education on health and civil engagement: proceedings of the Copenhagen symposium, @OECD 2006, date downloaded 15/07/2017

[9] Hoffman, SD and GJ Duncan (1988). Multinomial and Conditional Logit Discrete – Choice Model in Demography. Demography 25(3): 415-427

[10] Janjua, P.Z. and Karmal,U.A. (2011). The role of Education and Income in Poverty Alleviation; A Cross Country Analysis. The Lahore Journal Of Economics 16(1):143-172, date download 16/07/2017

[11] Kirsten, J. and Moldenhauer, W (2006). Measurement and Analysis of Rural Household Income in a Dualistic Economy: The Case of South Africa. UPSpace – Natural and Agricultural Science. URL Repository http://hdl.handle.net/2263/2286

[12] Maddala, G.S (1977). Econometrics (Ed). MacGraw-New York, USA: Hill BookCompany,pp.516,

[13] Miller, C and L.Jone (2010). Agricultural Value Chain Financing: Approach, Tools, Lessons and innovations. Practical Action: U.K Publishers. (Available at) download date 09/29/2016

[14] Muhammed, Y. and TH.Haruna (2015). Sustainability impact of Microfinance Banks on the performance of Agric-Based Small Scale Businesses in Kaduna Metropolis. Proceedings of 29th Farm Management Association of Nigerian annual National conference Duste (Ed) Haruna, U., Izge,A.U., Abdulhamid, A. IIiyasu, A., AbdurrahmanS.L andKatanga, Y.N Agriculture: A Renewed focus for Economic Development in Nigeria. 23rd -26th November, 2015. PP 539-550

[15] Najamuddeen, G., Abubakar, B.Z., Kebber,M.G., Magaji, A.S. and Ukashutu., U. (2012). The role of cooperative societies in comminuty development in

Sokoto State, Nigeria. *Scientific Journal of Review* 1(3):1 -15

[16] Nandudu, P. (2017). Banks still don't trust farmers with agricultural loans. Saturday Vision, July 15, 2017. Date download: 1507/07/2017

[17] Reddy, S.S., Ram, P.R., Sasty, N.T.V and Devi, I.B.(2004). Agricultural Economics, Oxford &New Delhi: IBA publishing Co. Pvt.Ltd, pp: 361 ISBN 8120415965

[18] Shirazi, N.S. (1994). An Analysis of Pakistan's Poverty and its Alleviation through hfaq (unpublished doctoral dissertation). International Islamic University, Islamabad.

[19] Tiku, NE and Enoibor, J H, (2012). Analysis of Resource use Efficiency in Yam Production in Yakurr Local Government of Cross River State, Nigeria. Agric.J 7(5):297-304 ISSN: 1816-9155

[20] Thirlwall, A.P (1999). Growth and Development: With special reference to Developing Economics (6th Ed) Chaitenhan: Edward Elgar, pp: 32-56

[21] Wanyama, M.1., Mose, L, Odendo, M., Okuro, J.O., Owuor, G. and .Mohammed, L. (2010). Determinants of income diversification strategies amongst rural households in maize based farming systems of Kenya.*Afric.J. Food Sci. 4(12): 754-763*