Storage Practices among Arable Farmers in Delta state, Nigeria: Implication for Food Security

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Abstract

This paper examines the storage practices of arable Farmers and the implication for food security in Delta State, Nigeria. Data were collected from 75 arable farmers with the aid of structured and validated questionnaire. Respondents were selected using a two stage random sampling technique. Data were analysis using descriptive statistics and probit regression model. The results show that the following storage facilities were available to arable farmers in the study area: basket (26.7%), floor/platform (13.3%), bag (13.3%), barn (44%), underground pit (1.35%), container/bin/pot (1.35%).. most of the respondents indicated that apart from barn , most of the storage facilities were grossly ineffective in storing their products. The respondents indicated various storage constraints or problems which included lack of capital, poor storage facilities, climatic factors and pests and diseases attacks. From the probit regression results, three socio-economic variables, namely, gender, age and income were found to have significant effect on storage practices of arable farmers. From the findings of this paper, it was recommended that the government should provide farmers with modern storage facilities such as silos, refridgerators, educate farmers on adequate storage methods, and empower farmers by providing micro-finance and other assistance that will help to ameliorate storage problems. If this is done the current food insecurity in the area as a result of poor or inadequate storage will be highly reduced.

Key word: storage habit, storage facilities, arable farmers, probit analysis, assessment, food security.

1. Introduction

Storage is the act of keeping food for future use. The importance of food storage is central to food security. It has been realized that almost all farmers who grow crops at various level of the rural agricultural landscape are known to have encountered heavy financial and food losses due to inadequate storage facilities in the country with the resultant food insecurity. Therefore the importance of adequate storage facilities to food security cannot be overemphasized.

In Nigeria, government policies, both past and present, tend to address the issue of food security without taking practical measures for providing adequate storage facilities. However, the 1970 – 1974 Agricultural Development Plan in Nigeria emphasized on agricultural storage facilities as a way of combating food wastages in the country. The plan's emphasis was on improving rural productivity and to diversity the rural income base with a view to enhancing the quality of life in the rural areas.

The Green Revolution Programme which was instituted by President Shehu Shagari in 1981 – 1983, was concerned with the issue of food storage that could boast food security in the country. The issue of food storage was promoted throughout Nigerian rural communities by sensitizing the rural famers about the need to embrace storage systems that could guarantee food security in the country. Similarly the issue of food storage also received attention during President Babangida era. In 1987 budget broadcast to the nation, Babangida (1987) stated that the Federal Government would in 1987 launch a national food security and storage system aimed at creating 50,000 tons of farms and off – farm storage capacity. The government's aim is to ensure that large quantity of food was produced and stored for future use.

The most recent National Agricultural Development Plan that recognizes storage was in 2000, introduced by president Obasanjo, called Special Programme for Food Security. It was also aimed at creating farm and off-farm storage capacity that would guarantee food sufficiency in the country. But one basic question is whether policies were truly translated into projects that could guarantee adequate storage facilities. In 2002, Nigeria's president Olusegun Obasanjo said, African government needed to pay more attention to storage as a means of curbing food storages. He also said much of African annual harvests was lost as a result of inefficient storage including half of its fruits and vegetables, one-fifth of its grains and a quarter of its tuber (Vanguard, 2008). What general Obasanjo said remains true today where by millions of Africans face food shortage.

Ezedinwa and Onazi (1994) identified some storage methods used by rural farmers which included the use of barns, baskets, bags, platform/floor, tins/pots, in storing their produces. However, various storage problems ranging from high cost of storage, losses of products during storage, disease and insect attacks, mishandling and use

of poor containers results in serious post-harvest losses (Malgwi, Kadri, Nwosun and Esekahagbe, 2008; Taylor, 1997).

Since most post harvest losses are due to inadequate storage it is therefore necessary that a study on accessibility of farmers to storage facilities is conducted with a view to assessing the problems of storage so that necessary intervention to ameliorate the situation could be put in place.

One of the basic needs of man from the earliest period of human development has been food. Storage facilities are to be used for preservation of food and other agricultural produce for future use in order to meet these essential needs in the period of emergencies such as famine, poor harvest season and drought. Poor and inadequate storage facilities have been identified with food shortage, loss of income by farmers, scarcity of food and food wastage during harvest period leading to food insecurity. It is noted that almost all the farmers who grow crops sustain heavy crop and financial losses for lack of adequate storage facilities Ewuim *et al* (1998) found that arable farmers who could not afford to get their products to the market due to poor transport and storage facilities were forced to sell them at very low prices to middlemen, who eventually made more money than arable farmers. Upton (1997) remark that the seasonality of crops in the tropics complicates farm and household decision making which further complicates food security status. It has been observed that food scarcity is usually higher during the wet season especially before the first harvest in June. This means that farmers and their families are under nourished just at the period when the work load for weeding and other maintenance practices are high.

Lack of storage facilities directly contribute to food insecurity in the sense that many peasants, knowing fully well that their food is going to be wasted within a few months, choose to set aside only a small portion for home consumption then sell the rest to middlemen who rummage through the country side combing for any cereals available for sale and purchasing them at throw away prices. This explains why a certain location can have bumper harvest this year, but will experience famine in the following year (Vanguard, 2008). Is this statement true of Delta State that is under investigation?

If value must be added to farmer produce, the necessary adequate storage facilities that are effective must be present. Against this background this study attempt to assess the agricultural storage practices of farmers' effect on food scarcity in Ika South Local Government Area. The following research questions thus arise:

- What are the various storage facilities available to and used by arable farmers in Delta State, Nigeria in storing their agricultural products?
- Are these facilities effective in storing agricultural products in the area?
- What are the problems encountered by farmers in storing their products?
- Can anything be done to improve storage facilities?
- Is there any relationship between farmer's storage practices and their socio economic characteristics?

The general objective of this study is to assess agricultural storage practices of arable farmers and the implication for food security in Delta State, Nigeria. Specific objectives are to:
* determine the socio-economic characteristics of respondents
* identify the various storage facilities available and used by farmers.
* evaluate the effectiveness of the storage structure of respondents
* determine the various problems association with food storage and how it can be minimized.
* determine the relationship between storage practices of the farmers and their socio-economic characteristics.

The following null hypothesis was used tested in the study:

Ho_1.   There is no significant relationship between socio-economic characteristics and storage practices of respondents.

2. Methodology

The study was carried out in Delta State. Delta state was created from the then Bendel state on August 27, 1991 by the then regime of General Ibrahim Babangida. Delta state shares common boundaries with Edo and Ondo States to the North-West, Imo and Anambra States to the North-East, Rivers and Bayelsa to the South-East. In the South and South-West it has approximately 122 kilometres of coast line bounded by the Bight of Benin on the Atlantic Ocean. The Major ethnic groups are Urhobo, Igbo, Ezon, Isoko and Itsekiri. Major crops grown include cassava (from which garri is produced), yam, coco yam, potato, plantain/banana, oil palm, rubber and pepper. Animal husbandry and fishing activities are also prevalent in the state. Delta state lies approximately between longitude $5^{\circ}00'$ and $6^{\circ}45'$ East and latitude $5^{\circ}00'$ and $6^{\circ}30'$ North. It has an estimated population of 4098291 (NPC, 2006) and total land area of 18,050 square kilometres, and about one-third of this is swampy and waterlogged. It experiences average rainfall of about 2000mm per annum with an average monthly temperature of $30.4\text{-}36.4^{\circ}C$ and a relative humidly varying room

56-86 percent per annum. Delta state is divided into three agricultural zones namely, Delta South, Delta North and Delta North.

A multi-stage sampling procedure was used to compose a sample size of 225 respondents. This was done as follows: out of the three agricultural zones in the state, one local government area was randomly selected from each zone. Seventy-five (75) respondents were selected from each of the randomly selected local government areas, giving a total of two hundred and twenty five (225) respondents that were sampled and studied.

Primary data were obtained from respondents with the use of structured and validated questionnaire. The instruments for primary data collection include a five point likert scale with values: 1= strongly disagree, 2= disagree, 3= undecided, 4=agree and 5=strongly agree. From point 3 will be regarded as effective while below 3 as non-effective as used by Akwiwu et al (2000). Furthermore, data were collected from secondary sources such as Journals, Past research work, Government records, documented statistics collected from the study area, internet and Library.

Descriptive and inferential statistical methods were used in data analysis. Information was presented using tables and simple percentages.Inferential statistics that was used in testing the stated hypothesis was the probit regression model.

2.1Model Specification

Where relationships are established with a dependent variable that is dichotomous (i.e. with yes or no values) such models are referred to as qualitative or binary choice models (Capps and Kramer, 1985; Akinola, 1987). The probit model is a nomal cumulative istribution function which has overcome the difficulty arising from the fact that predictions may be outside the (01) interval. The obvious soloution to the problem is to monotonically transform the original model in such a way that predictions will lie in the (0,1) interval for all explanatory variables, ω. (Bamire and Ola, 2004). The general form of the univiarate dichotomous choice model (Pindyck and Rubinfeld, 1998) can be express as:

$P_i = P_i (y_i = 1) = F (\omega_i, \varepsilon_i) = \int_{-a} {}^1/_{2\pi} e^{-1/2}/_2 \ dt \ (I = 1,2…n) …….(1)$

The equation means that probability of a respondent storing his crop produce, $P_i(y_i = 1)$ is a function of the vector of explanatory variables, ωi, and the unknown parameter vector, ε_i. P_i is the probability that the ith respondents chooses to store his produce (y = 1), and y = 0, if otherwise. This is because individual farmers vary over a range for which they use a particular agricultural practice. Tobin (1958) pointed at that the specifications for the expected values of the dependent variable are violated when ordinary least squares regression is used with a limited dependent variable. Probit analysis takes care of heteroscadasticity of the disturbance time as well as restricting predictions to values between 0 and 1.

3.   Results and Discussion $^{(wi)}$

The presentation and analysis of data from the study are shown in this section.

The result in Table 1 shows that 4% of the respondents fall below the age of 20 years, 6% falls within the age group of 20 -29, 23.3% falls within the group of 30 -39, 12% falls within the age group of 40 – 49, 28% falls within the age group of 50 -59, and finally 6.7% falls above 60 years. Thus, majority of the sampled respondents were middle aged which could have positive effect on adoption of storage technique (Rahman *et al* 2002).The study reveals that 46.7% of the respondents are married, 36% of the respondents are single, 8% of the respondents have been divorced, 5.3% of the respondents are widow and finally 4% of the respondents are separated as shown in table 1.The study further reveals that farming is the mainstay of the economy of the people of Ika South Local Government Area as 61.3% of the respondents engage in farming, 26.7% engage in Civil Servant while 12% of the respondents are engaged in trading. From Table 1, 18.7% of the respondents do not have formal education, 45.3% completed Primary School, 26.7% Completed Secondary while the remaining 9.3% had tertiary education.

The study also reveals that 28% of the respondents earn less than 10,000, 30.7% of the respondents earn 10,000 – 19,999, 24% of the respondents earns 20,000 – 29,999 while 17.3% of the respondents earns above 30,000 as shown in Table 1.

The study revealed that almost all the farmers have problems in storing their crops. The study showed that 16% of the respondents lack capital 25.3% lack adequate storage facilities, 24% of the respondent suffered from climatic factors while 34.7% suffer from pest and disease attack as shown in table 2. This limits the quantity of crops

that can be stored for future use, thus contributing to food insecurity. There are more males than females in the study area.

The study revealed that the available storage facilities to farmers in Ika South Local Government Area are basically traditional types which include barns, basket, floor/platform, bag and underground pit and bin/pot/containers in storing farm produce 26.7% of the respondents use basket in storing their farm produce, 13.3% use floor/platform method, 13.3% make use of Bags, 44% use barn, 1.35% employ underground pit and 1.35% use containers/bin/pot as storage facilities. These are shown in Table 3.

From Table 4, it is obvious that only the barn storage method was effective in terms of storage capacity and ability of products to store long without deterioration. The container/bin/pot method was only effective in terms of ability of the produce to store for a long time. The rest storage facilities were grossly ineffective in both criteria used to measure effectiveness.

Socio – Economic Determinants of Storage habit of arable farmers

The Socio – economic factors that determine of effectiveness of storage practices of arable farmers in the study area was evaluated with the use of profit model.This result is presented in table 5.

The results of the probit model showed that 3 out of the 5 variables are significant determinants of storage habit of arable farmers in the study area. The variables are gender, age, and income.

Gender:- This variable enter the model with a positive sign and it is significant at alpha = 0.05. This implies that gender contribute positively to the effectiveness of the storage habit. That is, since there are approximately more males than females that are involve in arable farming, male farmers demonstrated an effective storage habit that female counterparts in the study area.   This finding could be attributed to the fact that the dominant storage facilities in the study area are the platform and the barn method particularly for the storage of yam tubers. This storage habit requires physical or muscular effort which the male farmers can do better that the female farmers.

Age:- This variable is negative and significant in the model. This shows that aged farmers are less effective in their storage habit. This result is due to the fact that the older farmers shy away from barn and platform construction. Such farmers will rather resort to the use of ineffective storage facilities such as floor storage method which does not cost much.

Income:- Farmers income enters the model with positive sign and it is significant at alpha = 0.05. This implies that income contribute effectively to the storage habit of arable farmers; as the farmer's income is increasing there is the tendency to acquire efficient storage facilities.

4. Conclusion and Recommendation

In this study, an assessment of storage practices of arable farmers and food security in Delta State, Nigeria was carried out. The study established that the major storage facilities available to farmers are traditional storage facilities which included baskets, Platforms, floor and bag in storing agricultural produce. These traditional storage facilities apart from barn have been found to be ineffective. This invariably leads to food wastage with the resultant insecurity in the area.It was also discovered that lack of capital, inadequate facilities, climatic factors and pest and disease are the major problems of storage in the area. Moreover, some socio-economic factors had considerable influence on the storage practices of arable farmers in Delta State, Nigeria

On the basis of the findings of this study, these recommendations are made:

The Government should provide farmers with modern storage facilities such as   silos, bin, refrigerators and cold rooms etc.

The Government should provide adequate electricity supply that will help the farmers to power modern storage devices.

❖ The Government should provide farmers with effective pesticides and insecticides that will help to reduce crop losses.

❖ The Government should educate the farmers about improved methods of storing their crops.

If these recommendations are implemented, the storage problems and the resultant food insecurity will be ameliorated.

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Table 1: Socio – economic characteristic of respondents

Variable	Numbers of Respondents	Percentages
Age in years		
Below 20	9	4
20 – 29	36	6
30 – 39	75	23.3
40 – 49	27	12
50 – 59	63	28
60 and above	15	6.7
Sub-total	225	100
Marital Status		
Married	105	46.7
Single	81	36
Divorced	18	8
Widow	12	5.3
Separated	9	4
Sub-total	225	100
Primary Occupation		
Farming	138	61.3
Civil Servant	60	26.7
Trading	27	12
Sub-total	225	100
Monthly Income in Naira		
Below 10,000	63	28
10,000 – 19,999	69	30.7
20,000 – 29,999	54	24
30,000 and above	39	17.3
Sub-total	225	100
Educational Qualification		
No formal	42	18.7
Primary School	102	45.3
Secondary school	60	26.7
Tertiary	21	9.3
Sub-total	75	100

Source: Field Survey 2009.

Table 2:   **Storage Problems Faced by Farmers**

Problems	Frequency	Percentages
Lack of Capital	12	16
Lack of Adequate Storage Facilities	19	25.3
Climatic Factors	18	24
Pest and disease attack	26	34.7
	75	100

Source: Field Survey 2009.

Table 3: Storage Facilities Available to Farmers.

Storage facilities	Frequency	Percentages (%)
Basket	20	26.7
Floor	10	13.3
Bag	10	13.3
Barn	33	44
Underground Pit	1	1.35
Containers/bin/pot	1	1.35
	75	100

Source: Field Survey 2009.

Table 4: Effectiveness of storage structure of arable farmers

Effectiveness	Storage Structure											
	Basket		Floor/Plat-form		Bag		Barn		Undergou-nd Pit		Container/Bin/Pot	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
High Storage Capacity	2.40	0.91	2.36	1.10	2.00	0.93	4.68	0.94	1.02	1.01	1.80	0.92
Produce Stored Long without spoilage	2.20	0.94	1.60	1.31	2.60	1.01	3.41	0.99	1.10	0.90	3.80	0.96

Source: Field Survey 2009.
M = Means   SD = Standard Deviation

Table 5: Probit regression results of socio-economic determinants of storage practices

Variable	Coefficient	STD.Error	Z.Statistics	Probability
Gender (X_1)	0.02801	0.01035	2.7073949	0.0068
Age (X_2)	-0.69254	0.35563	-1.9473996	0.0515
Marital Status (X_3)	0.02463	0.04096	0.6013721	0.5476
Education (X_4)	-0.00002	0.00002	-1.2682927	0.2040
Income (X_5)	2.33684	0.64582	3.6184076	0.0130

Source: Field Survey 2009.
S.E of Regression 0.706687

Avg. Log Livelihood – 0.550553

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