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Effect of use of Poultry Manure by 'Nsukka Yellow Pepper' Farmers to the Environment in Enugu North Agricultural Zone of Enugu State of Nigeria

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ABSTRACT

Effect of use of poultry manure by 'Nsukka yellow pepper farmers to the environment in Enugu North Agricultural Zone of Enugu State of Nigeria was studied. Specifically, the objectives of the Study are to describe the socioeconomic characteristics of the respondents, access the effects of poultry manure use by the respondents to the environment, identify the technologies transferred to the respondent determine the rate of adoption of the technologies by the respondents and identify factors affecting the adoption of the technology in the study area. One hundred and twenty farmers were selected from Enugu North Agricultural Zone of the State. A well structured questionnaire was used to collect information needed for the study. The objectives were addressed using percentages, logistics analysis and factor analysis. The results show that most farmers were aged, fairly educated, well experienced, had large household size and membership of organization. The effects of manure use to the environments were odour, flies, water pollution and rodents. The technologies used by the farmers to abate environmental pollutions were proper incorporation of manure, use of poison or traps and cats, use of hydrophilic products and avoid manure with lots feed waste. The factors affecting the adoption of the technologies were age of the farmer, extension services, educational level and farming experience. The factors affecting use of poultry manure by the farmers were extension services, high cost of labour, poor access to credit, land problem, high cost of input (manure), low illiteracy level and gross negligence and carelessness. There is need to enhance farmers' access to credit, labour saving devices and extension services

Key words; Poultry, Manure use, 'Nsukka Yellow Pepper', Farmers, Environment

INTRODUCTION

The impasse of food insecurity in most rural areas of sub Saharan Africa which has left millions starving to death is well documented (Akan, 2013; Adebayo and Oladele, 2013; Ume, *et al;*2015).To forestall this prevailing scenarios in the region, food production must be increased through chiefly the use of appropriate soil amendments in order to meet up with the teeming population demand(Hileman 2009). The use of organic and inorganic fertilizer in combination has be advocated by research to boost crop production and productivity (Bynes, 1995; Adedeji and Kormawa, 2002). However, in recent time, the use of inorganic fertilizer is continually being jettison by most farmers as result of high cost, erratic availability coupled with low returns and unreliable markets for agricultural produce (Hileman,1970). Among the livestock manure, poultry dropping (poultry litter) seems to be the most preferred, probably due to its relative affordability and availability on demand (Hileman, 2009). Poultry manure is the

organic waste material from poultry consisting of a mixture of poultry excreta, spilled feed, bird's feathers, and material (wood shavings or sawdust) used as bedding in poultry operations (Mitchell and Donald, 2003). In addition, the manure has innate features of being reservoir of plant nutrients, has a high CEC, 'shock absorber' of soil pH, and chelates micronutrients, thus suitable for crop production particularly pepper (Hileman,2005).

However, pepper is the fourth most important vegetable in Nigeria and among varieties of pepper prevalently grown in Nigeria included Cayenne pepper or red pepper – 'Sombo' (*Capsicum frutescence*), 'Atarodo' (*Capsicum annum*), Tatase' (*Capsicum annum*) and Nsukka Yellow pepper (*Capsicum annum*) (Ugwu, 2014). Nsukka yellow pepper is a rain fed crop, deep green at maturity but yellow and orange variety evolved, could be consumed fresh or processed, pungent spice for favouring stew, soup and sauce and contain vitamin C and A (E A, Onwubuya *et al*, 2005). It is used in food processing industries for seasoning of food because of its nutritive value and in pharmaceutical industries in producing stimulant and counter irritant balm in applying externally as result of the medical value .The yellow pepper has aromatic flavour which endear it to many consumers (Hilema, 2005). This aromatic flavor is more when cultivated with animal manure especially poultry type (Hardin and Aniecki, 2005). As result, the farmers in this part of the State scout earnestly for the manure in order to enhance their pepper production and productivity (Onwubuya, *et al*; 2009).

The abuse in the use of this manure and the environmental effect are well documented and is of growing concern to environmental researchers, policy makers and government. For instance, the use of poultry manure as soil amendment as asserted by Young, (2009) pollutes land, air, and water with diseased carcasses, fecal dropping, antibiotics residues, heavy metals, chemicals, cysts, larvae, bacteria, parasites, pathogen cysts, and viruses. Furthermore, the antibiotic arsenic compound roxarsone is carcinogenic in nature and often used in chicken feed formulation. The resultant manure, if used for soil amendment may possibly result to lung cancer, if the roxarsone seeps into water bodies and consumed by man(Lee, Aamink,, Ognik, Becker, Verstegen, 2011). Also, poultry manure contains high quantity of nitrogen, which might be detriment to plant cell, as well cause methemoglobinemia, a blood disorder in infants, known also as "blue baby disease". This is most possible when the excess nitrogen is converted to ammonia and nitrates (Young, 2009). Furthermore, poultry waste could initiate excess algae that devour aquatic nutrients and obstruct sunlight required by underwater plants, thus suffocating the aquatic organisms like fish when decayed (Williams, 1998). In addition, chicken droppings infected with the cercal worm larvae that carry blackhead disease, could be fatal to wild turkeys, grouse, quail and other wild birds that eats it (Femandez-Rivera, Williams, Hiemaux, and Powell.1995). As, well, Hileman, (2005) reported that the toxic aerosol released by pfiesteria *piscicida* in poultry manure is capable of causing neurological injury, headaches, skin sores, memory loss, stomach cramps, respiratory restriction, and violent moods to man. Moreover, the poultry manure farming environs is often fleeted with odour and other nuisance, including flies and mosquitoes, which can transmit diseases, including cholera, dysentery, typhoid, malaria, filaria and dengue fever (Environmental Protection Agency (EPA),2012).

However, many innovations intended at limiting the aforementioned scenario and they include proper incorporating of poultry manure into the soil when applied in the farm, adequate curing of manure before application, un used manure should be well covered to avoid odour emanating from there, avoid applying or exposing manure in open area when wind velocity is high and manure should not

apply in erosion prone soil especially during rainy season (Hileman; 2009; Hileman, 2005) The success of these technologies in curbing the environment effects of the use of poultry manure especially in many developed countries are well documented, but in most developing countries, Nigeria inclusive the assertion is yet to be ascertained to the best knowledge of the researchers. The need to determine farmers adoption behaviour to the use of technology, can help to curtail maximally the havoc our environs and health are exposed to in bid to fetch a living from the soil.

Specifically, the objectives of the Study are to;

(i) describe the socioeconomic characteristics of the respondents

(ii) access the effects of poultry manure use to the environment

(iii) identify technologies used by the farmers to abate the environmental pollutions

(iv) ascertain the rate of adoption of the technologies by the respondents

(v) identify factors affecting the use of poultry manure by farmer in the study area.

MATERIALS AND METHODS

The study area is Enugu North agricultural zone of Enugu state, Nigeria. The zone is located in longitude 12'35^o 10'67^o and Latitude6'46^o 4'56$^{o.}$ The local Government Areas that make up Enugu North Agricultural zone include: Igbo-Etiti, Igbo-Eze North, Igbo-Eze South, Nsukka, Udenu, and Uzo-Uwani. The study area shares boundaries with Benue and Kogi States in the North and West respectively.Enugu West Agricultural zone .and Anambra State in the East and North respectively. It has a total population of 1,228,586 (National Population Commission, (NPC), 2006) and land area of 2363.461 square kilometers . It has rainy season from April to October and the dry season from November to March. The crops grown ther are yams, oil palm products, cocoyam, maize, rice, and cassava A purposive sampling and multi-stage sampling procedure were employed to select Local Government Areas, community, villages and respondents. In the first stage, four Local Government Areas (LGAs) were purposively selected. The selection was based on intensity of ' Nsukka Yellow' paper production. The selected LGAs were Nsukka, Uzouwani, Igboeze South and Udenu The next stage involved a random selection of five communities each from the four selected Local Government Areas. This gave a total of twenty communities. In the next stage, one village was selected from each community. Finally ten respondents were randomly selected from each of the villages and a total of one hundred and twenty respondents for the detailed study were got. Data collected were analyzed using descriptive statistics such as frequency distribution and percentage responses, Logit model and factor analysis

Model Specification

logit model

The logit model is based on the cumulative logistic distribution function expressed as:

$$P_i = \frac{1}{1+e^{-z}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

P_i is the probability of adopting yellow pepper production whiles 1-P_i is the probability of not adopting. In the logistic function 1- P_i can be expressed as:

$$1 - P_i = 1 - \frac{1}{1+e^{-z}} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$= \frac{1}{1+e^{z}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The ratio of equation (1) and (3) gives the odd ratio:

$$\frac{P_i}{1-P_i} = \frac{1+e^{-z}}{1-e^{z}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

$$\frac{P_i}{1-P_i} = e^{z} \ldots\ldots\ldots\ldots\ldots\ldots\ldots(5)$$

Equation (5) is the ratio in support of adoption of technology to the probability that they will not. Taking the natural log of both sides of the equation (5);

$$z = In \frac{P_i}{1-P_i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

Therefore, the function will be expressed as:

$$In \frac{P_i}{1-P_i} = \beta_o + \beta_i X_i + \mu \text{.....(7)}$$

Where: X_i denotes the factors influencing the adoption of the technology, β_i denotes vector of parameters to be estimated using the maximum likelihood method, and μ denotes error term which is normally distributed with zero mean variance.

The empirical specification of the logit model for the adoption of yellow peper production is:

$\text{Log } (P_i/1\text{-}P_i) = \beta_0 + \beta_{1M1} + \beta_2 Hm2 + \beta_3 m3 + \beta_4 m4 + \beta_{5M5} + \beta_6 M6 + \beta_7 M7 + \beta_8 M8 + e$ .....(8)

M_1 =Age of farmers (Years)
M_2= Gender (Dummy)
M_3 = Level of Education (Years)
M_4 = Farm Size (ha)
M_5 = Credit (N)
M_6 = Extension Services Years)
M_7 = Household Size (N)
M_8 = Farming experience (Years).

Where P_i denotes 1 if the farmer adopts Yellow pepper production, P_i denotes 0 otherwise,

β_0 denotes intercept, β_{is} denotes the coefficients to be estimated, and e denotes error term.

Factor analysis

Factor analysis is a multivariate technique used when there is a planned interdependence among a set of observed variables while the researcher is eager to establish some more basic or latent which generates this commonality. It is totally dependent on linear correlation between variables that tend to eradicate multi-co linearity amongst them thus instituting a small set of variables that are comparatively independent of one another called risk factor (Amusa. and Enete (2015). This model facilitates the discovering group (risk factors) that enable for assorting out of one variable to represent several others. This is highly adequate in many real-life applications where the number of independent input variables used in forecasting a reply variable (risk factor). The risk factor will explanation for one or more input variables using factor analysis (Enete and Amusa, (2010). The process of factor analysis is use of principal component. This technique guarantees that a set of observations of perhaps interconnected variables are changed into a set of values of linearly uncorrelated variables. Principal Component is most suitable than other methods because it tends to take advantage of the sum of squared loadings of each factor take out in turn.

The model is stated thus:

$P_1 = a_{11} X_1 + a_{12} X_2 + \ldots a_1 kXk$- - - equation 3
$P2 = a_{21} X_1 + a_{22} X_2 + \ldots a_2 kXk$ - - - equation 4
$P_3 = a_{31} X1 + a_{32} X_2 + \ldots a_3 kXk$ - - - equation 5
$Pk = ak_1 X_1 + ak_2 X_2 + \ldots akkXk$ - - - equation 6

Where P1, P2, P3 …….Pk are factors which are linear combinations of the Xs while X1, X2, X3 ……Xk are the observed variables which cause variation in the use of poultry manure. They are called the factor loading. In this study, factor loading of 0.30 was used, hence , variables with factor loading of less than 0.30 and variables that loaded in more than one factor were discarded (T A. Amusa. T A and Enete A A(2015); Green, D. A. G. and Ng'ong'ola, D (1993))

RESULTS AND DISCUSSION

Table 1 Definition of Variables Used in the Empirical Analysis

Variable	Definition Value/Measure	Expected Sign
Age of household head	Number of years of Head of Household	-
Farming experience	Farming experience number of years	+
Extension Services	Access to extension services = 1, otherwise, 0	+
Farming experience	Number of years spent in farming	+
Access to Credit	Access to Credit,1; otherwise, 0	+
Educational Level	Number of years of schooling	+
Membership of coop	1=yes and 0=no	+
Gender	Male ; 1, female, 2, Divorced, 3, Widowed, 4	-

Source, Field Survey, 2018

Table 1 revealed that 25% of the 'Nsukka yellow farmers were males, while 75% were females. The implication is that women dominated the growing of the crop in the study area. This is in confirmation to the finding of Onwubuya *et al,* (2009), who posited that vegetable production is female stereotypes, since it is less labour intensive compare to tuberous crops. The Table also indicated that 83.5% of the farmers were married, 4.2%; divorced, while 12.5% were single. This implies that most of the respondents were married and this class of people have higher odd in using their children as source of cheap labour especially during the period of labour scarcity in applying of poultry manure in their pepper farms using technologies that will not endanger the ecology, still optimize and maximize their outputs and profits respectively. This finding concurred to Ume, *et al* (2015), who opined on the importance of family labour in agricultural development in most countries in Sub – Saharan Africa. Further analysis of the Table shows that most farmers (52.4%) were below 40years of age, while 47 .6% were above 40 years. The implication is that many of the sampled farmers were not only within the economically active age, but as well innovative individuals in adopting best methods of poultry manure usage in their farms without risking the health of the people living in the environs (Femandez-Rivera, *et al;* 1995). More so, this age bracket is able-bodied individuals that can withstand drudgeries that are associated with environmental free pollution poultry manure application innovations in their farms (Onwubuya *et al;* 2009). The result of household size showed that 47.5% of the farmers had household size of 1– 10 people, while 52 .5% had 11 persons and above. Households with members that are of labour age according to Steinfeld, De Haan and Blackburn, (2014) employ tem in adoption of technologies aimed at achieving their production objectives without posing danger to the environment. Also 82.8% of the sampled farmers had farm size of 0.01 – 4.0 hectares, while only 17.2% had farm size above 4.0 hectares. Large farm size is a measure of success, as it entails farm income and high level of managerial ability in handling among others use of poultry manure in boosting crop yield without infect the immediate surroundings with odour and flies (Green and Ng'ong'ola, 1993).

The result of the 'Nsukka' yellow pepper farmers' years of farming experience revealed that 25% of the respondents had farming experiences less than 11 years old, while the greater majority (75%) had farming experience above 11years. Long years of farming experience enhances efficient use of scarce resources, poultry manure precisely in boosting the farm output with greater objective of attainment of high degree of environmental sustainability (Bamie A S, Ola. A (2004)). The above assertion is in agreement with Ume, *et al*;(2016), who reported that long years of farming experience assist farmers in setting realistic goals in achieving environmental sustainability in their course of their pepper production. Furthermore, Table 1 explained that only 41.7% of the respondents had contacts with extension agents, while 58.3% had not. This indicates poor extension outreach, which according to studies (Green and Ng'ong'ola,1993; Bamie and Ola, 2004, Akpan; 2013) might adversely affect the adoption of innovations intended at enhancing their farm outputs without compromising to environmental effluence (Akpan; M N (2013)) . More so, only 66.7% of the sampled Nsukka yellow farmers had access to credit through any of the lending institutions, while 33.3% had no access. Credit helps in acquiring material inputs of the technology (poultry manure), payment of labour and capacity building. Several studies; (Ume *et al*; 2016; Bamies and Ola, 2004; Akpan; 2013) made similar findings. In addition, 62.5%of the farmers were members of different organizations such as cooperatives, age grades and others, while 7.5% did not belong to any organization. Farmers that are part of organization have more access to

information relating to improved environmental free innovations through interaction compare to non member farmers (Adebayo and Oladele, 2013). Table 2 also revealed that 83.3% of the respondents had formal education, while only 16.7% had no formal education. Education as opined by Onwubuya; *et al*(2009) improves individuals' endowment to appraise, comprehend and concede to new innovation.

Table 2: Distribution of Respondents According to Socioeconomic Characteristics

Factors	Frequency (n=120)	Percentage
Gender (dummy)		
Male	30	25
Female	90	75
Marital Status		
Single	15	12.5
Married	100	83.3
Divorced	5	4.2
Age in Years		
20 – 29	20	16.7
30 – 39	43	35.8
40 – 49	34	28.3
50 – 59	12	10
60 and Above	11	9.2
Mean	40	
Household Size (No)		
1-5	25	20.8
6-10	32	26.7
11-15	37	30.8
16-20	14	11.7
Mean	6	
Farm Size (ha)		
0.01-1.00	40	33.3
1.01 – 2.00	30	25
2.01 – 3.00	18	15
3.01 – 4.00	15	12.5
4.01 – 5.00	12	10
> 5.00	5	4.2
Mean	2.7	
Years of Farming (yrs)		
1 – 5	10	8.3
6 – 10	20	16.7
11 – 15	50	41.7
16 – 20	30	25
21 and above	10	8.3
Mean	14	
Extension contact (dummy)		
Had extension contact	50	41.7
No extension contact	70	58.3
Access to Credit Use (dummy)		
Yes	80	66.7
No	40	33.3
Membership of Organization (dummy)		
Yes	75	62.5
No	45	37.5
Level of Education (yrs)		
No	20	16.7
Primary	55	45.8
Secondary	35	29.2
Tertiary	10	8.3

Source: Field Survey, 2018

Table 3 indicated that 88.3% of the sampled farmers reported problem of air pollution with odour as result of poultry manure use. Odour is a public-health concern to people who resides near to the farm or passerby, and the rate of its emission depends on the temperature and humidity of the manure, type of manure storage, and air movements (Mitchell and Donald 2003). Also, flies was a problem with people that has close proximity to farms with poultry manure applied but not incorporated into the soil as reported by 76.7% of the total respondents. (Safely, 2005) reported that flies could predispose people to various illness, including cholera, dysentery and filarial Furthermore, mosquito might be local nuisance often associated with wet poultry manure as observed by 71.7% of the sampled farmers. Studies (Hileman; 2009); Young, 2009; Steinfeld, de Haan and Blackburn, 2014) show that mosquito could affect victims to typhoid and malaria. Besides, 60% of the sampled farmers complained about water pollution as result of poultry manure application. This is very possible in places where the land is sloppy and very prone to erosion, has shallow water table and during rainy season (Lee, *et al*, 2011). More so, 57.5% of the respondents reported rats menace as result of living very close to farms treated with poultry manure. The risk of rat breeding may possibly be its ability of infecting neighbours to the farm with Lassa fever and dengue fever diseases (Hileman, (2005).

Table 4 Effects of poultry manure use on the Environment

Variable	Frequency	Percentage
Air pollution	106	88.3
Flies	92	76.7
Mosquito	86	71.7
Water pollution	78	65
Rat	69	57.5

*Multiple
Source; Field Survey, 2018

Table 5 revealed that 74.2% of the respondents used closed storage in form of bags or closed sheds in attempts to evade air pollution associated with poultry manure, especially when not in used in the farm.

This will help to reduce contact with air in order to prevent flies and mosquitoes breeding in the environs (Young, 2009). More so, incorporation of hydrophilic products in poultry manure could help to reduce odour associated with poultry manure as reported by 83.3% of the sampled farmers. This is ideal in situation where the farmer may not have labour input enough to incooperate the manure into the soil. The hydrophilic products (hashes, rice husk, peanut husk, dust or sawdust) has the capacity of absorbing litter's water content to avoid flies, odour and mosquito building up when corporate into the poultry manure (Mitchell and Donald, 2003; Hileman, 2005).

Moreover, 'Yellow pepper' farmers avoided rat proliferation in their poultry manure storage apartment waiting for use through use of poison or traps and cats, as opined by 81.7% of the respondents. Besides, 71.7% of the respondents avoided buying poultry manure with lots of feed waste. This helps in checkmating rats incursion in stored poultry manure stores and bags (Adebayo and Oladele, 2013). As well as 70% of the farmers avoided polluting their farming environs through proper incorporation of poultry manures spread in the farm with the soil. This practice will help to reduce odour, flies and water pollution through possible seepage into the ground water during rainy day (Hileman, 2005; Akpan, 2013).

Table 5 Technologies adopted by the Farmers in order to reduce environmental pollution

Variable	Frequency	Percentage
Proper incorporation of manure	98	81.7
use of poison or traps and cats	84	70
Use of closed storage	89	74.2
Use of hydrophilic products;	100	83.3
Avoid manure with lots feed waste	86	71.7

Multiple Responses
Field Survey, 2018

Table 6 shows that the age of farmers had direct relationship to adoption of technologies at 95% confidence interval. The sign identity of the variable could be best described by the positive correlation between increase in age and technology adoption rates through gaining more knowledge and information through succession of experimentations (Ume, et al.(2015). This finding is in variance with Ume *et al;* (2016), who reported that innovativeness, motivational and adaptability of individual decreases with age. Furthermore, the coefficient of credit against *priori* expectation and findings of (Green and Ng'ong'ola, 1993 and Adebayo, Oladele, 2013) had a negative impact on the rate of adoption of poultry manure use technology. The sign identity could be a function of poor access to credit facility by the sampled farmers. This finding is in inconsistency with (EA. Onwubuya et al), who opined that credit access aids in ensuring adoption of risky technologies, overcoming liquidity constraints and in promoting risk bearing capacity of the farmer.

Additionally, the coefficient of formal education was found to be positive and statistically significant at 1% level, indicating that there is direct relationship between poultry manure use and formal education. Studies (Ume, et al; 2016; Onwubuya et al;2009; Williams, 1998) revealed that education aids in the overall decision to adopt certain innovations through incorporating adequate awareness about the prospective benefit of the improved innovations to the environs. Educated farmer as observed by Adebayo and Oladele, (2013) has ability in comprehending and applying improved technologies in order to propel their production frontier forward bearing environmental sustainability in mind. This finding was in accordance to Kassie;(2009)) who opined that high educational attainment makes individuals to be more objective in evaluating innovations which would impart positively to their farm enterprises without risking their health and the ecosystem. However, Asarker, (2011) reported negative correlation between educational level and technology adoption. Lowly educated farmers may not be able to comprehend the effects of their production activities to the

environment and to their health. Their central motive is just to enhance the production and the consequences of their actions in the process to the environment and even to their health is not their palaver, they posited. For instance, most farmers are never bothered about undergoing soil fertility test before engaging into farming in order to ascertain soil nutrient requirement of the soil and the type and amount of manure required to improve the soil fertility. In fact, any type of manure available or affordable to them is applied and the rate is not their business, leading to over or under utilization (Ugbomeh, (2005).

As expected, the coefficient of extension services had a direct correlation with the dependent variable and significant at 5% risk level. This finding collaborates with (Williams T.O.(1999)) but differs with (Ume, et al; 2016). Extension services facilitate innovation dissemination, which could be perhaps through provision of technical assistance as well linking farmers to technological inputs sources. This could enhance the probability of timely procurement of inputs, hence causing the likelihood of discontinue technology adoption to be virtually zero (Williams, 1999). Besides, the coefficient of Farming experience interrelated positively with the rate of adoption of improved poultry manure use at 10% significance level. This finding concurred with (Onwubuya et al, 2009), who stipulated that farming experience enhances the farmers' skills in making appropriate decision making process aimed at preserving the environment and the ecosystem through right use of poultry manure in an attempt to enhance their soil fertility for high productivity. However, (Ugbomeh, 2005; Adedeji and Kormawa, (2002) found negative correlation between the farming experience and adoption of technology. The sign identity of the coefficient of the variable could be as result of experienced farmers turning deaf ear to extension service innovation transfer, as they often claim on the supremacy of their ideas. This could lead to endangering of their health and environs through their use of outdated practices (Asarker, 2011).

Table 6 Results of Logit regression

Variable	Coefficient	Standard Error	t- Value
Gender	0.5674	0.6321	0.8976
Age of the farmer	4.4003	2.2001	2.0000**
Educational level	0.6432	0.2004	3.2096***
Access to credit	-0.4680	0.3782	-1.2374*
Household Size	0.3421	0.4213	0.8120
Marital Status	1.1743	1.2387	0.9480
Farming Experience	0.5342	0.4308	1.2400*
Farm Size	0.3987	0.4998	0.7977
Extension Services	0.6439	0.3192	2.0172**

*, **, *** implies significance at 10%, 5%and 1% respectively
Source, Field Survey, 2018.

In Table 7, three factors were considered based on the answers of the sampled farmers, Factor 1= economic/institutional factor, Factor 2 = infrastructural factor and Factor 3 = socio-financial factor (Enete and Amata, 2010; Amusa. and Enete, 2015). Only variable with factor loading of 0.30 and above at 10% overlapping variance were used in naming the factors.The varibles with factor loading of less than 0.30 and variables that loaded more than one factor were discarded. Variables that loaded more than one factor like low yield and theft were discovered. The variables with factor loading above 0.30 are regarded as major constraint to use of poultry manure by the farmers. The constraints under the economic /institutional factor include poor access to credit (0.30). Poor access to credit for adoption of the technology is a persistent predicament to technology adoption in most developing countries of the world. This may as result of high interest rates charged by lending agencies, inability to provide the mandatory collateral as demanded by banks and ignorance of credit facility by the lending agencies(Ume et al; 2016; Young, 2009)).

Variables that loaded under factor 2 (infrastructural factor) include; high costs of material input(0.347), High cost of adoption is occasioned by high cost of material inputs e.g manure and this has resulted in partial adoption of technological package by poor resource farmers in particular. The effect of partial adoption of technology is the inability of the farmer to tap fully the

potentials of a given technology, hence discontinue adoption of the innovation might ensue (Kassie;(2009).The high costs of poultry manure could be linked to the closure of many poultry farms as result of high cost of production with meager or no profit to justify their labour (Adebayo and Oladele, 2013; Ugbomeh, (2005) . High cost of Transportation (0.320). High cost of transporting of manure from sales deport to the farm and from poultry farms to the farm. The high cost of transportation could be correlated to poor road net work in many rural areas thereby causing few lorries plying in those areas, high pump price in our filling stations and high cost of maintenance of motors as result of high Naira – Dollar exchange rate (Green and Ng'ong',1993; Asarker, 2009).The socio/infrastructural factors (Factor 3) was high labour cost (0.422). High cost of labour is common especially during the peak of farming season, hence resulting in low profitability of the farm enterprise as cost of production is high

Table 7.: Varimax-Rotated Factors Against Constraints to farmers' access to poultry manure in the Study Area.

Variables	Factor 1	Factor 2	Factor 2
High cost of material input	0.263	0.347	0.271
High cost of labour	0.021	0.211	0.422
Low crop yield ability	0.219	0.123	0.133
High cost of Transportation	0.187	0.320	0.043
Theft	0.233	0.229	0.026
Poor access to credit	0.301	0.175	.208

Source; Computed from SAS 2018.

CONCLUSION AND RECOMMENDATION

Based on the results, the following conclusions were deduced; Most farmers were aged, fairly educated, well experienced, had large household size and membership of organization. In addition, the effects of manure use to the environments were odour, flies, water pollution and rodent proliferation. Additionally, the technologies adopted by the farmers to abate environmental pollutions were proper incorporation of manure, use of poison or traps and cats, use of hydrophilic products and avoid manure with lots feed waste. As, well, the factors affecting the adoption of the technologies were age of the farmer, extension services, educational level and farming experience. Finally, the factors affecting use of poultry manure by the farmers were extension services, high cost of labour, poor access tocredit, high cost of input (manure), low illiteracy level and gross negligence and carelessness.

In line with the conclusion, the following recommendations were made;

(i) There is need to enhance farmers' access to seminars, workshops and conferences on issue regarding to environmental pollution consequences as results of their carelessness to poultry manure use.

(ii) Extension agents should be properly trained in environmental issues as most of their trainings are on animal and crop production, so that they could be in better position to impact same to the farmers

(iii) Farmers' access to credit through formal lending agencies should be fortified by the government agencies concern. This could facilitate the farmers not only in procuring the manure but in adopting the necessary technologies in abating possible environmental pollution through their farming activities.

(iv) Farmers with long years of farming experience should be encouraged to remain in production through supply of necessary inputs to that effects, and as well provide them with the necessary technical assistants by expects to avoid environmental degradation as results of their actions and in actions.

(v) There is need to provide the farmers with labour saving device such as hand driven plough to help in cooperating manure into the soil than living them uncovered, thus exposing the environs to odour and flies.

(vi) The cost of poultry manure should be subsidized by government especially those of them being procured from government poultry farms. This can assist the farmers to channel at least some part of their funds to solve other farming problems and family welfare.

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