Factors influencing Agricultural Business Investment Decision by Women in Rivers State, Nigeria

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Abstract
This study explored the livelihood activities of women and drivers of women decision to invest in agricultural activities in the oil rich state (Rivers State) of Nigeria. A stratified random sampling method was used to select a total of 120 women registered in cooperatives from 3 Local Government Areas of the state. Primary data was collected via a set of structured questionnaire and interview schedule. Data were analyzed using descriptive statistics and multinomial choice mode (ordered Probit model). Results showed that majority of the women were involved in cultivation of crops (60%). It was also found that, they were more involved in crop production (66.67%), farm produce marketing (65%), animal production (45.83%) and artisan jobs including hand craft than other jobs in the list. The results further showed that educational attainment, marital status, total income of farmers, access to insurance and expected rate of return in agribusiness investments by the women significantly influenced their decisions to engage in agricultural activities. It was recommended that programmes that will help promote women involvement in agriculture, strengthening the capacity to insure agribusiness in Nigeria, provision of rural infrastructure, literacy and agricultural extension services should be put in place by the State and Federal Governments to make agribusiness investment a rewarding investment in the area.
Key Words: Women entrepreneurship, agribusiness, investment decision, probit model, logistic model, Rivers State.

Introduction

Gender equality and women's empowerment achievements in Africa have been uneven, a recent report of African Development Bank, ADB (2010) observed. According to the report wage gaps and discrimination against women in labour markets have resulted in fewer women participating in the formal sector. In the agriculture sector, where the majority of the women work as unpaid labour, there is clear evidence that constraints to land ownership and lack of access to inputs by women are key obstacles to increasing agriculture productivity and economic growth, especially for those countries which depend on the sector as their main source of national income. It is now unequivocal that development will remain precarious if the creation of a productive agricultural sector is omitted. Historically speaking, increases in agricultural production had been the traditional path to industrialization and those countries that industrialized rapidly had already built up a strong agricultural base (Hagen, 2000). Women have a great role to play in this dimension. Research reports (World Bank, 2001 in Ihedura, 2002) had indicated that gender inequalities in developing world inhibited economic growth. The

report showed that there is a correlation between gender discrimination and greater poverty, slower economic growth, weaker governance and a lower standard of living of the people. Centre for Integrated Agricultural Systems, CIAS (2004) noted that women are faced with many constraints which range from lack of access to farm credit, loans, low level of income, to shortages of input supply and other economic resources, thereby limiting their contributions to household farming decisions.

The agricultural sector in Nigeria employs about two-thirds of the country's total labour force and provides a livelihood for about 90 per cent of the rural population (International Fund for Agricultural Development, IFAD, 2009). Nigeria, a major producer of fish and other food/cash crops and livestock, is the world's largest producer of cassava, yam and cowpea – all staple foods in sub-Saharan Africa; yet it is a food-deficit nation and imports large amounts of grain, livestock products and fish, IFAD added. Despite Nigeria's plentiful agricultural resources and oil wealth, poverty is still a challenge in the country, in a country with a bourgeoning population of over 150 million. (IFAD, 2009).

Poverty is especially severe in rural areas, where up to 80 per cent of the population lives below the poverty line and social services and infrastructure are limited (IFAD, 2009). The country's poor rural women and men depend on agriculture for food and income. Women play a major role in the production, processing and marketing of food crops. The poorest groups eke out a subsistence living but often go short of food, particularly during the pre-harvest period. Women and households headed solely by women are often the most chronically poor groups within rural communities (IFAD, 2009).

Much work has been performed in developing countries on the potential of women, increase food production. Boserup (1970) described black Africa as a region of female agricultural excellence. Patel and Antonio (1973) reported that 95% of women in the Yoruba in Nigeria, south-west of Nigeria's livelihoods are mostly in the agricultural sector, employ more yams, corn, tobacco, cassava, poultry and fish. They also participate in Bush clearing, land preparation and weeding. In addition to their role in production, they are actively engaged in harvesting, processing and marketing of agricultural products. The predominance of women in small-scale fishing activities, post-harvest fish micro-detail, fish processing, distribution and marketing of fish, women are key actors in the socio-economic development in West Africa. Despite the extensive and diverse portrayals of women participation in agriculture, they have either no or minimal part in the decision-making process regarding agricultural development hence making gender inequality dominant in the sector and this constitutes a bottleneck to development (Ogunlena and Mukhtar, 2009). In Rivers State of Nigeria, with its rich agricultural potentials not many studies have been carried out to x-ray the drivers of women participation and the problems faced by them in doing so. A related study by

Enete and Amusa (2010) focused on decision to participate in agroforestry in Ekiti State. However, it did not explore the possible effects of risk expectations, access to credit and insurance services on decision to invest by women in farm activities. This study is a response therefore to these knowledge gaps. Given the foregoing this study was designed to specifically identify the major agricultural and off-farm livelihood activities in Rivers State in which women partake in; and then ascertain the major determinants of their decision to participation or investment level in agriculture in the study area.

Theoretical Framework/Analytical Framework
This paper's framework hinges on the standard utility function model and farm household model which assumes that households take into account the external environmental and socioeconomic constraints in their choice of production activities represented in various equations that are slight modifications of the original model (see Singh et al, 1986 and Mendola, 2007). According to Mendola, the recognition that farm household behaviour is typically influenced by several natural, market, and social uncertainties in developing countries has raised some complexities in terms of understanding their production decisions. Seeking to insure household members against hunger and destitution is of great importance to any rural family in a less developed setting (Dasgupta 1993). Within the standard expected utility approach, the introduction of risk in peasant production choices has entailed including household preferences toward risk (e.g., risk aversion). Furthermore, where institutional arrangements provide imperfect insurance, households will self-protect by exercising caution in their production decisions (Morduch 1993). All these factors shape farm households' production choices and explain why vulnerable peasants are often observed to sacrifice expected profits for greater self-protection. This is because risk management is costly, and will differ across households at different points in the wealth distribution, with subsequent implications in terms of efficiency losses and poverty traps (Eswaran and Kotwal 1986). Recent works such as Duflo (2003) in Mendola (2007) had moved further to consider the psychological or decision costs of peasant production choices. Mendola (2007) indicated that there is a wide array of empirical studies providing evidence of the conflict between risk and productive choices, which may result in efficiency losses when safety is paramount. Rosenzweig and Binswanger (1993) estimated the impact of riskiness (based on measures of rainfall variability) on the agricultural investment portfolios of farmers. They show that uninsured weather risk is a significant cause of lower efficiency, and that farmers in riskier environments select portfolios of assets that are less risky (i.e., less sensitive to rainfall variation), but also less profitable. Similarly, Morduch (1993) as cited by Mendola found evidence that Indian farm households close to subsistence (i.e., those whose consumption is more

vulnerable to income shocks) are less likely to use risky high-yielding seed varieties than low-risk traditional varieties. These results consistently infer that vulnerable peasants (and especially the well-off ones who have more to lose) will tend to prefer a safe or conservative strategy with a low return, over a risky strategy with potential higher returns (Duflo 2003 in Mendola, 2007). In the case of adoption of a new technology, for example, given the costs involved in information, it can be wise for households to postpone their investments until they know more about the expected (risky) conditions (Mendola, 2007). This might explain the low take-up of pineapple cultivation in Ghana, despite the high rates of return (Goldstein and Udry 1990).

Multinomial Regression (e,g, Ordered Probit Model)

Multinomial logit models are discrete choice models used for the case of a dependent variable with more than two categories (Gujarati and Sangeetha, 2007 and Greene, 2008). This type of regression is similar to logistic regression, but it is more general because the dependent variable is not restricted to two categories. Each category is compared to a reference category, e.g. all types of forest conversion are compared to the stable forest category. The dependent variable should be categorical. Independent variables can be factors or covariates. In general, factors should be categorical variables and covariates should be continuous variables. It is assumed that the odds ratio of any two categories is independent of all other response categories. Multinomial choice models estimate the direction and intensity of the explanatory variables on the categorical dependent variable by predicting a probability outcome associated with each category of the dependent variable. An example is the ordered Probit model which was applied in this study. Others include conditional logit and multinomial logit models. According to Schmidheiny (2007) ordered Probit models dependent variables can often only assume a countable number of values, e.g. $y_n \in \{1, 2, ...J\}$. This applies often to a context where an agent (individual, household, firm, decision maker, ...) chooses from a set of alternatives. Sometimes the values/categories of such discrete variables can be naturally ordered, i.e. larger values are assumed to correspond to "higher" outcomes. The ordered probit model is a latent variable model that offers a data generating process for this kind of dependent variables. Some examples include Likert-scale questions in opinion surveys: 1 = "Strongly Disagree",2 = "Somewhat Disagree", 3 = "Undecided", 4 = "Somewhat Agree", 5 = "Strongly Agree"; employment status queried as 1 = "unemployed", 2 = "part time", 3 = "full time". (Although often used as example one might question the 'natural' order in this case and apply unordered models). A similar approach is the use of ordered logit model. Enete and Amusa (2010) used it to identify the determinants of women's contribution to farming decisions in cocoa based agroforestry households of Ekiti State, Nigeria and found that household socio-economic factors that encouraged high women contributions to farm decision making

were their number of years of formal education and farming experience, financial contributions to household farming activities, number of hours spent in the farm and farm size.

The Econometric Model
Consider a latent random variable yn for individual n = 1, ...,N. y∗n = x_nβ + εn with εi ☐ N(0, σ2) that linearly depends on xn. The error term εn is independently and normally distributed with mean 0 and variance σ2. The distribution of y∗n given xn is therefore also normal: y∗n |xn ☐ N(x_nβ, σ2). The expected value of the latent variable is Ey∗n = x_nβ. Observed is only whether individual n's index lies in a category j =1, 2, ..., J which is defined through its unknown lower μj−1 and upper bound μj , i.e. the observed choice yn is
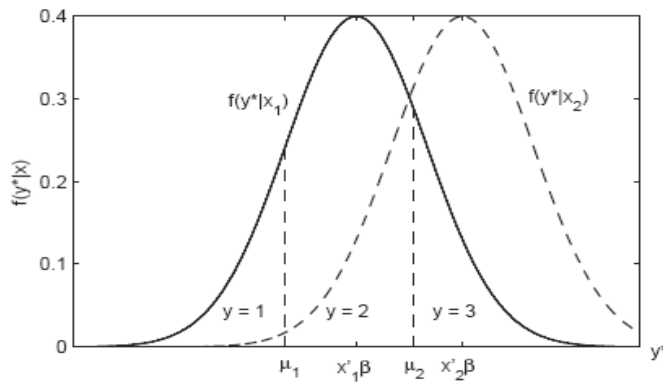

Figure 1: Probabilities in the ordered probit model with 3 alternatives.

$$y_n = \begin{cases} 1 & \text{if} & y_n^* \le \mu_1 \\ 2 & \text{if} & \mu_1 < y_n^* \le \mu_2 \\ 3 & \text{if} & \mu_2 < y_n^* \le \mu_3 \\ & \cdot & \\ J & \text{if} & \mu_{J-1} < y_n^* \end{cases}$$

The probability that individual n chooses alternative j is easily derived with help of Figure 1:

$$P_{nj} = P(y_n = j|x_n) \begin{cases} \Phi[(\mu_1 - x'_n\beta)/\sigma] & \text{for } j = 1 \\ \Phi[(\mu_2 - x'_n\beta)/\sigma] - \Phi[(\mu_1 - x'_n\beta)/\sigma] & \text{for } j = 2 \\ \Phi[(\mu_3 - x'_n\beta)/\sigma] - \Phi[(\mu_2 - x'_n\beta)/\sigma] & \text{for } j = 3 \\ \quad \cdot \\ 1 - \Phi[(\mu_{J-1} - x'_n\beta)/\sigma] & \text{for } j = J \end{cases}$$

where $\Phi(.)$ is the cumulative standard normal distribution.

The sign of the estimated parameters β can directly be interpreted: a positive sign tells whether the answer/choice probabilities shift to higher categories when the independent variable increases. The null hypothesis βk = 0 means that the variable xk, x = (x1, ..., xk, ..., xK) has no influence on the choice probabilities. Note, however, that the absolute magnitude of the parameters is meaningless as it is arbitrarily scaled by the assumption σ = 1.

One can therefore not directly compare parameter estimates for the same variable in different subgroups. Note that the marginal effects can only be reported for specified types *x*. When *βk* is positive, then the probability of choosing the first category $P(y = 1)$ decreases with *xk* and the probability of the last category $P(y = J)$ increases. However, the effect on middle categories is ambiguous and depends on *x*. According to Gujarati and Sangeetha (2007) in the probit model the rate of change in the probability is somewhat complicated and is given by $\beta_i f(Z_i)$, where $f(Z_i)$ is the density function of the standard normal variable and $Z_i = \beta_1 + \beta_i X_2 + ...+ \beta_k X_{kj}$, that is, the regression model used in the analysis. So, in both the logit and probit models all regressors are involved in computing changes in probability.

Research Method
Sample frame, method of collection and data structure
Rivers State is one of the 36 states of Nigeria. Agriculture is the major source of livelihood of the people of Rivers State and the agricultural policy of the state government is hinged on food production as it provides employment for young school leavers and university graduates as well. Major crops cultivated in the state include yam, cassava, maize, oil palm, banana and plantain. (Rivers State Agricultural Development Project, RSADP, 2003). Three LGAs including Ikwerre, Emohua and Obio/Akpor Local Government Areas (LGAs) were randomly sampled for the survey. Out of these three LGAs, two cooperative societies each that involve women were randomly sampled. These bring to 6 the total number of cooperatives sampled for the

survey. In each of the cooperatives, 20 women were sampled (i.e. 20 X 2 x 3 LGAs = 120).. This brings to 120, the total sample size of the study. The study relied heavily on primary data obtained from the above sampled farmers. However, secondary data were also consulted in writing the report especially journal articles, conference and seminar papers as well as online sources. A set of structured questionnaire and interview schedule were designed to elicit relevant responses from the plantain farmers. The data include costs and return, expectations information as well as household characteristics of the farms.

Empirical Data Estimation Method

Simple descriptive statistics like mean and percentages were used to ascertain the agricultural activities the women sampled engaged in and in finding out the problems identified by the women as their major constraints in achieving their business aim(s) in agriculture. The second major objective which is to find out the determinants of level of agricultural business participation was attained using ordered probit model (a multinomial choice model). The implicit form of the model which was used to find out the rate of change in level of participation in agricultural activities by the women in the survey was given by $\beta_i f(Z_i)$, where $f(Z_i)$ is the density function of the standard normal variable.

In explicit form the model is given by $Z_i = \beta_0 + \beta_1 Age + \beta_2 HHSZ + \beta_3 INCM + \beta_4 EDUCSTAT + \beta_5 MARITSTAT + \beta_6 CRDTACS + PERCRISK + INSACS + EXPRRT + u$.

Where Zi are Probabilities of participation ranging from 1 to 3, where Z1 = Probability of not investing (participating) in any agricultural activity, Z2 = probability of investing slightly (or participating in part-time agriculture and Z3 is the probability of investing fully (i.e. participating in full-time agricultural activity.).

Age = age of respondent in years; HHSZ = household size of the respondent (categorical = 1 = 1-3, 2 = 4- 6, 3 = 7 – 9, 4 = 10 and above) , Incm = monthly income in naira (Discrete variable where 1 = N0 – N5000; 2 = >N5000 – N10,000, 3 = >N10000 – N15,000; 4 = above N15,000 – N20,000, 5 = .>N20000 – N100,000, 6 = Above N100000); Educstat = educational status (categorical variable where 0 = No formal education, 1 = Primary Education, 2 = Secondary Education and 3 = Tertiary Education and above); Maritstat = marital status (discrete variable where 0 = single, 1 =separated, 2 = divorced, 3 = widowed and 4 = Married); creditacs = access to credit (Dummy, 0 = No access, 1 = access to credit); percrisk = level of risk perception in agriculture (discrete variable 0 = "Not risky", 1 = "slightly risky", 2 = "moderately risky", 4 = "Highly risky")+ insacs (dummy: 1 = "Insured", 0 = "Not insured") + EXPRRT (Expected rate of return, Discrete variable: 1 = 0-10%, 2 = >10 – 20%, 3 =

>20 – 30%, and 4 = > 30%) while u is the stochastic error term. The model was estimated using maximum likelihood method in STATA 11.0 software.

Results and Discussion

The results in table 1.0 shows some major livelihood activities women in Rivers State embark upon. The categories were based on Central Bank of Nigeria (1990) categorization of livelihood activities or entrepreneurial activities regarded as small scale business women were involved in Nigeria.

Table 1.0 Frequency Distribution of livelihood activities investment of women in Rivers State

Type of Livelihood Activity	Frequency	Percentage participation	Total Sample Size
Farm produce marketing (FPM),	78	65.00	120
Livestock Produce marketing (LPM)	48	40.00	120
Small confectionery/bakeries (SC)	38	31.67	120
Advanced private service(APS)	32	26.67	120
Animal Production (AP)	55	45.83	120
Soap Making	5	4.17	120
Crop Production	80	66.67	120
Artisan	55	45.83	120
Civil Service/Public service	23	19.17	120

Source: Field Data, 2011.

From the table it could be seen that majority of the women in the state were more involved in crop production (66.67%), farm produce marketing (65%), animal production (45.83%) and artisan jobs including hand craft than other jobs in the list. Others got involved in livestock produce marketing (such as poultry, goats and fish products 40 %) and in other related civil public and private works. Some of them do not rely strictly on only one job but tried to combine some activities in order to meet up with their household welfare challenges.

Major Factors Influencing Women's Level of Investment in Agribusiness Enterprises in the Rivers State, Nigeria

Tables 2 display the estimates of the parameters of ordered probit regression on the factors influencing the contribution of women to household agribusiness activities investment decisions. The explanatory power of the factors as reflected by Pseudo R^2 was relatively high (59%). The overall goodness of fit as reflected by Prob > Chi2

(0.0000) was also good. Threshold parameters $\partial 1$ and $\partial 2$ were significant at 1%, implying the three categories in the response were quite ordered. In terms of consistency with *a priori* expectations on the relationship between the dependent variable and the explanatory variables, the model also exhibited good fitness. When compared with the ordered logistic regression model, the results were very similar. Household size was found to be positively correlated with the decision to invest in more in agricultural business in the result. This had a Z value which was found significant at 5 percent.

Table 2.0 Logistic Regression (with comparison of output using both ordered logistics and ordered probit approaches)

Explanatory Variables	Coefficients	Z Ratios
Age of respondent	0.2207	1.34NS
Household size	0.4584	2.09**
Total Income (off-farm and farm income per annum)	-0.3898	-1.8500**
Educational attainment level	0.5459	3.6600**
Marital status	-0.1167	-0.8000***
Credit Access	1.2714	3.1400NS
Perceived risk in farm business	0.2243	0.9500NS
Insurance Access	1.0280	2.4600**
Expected Rate of Return from farming	1.1498	5.8600***
n/cut 1 (δ_1)	3.9175***	
n/cut2 (δ_2)	6.6458***	
Number of observation =	120	
LR chi2(9) =	154.300	
Prob > chi2 =	0.0000	
Pseudo R2 =	0.5895	
Log likelihood	-53.7257	

Source: Statistical Output from Field Data (2011) analysis using STATA programme

The variable is of similar effect with marital status since both of them demonstrate that the more the likelihood of having a highly populated household the more likely the probability of such household investing in agribusiness venture probably to cope with the demand for food consumption and other household needs. On the other hand total income of the decision maker (the woman investor) was found to be negatively correlated with the decision to invest in agribusiness enterprise. This variable had a Z ratio that is significant at 1 percent. It thus appears that with less income on the part of

the decision maker (i.e. the household) from all sources the household appeared to be motivated to engage in farm livelihood activity as a way of generating income to meet up with household requirements and strive to solve the problem of poverty. The above findings all agree with a priori expectation especially the utility function model used as the framework for this study. The level of education of women was positively and significantly related with their level of contribution to household farming decisions. In other words, highly educated women were likely to make higher contributions to farming decisions than less educated ones. Enete *et.al* (2002) in. Enete and Amusa (2010) reported that educated women may be more aware of their rights and responsibilities in the household and may be more assertive about them than uneducated ones and so may likely to take bolder step in investment decision on farm activities. Contrary to Rosenzweig and Binswanger (1993) riskiness perception by the farmers did not really influence the women farmers' decision to invest in this study area. Rather, the findings go further to show that expected rate of return from agribusiness enterprises largely determined their probability of investing in agribusiness enterprises in the study area. This variable had a z ratio significant at 1 percent. This contradicts Duflo 2003 in Mendola, (2007)'s .findings that vulnerable peasants will tend to prefer a safe or conservative strategy with a low return, over a risky strategy with potential higher returns. The female farmers showed that they would go for higher profit or expected rate of returns that are high than to tend towards risk aversion. This trend may not be surprising as it also appeared that the female investors studied also indicated the probability to invest more as they tended to access more insurance coverage. This could be the reason why it appeared as if they were risk neutral. The variable ratio found to be significant at 5 percent. On the whole the findings corroborated the assertion of CIAS (2004) who noted that women are faced with many constraints influencing their participation in agriculture. These they held ranged from lack of access to farm credit, loans, low level of income, to shortages of input supply and other economic resources, thereby limiting their contributions to household farming decisions.

Conclusion
The study found that most of the women in the state were more involved in crop production, farm produce marketing, animal production and artisan jobs besides other agribusiness enterprises as well. It shows that agricultural business holds great potentials for job creation and poverty alleviation which can empower Nigerian marginalized women in the Rivers State of Nigeria. It is hereby recommended that Government should put in place new agricultural programmes that will enhance the uptake of agricultural enterprises as livelihood means by more women who are still looking for jobs. Agricultural cooperatives for women should be supported financially by the governments too. The fact that access to agricultural insurance could boost

uptake of agribusiness as a way of livelihood should inform the decision of governments to improve and extend the services of the Nigerian Agricultural Insurance Scheme as well as Agricultural Credit Guarantee Scheme Fund (ACGSF) to make investment in agriculture more reassuring. It may be said that increase in household size can improve farm labour availability which influenced the probability to take up agribusiness as a way of investment. However, in the face of growing population in Nigeria with its attendant challenges of feeding more households the need for family planning will have to be encouraged by the government to reduce household vulnerability to low income. This can enable such households obtain greater utility from profits which they get in reality from the farm and the expected rate of returns too. Farmers need more training through improved extension services as well as adult literacy programmes. Government should establish such programmes and boost investment in provision of infrastructures such as good roads and electricity. These can go a long way in making real the farmers' expected rate of return in agribusiness.

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