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PROPENSITY OF ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICTs) IN AGRICULTURE AMONG FEMALE FARMERS IN ABIA STATE, NIGERIA

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ABSTRACT
The research was conducted with the aim of identifying significant predictors of the propensity to adopt ICTs by Nigerian Women in Agriculture. Abia state was used as case study. A total of 300 respondents were sampled from the three agricultural zones in Abia state. The instrument for data collection was a 20 item structured questionnaire. A total of 200 questionnaires were finally used for analysis. SPSS 21 was the software employed in conducting the analysis and the data were analysed by running a linear regression. The dependent variable was the propensity to adopt ICTs while the independent variables were Age, Level of education, Occupation, years of experience, income, and desire to use ICTs; frequency of use, ease of use, efficiency and effectiveness of ICTs. The study identified Age, level of education ad income of respondents as significant socio-economic predictors of the propensity to adopt ICTs by Nigerian WIA. Frequency of use, ease of use, efficiency and effectiveness of ICTs were equally identified as significant predictors of the propensity to adopt ICTs by Nigerian women in Agriculture.

Keywords: Propensity, Adoption, Women, Agriculture and ICTs

Introduction

Women play a vital role in agriculture and agricultural development in Nigeria. The women in agriculture program seek to improve agricultural extension services for women, and ensure that extension services have female extension workers at every level operation. These women in Agriculture need all the empowerment and support they need and can get, in other to perform their duties diligently as this will lead to greater production and in ensuring food security in Nigeria, (Chinaka *et al*., 2016). In this age of ICTs boom, the role of efficient and effective dissemination of agricultural information and delivery of extension services to farmers falls on information and communication technology tools. With the help of these ICTs tools farmers are able to receive prompt information about availability of inputs, weather forecasts, forecasts of impending disease or pest outbreak, farming methods, market prices, and technological innovations and so on. Common ICTs tools used by extension workers include Radios, Televisions, Telephones, print media etc, (Chigozie-Okwum *et al*, 2016). ICTs ensure speedy, easier and more efficient ways of transferring technology as well as rapid extension services delivery. The rate at which the Nigerian Women in Agriculture adopt ICTs in carrying out their job has an overall effect on sustainable agricultural development. Several scholars have proposed models on the factors that affect propensity of users to adopt technology, some of the models considered in this research include the Technology Acceptance Model (TAM), the Theory of Planned Behaviour (TPB), and the Theory of Reasonable Action (TRA). The Technology Acceptance Model as presented by

Davis (cited by van Akkeren and Cavaye, 1999) suggests that when a user is presented with a new technology, a number of factors influence their decision regarding how and when they will use it. This includes its perceived usefulness and its perceived ease of use. TAM is specifically tailored for modelling users' acceptance of information systems or technologies. Ajzen (1991) developed Theory of Planned Behavior which is about one factor that determines behavioural intention of the person's attitudes toward that behaviour. The Theory of Reasonable Action (Fishbein and Ajzen, 1975) is one of the most popular theories used and is about one factor that determines behavioural intention of the person's attitudes toward that behaviour. The Theory of Reasonable Action model includes four general concepts namely, behavioural attitudes; subjective norms; intention to use; and actual use. The aim of this study was to determine what factors influence the propensity of the Nigerian Women in Agriculture to adopt ICTs. The specific objectives included to;

Methodology

For the purpose of this research, the methodology adopted a case study approach. The research attempted to identify the predictors of the propensity to adopt ICTs by Nigerian women in Agriculture, using Abia state as case study. The instrument for data collection was a 20 item questionnaire. The instrument was developed to capture the propensity of Nigerian women in agriculture to adopt ICTs, their socio-economic characteristics, personal choices and interests as well as frequency, efficiency, effectiveness and ease of use of ICTs. The population of the study comprised of Women in Agriculture in Abia State. A random sampling of 100 respondents each were drawn from each of the three Agricultural Zones in Abia State namely, Umuahia, Ohafia, and Aba Agricultural zones, making the sample size 300. About 250 out of the 300 distributed questionnaires were returned giving a response rate of 83.33%. Out of the 250 returned questionnaires, 200 were used. Responses were discarded if at least 5 items were not completed, as this will give incomplete data. STATA 4A was used in analysing the data collated from the research, a Tobit regression procedure was run on the data with probablility and level of adoption of ICTs as the dependent variable. The Tobit model in case of censoring at zero can be expressed as:

$Yi^*=\beta X_{i+}\mu_i$…… …….. (1)

$Yi=max(0,Y_i^*)$…… …… (2)

The implicit form of regression is given by:

$Yi=f(X_1,X_2,X_3,X_4,X_5,X_6,X_7,X_8+ X_9+ X_{10}+\mu)$……..…… (3)

$Yi=\alpha+b_1lnX_1+b_2lnX_2+b_3lnX_3+b_4lnX_4+b_5lnX_5+b_6 lnX_6+b_7lnX_7+b_8lnX_8+b_9lnX_9+b_{10}lnX_{10}+\mu)$… (4)

Where

Y = level of adoption (0-100%)
X_1 = Age of Respondent
X_2 = Level of education
X_3 = Occupation
X_4 = Years of experience
X_5 = Income of respondents
X_6 = Desire to use ICTs
X_7 = Ease of use of ICTS
X_8 = Frequency of use of ICTs
X_9 = Efficiency of ICTs
X_{10} = Effectiveness of ICTs

Results and Discussion

The results showed that 36. 50% of the respondents were between the ages of 21-30 years, 22% were within the age bracket of 31-40 years, 19.50% fell under the 41-50 age range, and 20% were between 51-60 years, while only 2% of the sampled population were aged between 61-70years. The result showed that a high percentage of the respondents were relatively young and in their primes. The implication of this result is that age is an influencing factor in technology adoption, as there is a high tendency of younger, vibrant women to adopt technology as opposed to older women in agriculture. The result of the survey is in line with Weinberg, (2004), who found a complementarity between existing human capital and computer adoption and provides evidence that young workers are better able to adapt to new technologies.

Table 1: Distribution of respondents' socio- economic characteristics

Variable	Operational	Frequency	Percentage
Age			
	21 – 30yrs	73	36.50
	31 – 40yrs	44	22.00
	41 – 50yrs	39	19.50
	51 – 60yrs	40	20.00
	61 – 70yrs	4	2.00
Level of Education			
	Primary	20	10.00
	Post Primary	62	31.00
	B.sc/HND	63	31.50
	M.Sc.	33	16.50
	PHD	22	11.00
Annual income			
	Below 500,000	34	17.00
	500,000 – 999,999	84	42.00
	1,000,000 – 4,999,999	60	30.00
	5,000,000 – 10,000,000	22	11.0
Occupation			
	Civil Servant	90	45.00
	Independent Researcher	19	9.50
	Farming	35	17.50
	Student	16	13.33
	Agricultural Business	40	20.00
Years of experience in Agriculture			
	1 -10yrs	96	48.00
	11 – 20yrs	36	18.00
	21- 30yrs	40	20.00
	31 – 40yrs	28	14.00

Source: Field Survey, 2016

It was deduced from the results that only 10% of the sampled respondents has only primary education, 31% of the respondents has post primary education, 31.50% possessed Bachelor of Science degree/Higher National Diplomas, 16 % of the respondents had obtained their Masters degrees while 11% of the respondents possessed doctorate degrees. This showed that quite a higher percentage of the respondents possessed tertiary education and hence had the human captal capacity to adopt new technologies. According to many studies, education level is one of the major factors that influence technology access and usage. Several studies underline that ICT-adoption behaviour is likely to be influenced by education (Borghans and Ter Weel, 2005). So, it is necessary to review the importance of education on the women technological adoption process. A large body of prior research has shown that highly educated workers tend to adopt new technologies faster than those with less education (Welch, 1970; Wozniak, 1984, 1987; Krueger, 1993; Lleras-Muney and Lichtenberg, 2002).

The study showed that 17.00% of the respondents earned an annual income below 500,000Naira, 42.00% earned between 500,000-999,999 naira annually, 30.00% had 1,000,000-4,999,999 naira as their annual income while only 11% of the sampled population earned between 5,000,000-10,000,000 as annual income. Majority of the respondents earned below 1,000,000 annually, as seen from result shown on the table above and this could hinder their tendency to choose to

adopt ICTs. According to Yaseen, et al (2016), with the case of China, income has most significant effect on computer application such as ICTs tool; data shows that one unit increase in income will increase odds of computer application by factor of 1.00. This implies that increase in income has a positive ripple effect on rate of adoption of new technologies.

The results of the study presented in table 1 above below showed that 45% of the respondents were civil servants, 9.5% were independent researchers, 17.50% of the respondents were into full time farming as their occupation, 13.33% were students while 20% are into agricultural business. Additionally the study showed that 48% of the respondents had just between 1-10years experience in Agriculture, 18% had 11-20 years' experience, 20% of the respondents had 21-30years' experience in agriculture, while 14% of the sampled respondents had 31-40 years' experience in agriculture. In contrast to vintage Models, Weinberg, (2004) argue that new technologies may complement experience and be adopted first by experienced workers.

The results in Table 2 show the result of linear regression analysis where Propensity and intensity to adopt ICTs (dependent variable), was attempted to be predicted by the socio economic characteristics of the respondents. The predictors (independent variables) include; Respondent's Age, level of education, occupation, years of experience and annual income, desire to adopt ICTs, Frequency of use of ICTs, Ease of use of ICTs, Efficiency of ICTs and Effectiveness of ICTs.

The chi square value was highly significant at 1% level of probability indicating goodness of fit of the tobit regrtession line. The coefficient of age was positive and significant at 5% level of probability. This implies that any increase in age will lead to a corresponding increase in probability and intensity of adoption of ICts. The effect is thought to stem from accumulated knowledge and experience of farming systems obtained from years of observation and experimenting with various technologies. In addition, since adoption pay-offs occur over a long period of time, while costs occur in the earlier phases, age (time) of the farmer can have a profound effect on technology adoption (Bonabana-Wabb, 2002). The coefficient of eductation was positive and higly significant at 1% level indicating a direct effect on probability and intensity of adoption of ICTs among the female farmers Generally education is thought to create a favorable mental attitude for the acceptance of new practices especially of information-intensive and management-intensive practices (Waller et al. 1998 and Caswell et al., 2001). The coefficient of desire to adopt had a direct relationship with probability and intensity of adoption of ICTs among the farmers in the study area. The coefficient of annual income had a direct relationship with propensity to adopt ICTs. The decision to adopt is often an investment decision. And as Caswell et al, (2001) note, this decision presents a shift in farmers' investment options. Therefore adoption can be expected to be dependent on cost of a technology and on whether farmers possess the required resources. Technologies that are capital-intensive are only affordable by wealthier farmers (El Oster and Morehart, 1999) and hence the adoption of such technologies is limited to larger farmers who have the wealth (Khanna, 2001). In addition, changes that cost little are adopted more quickly than those requiring large expenditures; hence both extent and rate of adoption may be dependent on the cost of a technology. Economic theory suggests that a reduction in price of a good or service can result in more of it being demanded.

The frequency of adoption, ease of use of ICTs, efficiency of use of ICTs and effectiveness of ICTs are significant at 1% level and had a direct relationship with probability and intensity of adoption of ICTs. Acquisition of information about a new technology demystifies it and makes it more available to farmers. This agrees with the technology acceptance model which submits that a number of factors influence their decision regarding how and when they will use it, this includes its perceived usefulness and its perceived ease of use. The respondents agreed that ICTs which were easier to learn and provided efficient and effective usability were the most adopted technologies. Information reduces the uncertainty about a technology's performance hence may change individual's assessment from purely subjective to objective over time (Caswell

et al., 2001). Exposure to information about new technologies as such significantly affects farmers' choices about it. Feder and Slade (1984) indicate how, provided a technology is profitable, increased information induces its adoption.

Table 2: Tobit Regression estimates of the Determinants of Prpensity and Intensity of Adoption of ICTs in the study area

Variable	Coefficient	Std.Error	t-value
Constant (b_0)	0.055	0.108	0.510
Respondent's Age (X_1)	0.056	0.020	2.769**
Respondent's Level of Education(X_2)	0.148	0.023	6.402***
Respondent's Occupation(X^3)	-0.017	0.012	-1.401
Respondent's Years of Experience in Agriculture(X_4)	0.027	0.021	1.295
Desire to adopt(X_5)	0.177	0.068	2.617**
Annual Income of Respondents(X_6)	0.097	0.033	2.958**
Frequency of Adoption of ICTs(X_7)	0.282	0.028	10.230***
Ease of Use of ICT(X_8)	0.124	0.033	3.798***
Efficiency of ICTs(X_9)	0.125	0.026	4.872***
Effectiveness of ICTs(X_{10})	0.092	0.028	3.359**
Chi Square	34.789***		
Pseudo R^2	0.6723		

** and *** is significant at 5% and 1% level of probability

Conclusion

Information and communication technology has become an integral part of the daily lives of the 21st century individual as just about little or nothing can be achieved without the application, or integration of ICTs. The roles of the Nigerian Women in Agriculture in achieving sustainable agricultural development are such that cannot be relegated to the background. To this end efforts are geared toward ensuring they are equipped to work with the right tools to ensure smooth, fast and easy running of their job roles. It was observed that significant predictors of the propensity to adopt ICTs by Nigerian women in Agriculture included, Age, Level of Education, Income, and Frequency of use of ICTs, Ease of use of ICTs, Efficiency and effectiveness of ICTs. These significant independent variables influence the tendency of the Nigerian Women to choose to adopt ICTs in carrying out their jobs.

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