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Influence of psychological disposition on IPM adoption behaviour among cocoa farmers in Osun state, Nigeria.

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Abstract

A quantum of the world's potential crop production, including cocoa, is lost annually due to the effect of pest infestation. Integrated Pest Management must be developed that are effective in the long-term, cost effective and not detrimental to human and environmental health. Non adoption of IPM led farmers into a "pesticide treadmill" as farmers sprayed more pesticides without achieving the desired results. Adoption and impact assessment studies in IPM have had to focus on defining IPM without addressing the determinant of adoption behaviour. Hence, this study investigated the psychological disposition as a determinant of adoption behaviour among farmers. This study was carried out in Osun state in Tropical Rainforest zone. Cocoa is produced in seven

states in this zone namely; Ondo, Ogun, Osun, Oyo, Edo, Ekiti and Abia states. Osun state was purposively selected due to the training conducted by IITA in the state. Systematic random sampling technique was used to select 107 respondents out of 1073 trained respondents. A structured questionnaire was used to elicit information from the IPM trained cocoa farmers in relation to the study objectives. Chi-square was used to test hypotheses1, while multiple regression model was used to predict some selected variables on adoption behaviour.Age and farming experience of majority of the respondents were 41-60 and 11-20 years, respectively. Most (69.2%) of the respondents were males, married (91.5%), had formal education (71.0%). Most (60.8%) of the respondents had high risk orientation, majority (47.7%) had medium level of achievement motivation while majority (77.6%) had high level of innovation proneness. Farm experience **(**β=0.021), Risk orientation (β=0.027), Achievement motivation (β=0.021) and Innovation proneness (β=0.019) had positive and significant contribution to IPM adoption behaviour. Adoption behaviour was determined by farm experience, risk orientation, achievement motivation and innovation proneness in the state.

Keywords: Integrated pest management, Cocoa farmers, Farmers Field School, Osun state.

Introduction

Cocoa is a native of the Amazon basin and other tropical areas of South and Central America. The Spanish called cocoa "the food of the gods" when they found it in South America 500 years ago. [1] . Roughly two-thirds of cocoa bean production is used to make chocolate and one-third to make cocoa powder [1]. Apart from serving as source of livelihood to smallholder farmers, it plays tremendous roles in the health sector. Lots of discoveries through researches reported that the consumption of cocoa products reduces fatigue, prevents malaria, diabetes and hypertension among others [2].

Nigeria was the second leading cocoa producer in the world in the 70s but due to a combination of factors, such as insect pest and disease infestation. The main insect pests of cocoa are brown mirids; *Sahlbergella singularis and* black mirids; *Distantiella theobroma* which had caused damage of an estimated loss of 100,000 tonnes while the main disease of cocoa is the 'Black pod'

disease caused by *Phytophthora palmivora* and *Phytophthora megakarya* which had caused a total loss of 100% in some cocoa producing countries of the world and 75% loss in Nigeria [3]. [4] reported that approximately 30 to 40% of all potential cocoa production is lost to diseases and pests globally.

So far in Nigeria, there is no organic cocoa, as synthetic pesticide spray application must be embarked upon to keep plantations productive. However, with the awareness of Integrated Pest Management concept, the number of spray applications has been further reduced [5]. The era of blanket or calendar spraying of cocoa farms is now a thing of the past as farmers are encouraged to spray only when mirids are present on the crop and in sufficient number that can cause economic damage.

Mitigating the adverse effects of pesticides has become a focus for many research programmes. For example, a diverse range of non-chemical pest control options have been introduced by International Institute of Tropical Agriculture/Sustainable Tree Crop Programme (IITA/STCP) in Farmer Field School (FFS) training which include biological, cultural control (including the manipulation of planting dates and cropping patterns such as crop diversity and crop rotation), plant-host resistance, genetic transformation and hand removal of infected plants.

According to [6], farmers who had higher education status, risk orientation, management orientation, achievement motivation, innovative proneness and high farming experience most adopted IPM in sugarcane.

Investigation of why some technologies are more readily adopted than others requires key information about the socio-economic and biophysical interactions that affect farmers in making decisions [7]. There are factors which may either be barriers to or enhancers of adoption. The factors could be a complex set of interactions or conditions involving the technology, the institutions, the potential/targeted adopter or the general setting in which the technologies are introduced. Hence, this study investigates the influence of some psychological factors on adoption of IPM among cocoa farmers.

Objectives

(1) identify the socio-economic characteristics of the respondents

(2) determine the psychological dispositions of the respondents

Hypothesis

Ho1: There is no significant relationship between selected socio-economics characteristics and IPM adoption behaviour of the trained cocoa farmers.

Ho2: There is no significant contribution of socio economic and psychological factors to the adoption behaviour of the trained cocoa farmers.

Theoretical framework

Diffusion of innovations theory

The diffusion of innovations theory is perhaps the most commonly referred to framework to investigate the adoption and diffusion of innovations in social systems. The research framework originated from contributions in various scientific disciplines comprising anthropology, geography, rural sociology, public health, communication and marketing research [8] . Diffusion of innovations theory has undoubtedly yielded a wealth of insight into the principles and general patterns of innovation spread; and its easily comprehensible and attractive concepts provide a popular reference for the study of innovation adoption and dissemination in social systems, as well as for practical extension work. IPM technology is an innovation which needs to be disseminated to farmers to enhance its adoption

Methodology

This study was carried out in Osun state in Tropical Rainforest zone. Cocoa is produced in seven states in this zone namely; Ondo, Ogun, Osun, Oyo, Edo, Ekiti and Abia states. Osun state was purposively selected due to the training conducted by IITA in the state. Systematic random sampling technique was used to select 107 respondents out of 1073 trained respondents. A structured questionnaire was used to elicit information from the IPM trained cocoa farmers in relation to the study objectives. Chi-square was used to test hypotheses1, while multiple regression model was used to predict some selected variables on adoption behaviour. This study postulates that the probability of a farmer adopting IPM method (Q) depends on the attributes like Age, Farmers experience, Risk orientation, achievement motivation, Innovation proneness.

$$\text{In } Q=\beta_0 + \beta_{1\ \text{In}}x_1 + \beta_{2\ \text{In}}x_2 + \beta_{3\ \text{In}}x_3 + \beta_{4\ \text{In}}x_4 + \beta_{5\ \text{In}}x_5 + u$$

Where:

β =Regression Coefficient

Q=Adoption behaviour,

$x_{1=}$ Age

$x_{2=}$Farm experience

$x_{3=}$Risk orientation

$x_{4=}$Achievement motivation

$x_{5=}$ Innovation proneness

U= Random Error Term

Results and discussion

Sex of respondents

The male respondents in the study area was 69.2%, while the females were 30.8%. This justifies mixed evidence regarding the different roles men and women play in technology adoption. This finding is in line with [9] who opined that rural women farmers are constrained by social and institutional factors including access to inputs, modern technologies, education and land ownership. These factors limit rural women‘s ability to improve agricultural production and the well-being of their families.

Age of respondents

Few (24.3%) of the respondents' age were between age 21-40 years while 23.4% fall between age 61-80 and the remaining (52.3%) were between the age range of 41 and 60 years. Few youths are involved in cocoa farming which could affect IPM techniques adoption negatively as some of the techniques are labour intensive. Age is a factor thought to affect adoption and it is said to be a primary latent characteristic in adoption decisions. This study supports the findings of [10] who stated in their study that most of the farmers trained on IPM were still in their prime age and would be ready to adopt IPM.

Marital status of the respondents

Most (91.5%) of the respondents were married, 6.5% single, while 1.0% were divorced and widowed. This implies large family size and will create labour for IPM adoption. The high proportion of married respondents shows that more members of the farm family are likely going to be available for IPM adoption in the study area. This also corroborates the age distribution result that few youths are involved in cocoa production. According to [11], most married cocoa farmers relied on family labour, reducing the requirement to hire labour to carry out some IPM activities and thereby reducing their financial obligations.

Religion of the respondents

Table 1 reveals that majority (53.3%) of the respondents were Christians while muslim were 46.7%. This implies that there was no traditional worshippers in the study area. This supports [12] who stated in his findings that there is a reduction in attachment to traditional belief when there are few Traditional worshippers.

Farming experience of the respondents

In the study area, 15.9% had 1-10 years in cocoa farming experience, 52.3% of the respondents had between 11-20, 13.1% had 21-30 years and 31-40 years, while 5.6% had 41-50 years. The result implies that the farmers have long years of cocoa farming experience therefore, they might be expected to have higher proclivity to adopting IPM technology. [13] opined that the length of time of farming business can be linked to the age of farmers, access to capital and experience in farming which may explain the tendency to adopt innovations and new technology such as IPM.

Educational qualification of the respondents

Most (71.0%) of the respondents had formal education while 29.0% had none. This finding revealed that most of the respondents were literate. It is evidence that formal education has a positive influence on adoption of IPM innovation and supports the findings of [14], who posited that high literacy level will predispose farmers to adopt and use improved farm practices.

Psychological dispositions of the respondents

Risk orientation of the respondents

Table 2 shows the scores of risk orientation of the respondents. The scores were derived from the responses of the respondents' risk orientation statements and was categorised into high and low level. The result revealed most (60.8%) of the respondents had high risk orientation while 39.2% had low risk orientation. This shows that the ability for the respondents to take the risk of adopting IPM technology is high and they would be ready to adopt IPM despite the uncertainties involved. In a related findings, [15] concluded that majority of respondents had medium risk orientation which implies that ability to take risk in the adoption of IPM technology is high.

Achievement motivation of respondents

Table 3 shows the scores of achievement motivation of the respondents. The scores were derived from the responses of the respondents' achievement motivation statements and were used to categorise the respondents into high, medium and low levels. The result revealed that majority (47.7%) of the respondents had medium level of achievement motivation, 31.8% had high level while few (20.5%) had low level of achievement motivation. This implies that ability to excel regardless of social rewards was moderate among the trained farmers. This finding is different from [16] and [15] who found that majority of respondents had low achievement motivation.

Innovation proneness of respondents

The result on Table 4 shows the scores of innovation proneness of the respondents. The scores were derived from the responses of the innovation proneness statements and were used to categorise the respondents into high and low levels. The result revealed that majority (77.6%) of the respondents had high level of innovation proneness while 22.4% of the respondents fell in the low level of innovation proneness. This is an indication that the FFS trained farmers had high innovative ability to adopt IPM technology which is similar to the study of [17] who reported that that there was a positive and significant relationship between level of knowledge and innovativeness of farmers. The reason might be that the farmer who is more innovative will try to gather the information on technology and becomes more knowledgeable than other farmers. Hence it can be clearly concluded that knowledge and innovativeness are positively correlated.

Relationship between selected personal characteristics and adoption behaviour

Table 5 reveals that significant relationship exists between sex (X^2 =15.7, p<0.05), marital status (X^2 =253.9, p<0.05), education (X^2 =18.2, p<0.05), religion (X^2 =0.46, p<0.05) and adoption behaviour in the State. This finding is supported by the study of [18] who posited that Education expands individual scope of inference and paradigm, whereas training re-enforces individual's experience and up-grade the skills for effective implementation of any novel technology. Education enhances individual farmer's ability to access and process agricultural information, and the application of information in improving on-farm activities. Educational status is assumed to influence cocoa production technologies positively because with higher level of education the farmer would be in a position to technically and economically assess the new crop or technology to clear doubts and uncertainties associated with it and enhance its adoption. The significant relationship of sex implies that men and women have roles to play in the adoption of IPM in cocoa farms. According to [19] since cocoa farming is dominated by male farmers, it is expected that more male cocoa farmers would adopt technologies than their female counterparts, other things being equal. This is because women have less access to credit and land as collateral than men, as well as relying mostly on hired labour which is scarce due to migration of the rural youth to the urban areas to seek for jobs with relatively better remuneration.

Multiple regression analysis of variables affecting IPM adoption behaviour among respondents

The R-square value of 0.111 indicates that 11.1% of the factors affecting IPM adoption behaviour are explained by the model in the study area. The R value of 0.333 also shows that there is a weak correlation between the independent variables (factors) and adoption behaviour. Age had the highest beta value of 0.067 among variables that are significant. The positive relationship observed between the variable and adoption behaviour implies that the higher the age the greater the tendency to adopt IPM to increase their production. Farm experience (β=0.021), Risk orientation (0.027), Achievement motivation (0.021) and Innovation proneness (0.019) had positive and significant contribution to IPM adoption behaviour. [21] stated that age of cocoa farmer is predicted to have a negative impact on adoption because as the age increases, his physical strength tends to reduce and this is assumed to impact negatively on adoption of the

technologies.

Conclusion and recommendations

Based on the findings of this study it can be deduced that most of the farmers were in their prime age and would be ready to learn and apply the skill of IPM techniques in their farms. Most males who were married and educated were involved in IPM adoption. The farmers had long years of farming experience. In terms of their psychological dispositions, the respondents had high risk orientation, moderate achievement motivation and high innovative proneness.

Youth and women should be encouraged to grow cocoa and they should be given access to farm land for tree crops. Farmers Field School (FFS) should be established in all the cocoa producing states in Nigeria to facilitate the training of farmers on IPM technology which will increase adoption and farmers income.

Figures and Tables

Table 1: Distribution of respondents on socio-economics characteristics

Socio economic variables	**n=107**	
Sex	**Freq**	**%**
Male	74	69.2
Female	33	30.8
Age		
21-40	26	24.3
41-60	56	52.3
61-80	25	23.4
Marital status		
Single	7	6.5
Married	98	91.5

Divorced	1	1.0
Widowed	1	1.0
Religion		
Christian	57	53.3
Muslim	50	46.7
Traditional	-	-
Farming experience		
1-10	17	15.9
11-20	56	52.3
21-30	14	13.1
31-40	14	13.1
41-50	6	5.6

Source: Field survey, 2015

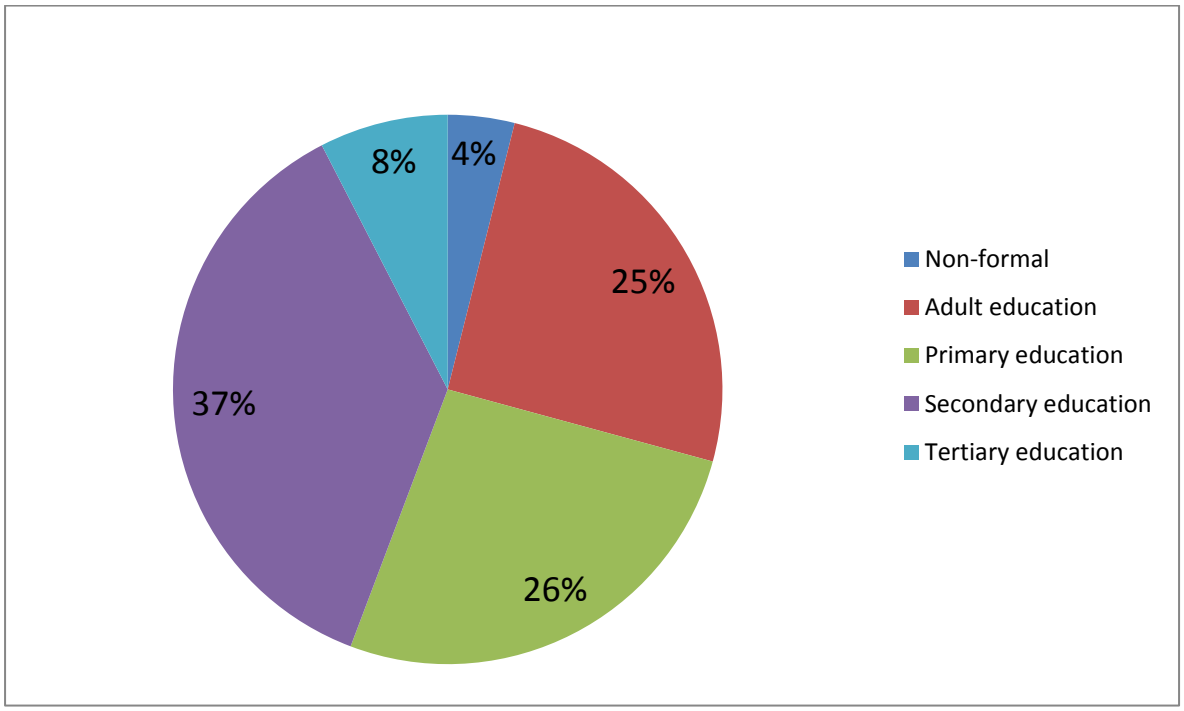

Figure 1: Educational qualification of the respondents

Source: Field survey, 2015

Table 2: Distribution of respondents based on risk orientation

Categories	Scores	Freq	%
High level	15-18	65	60.8
Low level	10-14	42	39.2
Total		107	100.0

Source: Field survey, 2015

Table 3: Distribution of respondents based on achievement motivation

Categories	Scores	Frequency	Percentage
High level	16-18	34	31.8
Medium level	14-15	51	47.7
Low level	10-13	22	20.5
Total		107	100.0

Source: Field survey, 2015

Table 4: Distribution of respondents based on innovation proneness

Categories	Scores	Frequency	Percentage
High level	14--16	83	77.6
Low level	10-13	24	22.4
Total		107	100.0

Source: Field survey, 2015.

Table 5: Chi-square showing relationship between socio-economic characteristics and adoption behaviour

Variables	Df	X^2	P	CC	Decision
Sex	1	15.7	0.000	0.206	S
Marital status	3	253.9	0.000	0.230	S
Education	4	18.2	0.001	0.248	S
Religion	1	0.46	0.499	0.176	NS

Source: Field survey, 2015

Table 6: Multiple regression analysis of variables affecting IPM adoption behaviour among respondents

Variables	B	Std Error	Beta	t-value	Sig.
Constant	137.741	58.323		2.362	.020
Age	.154	.312	.067	.492	.624
Farm experience	.055	.357	.021	.153	.879
Risk orientation	.804	3.070	.027	.262	.794
Achievement motivation	.244	1.708	.021	.143	.887
Innovative proneness	.270	1.615	.019	.167	.868

Source: Field survey, 2015.

R-value=.333

R-square=.111

Adjusted R-square=.018

Std Error=28.33376

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