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A Study of Factors Influencing Extension Agents Incorporation of Indigenous Knowledge Systems in Extension Programming for Cassava in Delta State, Nigeria

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Abstract

The study examined the factors influencing extension agents' application of indigenous knowledge systems (IKS) for cassava in extension programming in Delta State, Nigeria. Specific issues examined were the socio-economic characteristics of extension agents in the study area, the agents' perception of the use of indigenous technologies, indigenous technologies and their levels of incorporation and the factors affecting their use of indigenous knowledge systems in extension programming for in the study area. Multi-stage sampling technique was used to select 101 respondents from three agro-ecological zones in the state. Descriptive statistical tools comprising of frequency count, mean, and percentages and inferential statistics (Friedman test) was used to analyze data collected. The result showed that the average age of the extension agents was 42 years, most (65%) were holders of the Higher National Diploma, Bachelor of Science (B.Sc.) or Bachelor of Arts. The average experience of respondents was 15 years. The Friedman test result (chi-square = 378.91) showed that significant differences existed in the factors that influence the incorporation of IKS in extension programming by extension agents. Such factors as relevance of IKS to innovation (mean = 6.53), agents' attitude toward IKS (mean = 5.82), agents' willingness to accept IKS (mean = 5.73) and perceive functionality of IKS (5.61) were significantly more important in affecting extension agents' use of IKS in extension programming compared to such factors as time (mean =3 .88), cost of IKS (mean = 2.97), complexity of IKS (mean = 2.89) and official bureaucracy (mean = 2.57). Important factors affecting the incorporation if IKS in extension programming by extension agents were relevance of IKS to innovation (mean = 6.53), agents attitude towards IKS (mean = 5.82), agents willingness to accept farmers IKS (5.73), and functionality of IKS. It was therefore recommended that there should be reorientation of extension agents through seminar and in-service training to change their perception on IKS.

Keywords: *Indigenous knowledge system; Extension programming*

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Introduction

Sustained high level of agricultural production and income are not possible without effective agricultural extension services, supported by agricultural research that is relevant to farmers' needs. The adoption of agricultural production technologies and natural resources management are essential means of boosting agricultural productivity in developing countries. The importance of developing appropriately targeted technologies and promoting their subsequent use by farmers are fundamental component of this process. The primary role of agricultural extension is that of transmitting improved agricultural technologies to farmers who are the end users of all findings emanating from agriculture related researchers as well as taking their problems to appropriate research or government agencies for solution. Agricultural extension is an educational process designed for farmers to enable them adopt improved practices and by so doing, raise their standard of living through their own effort and using their own resources (Erie, 2009).

Extension workers who are charged with the task of disseminating improved farm practices to farmers have the responsibility of understanding the social setting i.e., the local culture, in which such information and changes are to be introduced. Failure in this respect can weaken their success in persuading farmers to adopt recommended practices (Onemolease, 2013). The major function of the African extension agency is that of disseminating appropriate information to farmers. Their roles become crucial in the sense that farmers in Africa are largely illiterate, so, they cannot use the print word as a vehicle for disseminating information but must rely personal contact. Unfortunately, the ratio of extension agents to farmers is very low (Belonwu, 2011). In fact Agbamu (2011) reported that the ratio of agricultural extension agents to farm families in Nigeria was about 1:1,722.

Agricultural extension agents have the responsibility of knowing the culture and the traditional farming knowledge of the farmers. Hence, understanding farmers' indigenous knowledge is a crucial factor for effective innovation development and subsequent adoption. Over the past decades, rural extension and advisory services established for precisely this purpose, have suffered a precipitous decline (World Bank, 2008). According to Getahu (2006), the absence of effective link between indigenous knowledge and conventional ones is one of the major problems that hinder the effectiveness of agricultural development in general and that of agricultural research and extension system in particular. Agricultural extension service provides assistance to farmers to enable them identify and analyze their production problems and to increase awareness of the opportunity for improvement. The conduct of agricultural extension work in Nigeria shows that one of the primary responsibilities is to help farmers make efficient use of available resources to meet the nation's food needs (Onyemekonwu, 2015). The goal of agricultural extension service in Nigeria is to facilitate acceptance of agricultural innovation, the ultimate goal being to improve farmers' welfare. A reason for the low productivity is low adoption by farmers. An explanation for the farmers' low acceptance of technology disseminated by extension service is that these technologies are not compatible (Onemolease, 2013). This suggests a disconnection between extension message and farmers' present farming practice. A solution to this has been for the extension service to incorporate the indigenous knowledge system (IKS) into extension communication (Rajasekaran, 1993). This will bridge the gap between farmer IKS and extension service delivery. Thus the study attempts to investigate the extent to which the extension service incorporates IKS on cassava into extension communication. Cassava is an important crop in Nigeria economy; Omoregie (2005) reported that cassava serves useful economic purposes. These include: (i) *garri*, the traditional product which is consumed in granule form, (ii) *fufu/akpu* which has attained a national spread in consumption, (iii) tapioca and *usi* (starch) which are delicacies among the Urhobos, Itsekiris, Ijaws peoples of the Niger Delta, (iv) materials for industrial and domestic uses, (v) the leaves are used as vegetable and (vi) as livestock feed.

Objectives of the Study

The overall objective of the study was to examine the factors that influence extension agents' application of indigenous knowledge system for cassava in extension programming in Delta State, Nigeria. To achieve this, the following specific objectives were:

a. To examine the socio-economic characteristics of extension agents in the study area;
b. To determine extension agents' perception of the use of indigenous technologies,
c. To assess the extent to which extension agents incorporate indigenous knowledge systems in extension programming for cassava, and
d. To determine factors affecting extension agents use of indigenous knowledge systems in extension programming.

Hypothesis of the study

Ho: There is no significant difference among the factors affecting extension agents' incorporation of indigenous knowledge system in extension programming

Methodology

This study was carried out in Delta State, Nigeria. Delta State is located in Southern Nigeria, and it is one of the six states in the South-South geopolitical zone of the country, the others being Edo, Bayelsa, Cross Rivers, Akwa Ibom and River States. It lies roughly between longitude 5°.00" and 6°.45" and shares common boundaries with Edo to the North, Bight of Benin to the South West, Ondo to the North West, Imo and Anambra to the East, Bayelsa to the South and Rivers to the South East respectively (Delta State Agric Policy, 2007). Delta State has a population of 4,098,391 (NPC, 2006) with a projected population of 4,813,917 in 2011 (NBS, 2011) and 4,825,999 in 2015 (NPC, 2015). The state is generally low-lying and has a deep coastal belt inter-laced with rivulets and streams which form the Niger Delta. The Atlantic Ocean forms its southern boundaries with coast line of 160 kilometers. The traditional income generating activities of the people are crop faming, fish farming, lumbering, weaving, canoe and pot making (Delta State Monthly Planner, 2013).

The study is limited to IKS associated with cassava. Multi-stage sampling technique was adopted. The first stage involved propositional selection of Delta North and Delta Central agricultural zones because they have the highest intensity of cassava cultivation and agricultural extension activities. The second stage involved proportionate sampling of the extension block or local government areas LGAs (9 from Delta North and 8 from Delta Central agricultural zone using 50% of the population. The final stage involved random selection of 48 respondents from Delta North and 53 from Delta Central, giving a total of 101 respondents that were sampled. Data were collected from the extension agents using a questionnaire. In order to ensure the validation of data gathering instruments, experts in the field of Agricultural Extension and Rural Sociology were presented with the instrument for assessment, criticisms and suggestions (face validity). Also the test-re-test method of establishing reliability of scale in the research instrument was used (Erie, 2009). A correlation coefficient of 0.817 was obtained indicating reliability of instrument. Data collected for the study were coded for computer-based analysis. Descriptive statistics comprising of frequency count, mean, and percentages were used for data analysis. Inferential statistics (Friedman 1937) was used to determine the significant or important factors affecting the incorporation of indigenous knowledge system in extension programming by the extension agents. It is a non-parametric test similar to parametric repeated measures ANOVA, except that it is applied when the data are ranked data. It is also used to test the significance of detected differences in treatments across multiple test attempts (Bortz, *et al*., 2010). The computer software used was the Statistical Package for Social Sciences (SPSS).

Measurement of variables

Extension agents' level of incorporation of indigenous technologies was measured using a four-point Likert scale measured as follows: very high (coded 4), high (coded 3), and low (coded 2), and very low (coded 1). Their level of incorporation of indigenous knowledge system was determined using the mean score of 2.50 computed as follows: 4 + 3 + 2 + 1 = 10 ÷ 4 = 2.50. A score of ≥ 2.50 means that indigenous technologies were highly incorporated by extension agents in extension programming while a score of < 2.50 means that indigenous technologies were not highly incorporated by extension agents in extension programming (Onyemekonwu, 2015).

Extension agents' perception on the use of IKS was measured by asking the respondents if indigenous technologies should be permitted in extension delivery. Their response was measured as either yes or no. A measure of the factors affecting extension agents' use of indigenous knowledge system in extension programming was obtained by asking the respondents to indicate the level of importance of the factors affecting the incorporation of indigenous knowledge in cassava cultivation. This was obtained using a three-point Likert-Scale measured as follows: very important (coded 3), important (coded 2), and not important (coded 1). The level of importance was determined using a mean score of 2.00. This score was computed as follow: 3 + 2 = 1 = 6 ÷ 3 = 2.00. A score of ≥ 2.00 means that the factor were important while a score of < 2.00 means that the factors were not important (Onyemekonwu, 2015).

Results and Discussion

Extension agents' personal characteristics

The extension agents' characteristics examined in the study were: age, academic qualification, experience and salary grade level. The results are presented in Table 1.

Characteristics	Frequencies (n = 101)	Percentages	Mean
Age (Years)			
25-29	9	8.9	
30-34	7	6.9	
35-39	20	19.8	
40-44	25	24.8	42.0
45-49	25	24.8	
50-54	13	12.9	
55 and above	2	2.0	
Academic qualification			
OND	24	23.8	
HND/B.Sc./B.A.	66	65.3	
M.Sc./Ph.D	11	10.9	
Experience (years)			
Less than 5	8	7.9	
5-9	19	18.8	
10-14	24	23.8	
15-19	24	23.8	
20-24	14	13.9	14.5
25-29	9	8.9	
30 and above	3	3.0	

Field data, 2014

Table 1: *Socio-economic characteristics of extension personnel.*

The result showed that the modal age (24.5%) for the extension workers were 40-44 years and 45-49 years, the average being 42 years, indicating that the workers were fairly young. This result is in agreement with Erie (2009) who reported a mean age of 42 for extension personnel in Edo State, Nigeria and that of Belonwn (2011) who reported a mean age of 42.1 years for extension personnel in Delta State, Nigeria. This age is well positioned for effective functioning of extension personnel, as experts argue that farmers do not readily accept new ideas from agents whom they consider much younger than themselves (Erie, 2009). Most (65%) of the extension personnel were holders of the Higher National Diploma, Bachelor of Science (B.Sc.) or Bachelor of Arts, 23.8% had Ordinary National Diploma (OND), about 11% had M.Sc./Ph.D. The data indicated that the extension personnel attained high educational qualification which could increase their efficiency in extension service delivery. The fact that all the respondents had formal education should be an advantage, since education is generally considered as an important variable that enhance the introduction and implementation of programme in rural areas (Akpovi, 2002). This result is well positioned for effective extension service delivery in the state as Agbamu (2011) had stated that insufficiently qualified, inexperienced and poorly trained personnel may do much to improve the quality of extension service offered to farmers. The average experience was 14.5 years. These numbers of years should be enough for the extension agent to understand the local culture of the farmers.

Extension Agents' Perception on The Use of Indigenous Technologies in Extension Service Delivery

Table 2 shows the perception of extension personnel on the incorporation of indigenous technologies on cassava cultivation. The results indicated that a high percentage of extension personnel (67.3%) disagreed that indigenous technologies should be incorporated in extension service delivery while 32.7% of them agreed. This result revealed that a high percentage of extension personnel do not want indigenous knowledge systems to be incorporated into extension service delivery, which suggests that they placed low value on these indigenous technologies. Based on this, extension agents may not be interested in incorporating indigenous knowledge system into extension service delivery. This result is in line with some authors statements: Flori (2005) stated that in extension programming, agricultural extension officers and research staff dominate the extension programme planning and implementation process while farmers and representatives of agricultural input and marketing agencies are not involved at all. Ragasakaran and Waran (1991) argued that during the process of technology development, farmers' informal experimentations are not considered by researchers. This is probably because they feel such IKS are not very relevant to modern farming practices.

Category	Frequency	Percentage
Yes	33	32.7
No	68	67.3
Total	101	100.0

Table 2: *Extension agents' perception on the use of indigenous technologies in extension service delivery.*

Perceived attributes of indigenous technologies

Table 3 shows the perceived attributes of indigenous technologies for cassava cultivation by the extension agents. The results show that the important attributes of indigenous technologies associated with cassava cultivation include: they easily diffuse over small homogenous zones mainly from farmers to farmers (i.e. they spread from farmer to farmer) (mean = 4.06), have low application cost (mean = 3.51), they generate only small increment on output (i.e. unproductive) (mean = 3.41) and have limited adaptability (mean = 3.10). Attributes such as location and site specific (mean = 2.46), environmental and ecological friendliness (mean = 2.19) and sustainability (mean 2.05) were not considered important attributes of IKS associated with cassava cultivation technologies the extension agents. The findings agrees with the statement of Grenier (1998), who stated that indigenous knowledge that was once adopted and effective for securing livelihood in a particular environment becomes inappropriate under conditions of environmental degradation. This finding that IKS have limited adaptability is supported by Ossai (2010), who stated that, indigenous knowledge is location and culture specific, and Nowroozi and Alegha (2000), who noted that an effective indigenous technology in one geographical location is not necessarily effective in another location.

Attributes	Perception (%) N = 101				
	Strongly Agree	Agree	Disagree	Strongly Disagree	mean
They diffuse over small homogenous zones mainly through farmer to farmer.	1.0	67.3	30.7	1.0	4.06*
Low in cost of application	0	1.0	21.8	77.2	3.51*
They generate only small increment on output (unproductive).	69.3	10.9	11.9	7.9	3.41*
They have limited adaptability.	3.0	78.2	16.8	2.0	3.10*

They are generally location and site specific.	1.0	45.5	52.5	1.0	2.46
They are usually environmental and ecological friendly.	3.0	27.7	55.4	13.9	2.19
They are sustainable	0	18.8	68.3	12.9	2.05

**Important attribute (≥ mean = 2.50)*

Source: Field data, 2014.

Table 3: *Perceived attributes of indigenous technologies.*

Indigenous practices associated with cassava cultivation crops and their level of incorporation

Table 4 shows indigenous practices associated with cassava cultivation and the extent of incorporation by extension agents. The results show that the major indigenous practices associated with cassava cultivation that had been incorporated into extension programming by the extension agents include mixed/ intercropping (mean = 2.69), burying of cuttings (mean = 2.66) and leaving cuttings to dry 2-3 days before planting (mean = 2.52). Practices such as slash and burn land preparation (mean = 2.42), zero tillage (mean = 2.40) and use of scare crows (mean = 2.32), use of traditional planting distance (mean = 1.49), staggered planting (not in rows) (mean = 1.22), use of wood ash as insecticide (mean = 1.21) and use of traditional cultivars (mean = 1.17) were not incorporated into extension programming by the extension personnel. The findings therefore, revealed that extension agents have only incorporated the indigenous practices that they believe to be relevant to increased productivity. The results suggest the level of incorporation of IKS associated with cassava is low. This may not be unconnected to agents' low perception of the value of such technology to increased productivity. This result also implies that extension agents do not see indigenous technologies as good enough to be incorporated in extension programming for cassava cultivation but rather concentrate on foreign technologies. This may have accounted for the report of UNESCO (2013) that the desire for modernity and new technologies are threatening the loss of indigenous knowledge held by native people. This result also may have prompted the statement of Emeguali (2003) that some of groups in Africa and elsewhere in the world have suffered from long term discrimination, inequality and exclusion from planning and execution of development programme and projects.

Practices	Extent of incorporation (%) N = 101				
	Very High	High	Low	Very Low	Mean
Mixed/intercropping	8.9	56.4	29.7	5.0	2.69 *
Burying cassava cuttings	11.9	36.6	39.6	39.6	2.66*
Leaving cuttings to dry 2-3 days before planting	2.0	52.5	41.6	4.0	2.52*
Slash and burn land preparation	3.0	42.6	48.5	5.9	2.42
Minimum tillage	0	45.5	49.5	5.0	2.40
Use of scare crows	1.0	42.5	44.6	11.9	2.32
Random spacing	1.0	5.0	36.6	57.4	1.49
Staggered planting (not in rows)	0	5.0	13.9	81.2	1.23
Use of wood ash as insecticide	0	2.0	17.8	80.2	1.21
Use of local cultivars	0	3.0	11.9	85.1	1.17

**highly incorporated. (mean ≥ 2.50)*

Source: Field data, 2014.

Table 4: *Indigenous practices associated with cassava cultivation and their level of incorporation by the Agricultural Development project (ADP).*

Factors affecting extension agents' use of indigenous knowledge systems in extension programming

Table 5 shows the perceived factors affecting the extension agents' incorporation of indigenous knowledge system in extension programming for cassava cultivation. The result shows that the major factors affecting the incorporation of indigenous knowledge systems in extension programming for cassava production by the extension agents include relevance of IKS to innovation on crop production with mean of 2.48, agents attitude towards IKS (mean = 2.17), agents willingness to accept IKS (mean = 2.16) and functionality of IKS (mean = 2.14). Factors such as time with mean of 1.71, cost of IKS (mean = 1.25), complexity of IKS (mean = 1.23) and official bureaucracy (mean = 1.14) were not important factors affecting the incorporation of IKS in extension programming for cassava cultivation.

Factors	Responses (%) N = 101			
	Very Important	Important	Not Important	Mean Rank
Relevance of the IKS to innovation on crop production	57.4	32.7	9.9	2.48*
Agents attitudes towards IKS	23.8	70.3	5.9	2.17*
Agents willingness to accept farmers' IKS	20.8	75.2	4.0	2.16*
Functionality of IKS	23.8	64.4	10.9	2.14*
Time factor	6.0	40.6	53.5	1.71
Cost	8.9	7.9	83.2	1.25
Complexity of IKS	4.0	15.8	80.2	1.23
Official bureaucracy	1.0	12.9	86.1	1.14

**important (mean = 2.00)*

Source: Field data, 2014.

***Table 5:** Factors affecting the incorporation of indigenous knowledge system.*

Test of difference in the factors affecting the incorporation of indigenous knowledge system in extension programming

Table 6 shows the factors affecting extension agents' incorporation of indigenous knowledge system in extension programming. Freidman test was used to discriminate among the factors affecting extension agents' use of IKS in extension programming. The Friedman test (chi-square = 14.067), was significant at the 5% level. This means that a significant difference exist among the factors affecting the extension agents' incorporation of indigenous knowledge system in extension programming for cassava production. Using a grand mean rank of 4.50, the result suggested that such factors as relevance of IKS to innovation with mean rank value of 6.53, agents' attitude toward IKS (mean = 5.82), agents' willingness to accept IKS (mean = 5.73) and perceive functionality of IKS (5.61) were significantly more important in affecting extension agents' use of IKS in extension programming compared to such factors as time With mean value (mean = 3.88), cost of IKS (mean = 2.97), complexity of IKS (mean = 2.89) and official bureaucracy (mean = 2.57).

Factors	Mean Rank
Relevance of IKS to innovation	6.53*
Agents' attitude towards IKS	5.82*
Agents' willingness to accept farmers' IKS	5.73*
Functionality of IKS	5.61*
Time factor	3.88
Cost	2.97

Complexity of IKS	2.89
Official bureaucracy	2.57

Chi-square is significant at 5% (14.067); df = 7;

Grand mean = 4.50

Source: Field data, 2014

Table 6: *Test of difference in the factors affecting the incorporation of IKS by extension agents (Friedman Test).*

Conclusion

The researchers conclude that, extension agents place low value on IKS associated with cassava cultivation and as 67.3% were of the view that IKS should not be incorporated into extension service delivery. However, extension agents' incorporation of IKS in extension programming is influenced by several factors particularly the relevance of IKS to innovation (mean = 6.53), the agents' attitude towards IKS (mean = 5.82), agents their willingness to accept farmers IKS (mean = 5.73), as well as the functionality of the IKS (mean = 5.61).

Recommendations

1. For effective extension service delivery, extension programme planners should consider farmer's indigenous knowledge systems.
2. Extension agents should be educated through seminar and in-service training in order to change their perception of IKS. This will enable them work with farmers and develop their research potentials so as to improve their production capacity.
3. Farmers' informal experiments should be monitored and recorded by extension agents to enable them identify farmer's areas of strength and weakness and notify personnel at research stations to recommend possible improvements. This will help improve the relationship between farmers and extension agents as farmers will see themselves as playing active and influential roles in innovation development. When IKS are acknowledged, farmers will be more willing to accept innovations that are generated by outside parties.

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