



Adoption of cassava production technologies by rural farmers in Bomadi Delta State, Nigeria

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Abstract

Nigeria produced a lot of cassava. The purpose of this study was to assess the adoption of cassava production technologies by farmers in Bomadi, Nigeria. Specifically, it identified cassava production technologies, ascertained the level of adoption and examines factors affecting adoption of technologies. Study design was a survey and purposive and random sampling techniques were used to select twenty farmers each from a sample frame consisting of twenty-five farmers each in nine communities making a total of one hundred and eighty (180) respondents. Primary data obtained were analyzed using simple frequency and percentage. The results reveal that majority (71.10%) of the respondents were female, aged 50 years (41%), having no formal education (31.10%), and 100.0% of the respondents used less than 1ha of land for cultivation. On income level, 62.20% had income level of less than N20, 000 per annum, and 82.2% adopted sole cropping but there was no extension visitation as inadequate extension staff was 94.44%. The result further reveal that age, educational background and extension services affect adoption of technologies. The Practical implication is that age, education and extension service greatly influence the number of technologies adopted by farmers. The theoretical implication shows that it was an attempt to understand the adoption decisions of individual farmers and the diffusion patterns among communities of farmers. The paper provides evidence of the adoption behaviour of farmers and shows whether the factors responsible for the behaviour are consistent with adoption theory. It also provides insights into similar research in other areas of adoption. It is therefore recommended that adequate attention should be paid to age, education and provision of agricultural extension service when introducing technologies for adoption by farmers.

Keywords: Adoption; Cassava; Extension services; Production; Rural farmers; Technologies

1. Introduction

Nigeria is predominantly an agricultural country although over the years, the sector has reflected low production and productively. In other words, the backbone of the Nigerian economy employing more than 65% of the total population and providing raw materials for local industries is agriculture (Central Bank of Nigeria (CBN), 2009). Nigeria is predominantly an agricultural country although the contribution of agriculture to the Gross Domestic Product (GDP) has over the years reflected low production and productively (Idiku *et al.*, 2013). Thus, poverty which is a multidimensional phenomenon and is common all over the world is widespread in Nigeria (Idiku *et al.*, 2015). Cassava (*Manihot esculenta* Crantz) is a very rich staple food that is enjoyed by inhabitants of tropical and subtropical Africa, Asia and Latin America. Cassava is a perennial woody shrub with an edible root was first cultivated in South America and introduced to Nigeria in the sixteenth century (Adeniji *et al.*, 2006). The majority of cassava farmers in Nigeria cultivate small farm areas which are not conducive for mechanization (Edamisan *et al.* 2020). Globally cassava has experienced consistent growth of well above 3% annually, as at 2018 world cassava production stood at about 278 million tonnes; Africa total production was about 170 million tonnes (about 56% of world production) and at the same period, Nigeria produced about 60 million tonnes (FAO, 2018, FAOSTAT, 2019). Despite being the largest producer of cassava in the world, more than 90% of cassava produced in Nigeria are consumed locally (Denton *et al.*, 2004). China

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however, imports more than 80% of total world cassava products processed into pellets and starch (FAOSTAT, 2019). Therefore, currently the bilateral trade agreement between Nigeria and China could further propel Nigeria's export of cassava to China in large quantities, but the current production level could not even meet the local demand for food and industrial use. Thus, this supply deficit should serve as motivation for cassava farmers in Nigeria and specifically those in Delta State to produce more. Abolaji et al., (2008) reported that the Nigerian Government has employed Science and Technology (S&T) to develop high yielding and pest resistant cassava varieties. With this avalanche of information, farmers are still faced with numerous challenges in cassava production, processing and marketing. In order to improve its production, processing and marketing cassava farmers thus, need information to optimize their activities. Crop yields in developing countries are often many times lower than those used with available technologies and farming techniques thereby leading to food security problem (Hyacinth-Ossai, 2003). Computers and Internet provide users with improved education and higher wages and therefore those nations and people with limited access are disadvantaged. This is a factor that compounds the problem of extension workers in Nigeria as majority of them lack computer knowledge thereby making them to lag behind in information and communication technology. As a result of lack of access and utilization of ICT, a term known as "global digital divide" was coined to describe the great disparities in opportunity to access the internet and the information and education/business opportunities tied to this access between the developed countries and the third world countries (Idiku *et al.*, 2011). Thus, for agricultural production to be sustained, technologies adoption is essential (Kuttle and Tya, 2001). This is because digital tools and other electronic technologies are changing the economies of nations, societies and people's lives, for example, technology has now a deep-rooted effect on the activities surrounding information and communications which are very important for sustainable development (Idiku *et al.*, 2020). Thus, a necessary condition for improvement of all areas of agriculture is information with adequate quality (Idiku *et al.*, 2021). Small farm size could be a factor which prevents farmers from adopting innovation because of the inappropriateness of modern technologies to the economic realities of small scale farmers. Farm size amongst other socio-economic factors was also found to be related to adoption and intensity of use of agricultural technologies. According to Bank of Agriculture (BOA), the absence of technology, the area of land that a farmer can cultivate each season is limited by such factors as available tools and the quality of the soil. Tools used by farmers in developing countries like Nigeria are often primitive. The use of simple farm tools for agricultural production does not only bring about serious human drudgery with little achievement but discourage timelessness and perfection. This is one reason why farmers in Nigeria are mainly subsistence peasant farmers (Walters (2006). However, the introduction of mobile phones in agricultural sector has brought about drastic changes which have helped farmers to be able to access information with ease (Idiku *et al.*, 2015).

Extension visitation to farmers is a necessary pre-requisite for the adoption of agricultural technologies by farmers. Orikpe (2013) stated that an effective agricultural extension depends on extension messages reaching many farmers and farmers problems reaching research institutes quickly and regularly through the extension staff. Emphasizing on the importance of extension visit, Ndifon (2005) stated that the obvious way for new practice to reach the farmers is through the visits made by the extension workers. Asiabaka and Owens (2002), strongly supported the argument that adopters of recommended farm practices must have personal contact with agricultural extension officers if they must adopt new innovations. Everything in the work of extension is geared towards delivering a high quality and timely visits. Thus, the quality and timely visits are account for the quantity of yields recorded by farmers.

Nevertheless, certain factors affect the performance of field workers in the dissemination of proven technologies to farmers. One of such variables influencing extension agents' work in the field is lack of materials (Asiabaka and Owens, 2002). Okpako (2000) examined the impact of Delta Agricultural Development Programme (DTADP) and found that whereas few farmers have very little access to improved agricultural inputs, most often, the extension agents have little access to improve inputs which are needed and used in the demonstration plots. Ndifon (2005) opined that extension workers cannot be successful in demonstration work without access to necessary supplies and equipment. Similarly, inadequate training of extension workers has contributed to influence extension performance. The basic pre-service training of extension agents and supervisors in many developing countries are inadequate.

According to Ngwu (2004), most of the training of the agricultural extension agents is theoretical with not much attention given to practical trainings. Okpako (2000) observed that the extension agents tend to concentrate on only contact farmers neglecting the non-contact farmers who seem to be ignorant of the extension visit schedule programme. Often times, technologies are delivered to farmers without adequate feedback to researchers on farmers' reaction to the technologies (Agbamu, 2005). Also, Agbamu (2005) stated that farmers problems and situations are often discussed at the forthrightly training, but most of these information's do not reach researchers and policy makers. Oladesu (2003) argued that the Nigeria farmer is surrounded by many deep-rooted socio-cultural factors which hinder him from accepting change. Omonoma, Oni and Uwagboe (2006), discovered that certain socio-economic factors such as age, illiteracy, and farm size influenced farmers response to extension programmes and consequently affected adoption rate. Adoption of new and improved farm technologies revolve around personal characteristics of farmers such as age,

literacy level, innovation characteristics, socio-cultural and economic variables. However, this essential role played by the agricultural sector has been on the decline in recent years due to the poor level of adoption of cassava production technologies. For instance, the overall agricultural situation deteriorated creating a wide gap between the supply and demand for food and the country is currently faced with mounting food import bills (Ovharhe 2016). This has created a knowledge gap which this research intends to fill by examining the level of cassava production technologies adopted by rural farmers in Bomadi Delta State Nigeria. Other specific objectives includes identifying cassava production technologies available to rural farmers in the study area, ascertaining the level of adoption of cassava production technologies by rural farmers as well as examining factors affecting adoption of cassava production technologies by rural farmers in the study area.

2. Material and methods

This study was conducted in Bomadi, Delta State Nigeria comprising of eleven communities namely: Okoloba, Akuqbene, Azebiri, Ogodobiri, Oobein-ama. Esanma, Kpakama, Ogriagbene, Ekamutagbene, and Kalafuogbene with Bomadi as the headquarters. The study area is located at latitude $5^{\circ}59'31''$ N and Longitude $5^{\circ}59'52''$ E and the major dwellers are the Ijaws with their chief occupation as farming and fishing. The area has an annual average rainfall of 260 cm, temperature of 27°C and relative humidity of 80%. According to National Population Commission (NPC) (2006), the population of the area is 86,644. Agricultural crops grown by the people in the area include food crops such as cassava, cocoyam, sweet potatoes plantain, banana and orange. The study employed purposive random sampling techniques to select nine communities. A sample frame was drawn and each frame consists of 25 farmers, while 20 farmers were randomly selected from the sample frame making a total 180 respondents. Primary data was used and information elicited through questionnaires and oral interviews. Data were analyzed using simple frequencies and chi-square statistics.

3. Results and discussion

Table 1 Socioeconomic characteristics of respondents

S/n	Variable	Frequency	Percentage
1	Sex		
	Male	52	28.90
	Female	128	71.10
2.	Age		
	<25 years	24	13.30
	26-30 years	30	16.70
	31-40 years	38	21.10
	41-50 years	48	26.00
	50 years and above	40	22.20
4.	Educational status		
	Non-formal education	56	31.0
	Primary education	54	30.00
	Secondary education	44	24.40
	Tertiary education	26	14.50
5	Farm Size		
	< 1ha	180	100.00
	1.2-2.5ha	00	00.00
	2.1-2.5ha	00	00.00
6	Farming experience		

	< 10 years	24	13.30
	10-15 years	48	26.70
	16 -20 years	38	21.10
	20 years and above	70	38.90
7	Income level		
	< N20, 000	112	62.20
	N21,000-N30,000	26	14.50
	N31, 000-N40, 000	24	13.30
	N41,000-(450,000	16	10.00
	Total	180	100.00

Source: Field survey, 2021

Table 1 result shows that majority (71.10%) of the respondents were female while 28.90% were male. In terms of age 13.30% of the respondents were less than 25 years old, 16.70% are between the age bracket of 26-30 years, 21.10% falls within the age range of 31-40, 26.79% while 41% are 50 years and 22.20% are 50 years and above. The table also revealed that 31.10% of the respondents had no formal education, whereas 30 % had completed their primary education, 24.40% had secondary education and 14.50% had tertiary education. The result further showed that 100.0% of the respondents used less than one hectare of land for cassava cultivation. On income level, 62.20% of the respondents had income level of less than N20, 000 monthly, while 10.00% had an income level of between N41,000 to N50,000. The years of farming experience showed that 13.30% of the respondents had been farming for less than ten years and 38.90% have had twenty years and above.

Table 2 Adopted/Non-adopted Agricultural Production Technologies

S/N	Item	Frequency	Percentage
1	Crop rotation	4	2.22
2	Duiron	6	3.33
3	Glyfosinate ammonium	4	2.22
4	NPK 15:15:15	68	37.78
5	(Mixed. cropping	32	17.78
6	Sole cropping	148	82.22
7	Improved cassava varieties	70	38.89
8	Minimum/zero tillage	32	17.78

Source: Field survey, 2021 *(multiple respondents)

Result of Table 2 shows that 2.22% of the respondents adopted crop rotation, 37.78% adopted NPK 15:15:15; 17.78% adopted mixed cropping while 82.22% adopted sole cropping. The result of Table 2 suggests that the highest cassava technology adopted was the sole cropping of cassava thereby raising the question of effective visit by extension staff since extension agents are out to ensure that improved technologies are properly utilized by small scale farmers to enhance adequate productivity.

Table 3 Extension visitation

S/No	Frequency	Number	Percentage
1	Fortnightly	0	0.00
2	Monthly	0	0.00
3	Very rarely	30	16.70
4	Not visited at all	150	83.30
	Total	180	100.00

Source: Field survey 2021

The result of Table 3 revealed that extension agents never visited majority of the farmers for the fact that they were non-contact farmers. Table 3 result confirm the findings that extension staff in Nigeria are severely stretched and only a small share of farmers can plausibly access their services. He further stated that in nearly all States in Nigeria, more than 70% of village extension agents were insufficient to provide services to all farmers. This situation was compounded by the advanced age of most village extension agents as in the near future the services of experienced workers might be lacking.

Table 4 Factors affecting the adoption of cassava production technologies

S/n	Item	Frequency	Percentage
1	In-adequate land for planting	20	11.10
2	High cost of input	140	77.78
3	Inaccessible road network	130	72.22
4	In-adequate extension visitation	170	94.44
5	In-adequate provision of inputs	24	13.33
6	Lateness of information and farm inputs	156	86.67
7	Unsuitability of improved cassava varieties to the environment	20	11.10
8	Non-availability of market	00	0.00

Source: Field survey, 2021; *(Multiple responses)

Data on Table 4 show that inadequate land for planting (11.10%), high cost of inputs (77.78%), inaccessible road network (72.22%), inadequate extension staff (94.44%), inadequate provision of inputs (13.33%) and lateness of information and farm inputs (86.67) were identified as the major factors affecting adoption of cassava production technologies and overall agricultural production. Other factors faced by the respondents were unsuitability of improved cassava varieties (11.10%). Market has no negative effect on adoption of technologies in the study area. The finding of Table 4 confirmed the result of Asiabaka and Owens, (2002) that certain factors affect the performance of field workers in the dissemination of proven technologies to farmers and that one of such variables influencing extension agents' work in the field is lack of materials. In testing the hypothesis, age of respondents and extension agent visits were found to have significant influence on adoption of cassava production technologies by farmers implying that the role of extension and advisory services need to be strengthened.

4. Conclusion

This study sought to assess the adoption of cassava production technologies by farmers in Bomadi Delta State, Nigeria. Factors affecting adoption of cassava production technologies were identified and small scale production dominates the study area with low level of adoption of cassava production technologies due to inadequate extension visitation, poor literacy level and lack of access to inputs. In view of the findings.

Recommendations

The following recommendations are made that: the state agricultural development programme (DTADP) should increase its extension manpower to meet the demand by farmers. Secondly, adequate funding and provision of incentives and credit facilities be made available to rural farmers while there is a great need to strengthen research-extension-farmer linkage in the study area.

Compliance with ethical standards

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Disclosure of conflict of interest

I hereby declare that there is no conflict of interest or potential conflict of interest for this article.

Statement of informed consent

I hereby declare that Informed consent was obtained from all participants included in the study

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