Determinants of Adoptive Behaviors of Rural Farmers in Nigeria

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Abstract
The major objective of the study was to assess the effect of information source and the attributes of a technology on the adoptive behavior of rural farmers in Nigeria. It assessed the perceptions of rural farmers on the availability, credibility, and degree of use of information sources. The variables tested in technology attributes were complexity, availability and cost, and compatibility. Data were collected from 480 farmers from southeastern Nigeria. Findings indicate farmers’ socioeconomic characteristics such age and education influenced their adoption behavior. Results indicate that the source of information was a significant factor in determining farmer’s adoption behavior. Variables such as credibility, availability, interest and usefulness of the information source had positive coefficients and were found to be statistically significant at 0.05 level. Findings also show that technology attributes such as complexity, cost and availability and compatibility were positive and statistically significant at both 0.05 and 0.01 levels. The study concluded that farmer’s personal characteristics, the source of agricultural information and technology attributes were significant determinants of farmer’s adoption behavior. It recommended that extension providers in Nigeria should consider these variables in planning and implementing extension intervention strategies.
Introduction

In Nigeria, agriculture is still the nation’s main economic bedrock employing 70-80 percent of the total population, mostly on a subsistence level. Despite its pivotal role to the nation’s economy, agriculture contributes only 25 - 30% of the GDP; this situation is largely due to the neglect the sector suffered during the oil boom years (late 70s and early 80s). However, significant improvements in food production have been recorded between 1986 and 1990 with an average annual growth rate of 3.6% and a rise in the level of domestic self-sufficiency from 81% in 1981 to 94% in 1995. Production increases have come about mainly through land expansion rather than through productivity increases. Despite the positive trends in the Nigerian agricultural food production in recent years, there are production variations arising principally from weather factors and/or access to agricultural inputs, credit and technology. Furthermore, significant differences exist in the quantity and quality of food consumed between spatial location, ecological zones and population groups (sexes, urban/rural dwellers).

For farmers of different agricultural zones to adopt a new agricultural technology, she/he must be aware of the technology, have valid and up-to-date information on the technology, the applicability of the technology to their farming system and receive the technical assistance necessary to adopt the technology (Asiabaka, Morse, & Kenyon, 2001). Institutional inefficiencies in the development and delivery of relevant information and assistance from national extension systems are often the major reason why farmers do not adopt farming innovations. Integration of local information and assistance from extension can facilitate the adoption process, but unless there is information and assistance from external sources, little change can be expected in farmer’s adoption behavior (Njoku, 1990).

The characteristics of farm information sources such as availability, credibility, interest, usefulness and socio-economic characteristics of the farmer/extension agent have interacting influences in the frequency of use of information (Bel-Molokwu, 1997). Adoption decisions are dependent upon the degree of exposure to a piece of information and the more interest shown by a farmer on a topical issue the more her/his propensity to move through the mental stages that lead to adoption of the information. Obviously farmers of all socio-economic backgrounds are more likely to use an agricultural information if they perceive the information to be useful to them. The credibility of the information source will sometimes depend on the perceived intelligence, reliability and/or expertise of the communicator and sometimes the gender of the communicator. The attributes of a technology also play an important part on farmer’s adoption behavior. Usually, farmers will adopt a technology under the following conditions: if it is simple, has comparative advantage, is compatible with existing planting practices, is available and is affordable. But it must be remember that often, technologies are developed in environments that are typically favorable and not typical of farming environments (Rhoades and Booth, 1982).

Purpose of the Study

The major objective of this study was to assess the affect of information source and attributes of a technology on the adoption behavior of rural farmers in Nigeria, based on new knowledge in the past few years. Specifically, the study had the following objectives:

1) To determine the relationship between source of agricultural information and adoption innovations by farmers;
2) To determine the relationship between the attributes of a technology and adoption of agricultural innovation;
3) To determine the relationship of farmer socio-economic characteristics and their adoption behaviors; and
4) To determine the difference in the adoption behavior between extension contact and non-contact farmers.

**Methodology**

Data for this study were collected from cassava and yam farmers in Abia and Imo States of southeastern Nigeria. Administratively, each state is divided into three agricultural zones. Abia State is made up of Aba, Umuahia and Bende while Imo State is made up of Owerri, Orlu and Okigwe agricultural zones. From the six agricultural zones, 480 farmers were randomly selected to participate in the study. A multi-stage stratified random sample was used to select the respondents. In each agricultural zone, eighty farmers were selected from four communities that were purposively selected because of the intensity of cassava and yam production in the community.

Additionally, the respondents included contact and non-contact farmers. The contact farmers are defined as farmers who have direct contact with the State Agricultural Development Program (ADP) which is the main extension organization in each of the States. The non-contact farmers are consequently defined as farmers in the community who do not have direct contact with the ADP. However the ADP envisages a ripple effect that should result in the non-contact farmers emulating new and improved farming practices from the ADP contact farmers.

In adoption studies, there is the need to determine the personal and socioeconomic characteristics of respondents in order to understand their predisposing influence in the adoption of named technology. The age distribution of the respondents showed that a greater majority of the farmers were in the age range of between 30 and 50 years. There were 168 women farmers included in the respondents, however selection of respondents was not based on gender. Sampling was based on inclusion or exclusion in the state ADPs, age, education, household size and farm size. The randomization was completed utilizing a sampling frame from a village listing provided by the state ADPs.

Data collection relied on participatory tools such as Semi Structured Interview (SSI), Focus group and Key Informant Interviews. Logbooks were also used to assist in data collection. The Z test and linear multiple regression analysis were utilized for hypotheses testing and in determining statistical inferences.

**Results and Discussion**

The results indicate that a majority of the farmers (61.25%) had only primary school education, while another 16.46% of the farmers had secondary school education and only 8.33% of the farmers had above secondary school education. Results also from the socioeconomic background of the farmers indicated that farmers are members of several groups or associations; specially 78.13% are members of the cooperative societies, 100% of the farmers are members of religious groups and community associations and 56.88% of the farmers are involved with informal credit societies. Results show that the average farm size ranged between one and four hectares. Findings also indicate that 37.3% of the farmers had between 1.00-1.99 hectares, another 36.7% had between 2.00-2.99 hectares. Majority (48.4%) of the
farmers had annual income of below 40,000 Naira (about the equivalent of US$340). But this result must be taken with caution as most farmers are not willing to disclose their income for fear that such information may be used for tax purposes. There were 168 women or 37.3% in the sample, but data was not disaggregated based to gender.

Table 1: Adoption rates of agricultural technologies: Contact and Non-contact farmers in Nigeria.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Contact Farmers</th>
<th>Non-contact Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planting Improved Varieties</td>
<td>74.58</td>
<td>14.23</td>
</tr>
<tr>
<td>Appropriate Spacing</td>
<td>74.13</td>
<td>10.92</td>
</tr>
<tr>
<td>Fertilizer Application</td>
<td>55.38</td>
<td>42.36</td>
</tr>
<tr>
<td>Weeding</td>
<td>35.92</td>
<td>29.45</td>
</tr>
<tr>
<td>Use of Pesticides</td>
<td>2.70</td>
<td>1.30</td>
</tr>
<tr>
<td>Use of Biological Control</td>
<td>2.02</td>
<td>0</td>
</tr>
<tr>
<td>Rouging</td>
<td>2.04</td>
<td>3.40</td>
</tr>
<tr>
<td>Use of resistant varieties</td>
<td>0.31</td>
<td>0</td>
</tr>
</tbody>
</table>

Results of the regression analysis show negative coefficients and t-ratios on the relationship between age of the farmers and their adoption behaviors. The implication is that the farmers’ ability to adopt new farm innovations decrease with age. The older the farmer, the less likely she/he will adopt innovations. The reason for this behavior is not difficult to ascertain. Typically, younger farmers are more willing to take more risks than older farmers, which is consistent with finds of Asiabaka, Morse, & Kenyon (2001). The coefficient of education is positive and significant at 0.05 and 0.01 levels. This implies that that education is an important determinant of farmers’ adoption behavior. The more educational opportunities a farmer has experienced, the more likely she/he is to look for new information. Consequently, the more educated farmers would adopt agricultural innovation more than the less educated farmers would. Farm size is also a variable, though positive was not significant at both 0.05 and 0.01 levels. The implies that farmers will adopt new technologies irrespective of farm size.

Sources of Agricultural Information

Information source factors such as availability, credibility, interest, usefulness and the socio-economic characteristics of the farmers can determine the frequency of use of such information. There are relationships between farmer characteristics and extension contacts on farmer’s use of agricultural information. An extension campaign that utilizes several different methodologies of information dissemination (eg. radio messages, information dissemination at markets, banners, posters, bulletin boards) will be more effective than relying solely on one-to-one visits. This is especially true when trying to reach farmers demographically different from the extension agents.
Availability of information source

Results show that the farmers ranked fellow farmers and friends as the most available source of information. Extension agents and farmer’s cooperatives followed this observation. Results also show that farmers have limited access to other agricultural personnel such as researchers or university personnel. These findings are consistent with earlier studies (Bel-Molokwu, 1997). This has important implications for projects and activities in the farming communities.

Interest in the Information Source

Farmers are more likely to adopt an innovation if they are interested in the source of information. Findings indicate that majority of the farmers (41%) preferred fellow farmers and neighbors as source of information. Information from extension agents was ranked second while mass media sources were ranked lowest. The implication of this finding is that rural farmers are more interested in sources that are more of one-to-one contact. However this may differ between farmers of different educational levels. These data still need to be analyzed based on education background. Also there needs to be research done into the effectiveness of different types of media sources.

Usefulness of Source of Information

Results show that most of the farmers perceived information from extension agents as from being useful (53.4%) to being very useful (28.6%). The respondents also perceived information from other farmers to be useful (61%), community leaders (78.5%) and farmers’ cooperative society (75.7%). Interestingly, about 39.6% of the farmers perceived information from research institutes as not useful. This result is expected because farmers do not have direct contact with researchers. Some other countries in the sub-Saharan region have developed radio programmes for researchers to communicate directly to the farmers and this might improve the situation in Nigeria (FAO, 1997). The regression coefficient for usefulness of the source of information was positive and significant at 0.05. The implication of this finding is that farmers would adopt an agricultural innovation/technology if they perceive the source of information to be useful.

Credibility of Source of Information

Data analysis indicate that 29% of the farmers perceived information from extension agents to be credible while 39.7% of the farmers perceived information from other farmers to be credible. Only 6% and 1.5% of the farmers perceived information from the radio and television respectively were credible. The perceived lack of credibility of radio and television stem from the fact that most radio and television stations in Nigeria are government owned. Since most people perceive government agencies as not trust worthy, information from radio and television are also perceived as not credible. The results of the regression analysis also indicate a positive relationship between credibility of the information source and farmers’ adoption behavior. The coefficient of the credibility variable is positive and significant at 0.05. The implication is that credibility of the source of agricultural information is a determinant of farmers’ adoption of a named agricultural technology.

Multiple exposures to Information

Findings show that there exists a positive relationship between exposure to agricultural information and farmers’ adoption behaviors. The implication is that the more
farmers are exposed to information, the more the likelihood of their adoption of the technology. Analysis of the result further shows that there is a direct relationship between availability of the source of information and adoption by farmers. The coefficient of the variable was positive and significant at 0.05 significant level. The implication is that when the source of information is available, farmers will adopt the recommended innovation.

The farmers’ interest in the source of agricultural technology has a positive and direct influence on their adoption behaviors. Interest as a variable was found to have positive coefficient and significant at 0.01. This result implies that the more the farmers are interested in an information source on a technology, the more they are likely to adopt that technology. Utilization of many types of extension methodologies such as one-on-one, posters, bulletin boards, market demonstrations and the like should therefore increase farmers’ interest.

**Technology Attributes Influencing Adoption**

The variables investigated included profitability, complexity and compatibility of the technology. The coefficients were positive and significant at the 0.05 level. The implication of this result is that technology attributes are significant determinants of farmers’ adoption of an innovation. It also implies that:

- the farmers will adopt a technology/innovation if there is a comparatively advantageous and profitable,
- farmers would adopt the technology/innovation if it is simple,
- farmers are more likely to adopt the technology, if the technology is compatible with existing agricultural practices.

Results of a Z test of difference between the mean scores of both groups show a significant difference between the adoption behaviors of contact and non-contact farmers in the study area (Z=4.43, p>0.05, Df =478). This implies that contact farmers may adopt more readily than non-contact farmers. This is expected because the various Agricultural Development Programs (ADPs) target contact farmers for dissemination of agricultural information in the country, and then rely on the contact farmers to disseminate the information or technologies to other, non contact farmers.

**Conclusions and Implications**

Farmers routinely make complex decisions, especially when it comes to adoption of new technologies. When adoption and non-adoption are discrete, that is, mutually exclusive, farmers would choose to adopt a new technology if the expected profit from such technology is likely to exceed the expected profit without the technology. Farmers also have make complex decisions about allocation of scarce resources taking account the inter-linkages between different enterprises. These decisions are made in the context of the whole household economy (Mettrick, 1993). If farmers do not adopt a new technology, it is because they have not understood well the technology, it is not compatible with existing practices, or because they have perceived the technology to be too complicated or too risky and not because they are ignorant (Asiabaka, Morse, & Kenyon, 2001). Many times, extension staff or project personnel will say that they have told the farmers what to do, but the farmers are just too stupid to understand. However, maybe, it is these extension staff who need to re-evaluate the technology or the mode of transmitting the information.
Extension service providers in Nigeria need to pay attention to the source of agricultural information. Results have shown that the farmers ranked fellow farmers and friends as the most available source of information, and extension agents and farmer’s cooperatives followed this observation. Policy should be adopted that extension personnel who will come into contact with the farmers have the appropriate background so as to be trusted by the farmers. Who these extension personnel will be will be determined on the type of farmers to be reached with the extension information. If, for example, it is determined that the youth should be reached more effectively with agricultural information and technology, there needs to be preference given to youth for these positions. In addition, as food security issues are related to gender and gender related farming activities, these data should be analyzed based on gender to determine the differences in adoptive behavior as related to gender. In keeping with these findings, more emphasis should be placed on developing the knowledge base of lead farmers in communities and supporting the efforts of farmer’s cooperatives.

There is a need to verify the characteristics of the source of information since farmers are more likely to adopt new information or technologies if the source is credible and useful. There is also the need to develop technologies that are appropriate, in terms of simplicity, comparatively advantageous and compatible with existing farming practices. This is more pertinent because farmers have limited resources and may not put their energies in technologies that very complex or not obviously profitable. As farmers’ socioeconomic characteristics influence their adoption behaviors, educated farmers are more likely to adopt new technologies. This emanates from the simple fact that they are more likely to seek and read information. If it is determined that food security is a priority for the country and women are the key food production farmers, then policy and programmes should be put in place to secure better formal and nonformal educational opportunities for women farmers. Extension messages for farmers with less formal education should be as simple and concrete as possible and utilizing appropriate methodologies such as radio.
References