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# **Communication and Adoption of Agricultural Innovations: Quantifications and Notes Towards A Conceptual Model**

by Bernard Nnamdi Emenyeonu\*

## **Abstract**

This paper reports and discusses the findings of a study conducted to investigate the correlation between rural farmers' responsiveness to agricultural innovations and the communication patterns used to popularize such innovations. The results of the survey carried out in this study showed that neither education nor the use of mass media has a significant association with the adoption of agricultural innovations. Personal communication sources were found to be more effective than mass communication sources in creating the necessary awareness and, hence, influencing the adoption of agricultural innovations.

## **Résumé**

Cet article rend compte de et analyse les conclusions d'une étude sur la corrélation entre la réaction des fermiers ruraux aux innovations agricoles et les modèles de communications utilisés pour populariser ses innovations. Le résultat de l'enquête faite dans étude a montré que ni l'éducation ni l'utilisation des mass-média n'ont une influence significative sur l'adoption des innovations agricoles. L'enquête a montré que les sources de communications personnelles étaient plus efficaces que les sources de communication de masse en matière de sensibilisation nécessaire, et partant, en matière d'influence pour l'adoption des innovations agricoles.

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## ***Introduction***

For many decades now, hunger, malnutrition, starvation, famine and squalor, along with an exponential growth in population have remained permanent features in the majority of developing nations. Owing to the devastating effects of drought, desertification and adherence to primitive farming systems, food production in these nations has continued to decline.

In the third world, for example, the gap between domestic production of food grains and the demand for them is at the moment, estimated to be 77 million tonnes. By Food and Agriculture Organisation (FAO) estimates too, the food requirements of developing nations will further rise by 3.6% before the turn of this decade, and that indicates that a minimum of 85 million tonnes of food will be required to meet food demands.<sup>2</sup>

Already, 10% of export revenue in the developing countries is spent on food imports, and this figure is expected to rise to 30%, with a population growth projected at a 40% increase per annum in the 1990s.<sup>3</sup>

Apart from the problem of overpopulation, some of the developing countries have had their food crisis complicated by natural disasters and bad weather. In countries like Ethiopia, Chad, Niger, Bourkina Faso etc., millions of lives have been lost to drought. In 1984 alone, 2.5 million people in four regions of Ethiopia reportedly died of starvation.

For governments in developing countries, therefore, structuring agriculture to feed the people and contribute to economic growth has become a challenge. A popular fad in the bid to raise adequate food supply in these countries is the intensification of innovative agrarian programmes.

## ***Innovation Campaigns in Nigeria***

In Nigeria, the first of such innovations was the introduction by the colonial government, in the 1920s, of large-scale, mixed farming which involved the use of ploughs and manure to effect an increase in the production of raw materials for British agro-industries.<sup>4</sup> Rudimentary as they were, these innovations resulted in remarkable increases in productivity. Cotton yield, for example, rose from 3,500 tonnes to 15,000 tonnes per annum within a period of seven years.<sup>5</sup> By the 1920s too, the British administration had established two schools of agriculture: one at Moor Plantation, Ibadan, and the other at Samaru, Zaria. With more innovations and extension personnel turned out at these schools, agriculture was given a tremendous boost throughout the colony.

At independence, therefore, Nigeria, endowed with about 228 million acres of predominantly arable soil,<sup>6</sup> inherited an economy whose mainstay was agriculture. Apart from feeding the populace, there was need to raise enough foreign exchange to sustain the emergent nation. Thus, there were plans to consolidate or even improve on the solid agrarian foundation laid by the British.

The initial post-independent steps taken towards improving agriculture included the setting up of farm settlements and the establishment of special extension services for agricultural foreign earners such as cocoa, rubber, cotton and palm produce. Evidence abounds to show that these facilities made tremendous impacts on the production of food.

For example, with a production capacity of 150,000 tonnes annually, in the 1960s, Nigeria was the world's largest producer and exporter of palm oil.<sup>7</sup> By 1969 too, Nigeria was rated the world's largest exporter of groundnuts. Other cash crops like sorghum, guinea-corn, and millet performed equally well during the period under review. In fact, within the first decade of independence, agriculture and other occupations like livestock rearing, fishery and forestry engaged about 30% of the population, provided well over 95% of the total food consumed and accounted for about 60% of the national income.<sup>8</sup>

These impressive trends, however, took a turn with the end of the Nigerian civil war. With the discovery of more petroleum and the chances offered by the Arab oil boycott of 1973, Nigeria hauled tremendously increased earnings from the oil sector. The petroleum industry, which had contributed a meagre five per cent of the gross domestic product before 1966, had suddenly soared to 94% of Nigeria's foreign earnings by 1975.<sup>9</sup>

Accordingly, the relegated agricultural sector continued to decrease in the level of output as the years passed. In 1972, for example, Nigeria which, in the 1960s, was the largest exporter of palm oil, was not only unable to export but had become a net importer of the same commodity.<sup>10</sup> Between 1973 and 1974, too, the total contribution of agriculture to the national gross domestic product declined to 26.8%.<sup>11</sup>

As the food output decreased, population growth rose progressively. By 1972, for example, Nigeria's population was estimated at 71 million, a growth rate reckoned at three per cent per year or an addition of 1.5 million mouths to the population annually, based on the 1963 population figures.<sup>12</sup>

The government's initial response to the problem of food shortage was impulsive: mass importation of food. In 1974, the food import bill was #157.9 million, and only a year later, the bill amounted to #300 million.<sup>13</sup> Within the first six months of 1976,

Nigeria's bill for the importation of several food items was well over #249 million. Only #129 million worth of agricultural products, mostly cocoa, was exported.<sup>14</sup>

But the government soon realised that continued importation could not be the panacea for solving a food crisis. In the second half of the 1970s, therefore, Nigeria returned to agriculture on a full-time and large-scale basis, marking another phase of attempts at adoption of agricultural innovations.

Several agricultural projects involving structural changes in agricultural technology were set up all over the country; farm settlements were reactivated and research institutes were established. These were then followed by the launching of special nation-wide campaigns geared towards revolutionizing agriculture.

### *The Operation Feed the Nation*

A most remarkable campaign of this sort was the Operation Feed the Nation campaign (OFN) launched by the Federal Government on May 20, 1976. The motive of the OFN was to produce more food, specifically by persuading farmers to adopt new technological packages such as improved seeds, fertilizers, feeds, pesticides and herbicides.

OFN is regarded as a classic example of a diffusion campaign in which the mass media were involved. In the organisational structure of the programme, the media were assigned the onerous role of disseminating the campaign exhortations to farmers.

The media diffusion strategies used in the campaign have been identified as including news stories, commentaries, editorials, features, cartoons and national advertising.<sup>15</sup> Others include slogans, radio talks, discussion panels and special documentaries. In addition to these, publicity vans were used to address villagers, posters and handbills were distributed, films on modern agriculture practice were shown and plays popularizing OFN were performed, all in a bid to demonstrate the benefits of modern farming. Extension workers were also drafted to give further education and guidance to local farmers on the new farming techniques.

Information about the OFN was so profusely diffused that even till this day, OFN remains a household concept in Nigeria. The profusion of information about OFN, however, could not induce the much-needed agricultural excellence. An indication to this fact was that food importation had ironically risen to astronomical heights during the campaign period while exportation of cash crops decreased.

In 1977, for example, ₦780.7 million worth of food was imported. A year later, the import bill rose to ₦1108.2 million.<sup>16</sup>

### *The Green Revolution*

With the inauguration of a new civilian regime in 1979, the OFN was labelled a dismal failure, discarded and replaced with a supposedly more radical agrarian revolution. In 1980, the Green Revolution was launched with the usual objective of attaining self sufficiency in food production, this time, through increased production and processing of good raw materials, livestock, fish and cash crops.

In the manner of its forerunner, the Green Revolution was propagated through the mass media but did not enjoy as much publicity as the OFN. Part of the problem was that the Green Revolution was born in a tense political climate. For the mere sake of discrediting the political party controlling the centre, state governments controlled by other parties insisted that the media under their control never gave space or time to the programme. On the other hand, the distribution of inputs followed a spoil system in which only party loyalists who turned farmers overnight were granted loans, inputs and other related facilities to the detriment of genuine full-time agriculturists and peasant farmers.

So, at the end of it all, the Green Revolution failed to produce enough food for the nation. Rather, Nigeria's import bill, as ever before, continued to mount. Between April and December 1983, a staggering sum of ₦5.5 billion was spent on food importation, especially rice.<sup>17</sup>

Between the demise of the Green Revolution and now, a series of innovation campaigns have been quietly launched. The food situation, however, does not seem to show any signs of improvements. Recent expert projections reveal that Nigeria may face starvation by 1990 unless the present output of food is doubled.

Despite the unsatisfactory results of earlier campaigns, the government of the day still believes that the surest bet of bailing the country out of the threat of starvation must be a continued diffusion of innovation agricultural practices. Herein lies the deadlock. Given her rich endowments in the form of arable land, human and material resources, put to use in the execution of lofty innovative programmes, it becomes worrying that Nigeria is unable to meet her domestic food demands, let alone raise finances for development through agricultural export.

This study seeks to investigate the deadlock by examining the communication patterns involved in the diffusion of agricultural

innovations among rural farmers. This perspective was chosen because no innovation ever gets accepted without effective communication from originators to the target adopters. Rogers has observed that "Communication is an important element throughout the social change process; all explanations of human behaviour directly stem from an examination of how individuals acquire and modify ideas through communication with others".<sup>18</sup>

### *Review of Literature*

Available data show that Nigerian farmers acquire farm information from both the mass media and personal sources. In a study of the channels of farm information among cocoa farmers, for instance, Monu and Omole found that the majority of the respondents, 75%, received information concerning agricultural innovations from radio, followed by 51% who got their information from extension agents. Television ranked lowest with 0.8% dependents.<sup>19</sup>

In another study, of the NORCAP agricultural extension project in Abakaliki, in Eastern Nigeria, Obibuaku established that radio was the most effective medium for creating awareness among farmers.<sup>20</sup>

Monu also studied the diffusion of innovation model in the Funtua Agricultural Development Project in Kaduna State. He reported that radio topped the list of sources of farm information among his respondents.<sup>21</sup>

Another important source of farm information mentioned in other studies is the extension agent. Ononamadu showed that farmers in the Awka and Nsukka agricultural zones of Anambra State, learnt of recommended new inputs from extension agents.<sup>22</sup>

In another study of an agricultural formation in Anambra State, Uzuegbunam found that 80% of his subjects became aware of the National Accelerated Food Production Project (NAFPP) and its innovation packages from extension workers.<sup>23</sup>

In their own study, Clarke and Akinbode not only found the extension agent to be an important source, but also found a significant association between farmers' adoption index and their frequency of contact with extension staff.<sup>24</sup>

Data relating to the impact of the media on adoption reveal a weak degree of association between media exposure and adoption. For example, Uwakah *et al.*, studied farmers' response to the OFN campaign in Imo and Anambra States and found a weak correlation between awareness of the OFN Innovations and the adoption of the recommended packages.<sup>25</sup>

The same trend was reported by Obibuaku and Hursh. They

investigated the adoption rate of five innovation packages which some extension staff persuaded farmers in some Eastern Nigeria villages to adopt. A majority of the farmers knew about all five packages but did not adopt them.<sup>26</sup>

In a similar study done in four divisions of the former Western Region in Nigeria, Kidd found that recommendations made by the ministry of agriculture on the adoption of improved farm inputs were all well known to, but were not adopted by farmers.<sup>27</sup>

A preponderance of other findings dwell on the relationship between variables such as education, social status, age, income, use of the media, farm size and adoption. Voh found, for instance, that education had a significant association with adoption of innovation among some farmers from Northern Nigeria.<sup>28</sup>

In another study done in Anambra and Imo States of Nigeria, Uwakah and others found a positive correlation between level of education and response to innovation campaigns.<sup>29</sup>

In the same vein, Nweke's survey of farmers' adoption pattern in some farm communities in Anambra State established that literacy was a very significant determinant of progress in agriculture.<sup>30</sup>

Osuji, in his own study, studied the infrastructural facilities affecting the adoption of new farm practices in Imo State of Nigeria. He found age, education, income and frequency of contact with extension agent to have a positive correlation with adoption.<sup>31</sup>

Clarke and Akinbode also established that the use of the mass media, size of farm and level of education were all positively associated with adoption.<sup>32</sup>

Finally, Voh tested the correlation between some selected variables and the adoption of recommended farm practices. He found that education and socio-economic status, among others, were significantly associated with adoption.<sup>33</sup>

Based on these patterns of findings, this paper seeks to study the dominant paradigm of agricultural communication for adoption of innovations among rural farmers by answering the following questions:

1. What is the level of farmers' reliance on the various media or dissemination of agricultural innovations?
2. What is the relative utility and limitations of the media in the dissemination of agricultural innovations?
3. How significant are the roles of the modern media in innovation campaigns?
4. How do variables such as education and socio-economic status associate with adoption?
5. Would increased awareness guarantee adoption?

### **Method:**

To answer these questions, a sample of 200 rural farmers randomly drawn from the Eastern region of Nigeria was studied. This sample included full-time and part-time, large-scale and small-scale, educated and uneducated farmers.

A questionnaire was the instrument for data collection. Questions sought information about the personal characteristics of respondents, their media use patterns and other factors related to their reception of agricultural information and adoption of new farm practices. Of the 200 questionnaires distributed to the respondents, 168 or 84% were duly completed and returned. Data contained in these questionnaires were coded and processed with a computer. Findings are presented in frequency distribution and in tests of significance.

### **Results:**

More than half the sample, 94 farmers or 56%, engaged in full-time farm work while 74 (44%) combined farming with other occupations. In response to their highest educational attainment, 40 respondents (23.8%) indicated they had never attended any formal school. Eighteen (10%) had incomplete primary-school education while 27 (16.1%) completed primary-school education. Seven farmers (4.2%) said they had gone further than primary school education but did not complete secondary-school education while 24 (14.3%) indicated they completed secondary-school education. Diploma holders were 37 (22%) while bachelors' degree holders were 10 (5%). Only two farmers (1.2%) possessed masters' degrees. (See Table 1)

Table 1: *Respondents' Educational Level*

<u>Qualification</u>	<u>Number</u>	<u>Percentage</u>
Never attended any school	40	23.8
Primary-school uncompleted	18	10.1
Primary school completed	27	16.1
Secondary school uncompleted	7	4.2
Secondary school completed	24	14.3
Diploma	37	22.0
Bachelor's degree	10	5.0
Master's degree	2	1.2
Other qualifications	3	1.8
<b>Total</b>	<b>168</b>	<b>100.0</b>

Asked to indicate the media they attended to, a majority of the sample, 138 (82.1%), said they owned radio sets, 49 (29.2%) had television sets while 99 (58.9%) said they bought and read newspapers. (See Table 2a)

In response to why they did not possess radio sets, 16 farmers (9.5%) responded that they could not afford them, six others (3.6%) said they did not have the patience to listen to radio programmes, and three farmers (1.8%) replied that they "didn't have need for them." A "lack of electricity" and "inability to maintain radio" attracted two respondents each. (See Table 2a.)

*Table 2a: Respondents' Media Use Pattern*

Medium	Yes		No	
	Number	Percentage	Number	Percentage
Own radio?	138	82.1	30	17.9
Own television?	49	29.2	119	70.8
Buy/read newspapers?	99	58.9	69	41.1

n = 168

Reasons for non-possession of television and non-consumption of newspapers are presented in Tables 2c and 2d respectively.

*Table 2b: Reasons for not Using Radio*

Responses	Number	Percentage
Impatience at listening	6	3.6
Inability to afford	16	9.5
Don't need it	3	1.8
No electricity	2	1.2
Can't maintain it	2	1.2
No response	139	82.7
<b>Total</b>	<b>168</b>	<b>100.0</b>

*Table 2c: Reasons For Not Using Television*

Responses	Number	Percentage
No electricity	30	17.9
Unable to afford	66	39.2
No interest	6	3.6
Don't need it	10	6.0
No response	56	33.3
<b>Total</b>	<b>168</b>	<b>100.0</b>

*Table 2d: Reasons For Not Reading Newspaper*

Responses	Number	Percentage
No vendors	18	10.7
No reading skills	48	28.6
Cannot buy	3	1.8
No response	99	58.9
<b>Total</b>	<b>168</b>	<b>100.0</b>

There was a high level of awareness of the three firm packages used in this study: improved seeds, agro-chemicals and credit schemes. 136 (81%) indicated that they were aware of improved seeds while 32 (19%) said they were not; 122 respondents (72.6%) knew about agro-chemicals while 46 (24.4%) did not. Furthermore, 113 (67.3%) were aware of credit schemes while 85 (32.7) were not.

In terms of respondents' primary source of agricultural information, extension agents featured predominantly. 103 respondents (61.3%) chose them as their primary source. Radio attracted 25 (14.8%) respondents while only five (3%) chose newspapers. Three respondents (1.8%) mentioned magazines, eight (4.8%) chose television, three (1.8%) chose films and the remaining 10 respondents mentioned fellow farmers. (See Table 3a.)

*Table 3a: Source of Farm Information*

Source	Number	Percentage
Newspapers	5	3.0
Magazines	3	1.8
Radio	25	14.8
Television	8	4.8
Film	3	1.8
Extension Agent	103	61.3
Fellow Farmers	10	5.9
Relatives	5	3.0
Others	6	3.6
<b>Total</b>	<b>168</b>	<b>100.0</b>

The formal media of Mass Communication such as radio, television and newspaper were not popular as sources of further agricultural information among the farmers. Rather, the extension agent, once attracted a majority of the respondents. While 100

respondents (59.5%) said they would prefer the extension agent as a source of further information on agricultural innovations 47 (28%) chose radio: television and newspapers attracted five (3.0%) respondents each (See Table 3b.)

*Table 3b: Sources of Additional Information*

Source	Number	Percentage
Radio	47	28.0
Television	5	3.0
Newspaper	5	3.0
Extension agent	100	59.5
Film	1	0.6
No response	10	5.9
Total	168	100.0

Two major reasons were given for the overwhelming reliance on the extension agent as a favourite source of additional information on agricultural innovations. Fifty-six (56%) respondents preferred the extension agent because he "could combine information with demonstration" while 44 (44%) chose him because "he was always accessible".

There was a high adoption of improved seeds and agro-chemicals but a low adoption rate for credit schemes. One hundred and one respondents (60.1%) adopted improved seeds while 67 (39.9%) did not; 85 (50.6%) adopted agro-chemicals and 83 (49.4%) did not. Only 29 (17.3%) adopted credit schemes while 139 (82.7%) did not. Four respondents did not adopt any of the three packages. (See Table 4.)

*Table 4: Adoption of Packages*

Packages	Adopters		Non-adopters	
	Number	Percentage	Number	Percentage
Improved seeds	101	60.1	67	39.9
Agro-chemicals	85	50.6	83	49.4
Credit schemes	29	17.3	139	82.7
None	4	2.4	—	—

n = 168

## Discussion

The formal media of mass communication such as radio, television, newspaper and film are generally believed to have an insidious influence in the dissemination of new ideas. Consequently, they are hastily employed in campaigns such as those aimed at diffusing innovations in agricultural practice.

According to the results of this study, however, farmers had no significant reliance on the media. Only 25 (14%) respondents chose the radio as their primary source of information. Television and newspapers attracted eight (4.8%) and five (3.0%) users respectively while the extension agent, a personal source of information, attracted 103 (61.3%) respondents.

Another indication of the low level of reliance on the media is deduced from results pertaining to respondents' choice of sources of further information on agricultural innovations. Radio was chosen by only 47 (28%) farmers while television and newspaper were chosen by just five (3%) farmers each.

From the above data, it is further deduced that of the media mentioned in this study, (radio, television, newspaper, film), radio was mostly relied on. This could be attributed to its affordability and ease of operation.

On the other hand, the low usage rate recorded for television could have been because it was expensive to afford. Additionally, the locale of the study, a rural setting without electricity, did not favour the use of television.

About half the sample was deficient in reading skills while the majority of the literate respondents could not have access to vendors. These two factors may have accounted for the low level of reliance on newspapers as media for dissemination of agricultural information.

In order to determine how significant the media were in effecting adoption of innovations, media use, operationalized as use of radio, television and newspapers, was cross-tabulated with adoption of three innovation packages. The results obtained from a cross-tabulation of each medium with each package showed that there was no significant association between media use and adoption of innovations. (See fig. 1.)

Fig. 1:

Radio:  $\chi^2 = 1.10$ ,  $df = 1$ , .05

Newspaper:  $\chi^2 = 0.30$ ,  $df = 1$ , .05

Television:  $\chi^2 = 2.31$ ,  $df = 1$ , .05

In terms of the nature of relationship between education and social status, and adoption, it was found that education had no significant association with adoption. An explanation for the non-significant relationship between education and adoption could be deduced from the media usage pattern of the respondents.

Both the educated and uneducated respondents relied heavily on a dominant source of information: the extension agent. The educated farmers who could have gained more knowledge of innovations from newspapers, radio and television were hindered by inaccessibility of vendors and lack of electricity.

Socio-economic status, however, had a significant relationship with adoption. Since socio-economic status is often associated with education, an explanation for the significant association between the two variables could be that high socio-economic status, which offers relevant social contact, and creates access to reference groups for the acquisition of knowledge of new practices, gave farmers with a high socio-economic status an edge over other cadres of farmers in gaining awareness of, and adopting farm innovations.

Finally, the study established a positive correlation between awareness and adoption. This means that farmers who knew more were likely to adopt more.

### **CONCLUSION**

Much as the media possess potentials for persuading the audience to accept changes, this study has shown that personal sources of communication, as exemplified by extension agents, are more effective in creating awareness and influencing adoption of innovations among rural farmers than mass media sources. A medium like television could captivate audience attention with its audio-visual potentials. However, it may not work in a rural setting where there is no electricity and the people are not buoyant enough to afford a set. Any attempt, therefore, to reach rural farmers with innovation campaigns, through television would miss the target. The same goes for the other media with their inherent limitations.

It is therefore recommended that priority should be given to the development and use of personal sources of communication for the dissemination of farm innovations among rural farmers.

As a corollary to the above, more extension personnel should be trained for the intensification of extension services in rural farm communities. With the electrification of these areas, television and radio could be used to supplement the efforts of personal sources of information.

The majority of Nigerian farmers are feared to be peasant and

illiterate, and are said to have the propensity to resist innovation methods of farming as a result. This study has, however, shown that education is not a significant determinant of adoption of innovations among rural farmers. The study further showed that increased awareness would lead to increased adoption. Agricultural innovation agents should therefore intensify efforts to create more awareness of new farm packages, and to offer incentives such as were suggested by farmers in this study, in order to get the farmers to adopt more innovations.

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