

Improving Technology Perception through Information and Education: A case of Biotechnology in Nigeria

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Summary

A study was conducted in two states in Nigeria (Edo and Delta) as part of the International Institute of Tropical Agriculture Activities in the Niger Delta area of the south-western agro-ecological zone part of Nigeria. A workshop was organized for the sole purpose of presenting information on biotechnology as a discipline and as a necessary technology that can be safely adopted by even peasant farmers. Several areas of biotechnology such as biosafety, ethics, environmental and health safety where the audience can participate and explore were presented by speakers. Ninety-five participants at the workshop formed the respondents for the study and a questionnaire was designed to elicit information on the participants' awareness, knowledge, perception and attitude about biotechnology and its products, before and after the workshop. The results showed that the age of the respondents ranged from 19 to 56 years with a mean of 41 years. Results also showed that all the participants, apart from 14.8 percent, had educational qualification higher than secondary school. Majority (63 percent) were civil servants including 30 percent from Ministry of Agriculture and 33 percent from Agricultural Research Institutes, 24 percent from the academia and others from private organisations. Through workshop as an education method, there was change in perception after training. Before the workshop 67.4 percent of the respondents said they would eat food made from genetically engineered crops however, at the end of the workshop 80 percent of the same group of respondents indicated they will eat food made from genetically engineered crops. Using a paired sample t-test statistics, the test of difference on disposition before and after the workshop gave a t-value of 4.569 which was significant at 0.05 level. The study concludes that information dissemination through training method such as workshop has contributed to change in perception of biotechnology in Nigeria.

Key words

technology, perception, information, education, biotechnology, Nigeria

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Introduction

Agricultural technology is a much needed ingredient to create the impetus for agricultural development and this has been the justification for creation of agricultural research institutes in many countries. It is expected that apart from providing solutions to agricultural problems experienced by the farmers, the research institutes are to stimulate and design technological innovations to facilitate improvements in agricultural production and management. The efficiency and effectiveness of such research institutes have been a crucial factor for the economic development and food and nutrition security of the people. Technologies for development are supposed to be developed and disseminated to the end users through a facilitation of an adoption process. The adoption process itself is a complex mix of uncertainties and expectations which interact to determine the disposition of individuals towards the developed technology. Rogers (2003) described the adoption of a specific practice as not the result of a single decision to act but of a series of actions and thought decisions. These finalities (the thought and then action) are influenced by several characteristics of the innovation, source of information and the technology itself. Thus there is a need to arrange a convergence of the crucial concepts, the mentioned characteristics, and to examine the influence of the convergence on adoption of the technology.

Information delivery stands out as the vehicle through which research findings can get to interest groups such as policy makers, end users and development planners. This has evolved into methods or systems, the development of which depends on the level of technological sophistication of the social system. Information, from which ever source, often marks the beginning of a chain of thoughts which build upon the capacity and tendency of the target audience. This behoves that technological information sensitive to the individual and group situations, giving enough considerations for what the individual has to overcome to be able to freely and favourably react to the technology.

With the two prominent means of information delivery, interpersonal and mass media, it seems that the creation of awareness has been taken as the end in information delivery. However, awareness is just the beginning of the adoption process which terminates with continued adoption or rejection. Thus depending on the nature of the technology, it may be necessary to reinforce the awareness stage and bolster the decision process towards eventual adoption. In order for agricultural technologies to succeed, their attributes should address end-users' concerns and this stresses the role of information and education in order to set agenda for adoption. Adesina and Zinnah (1993) noted that information through extension contact affected farmers' decisions to adopt a new variety of rice

in Sierra Leone. Other examples of adoption in Nigeria is the awareness creation through participatory learning process enhanced the adoption of Sawah rice production technology in Nigeria Fashola et al. (2006), while Oladele and Adekoya (2006) found that information through extension visits helps farmers to sustain the adoption of improved varieties of Downy Mildew resistant variety of maize and early maturing cowpea variety in south western Nigeria.

Agwu et al. (2008) reported that the radio farmer programme enhanced the extent of adoption of six technologies namely: modern land preparation and planting of early season crop, harvesting of yam and storage in barn, site selection/bush burning/packing, processing of cocoyam into chips and flour, improved early maize cultivation, weeding and fertilizer application in yam + cassava + maize intercrop and pest control in the food crop farms in Enugu state, Nigeria

Similarly, Oladele and Akinsorotan (2007) reported that a significant relationship exist between sources of information (radio, newspaper, scientific periodicals) and the perception of scientists toward genetically engineered crops in south western Nigeria. Sofranko et al. (2004) noted that lack of technical information led to farmers' discontinued adoption of value enhanced grain in South Africa. The most important factor that explained the adoption of genetically modified organisms among Ohio farmers among attitudes, beliefs, production practices and cost is awareness and knowledge of the technology (Darr, 2002).

The role being played by information dissemination is to act as a catalyst for changes within the system. However, certain technological information require more than mere delivery due to the nature of the innovation and the extent to which it infringes on traditional beliefs and other idiosyncrasies of the people. This dimension may require a sort of confidence building by the technology developers in the adopter group. The role of the disseminators is by no means overtaken but merely reinforced and it is incumbent on the fact that the complexity of the technology may require competent individuals to give a broad view of the technology and also address concerns of the prospective adopter.

Biotechnology is particularly seen as a technology that may be variously interpreted by an informed audience depending on beliefs and customs. This implies that various concerns which might affect its adoption will arise among the people. So it is necessary to organize forums which will enable the raising of the concerns and provide further information to mitigate the concerns. Some of the common concerns arise out of insufficient information about the processes involved in biotechnology as well as the likely consequences. Duvel and Abate (2004) identified commu-

nication variables such as extension contact and media exposure as significant variables in predicting the adoption behavior and efficiency of maize and dairy farmers in Shaashemene and Debrezeit in South-Western Ethiopia. Therefore if media created awareness is reinforced by an interactive session between the audience, researchers, practitioners and other interest groups, the concerns will be overcome and adoption is expected to improve.

The general objective of the study was to determine the impact of information and awareness on the attitude of people towards biotechnology. Specific objectives include the identification of personal characteristics, assessment of knowledge of biotechnology and determination of attitude towards biotechnology before and after the workshop.

Materials and methods

The study was conducted in Edo (6°19'N, 5°36'E) and Delta states (6°11'N, 6°45'E) of Nigeria. The study area is located in the south western agro-ecological zone of Nigeria and therefore supports the cultivation of a wide variety of agricultural practices such as crop production, agroforestry and livestock production. Agriculture is thus a dominant means of livelihood among the people in the area. Apart from agriculture, the area supports several virile economic activities especially because it is located along the route leading from Lagos, the economic centre for the country, and Abuja, the political centre. A workshop was organized for the sole purpose of presenting information on biotechnology as a field and as a necessary technology that can be safely adopted even by peasant farmers. Several areas of biotechnology where the audience can participate and exploit were presented by speakers.

The audience was drawn from academia, civil servants, traders, farmers, researchers and the media. In all, 95 of the participants who attended the workshop formed the respondents for the study and a questionnaire was designed to elicit information on the participants' awareness, knowledge, perception and attitude about biotechnology and its products, before and after the workshop. Data collected were analyzed using Statistical Package for the Social Sciences (SPSS 13.0) using frequency counts, percentages and t-test to test for difference in workshops' participant disposition to biotechnology before and after the workshop.

Results and discussion

The age of the respondents which ranged from 19 years to 56 years with a mean and mode of 41 years (Table 1), which implies that most of the respondents are mature and will be in with decision making capacities in their various positions. Their perceptions about issues like biotechnology may therefore influence other people in their

households. In addition, results presented (Table 1) further revealed that all the participants, apart from 14.8 percent, had educational qualification higher than secondary school thus implying that majority were able to understand what was discussed at the workshop. Majority (63 percent) were civil servants including those from the Ministry of Agriculture and research institutes, 24 percent from the academia and others from private organisations. Most of the participants (40 percent) were engaged in extension activities and it was hoped this would help create a spiral effect on biotechnology awareness. About 27 percent were researchers, 8.4 percent in farming, 17.2 percent in policy making and administration and the others involved in various agricultural related endeavours. These findings agree with the findings of Oladele and Akinsorotan (2007).

It is shown that 89.5 percent claimed to have heard about biotechnology with 21.1 percent having heard from radio, 24.2 percent from television, 40 percent from school, 31.6 percent from books and literature and about 17 percent from other sources (Table 2) Most (81.1 percent) had favourable perception, 3.2 percent were of poor perception while others were neutral towards biotechnology. In addition, 87.4, 90.5 and 91.6 percent respectively agreed that biotechnology can help improve livelihood, agricultural health and environment and crop yields (Table2). Furthermore, 81 percent agreed that biotechnology can

Table 1. Respondents' personal characteristics

Personal characteristics	Frequency	Percent
Age		
19 – 30 yrs	20	21.05
31 – 40 yrs	22	23.16
41-50 yrs	38	40.00
Above 50 yrs	15	15.79
Gender		
Male	79	83.2
Female	16	16.8
Education		
No formal education	7	7.4
Up to secondary level	7	7.4
National diploma	20	21.1
University education	61	64.1
Occupation		
Farming	8	8.4
Students	5	5.3
Civil service	60	63.2
Academic	18	18.9
Trading	4	4.2
Occupational focus:		
Farming	8	8.4
Administration	17	17.2
Extension	37	38.95
Research	26	27.37
Teaching	17	17.2

Source: Biotechnology workshop in Nigeria

Table 2. Pre-workshop awareness and perception towards biotechnology

Awareness and perception variables	Frequency	Percent
Heard of biotechnology before	85	89.5
Source of awareness:		
Radio	20	21.05
Television	23	24.21
Newspaper	18	18.9
School	38	40.0
Text books	30	31.58
Others	17	17.2
Perception towards biotechnology		
Favorable	77	81.1
Neutral	15	15.8
Unfavourable	3	3.2
Helps improve livelihood	83	87.4
Helps improve agriculture, health and environment	86	90.5
Helps secure food	87	91.6
Help develop immunity against disease	87	91.6
Can be helpful to farmers.		
Have concerns about biotechnology	79	83.2
Areas of concern:		
Food safety	59	62.1
Ethical concerns	11	11.6
Cost/financial concern	8	8.4
Heard of genetically modified crops:		
Yes	79	83.2
No	14	14.7
Will eat genetically modified food/products:		
Yes	64	67.4
No	8	8.4
Not sure	23	24.2

Source: Biotechnology workshop in Nigeria

help develop disease immunity and 91 percent indicated that it can help Nigerian farmers (Table 2). These findings seemed to suggest that biotechnology was not entirely new to the participants as they had been exposed to information on it from various sources. It was therefore alright to have asked them about their perceptions of biotechnology and also of genetically modified foods.

Results further showed that most (83.2 percent) respondents have concerns about biotechnology with 62.1 percent bothered about food safety, 11.6 percent with ethical concerns and 8.4 percent with concerns about cost (Table 2). On genetically engineered crops the awareness was high (83.2 percent) with 63.4 percent indicating readiness to consume genetically engineered crops, 22.1 percent being unsure and only 8.4 percent indicating they would not (Table 2). All these really arose from the concept at hand on biotechnology for which some seem to take it as distorting natural creation which is bound to have consequences. Such positions arose from traditional and orthodox beliefs of sanctity of nature.

Table 3. Post-workshop awareness and perception towards biotechnology

Post-workshop	Frequency	Percent
Workshop improved knowledge	79	83.2
Now have better understanding of subject	84	88.4
Areas workshop was deficient:		
Technical	11	11.6
Regulatory	3	3.2
Food safety	6	6.3
Have concerns about biotechnology allayed	72	75.8
Will eat genetically modified food/products:		
Yes	82	86.3
No	12	12.6
Not sure	1	1.1

Source: Biotechnology workshop in Nigeria

After the workshop, participants were presented with questionnaire to determine the changes in their perceptions consequent upon the workshop presentation and discussion. Results further showed that 83.2 percent of the respondents indicated the workshop met their needs (Table 3). Generally, 82.1 percent felt the subject of biotechnology was adequately addressed while 11.6 percent, 3.2 percent and 6.3 percent had technical, regulatory and food safety issues, respectively, were not adequately addressed (Table 3). In all, 88.4 percent had a better understanding of biotechnology as a result of the workshop (Table 3). In addition, 75.8 percent responded that their concerns about biotechnology were allayed by the workshop while 86.3 percent affirmed readiness to consume genetically engineered crops and their products. In developing countries, various surveys have documented public opinion of genetically engineered products. These surveys have reported public opinions ranging from low public awareness in Zambia (Chinsembu and Kambikambi, 2001) and requests for a ban on the use and commercialization of genetically engineered crops in Brazil (Toni and von Braun, 2001) to optimism about biotechnology and acceptance of the technology where conventional methods are not applicable in The Philippines and Mexico (Aerni, 2001) but with the awareness and concerns for the requirement of safe guards in these two countries.

Before the workshop 67.4 percent of the respondents said they would eat food made from genetically engineered crops however, at the end of the workshop 80 percent of the same group of respondents indicated they will eat food made from genetically engineered crops. This in a sense indicates a substantial achievement of the workshop in educating the participants on biotechnology and providing facts on the advantages inherent in biotechnology that then changed the disposition of the respondents

Table 4. t-test showing differences in perception before and after workshop

Perception on biotechnology	N	Mean	Std. Deviation	Std. Error Mean	t	df	p
Before worshop	95	17.33	8.25	3.80	4.56	93	.001
After workshop	95	87.17	37.23	15.37			

towards genetically engineered crops. The test of difference on this item (disposition before and after the workshop) gave a t-value of 4.56, which was significant at 0.00 level (Table 4)

Conclusion

It is evident that information alone may not be sufficient to motivate adoption especially in situations where the innovation touches on belief and value system of the target system. This is the case with biotechnology since it may be taken as infringing on the natural composition of an organism and thus on the natural order of things. However, the workshop clarified this position and even opened up other areas of biotechnology where people can freely participate harmlessly. Direct interaction with prospective adopters in such a way that reservations against the innovation are openly discussed is a way forward towards solving adopter apathy for technological innovations. Once the concerns are determined, it becomes easy for change agents to reinforce and broaden the information prior received by the target. It also affords technology developers an opportunity to shed more light into innovations as well as have better understanding of the target system.

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