

## Improving Technology Perception Through Information and Education: A Case of Biotechnology in Nigeria

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**Abstract:** This study investigated improving technology perception through information and education: A case of biotechnology in Nigeria, due to the importance the subject currently enjoys. The study was conducted in Edo and Delta states of Nigeria. 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 by even peasant farmers. The several areas of biotechnology 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 show that the ages of the respondents which ranged from 19-56 years with a mean and mode of 41 years. It also reveals that all the participants, apart from 14.8%, had educational qualification higher than secondary school. Majority (63%) were civil servants including those from the Ministry of Agriculture and Research Institutes, 24% from the academia and others from private organisations. Through the education method, there was change in perception after training. Before the workshop 67.4% of the respondents said they would eat food made from GM crops however, at the end of the workshop 80% of the same group of respondents indicated they will eat food made from GM crops. The test of difference on this item (disposition before and after the workshop) gave a t-value of 4.569 which was significant at 0.00 level. Information dissemination through method of training has contributed to change in perception of biotechnology in Nigeria.

**Key words:** Technology, perception, information, education, biotechnology, Nigeria

### 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 certainties 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 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 other interest groups. 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 train of thoughts which build upon the capacity and tendency of the target audience. This behoves that technological information be 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 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. For the success of agricultural technologies, their attributes should address end-users' concerns; 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. 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 and Wen, 2002).

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 maize and cowpea in south western 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 modified organisms 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 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 aware audience depending on the 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 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 communication 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 Africa. Therefore, if the 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 and Delta states of Nigeria. The study area is located in the rain forest region and therefore supports the cultivation of a wide variety of agricultural and forestry species. 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. Among these set of activities are education and transportation.

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 by even peasant farmers. The several areas of biotechnology where the audience can participate and exploit were presented by speakers.

The audience was drawn from all walks of life in the area, 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.

## RESULTS AND DISCUSSION

Table 1 gives the ages of the respondents which ranged from 19 years to 56 years with a mean and mode of

**Table1: Respondents' personal characteristics**

| Personal characteristics   | Frequency | (%)   |
|----------------------------|-----------|-------|
| <b>Age</b>                 |           |       |
| 19-30 years                | 20        | 21.05 |
| 31-40 years                | 22        | 23.16 |
| 41-50 years                | 38        | 40.00 |
| Above 50 years             | 15        | 15.79 |
| <b>Gender</b>              |           |       |
| Male                       | 79        | 83.2  |
| Female                     | 16        | 16.8  |
| <b>Education</b>           |           |       |
| No formal education        | 7         | 7.4   |
| Up to secondary level      | 7         | 7.4   |
| National diploma           | 20        | 21.1  |
| University education       | 61        | 64.1  |
| <b>Occupation</b>          |           |       |
| Farming                    | 8         | 8.4   |
| Students                   | 5         | 5.3   |
| Civil service              | 60        | 63.2  |
| Academic                   | 18        | 18.9  |
| Trading                    | 4         | 4.2   |
| <b>Occupational focus:</b> |           |       |
| 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

41 years, 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.

Table 1 further reveals that all the participants, apart from 14.8%, had educational qualification higher than secondary school thus implying that majority were able to understand what was discussed at the workshop. Majority (63%) were civil servants including those from the Ministry of Agriculture and Research Institutes, 24% from the academia and others from private organisations. Most (40%) of the participants were engaged in extension activities and it is hoped this would help create a spiral effect on biotechnology awareness. About 27% were researchers, 8.4% in farming, 17.2% in policy making and administration and the others involved in various agricultural related endeavours.

In Table 2, it is shown that 89.5% claimed to have heard about biotechnology with 21.1% having heard from radio, 24.2% from television, 40% from school, 31.6% from books and literature and about 17% from other sources. Most (81.1%) had favourable perception, 3.2% are of poor perception while others are neutral towards biotechnology. Also, 87.4, 90.5 and 91.6% agreed that biotechnology can help improve livelihood, agricultural health and environment and crop yields, respectively, while 81% agreed that biotechnology can help develop disease immunity and 91% indicated that it can help Nigerian farmers. These findings seem to suggest that

**Table 2: Pre-workshop awareness and perception towards biotechnology**

|   | Frequency | (%)   |
|---|-----------|-------|
| Heard of biotechnology before                       | 85        | 89.5  |
| <b>Source of awareness:</b>                         |           |       |
| 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  |
| <b>Perception towards biotechnology</b>             |           |       |
| Favourable  | 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               | 77        | 81.1  |
| Can be helpful to farmers.                          | 87        | 91.6  |
| Have concerns about biotechnology                   | 79        | 83.2  |
| <b>Areas of concern:</b>                            |           |       |
| Food safety   | 59        | 62.1  |
| Ethical concerns                                    | 11        | 11.6  |
| Cost/financial concern                              | 8         | 8.4   |
| <b>Heard of genetically modified crops:</b>         |           |       |
| Yes   | 79        | 83.2  |
| No  | 14        | 14.7  |
| <b>Will eat genetically modified food/products:</b> |           |       |
| Yes   | 64        | 67.4  |
| No  | 8         | 8.4   |
| Not sure  | 23        | 24.2  |

Source: Biotechnology workshop in Nigeria

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.

Most (83.2%) respondents have concerns about biotechnology with 62.1% bothered about food safety, 11.6% on ethical concerns and 8.4% on cost. On GM crops the awareness was high (83.2%) with 63.4% indicating readiness to consume GM crops, 22.1% being unsure and only 8.4% indicating they would not. 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.

After the workshop, participants were presented with questionnaire to determine the changes in their perceptions consequent upon the workshop presentation and discussion.

In Table 3, 83.2% of the respondents indicated the workshop met their needs. Generally, 82.1% felt the subject was adequately addressed while 11.6, 3.2 and 6.3% felt technical, regulatory and food safety issues, respectively, were not adequately addressed. In all, 88.4% had a better understanding of biotechnology as a result of the workshop. Also, 75.8% responded that their

Table 3: Post- workshop awareness and perception towards biotechnology

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

Source: Biotechnology workshop in Nigeria

concerns about biotechnology were allayed by the workshop while 86.3% affirmed readiness to consume GM crops and their products.

Before the workshop 67.4% of the respondents said they would eat food made from GM crops however, at the end of the workshop 80% of the same group of respondents indicated they will eat food made from GM 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 which then changed the disposition of the respondents towards GM crops. The test of difference on this item (disposition before and after the workshop) gave a t-value of 4.569 which was significant at 0.00 level.

### 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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