

NISEB 2010016/11104

Challenges to the transfer of agricultural technologies in Nigeria

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ABSTRACT: The main problem facing Nigeria today is not lack of technologies and scientific discoveries needed for economic growth and rural change, but that of converting them as instruments of economic growth and social change. The challenge of agricultural development to a great extent is dependent on the development of agricultural technology system (ATS) and its subsequent and sustained adoption by the farmers. There is a gap between research findings and what farmers practices. The problem has been linked to: the nature of the technologies, the technological transfer system socio-economic attributes of the farmers and local differences and peculiarities among others. Poor farmers in the developing countries, though suspicious to change, are not “happy peasants” who actually like being poor. The problem is not one of basic unwillingness to change; rather, it is one of reluctance to change if the risks of change are not adequately covered. It is not true that farmers in the traditional environment are always unable to evaluate new technologies correctly. In fact, it is often the “experts” who are ignorant and the traditional farmer who is wish. Unless the potential gains from a new technology more than offset the risks of low market prices and the probability of crop failure, it is perfectly rational for the farmer to reject the new technology if the potential gains are perceived to be relatively small. It is unlikely that the new method will be adopted, and this decision is perfectly rational in view of the risk involved. Thus a strong, effective and sustainable technological transfer system is one where institutions facilities flow of information, good partnership, and coalition between key actors over time.

Keywords: Technological Transfer, Farmers, Agriculture.

Introduction

Given the agrarian nature of the Nigerian economy, the fundamental condition for overall social and economic growth of the country is a dynamic agricultural sector, brought about by a steady increase in agricultural productivity, which is a product of technological change. Recent reports on agricultural products and food security change over the next quarter to half century all concluded that food production has to increase substantially (FAO, 1993) . unfortunately, over the years, the performance of the agricultural sector continue to be relatively on the decline. Several reasons advanced in literature for this include non-adoption of technological innovations by farmers.

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According to Torimiro, Adedoyin and Ala, (2000) the main problem facing the developing world today is not lack of technologies and scientific discoveries needed for economic growth and rural change, but that of converting them to instruments of economic dependent on the development of agricultural technology system (ATS). It is common knowledge that in many developing countries, there is a gap between research findings and what farmers practices. (Ajala, 1992). Sadly, many of these innovations are still resting on the shelf or at best poorly disseminated without institutional backing to sustain diffusion Jibowo (1992) noted that even when adoption takes place, that an individual may discontinue practicing the ideas. Discontinuation could be caused by many reasons such as poor yield owing to improper application of technology. Lack of continuity in programme delivery by agents and agencies, finance, among other things. The result is the tacit and tactful response of the farmers to their environment and resources to solves their perceived problems.

Traditionally, agricultural innovation system in Nigeria is characterized by a top down, centralized, monolithic and isolated structures. Linkages, interactions and learning mechanisms among the sub-systems/organization are notably weak and suffer from poor systemic coordination. Extension services are operated by a multiplicity of government departments and quasi-private organizations. (Madukwe and Anyanwn, 2000; Barshap and Langan, 1999). This system is not only loosely coordinated, but agricultural production and other related services are carried out by structurally differentiated agencies which are not suitable for effective supervision. Worse still, most often some actors are sidetracked and largely disconnected from the system and this negates institutional learning and capacity building. In addition, Qyeyinka (2003) observed that this system of innovation is characterized by rigidities in organization, sub optimal knowledge networks, path dependence, system failure, organizational ineffectiveness and institutional gaps. Thus a strong, effective and sustainable innovation system is one where institutional facilitate flow of information, good partnership, and coalition between key actors over time.

THE CHALLENGES TO THE NIGERIA AGRICULTURAL TECHNOLOGY TRANSFER.

The challenges to the transfer of Agricultural Technologies in Nigeria can be grouped into four broad categories viz:

1. The problem with the technology itself
2. The problem with the technological transfer system
3. Socio-economic attributes of farmers
4. Local peculiarities and differences.

1. The problem with the technology itself:

This problem has to do with the nature of the technology, its operation and practicability to the illiterate farmers, vis-avis what they are used to. In most cases, most technologies fail not because they are not good in themselves, but because they are difficult and complex for the farmer to manage. This view is supported by Anyanwu (1997). He reported that the speed with which an innovation is adopted depends on the characteristics or attributes of the innovations themselves. Most of the technologies are not accessible and affordable. When the technologies are accessible, in some cases they are not affordable. According to Agwu (2006), the cost and accessibility of agro-chemicals and fertilizers imposed great threat to the adoption of improved oil palm production technologies in Arochukwu.

These technologies are prepared undercontrolled environment and adapted to some specifics, under which they function optimally. In most cases these specifics are not explained to the farmers, when they are, these conditions are not being met by the farmers thus, the technology crashes and leaves the farmers worse off. An example is the near collapse of large scale chicken enterprise following the Structural Adjustment Programme in Nigeria. This made alternative production systems using improved strains of birds under the traditional extensive management systems imperative. This however has a major obstacle, namely, the facilities and special skills required for successful brooding of newly hatched improved chicks, which is not common among a majority of the rural poultry producers. (Ibe, 1999) other examples abound in the transfer of most of the agro-chemicals and improved breeds of seeds where some specified dosages and treatments must be ensured for optimal performance.

2. Problems with the technological transfer system:

By this, we mean the processes involved in the transfer of the technologies. In developing most technology, the farmers are not carried along, they are top down in nature, and the process of getting them is filled with a lot of rigidity and red tape, conditions the poor farmers can not cope with. Worse still, is the late arrival of these technological inputs at the stages in the production process when they would not be useful to the farmers.

3. Socio-Economic attributes of the farmers:

This has to do with the farmers personal characteristics and conditions around him that predispose him to adopting any technology some of these characteristics are;

Education: Education plays a very vital role in the process of technological transfer. An educated man understands and appreciate innovations better than an illiterate. Education enhances the behavioral changes; because it informs and leads to the understanding of complex material and values and use of innovation. Onu, (1991), Osuji (1983), Okoro (1991) and Ajala (1992) have reported a positive relationship between education and adoption. Obibuaku (1983) has also opined that a low level of education tend to foster unfavorable attribute toward adoption of improved technological practices. This therefore calls for the reappraisal of policy initiatives towards the educational needs of the farmer for better results.

Age: the age of the farmers has a lot to do with disposition to accepting or rejecting a technology. While some technology adoption favours the young farmers, the others favours the old. This is in line with the finding of Ozor and Madukwe (2005) that the younger rabbit farmers adopted improved rabbit technologies better than the old due to their interest in the animal.

Level of experience:- there is no gainsaying that the well experience farmer in a particular enterprise are always very much at home with technological adoption, since they are better risk managers than the inexperienced ones. Ozon and Madukwe (2005) also reported a positive relationship between years of experience and technological adoption.

Income and social status:- the financial position or reputation of a farmer plays vital role in his level of adoption of a technology. This is because he is financially well to do to hedge against risk or that he has a status to protect in the community.

Gender:- some technology are gender specific. It will not be wise and truthful to introduce a technology that disfavour the traditional norms of a society. By placing the role of the male in the hands of the women and vice versa, that would be a taboo. For example, how fruitful will a technology of an instrument that makes a woman to stand on the ground to harvest palm fruit be in a society. Where it is a taboo for a woman to cut palm fruit?. Such a technology will surely fail without proper orientation and sensitization belonging to social groups. The more social organizations a farmer belong to, the more likely he will be disposed to adopt new farm technologies. This view was supported by Lionberger (1968), when he noted that social group dynamics provides person with ready access to others with similar interest and problems where opinions can be sounded and trustworthy and advisors found people are usually influenced by the decision of others, which is why it is necessary to help farmers to form co-operatives that will facilitate their levels of technological adoption.

4. Local peculiarities and differences:

It is very difficult to cause a farmer to abandon his already established ways of doing thing no matter how primitive, for a so called better technology which he is not sure of. In addition, some of the technologies do not conform to the local differences and peculiarities. For example, a study by Agwu (2006) shows that only 22% of farmers in Arochuhwu adopted improved palm processing technology and Okoro (1990) reported a 19.2% adoption.

According to field observation by Agwu, the low level of adoption was a result of a perceived conflict in the traditional role of women in oil palm processing. This was because; the womwn who were entrusted with that responsibility were being displaced by the technology. This means that the total adoption of the

technology would displace the women, since they no longer have total control of the process and proceeds of the oil palm processing, as the technology is being operated by men. Therefore, notwithstanding the efficiency of the technology. It conflict with the traditional practices. Agwu (2002) also noted a low level of adoption of early maturity beans variety in Bauchi and Gombe State of Nigeria. This was because the maturity coincided with the peak of the rainy season (August to September). This entails frequent visit to the farmers, to pick the pods, as they would rot away if they were not picked. It also entails the use of pesticide to prevent pest attack. This practices conflicts with the qualities of the variety the farmers were already used to which matured at the pick of the dry season and require very little or no insecticide. It is also harvested at their convenience the seeds will not be rot easily.

IMPLICATIONS

It is therefore obvious that for a farmers to adopt an innovation the characteristics of not only the technologies, but also that of the farmer the environment and methods of information dissemination that influence the response of the farmers to the adoption processes are very necessary. Contemporary issues in agriculture have revealed that agricultural development is not just a matter of economics. Economics who base their policy advice on growth models emphasizing capital formation take too many things for granted by assuming that other factors are held constant, which can never be, because of the peculiar nature of man and nature that are never static but are highly unpredictable and stochastic. Those who assume that every farmers is a rational economic being, who respond quickly and predictably to marginal price incentives, ignore the very imperfect nature of factor and product markets in developing countries and the lack of information necessary for these market to function smoothly. The inability of our local farmers to respond swiftly to the so called professional advice has made economists to use various derogatory words to qualify our local farmers, who have been, are and will continue to be the man power base of our agriculture. Even before the oil boom when agriculture placed Nigeria economy is a competitive tract with many developed countries of the world.

Most of or extension agents are unaware of local peculiarities in land tenure arrangement, water right, customs, religious beliefs, and other local traditions. Some times their advice is rejected because, traditional farmers know more about local soils, rainfall patterns, pests, and diseases, etc, than the visiting "expert", so failure to adapt these innovations to suit these local difference leads to, not only failure, but total rejection by the local farmers.

Inducing farmers to change requires among other things, agricultural research and a skilled extension serves to transmit research results directly to farmers. Academic training for extension agents is not enough. Even an illiterate farmer can sport an inexperienced agronomist, who has no feel for rural life. Farmers are not likely to place much trust in a technician who has little on-farm experience, neglects to consider regional and local specific differences in soils, rainfall, or pest problems and shows little respect for local traditions and values.

Our local farmers are therefore rational.

Poor farmers in the developing countries, though suspicious to change, are not "happy peasants" who actually like been poor. The problem is not one of basic unwillingness to change; rather, it is one of reluctance to change if the risks of change are not adequately covered. It is not true that farmers in the traditional environment are always unable to evaluate new technology correctly. In fact, it is often the "experts" who is ignorant and the traditional farmer who is wise.

For example, intercropping system employed by small farmers are often ignored because of the widespread but erroneous belief that total productivity is always highest with pure stands, not when several crops are grown simultaneously on the same land. The "expert" may not realize, for example, that the farmer places a high value on food security, which can be provided by inter-planting a variety of a subsistence crops one or more small plots. Concentration on a single cash crop, which the "expert" might recommend can force the farmer to go into debt and to face an uncertain market (and price) for his or their products. In the event of crop failure, farmers are left with insufficient supply of homegrown food and few resources to purchase food in the market place. Unless the potential gains from the cash crop (or new technology) more than offset the risks of low market prices and the probability of crop failure, it is perfectly rational for the farmer to reject cash crop and the new technology associated with them. situation, the "expert" who thinks that inter planting is always a bad practice is the real obstacle to change.

When a substance farmer sees that the potential gains form new crops, technology or technologies outweigh the risks, tradition per se is not likely to be major stumbling block. Evidence from around the

world on farmer's decision-making processes has led to widespread agreement among social scientist on the "economic rationality" of traditional farmers.

If farmers are to adopt new technology, they will either have to borrow money to purchase modern inputs or have to commit more of their own resources to their farm operations. In either case they stand to commit more of their own resources to their farm operations. In either they stand to loose more in the event to crop failure, than under traditional methods of production. Since they will be ill- at-ease with the new technology for a few crop circles, they must have some assurance that success with the new technology will provide them significantly higher income than they would they will receive under traditional methods of farming. If the potential gains are perceived to be relatively small. It is unlikely that the new method will be adopted, and this decision perfectly rational in view of the risk be better decision makers that government advisers. If the farmers are relatively far from transportation is expensive and difficult, if there are no good storage facilities with guaranteed power supply and if there are no good processing facilities, no rational farmers will adopt a technology that will make him poor by wasting his resources to produce what he can not sell. In addition, if the price of cash crop is low, they will concentrate on substance crops. When access to market improved (eg with construction of an all weather road) or the price of an annual cash crop rises, they will shift to crops destined for the market. The great majority make such changes without access to bank credit, relying on their own savings (often held in form of livestock) or borrowing from private money lenders in what is called the "informal or non-institutional" credit market.

In summary, what appears to be a technological problems is not quite as simple as that, the adoption of a new technology is intimately tied up with the supply of credit, the land tenure structure, the availability of foreign exchange, socio-cultural, economic and agronomic factors, etc. modern technology alone then is not the key to successful agricultural development but the pragmatic integration of the above variables policy recommendation.

From the ongoing, it therefore follows that, for effective and efficient technological transfer, all the social actors-village leaders, farmers, researchers, aid official extension agents, traders, government agents/officials, institutions, policy makers etc, have to work in concert. These action according to Crumb (2000), have to maneuver, negotiate, organize, cooperate, coerce, obstruct, form collisions, adopt an adapt within a specific geographical and historical context. These claims of actions, influence policy, leading to improved technology development dissemination and incorporation in to farming systems and many of the actors may be made better off. This view point is in line with the opinion of Biggs and Smith (1998), that the rural development interventions involves a variety of social actors with divers histories and agenda from both within and beyond rural communities, according to Biggs (1990), technological development is an actor-oriented process, a complex, multithreaded and multidirectional process, involving many actors other than scientists in the formal research system. Moreover, the emergence of a particular technology depends not only on its scientific merits but also on the actions of "development coalitions" or loose grouping of actors who combine their resources to push for a particular or path of technical change. While it is appropriate to evaluate a given technology in itself, the result often lead to an incomplete account of what it takes to succeed in technology development. This typically involves networking, advocacy, lobbying, and other activities which can be called "coalition bundling". These activities are often excluded from conventional accounts of technology development. Policy coordination is the key to successful and profitable development efforts.

In their own view, Crowder and Anderson (1997) opined that major actions are required to improve agricultural technology systems; shifts in research, extension and education priorities, policies, functions and funding changes in the organization, staffing and management of institutions; and development of strong multilevel links among these organizations and with farmers.

Therefore, a project intervention needs to be recognized as a part of an ongoing, continually renegotiated social process, not simply the execution of a pre-specified plan of action with expected outcomes. Moreover, any technology dissemination activity takes place in a specific, historical, political and economic, agro climate and institutional context. The influence of these contextual factors may be crucial in determining the outcome of a particular project.

Conclusion

The adoption of any technology depends on the characteristics of the technology and the transfer system with respect to the speed of awareness and application, the socio-economic attributes of the farmers, the characteristics of the individual production system and the environmental peculiarity of the farmers.

Efforts to increase the rate of adoption of any technology therefore, should include among other things, the study of the socio-economic environment of the farmers in order to take good advantage of their uniqueness and diversities to promote adoption.

A critical look at the Nigerian technological transfer system reveals that it requires that government foster linkage mechanisms, both public and private can overlap. It also means establishing vertical and horizontal links at multiple levels. This according to Kids (2002) and Byerlee (1998) will lead to the emergence of holistic, cross sectoral, and integrated approaches to planning and implementation, and institutional capacity building in the system. Sustainable agricultural development will continue to elude Nigeria except suitable and different kinds of information and agricultural technologies are effectively transmitted and sustained. On a general note, Idachaba (1995) stated that there are enough packages on the technology shelf and the missing link in an effective agricultural extension system to disseminate available technologies.

References

- Agwu A.E. (2006) Adoption of improved oil palm production and processing technologies in Arochuku L.G.A. of Abia State, Nigeria, *Agro-Science Journal of Tropical Agriculture, Food, Environment and Extension*, Vol. No 1 pp. 26-35.
- Ajala A.A. (1992) Factors Associated With Adoption of Improved Practices By Goat Producers in Southern Nigeria. Dept. of Agric. Extension University of Nigeria, Nsukka.
- Anyanwu A.C. (1997) Agricultural technology transfer for sustainable rural development. In E.C Eboh, C. Okoye and D. Ayichi (eds), *Rural Development in Nigeria, Concepts, Processes and Prospects*. Enugu Auto-Century Publishing Company, Nigeria 126-134.
- Barshap, A.C. and R.D. Lagan (1999) Strategies for Effective Agriculture Extension in Nigeria, Paper Presented at National Workshop on Agriculture and Rural Development in the New Millennium. VOM December, 8th, 1999.
- Bennet C.F. (1992) Meeting public and users needs through the generation and adoption of practices and technologies an inter dependence model and implication. In US Department of Agriculture, *Extension Services Co-operative Extension Roles and Relationships for a New Era*. Washington, D.C. USA.
- Biggs, S.D. (1990) A Multiple Source of Innovation Model of Agricultural Research and Technology Promotion. *World Development* Vol 18, pp 1499.
- Biggs, S.D. and G. Smith (1998) Beyond Methodologies: Coalitions Building for Participatory Technology Development. Vol 26, pp 239-248
- Byerlee D. (1998) The Search for a New Paradigm for the Development of National Agricultural Research System: *World Development* Vol 26:6:10941-55.
- Cram R.A. (2000) Processes affecting the successful adoption of new technologies by small holders. In Hacker, B. (ed) *Working with Farmers the key to the Adoption of Forage Technologies* pp11-22 No AUAR Proceedings No 95. Canberra: Australian Center for International Agricultural Research. Creating a Trading System for Development, World Bank, Washington, DC.
- Crowder, L. and J. Anderson (1997) Linking research, extension and education: why is the problem so persistent and pervasive? *European Journal of Agricultural Education and Extension*, 3:4: 17-21.
- Food and Agriculture Organization FAO (1993) *The State of Food and Agriculture*: Rome.
- Ibe, S.N. (1999) Livestock Production in the South Eastern Zone; Prospects and Strategies in the New Millennium. Proc. Of the 14th Annual Farming Systems Research and Extension Workshop in South-Eastern Nigeria, Umudike, 9-12, November, pp 12-24.
- Idachaba, F.S. (1995) Food for All Nigerians. Is there Hope? Alumni Lecture; University of Ibadan, Nigeria.
- Ikeme A. I. and P.O Uvere (1995) Mobilizing indigenous technology for agricultural development. In E.C. Eboh, C. Okoye and D. Ayichi. *Rural Development in Nigeria, Concepts Processes and Prospects*. Enugu. Auto-century publishing company, Nigeria.
- Jibowu A.A. (1992) *Essentials of Rural Sociology* Abeokuta, GBEN SODIPO Press Ltd.
- Kidd, J. (2002) *Agricultural and Rural Livelihood: Is Globalization Opening or Blocking Parts Out of Rural Poverty?* Agricultural Research and Extension Network Paper No, 121 ODI, London.
- Lionberger, H.F. (1968) *Adoption of New Ideas and Practices*, 6th (ed) Iowa State University, Ames Iowa, U.S.A.
- Madukwe M.C. and A.C. Anyanwu (2000) The challenges of Nigeria agricultural extension in the 21st century. *Journal of Tropical Agriculture Food, Environment and Extension* Vol 1:185-90.
- Njoku Z.C. (1995) Sustainable rural development in Nigeria: A challenge for education in science and technology. In E.C. Eboh, C. Okoye and D. Ayichi (eds) *Rural Development in Nigeria, Concepts, Processes and Prospects*. Enugu, Auto-century Publishing Company, Nigeria.

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- Obibuaku, L.O (1983) *Agricultural Extension, a Strategy for Agricultural Transformation*, University of Nigeria, Nsukka.
- Okoro F.U. (1991) *Factors Influencing Adoption of Improved Oil Palm Management Practices Among Small Holders In Imo State*. A Ph.D Thesis, Department Of Agricultural Extension University Of Nigeria, Nsukka.
- Osuji L.O. (1983) Institutional factors associated with adoption of new farm technologies among farmers in Eastern Nigeria. *The Nigerian Journal of Agricultural Extension* 1:2, 43-53. Oyeyinka B.O.
- Ozor N. and M.C. Madukwe (2005) Obstacles to the adoption of improved rabbit technologies by small scale farmers in Nsukka local government areas of Enugu State. *Agro-Science Journal of Tropical Agriculture, Food, Environment and Extension* Vol 4:1pp 70-73.
- Sumberg, J. and C. Okali (1997) *Farmers' Experiments; Creating Local Knowledge*. Boulder and London: Lynne Rienner.
- Torimiro O.O., S.F. Adedoyin, and J.A. Alu (2000) Forms of Communication Used for Strengthening Agricultural Technologies Dissemination in Ogun State Agricultural Extension and Poverty Alleviation in Nigeria, a Proceedings of the 6th Annual National Conference of the Agricultural Extension Society of Nigerian 10th-12th April Pp. 183-184.