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COMPARATIVE ANALYSIS OF THE AGRO-TECHNOLOGY GENERATION AND TRANSFER SYSTEMS OF UNIVERSITY AND AGRICULTURAL DEVELOPMENT PROGRAMME IN NIGERIA

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ABSTRACT

This study comparatively analysed technology generation and transfer practices between the extension systems of ADP and university in Nigeria. It is part of a larger study which analysed the agro-technology transfer systems of ADP and University in Nigeria. Four states namely, Benue, Kaduna, Ogun and Osun were purposively selected. Two hundred and eighty four randomly selected extension staff made up of two hundred and twenty from the ADP and sixty four from the university made up the sample size for the study. Questionnaire was employed for data collection, while t-test was the statistical tools adopted in analyzing the data. The findings show that the university had greater autonomy in agro-technology generation than the ADP. However the ADP involved farmers in their field research trials than the university. On technology transfer, the university grouped farmers and targeted them with programmes based on need more than the ADP. The ADP system had better knowledge of rural dynamics than the university system. The ADP had poor staff training facilities and provided inadequate training incentives to staff compared with the university which had better training facilities and provided competitive incentives to extension workers. The paper recommends restructuring of the ADP and university extension systems, such that each will concentrate on the areas it has greater comparative advantage and complement each other.

Key words: Agro-Technology Generation, Transfer, Agro-Systems

INTRODUCTION

Background Information

Nigerian agricultural extension policy for nearly two decades after independence emphasized transfer of technical information on specific cash crops using regional Ministries of Agriculture (MOA) in the North, West and East. The period saw the establishment of the Institute for Agricultural Research (IAR) in the North, Moore Plantation in the West, and the National Root Corps Research Institute (NRCRI), Umudike in the East. Consequent upon states creation in 1968, the federal and states MOA assumed agro-technology transfer functions until the 1976 local government reform which gave specific agricultural extension functions to Local Government Councils (Mijindadi, 1983; Obibuaku & Madukwe, 1991). However, the MOA was highly centralized while Local Government Councils (LGCs) were defective because of poor job descriptions, absence of staff mobility and lack of extension staff training and contacts with farmers (Madukwe, 1996). Further reforms of the Nigeria's agricultural policy gave rise in the seventies to the involvement of

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Universities and Agricultural Development Projects (ADPs) in agro-technology transfer to the farmers.

Initially five conventional universities namely: Ahmadu Bello University, Zaria; University of Ibadan, Ibadan; University of Ilorin, Ilorin; University of Nigeria, Nsukka; and Obafemi Awolowo University, Ile-Ife were involved. Later the University of Agriculture policy was initiated in 1988 to amplify the efforts of conventional universities in agro-technology transfer services to farmers. This led to the establishment of a University of Agriculture at Makurdi, Abeokuta and Umudike. Currently, the ADP and University are the prominent government funded extension systems in Nigeria.

An agricultural extension system indicates extension practice with identifiable organisational structure linked to institutionalized source of new technologies and independent staff with appropriate channel for disseminating research information to end users (Madukwe, 1995). A viable agricultural extension system has technology generation and technology transfer as crucial sub-systems with notable indices of success. The success indices of viable technology generation and transfer components of an extension system include; constant creation of technical knowledge, field driven technologies and harmonious existence with other agencies (Ogunfiditimi and Ewuola, 1995). Others include; farmer participation in management of field trials, extension staff training and contacts, user participation and control in technology transfer and provision of information on necessary farm inputs (Mijindadi, 1994).

The Problem

Over the years little progress has been made in achieving agro-technology transfer objectives despite internal and external financial support. With declining external funding there is a rethinking of the role of these multi-agro-technology transfer systems and a growing global interest in strengthening agro-technology transfer agencies.

To what extent have the ADP and University developed the indices of successful agro-technology transfer systems in their technology generation and transfer operations? Available research reports have blamed ineffectiveness of past agricultural extension systems in Nigeria on inadequate orientation of research towards utilization and lack of appropriate linkage between research, extension and training (Ajala and Madukwe, 1992; Madukwe, 1996).

The ADP use the Training and Visit (T & V) strategy with focus on improving the knowledge and skills of small holder farmers, using technology generation and transfer techniques on state-wide coverage. On the part of the university, emphasis is on generating relevant agricultural technologies within their faculties of agriculture and transferring these technologies to farmers at selected farming communities. What comparative advantages exist between the university and ADP in technology generation and transfer practices? Policy makers are likely to give sustained support for extension systems of ADP and university if operational modalities are drawn up for each service based on the necessary framework for addressing national policy for agro-technology transfer. The foregoing situation raises the following pertinent questions. What are the practices adopted by the University and ADP in sourcing and disseminating agro-technology information?. What policy lessons could be learned from the approaches of the ADP and University extension systems to enhance the development of a national agro-technology transfer policy that will ensure the effectiveness and efficiency of the agro-technology transfer process

The overall purpose of this study was to comparatively analyse the technology generation and transfer processes between the extension systems of ADP and university in Nigeria. Specifically, the objectives includes to:

1. compare the technology generation procedures of the ADP and university;

2. compare the technology transfer practices of the ADP and university; and

3. identify necessary extension policy issues, to ensure the effectiveness and efficiency of the agro-technology transfer process.

METHODOLOGY

Population and Sample

There are thirty seven (37) ADPs in Nigeria; one in each of the thirty six states and the federal capital territory, Abuja. In addition there are seven federal universities with agricultural extension outreach programmes. The seven federal universities include: the Ahmadu Bellow University, Zaria, the University of Agriculture, Abeokuta; the University of Ibadan, Ibadan,, the University of Ilorin, Ilorin; University of Agriculture Makurdi; the Obafemi Awolowo University, Ile-Ife and the University of Agriculture, Umudike. All the staff of the ADPs and the identified universities constituted the target population. To enhance comparison, states that have the two systems were selected. Consequently, the study purposively selected four states namely; Benue, Kaduna, Ogun and Osun. The following institutions were selected from each state

Benue (Benue State ADP, and the Federal, University of Agriculture, Makurdi)
Kaduna (Kaduna State ADP, and the Ahmadu Bello University, Zaria)
Ogun (Ogun State ADP, and the Federal University of Agriculture, Abeokuta)
Osun (Osun State ADP, and Obafemi Awolowo University, Ile-Ife)

The basis for the selection was the existence of universities with extension-farmer outreach programmes and their representation of three major agricultural zones in Nigeria namely; south west, central and north east. From each university the Director of the extension-farmer outreach unit, three departmental staff (one from research and two from extension services) and twelve extension advisers at field level were selected. Thus, sixty four (64) university extension workers were involved.

From the ADP, three core Sub-programmes at the headquarters namely, extension, technical and rural institution development and one support sub-programme namely, administration were involved. At the zonal level three Zonal Managers (ZMs), three Zonal Extension Officers (ZEOs) per state and three Subject Matter Specialists (SMS) per zone (Agronomy, Women-in-Agriculture and Livestock) were selected. At the block level six Block Extension Supervisors (BESs) per selected zone and six Extension Agent (EAs) per zone made up of one EA per block were selected. Thus, fifty-five (55) extension staff per state ADP, which gave a total of two hundred and twenty (220) ADP extension staff participated in the study.

Data Collection and Analysis

Questionnaire was used to collect primary data from workers of the two agencies between November, 1998 and February, 1999. The questionnaire sort information from the respondent on their assessment of the technology generation and technology transfer practices of the agencies they serve. The questionnaire used a five point Likert type scale in assessing the extent to which the issue investigated existed in each agency. Specific issue in which data were collected on technology generation include: autonomy in technology generation that is, the extent to which each agency had freedom (non-interference from outside the agency) in identifying farmers problems and taken steps to develop a solution; extent to which technology generation effort is based on farmers real problems; extent to which farmers participate in the management of technology generation; extent to which frequency of technology generation activities keep pace with the frequency of identification of farmers field problem; extent to which adaptive research trials are located in farmers farm. Others are extent to which extension agents were involved in management of field trials; provision of research

facilities and incentives to workers; distance between research institutes and technology transfer agencies and extent of farmers participation in financing adaptive research trials. Similar approach was used in collecting data on technology transfer issues.

Group t-test was used to compare the two systems on each of the items of agro-technology generation and transfer.

RESULTS AND DISCUSSION

Comparison of agro-technology generation practices of ADP and university

Based on the assessment of extension staff of these agencies, the results show a significant difference (t =2.03) in the level of autonomy enjoyed by the ADP and university in generating agricultural technology (Table 1). The university (4.26) had greater freedom in generating agricultural technology than the ADP (3.52)

Autonomy in the generation of agricultural technology has been identified as a major index of success in agricultural development (Blum, 1991; Madukwe, 1996). The higher the autonomy in operations, the greater the capability of an extension system to meet the desired targets. Autonomy in technology generation means independence, non-interference with problems identification, and uninterrupted technology design and supply services. Comparatively the university had greater freedom than the ADP in agro-technology generation.

Also ADP and university differed on the extent to which their technology generation activities were oriented to farmers field problems (t=1.80). Orientation of technology generation towards farmers' field means directing research activities towards addressing the immediate and pressing field problems of farmers. Such technology generation effort is provided in such a way as to be cost-effective with minimum adverse effect on farmers environment . The foregoing analysis indicates that the ADP (4.05) had limited orientation towards the farmers' fields in technology generation compared with the university (4.43). This finding conforms with expectation of earlier reports which noted that the ADP basically was involved in technology testing and adaptation trials only (Madukwe, 1996). Orientation of technology generation efforts towards farmers fields will ensure that new technologies evolve from farmers field problems which is an index of appropriate technology. Thus, the university could utilize ADP techniques of technology testing to achieve well articulated problem identification and strengthen technology generation to meet farmers needs.

Other areas of discrepancies in technology generation between the extension systems of ADP and university include; levels of farmers participation in field trials (t=1.78); and extent technologies generation procedures keep pace with current field practices (t = 1.67). Farmers participation in field trials contributes largely to orientation of technologies towards sustaining farmers interests in extension activities. This practice no doubt, ensures that technology evolve from current problems. Orienting agro-technology towards field practices is a facilitating measure towards achieving success in extension activities. The indication was that farmers had limited participation in field trials under the university extension system (3.52) compared with the ADP (4.0).

Also the university differed with the ADP in the distance between research institutes generating technologies and the technology transfer sub-systems of the agencies (t=2.17). The ADPs were located farther from research institutes generating the bulk of the technologies they transferred compared with the universities. The ADPs depended on distant research institutes as source of agro technology compared with the universities, which basically sourced relevant technologies from their academic departments. The physical distance between the location of the agency for technology generation and the location of the agency for technology transfer of any agricultural extension system, no doubt, increases the cost and time of providing technical information to the participating farmers. The

Table 1: Differences in technology generation practices between ADP and University.

TECHNOLOGY GENERATION PRACTICES	Means indicating level of existence (max = 5)		t-cal
	ADP	University	
Autonomy in technology generation.	3.54	4.26	2.03*
Technology generation based on field problems	4.05	4.43	1.80*
Farmers participate in field research trials.	4.0	3.52	1.78*
Technology generation activities keep pace with current field practices.	3.76	3.32	1.67*
Adaptive research trials are located in farmers field.	3.17	2.84	1.18
Extension agents participate in field research trials.	4.20	3.89	1.09
Adequate research facilities and incentives to workers.	3.89	2.84	1.18
Distance between technology generation and technology transfer components.	2.89	2.21	2.17*
Farmers co-finance adaptive research trial.	1.82	1.63	0.67

*P < 0.05.

analysis shows that agricultural technologies generated in the university would be more available to the participating farmers compared to the ADP which would involve longer period and higher financial cost in sourcing technologies from distant research institutes.

Data show that the ADP and university did not differ on practices such as siting adaptive research in farmers field (t=1.18); and involving extension agents in management of field trials (t=1.09); Others include; provision of adequate research facilities and incentives (t=1.18), and farmers participation in financing adaptive research (t=0.67). Location of adaptive research in farmers field no doubt, demands extension agents involvement in research management in order to establish the desired targets. In addition, provision of necessary research facilities and incentives contributes largely to effective involvement of the extension agents and overall participation of farmers in financing adaptive research activities. Thus, the analysis indicates that the extension systems of ADP and university in Nigeria have indices identifiable in a successful agricultural extension system. The areas of discrepancies and similarities indicate critical policy issues for consideration in order to achieve the desired harmonization and unification in technology generation between ADP and university in Nigeria. One such policy issue is the autonomy of agro-technology transfer institutions and systems in generating technology. The enhanced autonomy of the university system in technology generation should be used to advantage by making each state ADP part of a university in the state. This will also ensure that field problems of farmers form the basis for technology generation of university research and that farmers participate in the management of field trials in the university technology generation efforts. This policy thrust will also remove the problem of cost and delay introduced in technology generation by the physical distance between research institutes and technology transfer systems under the present arrangement.

Comparison of Agro-technology Transfer Practices of the ADP and University in Nigeria

The analysis (Table 2) indicates some similarities between university and ADP on technology transfer issues such as: use of farmers

local communication channels (t=0.61); and adoption of in-house staff training (t=0.10). Others include; involvement of personal contacts (t=1.36); use of demonstration methods (t=1.26); and use of print and electronic media (t=1.03). Involvement of farmers organisations no doubt, enhance employment of existing communication, while adoption of in-house extension staff training enhance staff learning and indeed competencies in the contact strategies necessary in achieving effective agricultural technology transfer to the farmers. This type of learning by firms and technology transfer agencies has been identified as the key to effective transfer and diffusion of innovative capability (Mylelka and Tesfachew, 1999).

Table 2 shows that ADP and University differed in categorising farmers for technology transfer (t = 2.16); extension orientation towards clients (t = 1.87); involvement of external training (t = 3.75); and use of appropriate training facilities (t = 2.71). The analysis indicates that university (3.67) significantly used farmer categorization strategy in technology transfer compared with the ADP (3.0). In other words, technology transfer practices were more oriented towards meeting the farming needs of farmers under the university than under the ADP.

Categorisation of farmers into groups for technology transfer is an important survival strategy for agro-technology transfer agencies. Categorisation means organising farmers according to similar farming patterns and socio-cultural interest for the purpose of transferring agricultural technologies that meet their specific needs.

The analysis also indicates that university and ADP differed in the provision of training incentives to their extension staff (t = 3.33); and extension staff knowledge of rural dynamics (t = 2.71). The analysis shows that universities provided higher training incentives to extension staff (3.42) compared with the ADP (3.39). However, the ADP extension workers indicated higher knowledge of rural dynamics (4.16) compared with the university (3.37). We recommend that the extension system of universities should take complete responsibility for extension staff training, while the ADP could utilize her rural orientation and concentrate efforts

Table 2: Differences in agro-technology transfer practices between the ADP and university.

TECHNOLOGY TRANSFER ISSUES	Means indicating level of existence (max = 5)		t-cal
	ADP	University	
Involve farmers organisations.	4.03	3.34	0.72
Categorising farmers according to needs.	3.0	3.67	2.16*
Orienting extension services to suit client interests.	4.02	3.57	1.87*
Disseminating technology through farmers existing communication channel	4.16	4.05	0.61
Adopt short in-house staff training.	3.65	3.63	0.70
External training of extension staff.	3.61	2.36	3.75*
Availability of appropriate staff training facilities.	3.37	4.16	2.71*
Provision of training incentives to staff.	3.39	3.42	3.33*
Emphasis on personal contact with farmers.	4.41	4.05	1.36
Extent of use of demonstration methods.	4.39	4.05	1.26
Use of print and electronic media.	3.06	2.74	1.03
Knowledge of rural dynamics.	4.16	3.37	2.71*

*P < 0.05

on extension contacts with the farmers. The recommendation implies that the university should strengthen their training arrangement and facilities, while the ADP improve on sponsorship of staff to training and payment of necessary incentives to the field staff.

CONCLUSION

This study comparatively analysed two sub-systems in implementing an extension system namely; technology generation and transfer sub-systems of the Agricultural Development Programme and university in Nigeria. Considering the areas of comparative performance between the ADP and university in technology generation and transfer, we conclude that the ADP may take over complete responsibility for field extension activities. The university in turn could absorb the ADP as her implementing arm while concentrating on technology generation and linking with other research institutes. This conclusion is based on the finding that the extension system of University had higher quality research personnel and better training facilities compared with the ADP. Thus the university could take complete responsibility of technology generation, while the ADP complement the crucial technology generation of the university by providing the necessary field extension workers to participate in problems identification and management of field trials. This implies streamlining the functions of the ADP extension workers and assigning purely extension duties to extension staff and improving the working conditions for ADP staff.

Examined as an agro-technology system the linkage between technology generation and technology transfer sub-systems was weak in the ADP system and strong in the university system. The ADP as an agro-technology transfer system (established in the eighties) is a relatively younger organisation compared with the cooperating technology generating agencies (established in the sixties). Our observation points to the difference in the age of the agencies as an important issue that reduced cooperation between the sub-systems. In the university system which showed a strong link between the technology generation and transfer sub-systems, this difference in age does not exist.

One other policy issue that played a role in weakening the link between the technology generation and transfer subsystems of the ADP was the differences or non-synchronisation in the period of funding. The ADP came into existence with liberal external funding from the World Bank at a time the Structural Adjustment Programme was adversely affecting the capability of the research institutes to generate agro-technology. This introduced some differential or dis-equilibrium within the agro-technology system of the ADP. A holistic approach to developing or restructuring an agro-technology system rather than dealing with each sub-system is an important policy option. The growing knowledge-intensity of agro-production at rural farm level puts a premium on a simultaneous support of agro-technology generation and transfer sub-systems or institutions.

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