Constraints and Strategies toward Effective Cost-sharing of Agricultural Technology Delivery in Nigeria: Perception of Farmers and Agricultural Extension Personnel[1]

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Abstract

Providing adequate and stable funding for agricultural extension service in Nigeria has been a major problem since the expiration of the World Bank's funding arrangement. In order to solve this problem, cost-sharing of agricultural technology delivery is seen as a tenable privatization policy option. Considering the fact that agricultural technology transfer in Nigeria has mainly been publicly funded, introducing cost-sharing arrangement is expected to meet some obstacles. Hence, this study ascertains the perception of farmers and extension agents on the constraints and strategies towards effective cost-sharing of agricultural technology delivery in Nigeria. The study was carried out in six geopolitical zones of Nigeria. Multistage random sampling technique was applied in the selection of respondents. A sample size of 267 farmers and 272 Agricultural Development Programme (ADP) staff participated in the study. Means, standard deviation, exploratory factor analysis and t-test statistics were used in realizing the objectives. The results show that the major constraints to effective cost-sharing of agricultural extension service in Nigeria are weak institutional development, extension system lapses, lack of cooperation by farmers, uncertainties experienced in agriculture, conflicts and corruption. The major strategies for effective cost-sharing arrangement include building political support for cost-sharing, establishment of farmers' cooperatives to serve as avenues for collection of payments, creating enabling legislation for cost-sharing and increasing the number of extension staff. The study recommends proper dissemination of information on cost-sharing before implementation, creating enabling legislation, decentralizing extension system and building the capabilities of extension staff.

Keywords: Cost-sharing, agricultural technology delivery, constraints and strategies, Nigeria

[1] Acknowledgment: This research was supported with a grant from the African Technology Policy Studies Network (ATPS).

Introduction

Agricultural technology delivery, the main activity of the agricultural extension programme in Nigeria, as in many developing countries, is on the brink of collapse. Out of the six extension programmes that operated in Nigeria in the last thirty years, only two, River Basin Development Authority and the Agricultural Development Programme still exist and are being operated in limited scopes. The weak level of technology component of agriculture in Nigeria is manifested in the dismal performance of the agricultural sector and deepening poverty. Report from the Central Bank of Nigeria and the National Population Commission indicates that while the Nigerian population has been growing at 3% per annum, food production has been increasing at only 1.5% per annum in the last five years. In addition, 70% of Nigerians are living below poverty line (United Nations, 2003).

The problem of agricultural extension and indeed technology delivery became prominent with the expiration of the World Bank component of the agricultural extension funding arrangement. Withdrawal of funding and fierce competition for resources from the national budget among different economic sectors has substantially reduced the funding available for agricultural technology delivery in Nigeria. Anderson and Feder (2003) observed that "despite the fact that public financing for extension is often justifiable, the general trend towards fiscal restraint and a reduced role for the public sector has led to financial crises in many extension services" (p. 9). Since the late 1990s, inadequate funding has led to the virtual collapse of research and extension institutions that provided services to small farmers and rural communities in Nigeria (Omotayo, 2004). For example, average available funds for Ogun State ADP fell by about 20% as the State and Federal Government exhibited reduced commitments to the funding of the ADP (Adebayo, Idowu, Omotayo, Olunuga, & Apkantaku, 1999). In addition, Enugu State Agricultural Development Programme (ENADEP) audited account (2002), shows that the amount available to ENADEP in 2002 (3.9 million), when compared to that available in 1993 (9.3 million), fell by 5.4 million (57.61%). Considering that improved technology delivery in Nigeria's agriculture is the veritable means of bringing about improvement in the current levels of agricultural production and resource productivity, promoting technology delivery is imperative.

Several researchers (Adebayo et al., 1999; Agwu & Chukwuone, 2005; Ikpi, 2002; Ogunbameru, 2005; Omotayo, 2004) have shown that one of the major lessons learned from the past extension programmes in Nigeria is that it is not possible for government alone to support extension programme in all its ramifications. The private sector needs to play a more active role in both funding and the physical transfer of the available improved technologies. In pursuance of more private involvement in agricultural technology delivery, some innovative mechanisms, derived from the Nigerian government stance on privatization policy, are being considered. In this regard, cost-sharing is seen as a tenable privatization policy option. Cost-sharing is a system where beneficiaries of services pay user fee. It is a privatization strategy, which entails paying a fee for services, and advice, which formerly was free of charge (Rivera & Cary, 1997). It is similar to partial commercialization, which involves the reorganization of public enterprise and the introduction of commercialization principles into the enterprise operation, such as user charges, with the aim of realizing funds for the enterprise (United Nations, 1995).

Theoretical Framework

The theoretical basis of cost-sharing is the new institutional economic theories, specifically, transaction cost theory. Transaction costs are economic equivalent

of friction in physical terms. The transaction cost theory, (Coarse, 1960) compares the cost of planning, adapting, monitoring, coordination and enforcement of contracts under alternative governance structures. Transaction costs are more pronounced in institutional arrangements that foster less competition, for example, institutions that are completely controlled by government bureaucracy and private involvement are not encouraged. Under such conditions, especially when the institutions are weak, opportunistic and counterproductive behaviours abound thus increasing transaction costs. However, when supply of services is competitive, transaction costs are low. Therefore, institutions that evolve to lower transaction costs are the key to the performance of economies (Meier, 1995).

In Nigeria, like in most developing countries where institutions (economic, political and legal) are weak and opportunistic, counterproductive behaviours (corruption, cheating and rent seeking) abound. These have led to marked increases in transaction costs thus weakening service delivery. For example, due to poor funding, funding instability and the activities of corrupt officials, extension agents, are not paid their salaries for months; materials for fieldwork and transport facilities, which were formerly provided, are no longer available. Even when they are provided, the materials do not get to the field workers but are diverted by corrupt officials. All these have increased the cost of monitoring and dissemination of technology to farmers as government incurs additional expenses in order to reach farmers. Increased transaction costs coupled with dwindling funds have made government to stop some extension services thus leading to decreased food production. Therefore to reduce transaction cost and increase performance, there is a need to make agricultural technology delivery demand driven. This can be achieved through cost-sharing. Cost-sharing of agricultural technology delivery in Nigeria between farmers and extension agencies would help make the market competitive, involving private for profit agencies, thereby lowering transaction costs.

Purpose and Objectives

Considering the fact that agricultural technology transfer in Nigeria has mainly been publicly funded and delivered, introducing cost-sharing arrangement is expected to meet some obstacles. Hence this study ascertains the perception of farmers and agricultural extension personnel of Nigeria's Agricultural Development Programme on the constraints and strategies towards effective cost-sharing of agricultural technology delivery in Nigeria.

Methods

The study was carried out in Nigeria. Nigeria is divided into five agricultural zones namely: North West, North East, North Central, South West, and South East zones, for the purpose of establishing farming systems research and linking the research to the extension activities (Shaib, Aliyu, & Bakshi, 1997). These five zones cover the agro-ecological environments of Nigeria. However geopolitically, the southern part comprises Southwest, Southeast, and South South.

Multistage (random) sampling technique was used in selecting the respondent farmers. In the first stage, six states namely, Katsina, Bauchi, Kogi, Ondo, Enugu, and Rivers were randomly selected from the six geopolitical zones in Nigeria; namely, North West, North East, North Central, South West, South East and South South zones, respectively. These geopolitical zones were used in order to cover the administrative structures as well as the agro ecological delineations of the country.

In the second stage, using the delineation by the different State Agricultural Development Programmes (ADPs), two agricultural zones were randomly selected from each state giving a total of 12 agricultural zones. From each of

the selected zones, 25 farmers were randomly selected from the list provided by the State ADPs for interview, resulting in a total of 300 farmers. However, data were completely collected from a total of 267 farmers comprising 45, 50, 50, 42, 40 and 40 farmers from Katsina, Bauchi, Kogi, Ondo, Enugu, and Rivers states, respectively.

A set of detailed and carefully designed and validated structured interview schedule and questionnaire were used for primary data collection. Content validation of the research instruments was done by a team of four experts in agricultural extension system. The interview schedule was used for collecting data from the farmers, while the questionnaire was used for the staff of ADPs. The data were collected between August 2003 and March 2004.

Trained field assistants selected in each location, in addition to the researchers, collected the data for this study. A pilot test was conducted as part of instrument validation and to familiarize the assistants on the research instrument.

Means, standard deviations, and factor analysis were used for data analysis. Specifically, exploratory factor analysis procedure using the principal factor model with varimax rotation was employed in grouping the constraint variables into major constraint factors. In factor analysis, the factor loading under each constraint (beta weight) represent a correlation of the variables (constraint areas) to the identified constraint factor and has the same interpretation as any correlation coefficient. However, only variables with loadings of 0.40 and above (10% overlapping variance, (Comrey, 1962) were used in naming the factors.

In trying to obtain the possible strategies to achieve success in cost-sharing of agricultural technology transfer, a Likert-type format with five response options (5 = to a very great extent; 4 = to a great extent; 3 = to some extent; 2 = to a little extent; and 1 = not at all) was used. The values on the Likert-type scale were summated to 15, which were later divided by five, to get a mean score of three. Then respondents' mean scores were obtained for each response item such that any one higher or equal to three was regarded as a "possible strategy."

Results

Constraints to Effective Cost-sharing of Agricultural Technology Delivery in Nigeria

Perceptions of staff of public agricultural extension service. Exploratory factor analysis was used to group the variables into possible constraint factors for policy relevance. The results of the rotated component matrix showing the extracted factors, based on the response of the staff of public agricultural extension service and those of farmers served by public agricultural extension are shown in Tables 1 and 2, respectively. The results in Table1 show that four constraint factors were extracted based on the response of the staff of public extension service delivery institution. Only variables with loadings of 0.40 and above (10% overlapping variance; Comrey, 1962) were used in naming the factors. Factors, 1, 2, 3, and 4 were named weak institutional development, extension system lapses, lack of farmers' cooperation, and agricultural uncertainties, respectively.

Weak institutional development was dominated by poor government commitment to implementation of policies and programmes in agriculture (0.44), political instability (0.47), inadequate legislation/regulation to back up the cost-sharing policy (0.48), irresponsiveness of private extension organizations to government policies (0.56), reduction of informal/formal linkages both among private extension organizations and among farmers in the exchange of agricultural and other relevant information (0.52), lack of inadequate database for planning (0.65), late supply of necessary technologies required due to logistic problems (0.73) insufficient credit availability (0.50), and unstable

pricing of agricultural goods and services (0.40).

The loadings under extension lapses include the following: it will be difficult to prevent those who did not pay from benefiting from the service (0.42), conflict between service providers in terms of service to be rendered and client groups to serve (0.42), lack of ready market to sell the increased output as a result of improved extension services (0.41), extension workers may divert the money so that in the end farmers do not receive what they paid for (0.60), dishonesty/corruption among extension workers (0.66), poor coordination/planning of the cost-sharing programme (0.42), sheer exploitation of farmers by private extension organization (0.58) and the diminishing emphasis on public good information and the advancement of knowledge as a saleable commodity (0.56).

Specific issues with high loading under lack of farmers cooperation include that it will be difficult to prevent those who did not pay from benefiting from the service (0.50), general reluctance on the part of the farmers to pay for services (0.41), poor economic (poverty) status of farmers (0.55), difficulty in collecting the money from farmers/high cost of its administration (0.56), high level of illiteracy among farmers (0.66), and farmers lack of interest in participating in extension programmes (0.48).

Items that loaded high under agricultural uncertainties after rotation include resultant high cost of agricultural inputs and services (0.77), high risk and uncertainty in agriculture (0.67) and the tendency to enhance large scale farm enterprise to the detriment of small-scale farming.

Table 1

Rotated Component Matrix Based on the Responses of Staff of Public Extension Service on Possible Constraints to Effective Cost-Sharing of Agricultural Technology Transfer

	Factors			
Possible Constraints	1	2	3	4
Resultant high cost of agricultural inputs and services	0.16	0.08	0.00	0.77
High risk and uncertainty in agriculture	-0.09	0.08	0.10	0.67
Non existence/inadequate farmers' cooperative associations	0.09	0.22	0.50	0.04
It will be difficult to prevent those who did not pay from benefiting from the service	0.34	0.42	0.18	-0.11
Lack of political consensus and commitment to policy issues by government	0.26	-4.15	0.29	0.31
Poor government commitment to implementation of policies and programmes in agriculture	0.44	-0.10	0.32	0.39
Conflict between service providers in terms of service to be rendered and client groups to serve	-1.33	0.42	0.21	0.27
Political instability	0.47	0.05	0.31	0.07
General reluctance on the part of the farmers to pay for services	0.25	0.27	0.41	-0.04
Poor economic (poverty) status of farmers	0.20	-1.68	0.55	0.34
Lack of ready market to sell the increased output as a result of improved extension services	0.10	0.41	0.15	0.34

Table 1 (continued)

Possible Constraints	Factors 1	2	3	4
Extension workers may divert the money so that in the end farmers do not receive what they paid for	-0.03	0.60	0.21	0.09
Difficulty in collecting the money from farmers/high cost of its administration	0.18	0.24	0.56	0.06
Dishonesty/corruption among extension workers	0.04	0.66	0.19	-0.02
High level of illiteracy among farmers	-1.15	0.11	0.66	0.16
Poor coordination/planning of the cost-sharing programme	0.30	0.42	0.29	0.02
Inadequate legislation/regulation to back up the cost-sharing policy	0.48	0.34	0.33	0.13
Difficulty in attaching value to extension service	0.27	0.33	0.28	-0.06
Sheer exploitation of farmers by private extension organization	0.09	0.58	-0.10	0.19
The tendency to enhance large scale farm enterprise to the detriment of small-scale farming	0.09	0.35	0.08	0.41
Irresponsiveness of private extension organizations to government policies	0.56	0.30	0.10	0.09
The diminishing emphasis on public good information and the advancement of knowledge as a saleable commodity	0.24	0.56	0.04	0.12
Reduction of informal/formal linkages both among private extension organizations and among farmers in the exchange of agricultural and other relevant information	0.52	0.37	-0.02	0.22
Lack of adequate database for planning	0.65	0.24	0.06	0.11
Late supply of necessary technologies required due to logistic problems	0.73	-0.02	-0.06	0.24
Farmers lack of interest in participating in extension programmes	0.20	0.17	0.48	0.04
Insufficient credit availability	0.50	-0.10	0.29	0.18
Unstable pricing of agricultural goods and services	0.40	0.18	0.20	0.32
Poor capacity building of extension personnel	0.22	0.16	0.07	0.37

Note. Factors: 1 = Weak Institutional Development; 2 = Extension System Lapses; 3 = Lack of Farmers Cooperation; and 4 = Agricultural Uncertainties.

Perception of farmers. The result in Table 2 shows that four constraint factors were selected based on the responses of the farmers served by the public extension institution. Factors 1, 2, 3 and 4 were named weak extension enabling environment, weak institutional base, conflicts, and corruption, respectively. The variables that loaded high under weak extension enabling environment include high level of illiteracy among farmers (0.56), inadequate legislation/regulation to back up the cost-sharing policy (0.56), difficulty in attaching value to extension service (0.57), reduction of informal/formal linkages both among private extension organizations and among farmers in the exchange of agricultural and other relevant information (0.48), lack of adequate database for planning (0.68), late supply of necessary technologies required due to logistic problems (0.65), and insufficient credit availability (0.69).

Those under weak institutional base include resultant high cost of agricultural

inputs and services (0.65), high risk and uncertainty in agriculture (0.54), non existence/inadequate farmers' cooperative associations (0.44), lack of political consensus and commitment to policy issues by government (0.66), poor government commitment to implementation of policies and programmes in agriculture (0.67), political instability (0.42) and poor economic (poverty) status of farmers (0.57).

The loadings under conflicts (factor 3) include that it will be difficult to prevent those who did not pay from benefiting from the service (0.48), conflict between service providers in terms of service to be rendered and client groups to serve (0.60), sheer exploitation of farmers by private extension organization (0.57), the tendency to enhance large scale farm enterprise to the detriment of small-scale farming (0.54), irresponsiveness of private extension organizations to government policies (0.54), the diminishing emphasis on public good information and the advancement of knowledge as a saleable commodity (0.45) and farmers lack of interest in participating in extension programmes (0.43). Finally, corruption (factor 4) was dominated by variables such as extension workers may divert the money so that in the end farmers do not receive what they paid for (0.76), difficulty in collecting the money from farmers/high cost of its administration (0.68) and dishonesty/corruption among extension workers (0.44).

Table 2

Rotated Component Matrix Based on the Responses of Farmers on Possible Constraints to Effective Cost-Sharing of Agricultural Technology Transfer

	Factors			
Possible Constraints	1	2	3	4
Resultant high cost of agricultural inputs and services	0.18	0.65	-0.02	0.05
High risk and uncertainty in agriculture	0.08	0.54	0.04	0.13
Non existence/inadequate farmers' cooperative associations	0.09	0.44	0.26	0.25
It will be difficult to prevent those who did not pay from benefiting from the service	-0.07	0.19	0.48	0.15
Lack of political consensus and commitment to policy issues by government	0.13	0.66	0.09	-0.04
Poor government commitment to implementation of policies and programmes in agriculture	0.33	0.67	0.14	-0.11
Conflict between service providers in terms of service to be rendered and client groups to serve	0.08	0.33	0.60	0.04
Political instability	0.12	0.42	0.36	0.23
General reluctance on the part of the farmers to pay for services	0.27	0.35	0.21	0.39
Poor economic (poverty) status of farmers	0.20	0.57	0.13	0.28
Lack of ready market to sell the increased output as a result of improved extension services	0.11	0.28	0.21	0.34
Extension workers may divert the money so that in the end farmers do not receive what they paid for	-0.04	0.06	0.16	0.76
Difficulty in collecting the money from farmers/high cost of its administration	0.18	0.01	0.07	0.68

Table 2 (continued)

Possible Constraints	Factors 1	2	3	4
Dishonesty/corruption among extension workers	-0.03	0.24	0.23	0.44
High level of illiteracy among farmers	0.56	0.17	0.02	0.27
Poor coordination/planning of the cost-sharing programme	0.42	0.20	0.02	0.45
Inadequate legislation/regulation to back up the cost-sharing policy	0.56	0.17	0.02	0.27
Difficulty in attaching value to extension service	0.57	0.21	0.20	0.12
Sheer exploitation of farmers by private extension organization	0.22	0.17	0.57	-0.12
The tendency to enhance large scale farm enterprise to the detriment of small-scale farming	0.29	-0.09	0.54	0.13
Irresponsiveness of private extension organizations to government policies	0.24	0.17	0.54	0.23
The diminishing emphasis on public good information and the advancement of knowledge as a saleable commodity	0.26	0.06	0.45	0.37
Reduction of informal/formal linkages both among private extension organizations and among farmers in the exchange of agricultural and other relevant information	0.48	0.08	0.28	0.20
Lack of adequate database for planning	0.68	0.15	0.23	0.01
Late supply of necessary technologies required due to logistic problems	0.65	0.22	0.26	-0.02
Farmers lack of interest in participating in extension programmes	0.29	-0.00	0.43	0.12
Insufficient credit availability	0.69	0.19	0.11	-0.01

Note. Factors: 1 = Weak Extension Enabling Environment; 2 = Weak Institutional Base; 3 = Conflicts; and 4 = Corruption.

Possible Strategies for Achieving Success in Cost-sharing of Agricultural Technology Transfer

The results of the responses of staff of public extension service and farmers served by public extension as regards possible strategies for achieving success in cost-sharing of agricultural technology transfer are shown in Table 3.

The table reveals that the staff of public extension service were of the opinion that enlightenment of farmers on the concept and importance of cost-sharing in agricultural development (M = 4.22) would be the best possible strategy for achieving success in cost-sharing of agricultural technology transfer in Nigeria. This was followed by motivation of staff and farmers (M = 4.18) and ensuring public transparency and accountability by extension staff involved in the scheme (M = 3.97).

Other possible strategies for success as perceived by the extension staff include involvement of farmers and other stakeholders in planning and implementation of cost-sharing programme (M = 3.92), cost-sharing programme should begin with the areas in agriculture identified as priority areas for cost-sharing (M = 3.85), establishing mechanisms/procedures for monitoring the progress and results of the cost-sharing strategy (M = 3.82), increasing the number of extension staff (or reducing the area of coverage of extension agents) (M = 3.80), clear definition of form, modalities and principles of cost-sharing (M = 3.73)

and farmer–to–farmer information about the importance of cost-sharing of agricultural technology transfer to agricultural development (M = 3.67).

The extension staff further perceived the establishment of mechanisms to ensure the protection of low income farmers (M = 3.65), establishment of commodity boards to ensure stability of price of products (M = 3.65), establishment of farmers cooperatives to serve as avenues for levy collection (M = 3.57), enacting enabling legislation for cost-sharing (M = 3.27) and building political support for cost-sharing of agricultural technology transfer policy (M = 3.20) as possible strategies for achieving success in cost-sharing . However, they did not perceive the use of law enforcement agents to arrest and punish offenders and/or defaulters (M = 2.24) as a possible strategy for success in cost-sharing arrangement. The standard deviations were less than 1.50 showing that their individual responses were not far apart from the mean.

On the other hand, the response of the farmers (Table 3) shows that they perceived motivation of staff and farmers (M = 3.92) to be the best possible strategy to achieving success in cost-sharing of agricultural technology transfer in Nigeria. This was followed by enlightenment of farmers on the concept and importance of cost-sharing in agricultural development (M = 3.85) and increasing the number of extension staff (or reducing the area of coverage of extension agents (M = 3.69).

Other critical success factors as perceived by the farmers include that cost-sharing programme should begin with the areas in agriculture identified as priority areas for cost-sharing (M = 3.61), ensuring public transparency and accountability by extension staff involved in the scheme (M = 3.61), establishing mechanisms/procedures for monitoring the progress and results of the cost-sharing strategy (M = 3.59), involvement of farmers and other stakeholders in planning and implementation of cost-sharing programme (M = 3.58) and establishment of farmers cooperatives to serve as avenues for levy collection (M = 3.50).

In addition, the farmers were of the opinion that clear definition of form, modalities and principles of cost-sharing (M = 3.45), establishment of mechanism to ensure the protection of the low income farmers (M = 3.41), farmer–to–farmer information about the importance of cost-sharing of agricultural technology transfer to agricultural development (M = 3.40), establishment of commodity boards to ensure stability of price of products (M = 3.35), enacting enabling legislation for cost-sharing (M = 3.34) and building political support for cost-sharing of agricultural technology transfer policy (M = 3.02) were possible strategies for achieving success in cost-sharing . However, they were also of the view that the use of law enforcement agents to arrest and punish offenders and/or defaulters (M = 2.48) was not a possible strategy towards achieving success in cost-sharing of agricultural technology transfer (Table 3).

Table 3

Means and Standard Deviations for Public Extension Service Staff and Farmers on Possible Strategies to Achieve Success in Cost-Sharing of Agricultural Technology Transfer

	Extension Staff		Farmers	
Strategies/Success Factors	*M*	*SD*	*M*	*SD*
Building political support for cost-sharing of agricultural technology transfer policy	3.20*	1.32	3.02*	1.43
Establishing mechanisms/procedures for monitoring the progress and results of the cost-sharing strategy	3.82*	1.05	3.59*	1.24
Farmer–to–farmer information about the importance of cost-sharing of agricultural technology transfer to agricultural development	3.67*	1.23	3.40*	1.31
Establishment of mechanism to ensure the protection of the low income farmers	3.65*	1.17	3.41*	1.39
The use of law enforcement agents to arrest and punish offenders and/or defaulters	2.24	1.34	2.48	1.49
Involvement of farmers and other stakeholders in planning and implementation of cost-sharing programme	3.92*	1.11	3.58*	1.38
Cost-sharing programme should begin with the areas in agriculture identified as priority areas for cost-sharing	3.85*	1.11	3.61*	1.32
Establishment of farmers cooperatives to serve as avenues for levy collection	3.57*	1.34	3.50*	1.34
Ensuring public transparency and accountability by extension staff involved in the scheme	3.97*	1.20	3.61*	1.24
Enacting enabling legislation for cost-sharing	3.27*	1.31	3.34*	1.26
Clear definition of form, modalities and principles of cost-sharing	3.73*	1.10	3.45*	1.16
Establishment of commodity boards to ensure stability of price of products	3.65*	1.29	3.35*	1.36
Motivation of staff and farmers	4.18*	1.04	3.92*	1.26
Increasing the number of extension staff (or reducing the area of coverage of extension agents)	3.80*	1.23	3.69*	1.30
Enlightenment of farmers on the concept and importance of cost-sharing in agricultural development.	4.22*	1.02	3.85*	1.27

Note. Scale: 5 = to a very great extent; 4 = to a great extent; 3 = to some extent; 2 = to a little extent; and 1 = not at all.

Differences between Public Agricultural Extension Service Staff and Farmers on Possible Cost-sharing Strategies

The difference in the opinion of staff of public agricultural extension service and farmers on possible strategies for cost-sharing was ascertained using *t*-test statistic and presented in Table 4.

The result shows that the mean responses of the extension staff and farmers as regards possible strategies for effective cost-sharing of agro-technology were significantly different for 11 of the 15 strategies. Among these statements the means of responses of the staff of public extension service were higher than that of the farmers in all items except for "the use of law enforcement agents to arrest and punish offenders and/or defaulters" (Table 4).

Four strategies (building political support for cost-sharing of agro-technology transfer; establishment of farmers cooperative to serve as avenues for levy collection; enacting enabling legislation for cost-sharing; and increasing the number of extension staff or reducing the area of coverage per extension staff) were not significantly different between respondent groups. It then implies that the two categories of respondents hold the same opinion as regards these items.

Table 4

Test of Difference between Perceptions of Public Extension Service Staff and Farmers on Possible Strategies to Achieve Success in Cost-Sharing of Agricultural Technology Transfer

	Extension Staff		Farmers		
Strategies/Success Factors	*M*	*SD*	*M*	*SD*	*t*
Building political support for cost-sharing of agricultural technology transfer policy	3.20	1.32	3.02	1.43	1.48
Establishing mechanisms/procedures for monitoring the progress and results of the cost-sharing strategy	3.82	1.05	3.59	1.24	2.28*
Farmer–to–farmer information about the importance of cost-sharing of agricultural technology transfer to agricultural development	3.67	1.23	3.40	1.31	2.49*
Establishment of mechanism to ensure the protection of the low income farmers	3.65	1.17	3.41	1.39	2.21*
The use of law enforcement agents to arrest and punish offenders and/or defaulters	2.24	1.34	2.48	1.49	-1.98*
Involvement of farmers and other stakeholders in planning and implementation of cost-sharing programme	3.92	1.11	3.58	1.38	3.15*
Cost-sharing programme should begin with the areas in agriculture identified as priority areas for cost-sharing	3.85	1.11	3.61	1.32	2.28*
Establishment of farmers cooperatives to serve as avenues for levy collection	3.57	1.34	3.50	1.34	0.63
Ensuring public transparency and accountability by extension staff involved in the scheme	3.97	1.20	3.61	1.24	3.36*
Enacting enabling legislation for cost-sharing	3.27	1.31	3.34	1.26	-0.65
Clear definition of form, modalities and principles of cost-sharing	3.73	1.10	3.45	1.16	2.77*
Establishment of commodity boards to ensure stability of price of products	3.65	1.29	3.35	1.36	2.61*
Motivation of staff and farmers	4.18	1.04	3.92	1.26	2.53*
Increasing the number of extension staff (or reducing the area of coverage of extension agents)	3.80	1.23	3.69	1.30	0.98
Enlightenment of farmers on the concept and importance of cost-sharing in agricultural development.	4.22	1.02	3.85	1.27	3.70*

Note. Scale: 5 = to a very great extent; 4 = to a great extent; 3 = to some extent; 2 = to a little extent; and 1 = not at all.
* $p < .05$

Conclusion, Recommendation, and Implications

The study ascertained the perception of farmers and public agricultural extension staff on constraints and strategies towards evolving an institutional arrangement where agricultural technology delivery cost could be shared between farmers and the agencies responsible for technology delivery. The study showed that the major constraints to cost-sharing arrangement were weak institutional development, uncertainties inherent in agriculture, poor cooperation from farmers and weak agricultural extension/technology delivery mechanisms. The two categories of respondents were of the view that enacting enabling legislation for cost-sharing, building political support and disseminating information on cost-sharing of agricultural technology delivery could help facilitate cost-sharing arrangement. Other measures include increasing the number of extension staff or reducing the area of coverage by an extension agent and establishment of vibrant farmers cooperative to serve as avenue for collecting the charges from farmers.

These findings suggest that measures to strengthen the institutions responsible for agricultural technology delivery would facilitate cost-sharing. Such measures include decentralizing extension administration so that local government authorities could be the centre of extension instead of state governments. Other institutional measures include enhancing the capacity of the extension staff through training and retraining schemes and building reliable data base for planning. Currently, extension personnel, apart from the fortnightly training programme, are not given elaborate training so as to cope with changing problems faced by farmers. In addition, the findings support putting in place measures that would enhance farmer's risk coping ability. Some facilitating measures include establishment of a revolving credit mechanism as part of extension programme, and giving tax holiday to farmers. Also, policy measures to support micro-credit institutions especially through linkage with commercial banks would enhance credit delivery to farmers. Other intervention measures include providing effective information dissemination to farmers, improvement in technology delivery mechanisms and increasing outreach such as making technology component farmer specific, decentralization of agricultural technology delivery institutions, enhancing farmer's managerial ability especially through cooperative organizations and education and reforming agricultural markets to stabilize income of farmers. Therefore in order for cost-sharing to be effective, there should be enough information dissemination including radio advertisement and stakeholders' fora in different parts of the country to sensitize the public especially farmers on cost-sharing.

Furthermore, enacting suitable legislation and enforcing them could help strengthen the political, economic and legal institutions in the country thus creating an enabling environment for cost-sharing. Although the extension system has a large number of staff in Nigeria, the farmer to extension agent ratio is still too low and most farmers are not reached by extension agents. Thus, strengthening the personnel base of the extension system so that more farmers can be covered could facilitate payment for services. Private for profit extension agents will be involved when they are sure of receiving equitable benefits for their services thus making technology delivery services competitive.

Putting in place these measures would help create an enabling environment for cost-sharing of technology delivery in Nigeria. Considering the need for a reliable funding mechanism for extension and agricultural technology delivery, providing these measures as perceived by the farmers and extension staff is imperative.

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