

Strategies for Enhancing Linkage in the Agricultural Innovation Transfer Sub-system in South-Eastern Nigeria

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KEYWORDS Innovation System. Linkage. Actors. Professionals. Social and Economic Development

ABSTRACT The study examined professionals' perception on strategies for enhancing linkage in the agricultural innovation transfer sub-system in South Eastern Nigeria. Two hundred and ten (210) extension professionals from the public and private/NGOs actors in the innovation transfer sub-system were used as sample. Data were collected by use of set of questionnaire and analyzed using descriptive statistics, one-way analysis of variance (ANOVA) and Pearson correlation coefficient. The findings showed that the respondents opted to forging effective linkages among actors in the sector. Overall use of liaison committee, free access to annual report, magazine, and bulletin, joint use of facilities were perceived appropriate. They accepted the adoption of allocating staff time to linkage activities, allocating operating fund to linkage, building linkage responsibilities into job descriptions and others. The major linkage constraining variables were inadequate sources of fund, poor government commitment to extension, low mobility of professionals, inappropriate government policy, poor training opportunities for professionals and others. The study recommends that regulatory mechanisms, policies and framework that could stimulate and enhance linkages among agencies in the sub-system should be put in place.

1. INTRODUCTION

Agricultural development is driven by the dynamics of supply and demand of farm knowledge among research – extension and farmers. Ideally, it is a function of interaction and linkages between innovation development and innovation implementation processes, driven by the institutions and policies that influence the innovative behaviour and performance. Over decades, agricultural development efforts have largely emphasized investment in science and technology; projecting research as the sole source of innovation and technological change as the panacea for social and economic development. Consequently the agricultural research system in most developing country including Nigeria is characterized by a top-down, centralized, monolithic, linear and isolated structure with interactions, linkages, learning mechanisms very limited, weak and/or often non-existent. Apparently, the overall innovative strength remains isolated and encapsulated and many institutions /organizations relevant to innovation are weak and possibly non-existent.

Innovation system paradigm, however views innovation as a social process, requiring the convergence of many sources of knowledge and skill usually in the form of a network (Nigel et al. 2001). According to Clark et al. (2003) in-

novation system consists of major social actors/organizations that affect the revealing, acknowledgement, generation and diffusion of technical and institutional knowledge over time; including the interactive learning that characterized the whole process and institutions that govern the interaction and processes (Tugrul et al. 2001).

Specifically, agricultural innovation system according to Tugrul and Ajit (2002) is a set of agents that jointly and/or individually contribute to the development, diffusion, and use of agriculture-related new technologies and that directly and/or indirectly influence the process of technological change in agriculture. The agents deal with issues relating to agriculture, farming, input supply, processing, marketing, research, extension, training, credit, information and policy. This includes such actors as research establishments, government agencies, commercial input providers, advisory services, processing industries, agricultural cooperatives, farmer organizations, credit institutions, non-governmental organizations, policy, legislative framework/infrastructure and many other firms and services, which forms a complex system. These actors have been variously classified. For example, CABI/CTA/KIT/VRLIE/WUR (2006) identified five categories (sub-systems) namely enterprise/farmer, market/demand, research,

diffusion or transfer, and infrastructure/policy sub-systems. The enterprise or farmer sub-system mainly includes users of knowledge (farmers and their associations), while market/demand include consumers and traders. The research sub-system includes generators of knowledge (research institutes, universities etc.); the diffusion/technology transfer are knowledge transmitters (extension outfits), while the infrastructure includes policy, legislation, resources (policy making agencies, financial institutions, infrastructure etc.).

Also, the agricultural innovation system can be classified into three major sub-systems based on key roles, mandates/operations of the actors. This includes the technology/ knowledge generating, technology transfer/diffusion and the productive/utilization sub-systems, with the infrastructural/policy sub-system regulating the other three sub-systems. In either case, roles and operations sometimes may overlap. Nevertheless, the innovative performance of the individual or component actors, invariably the impact on the overall economic development, revolves on the intensity of interaction, flow of information, and learning through linkage among the actors across sub-systems and within each sub-system. Thus, fostering linkages both vertical (among different categories) and horizontal (within a category) is an imperative. In addition to benefit of enhanced innovative performance and capability building in innovation culture, linkages and collaboration are essential for optimal use of limited resources, personnel, funds and logistics for increase coverage of the component and individual actors in the system. Besides, incidence of replication of efforts, rivals, competition, and confusion at the grass root are considerably reduced.

The agricultural innovation transfer sub-system includes actors/agencies involved in delivering extension/advisory services in the agricultural sector. They also facilitate rural development programmes and provide information on the socio-economic and cultural environment of the farmers which are fed into the technology generating sub-system for modification and to guide decisions on research priorities. Earlier attempts were characterised by dominant of the public agencies and proliferation of projects and programmes.

However, the last two decades witnessed increased participation of private sector and/or

non-governmental organizations in the provision of extension services. Consequently, several non-government organizations (religions and farmers organizations), national and international organizations and private agro-business firms implement one form of agricultural extension service or the other. Therefore, the obvious challenges are instituting efficient collaboration and linkages among various agencies for greater innovative stride and performance in the sub-system. Generally, studies have shown poor linkages and collaboration altitudes among agencies involved in agricultural and rural development (Agbamu 1998,1999; Uzuegbunam 2001). Therefore, the study seeks to ascertain the professionals' perception of appropriate strategies for forging linkages among agencies in the agricultural innovation transfer sub-system. The questions therefore are: what arrangements seem most appropriate to the professionals to create and foster linkages? What strategies should be employed to effectively facilitate linkage among the organizations in the transfer sub-system? What are the likely impediments to linkage formation and use in the sub-system?

1.1 Objective of the Study

Specifically the objectives of the study were to:

- identify arrangements for linkage among agencies in the transfer sub-system;
- determine strategies essential for enhancing linkages among agencies; and
- ascertain major constraints against linkage among agencies in technology transfer system.

1.2 Hypotheses

- There is no significant difference in professionals' perception / choice of linkage arrangements among agencies in the agricultural innovation transfer sub-system.
- There is no significant difference in professionals' perception of the strategies for effective linkages among the agencies in the agricultural innovation transfer sub-system.
- There is no significant difference in professionals' perception of the linkage constraining factors among agencies in the transfer sub-system.

- There is no significant relationship between perceived linkage constraining factors and problems of the public agencies

2. METHODOLOGY

The study was conducted in old south-eastern agro-ecological Zone of Nigeria. Out of the nine states that made up south-east, three states namely Enugu, Ebonyi and Rivers were purposively selected for the study. This was because of the presence of functional agencies involved in agricultural technology transfer. Agencies in the agricultural innovation transfer sub-system existed either as public, private and/or non-governmental organizations (NGOs). Extension professionals in these agencies constituted the population for the study. Agricultural Development Programmes (ADPs) and Local Government (LGs) were purposively selected to represent the public agencies. Agricultural Development Programme and LGs are the main agencies of government with mandate for extension services. The list of extension administrators and technical officers in ADPs were accessed and used. All the programme managers (3), directors of extension (3), zonal extension officers (18) were used. The subject matter specialists (15) and block extension supervisors (21) were purposively selected, giving a total of 60 respondents from ADPs.

The number of local governments in the state was accessed as follows: Enugu (17), Ebonyi (13) and Rivers (23). Ten federal government-recognized local governments were purposively selected from each state (30 LGs). The heads of agriculture and one extension officer from each local government were purposively selected because of their direct involvement in extension. A total of 60 respondents from LGs were used.

Private/NGOs agencies existed as either profit NGOs (private) and non-profit NGOs (voluntary/religious/civil society organizations/farmer associations). Two non-profit NGOs were purposively selected from each state (6NGOs) based on the level of involvement in agriculture extension delivery. Specifically, the non-profit NGOs used were Sudan United Mission (SUM), International Institute for Rural Development (IIRD) (Ebonyi State), Nsukka United Self Help Organization, (NUSHO) and Catholic Institute For Justice And Peace (CIJAP)(Enugu State), Nigeria Agip Oil Company (NAOC),and Shell Petroleum Development Company (SPDC)

(River State). The heads of agriculture and four extension workers were purposively selected from each NGOs, giving a total of 30 respondents from non-profit NGOs.

The profit NGOs/private agencies operated in different forms, and were categorized into five: agro-processing and marketing, input/agro-chemical dealers, agro equipment-firms, para-veterinary/livestock enterprise, credit institutions/support services. Two of each form was selected from each state and a total of 30 profit NGOs were used for the study. The chief executive and one agent were purposively selected from each profit NGOs based on area of involvement in the enterprise. A total of 60 respondents from profit NGOs were used. Overall total sample size of 210 respondents was used for the study. However 174 completed questionnaires were found analyzable.

Data were collected by use of questionnaire. To generate information on the professional's perception of possible linkage arrangement among agencies in the transfer sub-system, respondents rated the extent to which they agree to each of the 14 linkage arrangements on a four point Likert type scale of: strongly agree (4), agree (3), disagree (2) and strong disagree (1). Similarly 16 items on linkage strategies were presented to the respondents to indicate the extent of agreement that the strategies if employ by the organizations could facilitate and enhance linkages among the agencies in the innovation transfer sub-system using four point Likert-type scale of- strongly agree (4), agree (4), disagree (2) and strongly disagree (1). Also twenty possible linkage constraining variables were rated by the respondents on a four-point Likert-type scale of: very great extent (4), great extent (3), very little extent (2), and little extent (1). Data were analysed using mean scores. Variables with mean ≤ 2.5 were regarded as agreed arrangement, strategies, or constraint and >2.5 as disagreed for both cases. The hypotheses (1-3) were tested using one-way analysis of variance and Pearson correlation for hypothesis 4.

3. RESULTS AND DISCUSSION

3.1 Linkage Arrangements among Agencies in the Agricultural Innovation Transfer Sub-system

Table1 shows respondents' reaction to possible linkage arrangements that should exist

among agencies in the agricultural innovation transfer sub-system. The respondents perceived appropriate the following linkage options; annual/ quarterly workshop/conference (3.21), free access to bulletin, annual report and farm magazine (3.13), joint funding of research projects/programmes (3.09), joint training of extension personnel of the agencies (2.91), joint diagnostic survey/field visits (2.74), joint use of farmers group for training (2.74), joint use of facilities by the agencies (2.70), joint use of SMS/resource persons for training (2.73), co-funding of broadcast programme (2.62), and use of liaison committee (2.57). The respondents however, expressed disagreement to the options of independent existence of the agencies (1.70), forging linkages only among public agencies (1.89) linkage limited to informal interaction among staff of the agencies (1.71) and staff exchange between the agencies (2.48).

Specifically, the responses show that the LGs

staff disagreed to the use of liaison committee (2.27), while the profit NGOs indicated disagreement to joint diagnostic survey/field visit (2.33), joint use of resource persons/SMS for training (1.91), staff exchange between the agencies (1.80), joint use of farmers group for training (1.93) and co-funding of farm broadcast programme (1.89) (Table 1).

On the other hand, the non-profit NGOs' extension workers disagreed to joint use of facilities among agencies (2.38), joint diagnostic survey/field visit (2.38), staff exchange (2.42) and co-funding of farm broadcast programmes (2.35). It is evident from the findings that the agencies reacted positively to forging effective linkage among the innovation delivery agencies. The public agencies seem to show more interest in most of the linkage options than their counterpart in the private/NGOs agencies. This could be as a result of the dysfunctional state of the public extension system caused by gross poor

Table 1: Mean scores on linkage options/arrangements among agencies in transfer sub-system

<i>Linkage arrangement</i>	<i>Agencies (n = 57)</i>	<i>LGs (n = 45)</i>	<i>Profit NGOs (n = 46)</i>	<i>Non-profit NGOs (n = 26)</i>	<i>Overall mean (n=174)</i>
Extension agencies should exist independent of others.	1.75 (.95)	1.80(1.16)	1.76(1.16)	1.27(1.16)	1.70
Linkages should exist only among public sector agencies (ADP, MOA and LG).	2.12 (.95)	2.22(1.28)	1.72 (.86)	1.08 (.98)	1.89
Linkage among extension agencies should be limited to informal/interpersonal relationship.	1.65 (.78)	1.67(1.00)	2.02 (.77)	1.33 (.85)	1.71
Joint training of extension workers of the organizations.	3.35 (.77)	2.87(1.22)	2.65(1.16)	2.50(1.75)	2.91
Research projects/programmes should be jointly funded by the extension agencies	3.33 (.79)	3.31(1.22)	2.87 (.93)	2.58(1.70)	3.09
Joint use of facilities among agencies within a locality.	2.89(1.21)	2.71(1.49)	2.61(1.16)	2.38(1.47)	2.70
Joint diagnostic survey/field visit of extension workers of the agencies within the same area.	3.02(1.04)	3.02(1.36)	2.33(1.43)	2.38(1.47)	2.74
Sharing/free access to annual report bulletin and form magazine by personnel of the agencies (public and private).	3.30 (.91)	3.16(1.07)	2.83(1.14)	3.23(1.27)	3.13
Use of liaison committee to coordinate activities of the agencies.	2.86(1.09)	2.27(1.37)	2.54(1.35)	2.50(1.53)	2.57
Annual/ quarterly workshop/ conference for personnel.	3.44 (.85)	3.27(1.16)	2.76(1.27)	3.46 (.86)	3.21
Joint use of SMS for training of extension/field agents of the agencies.	3.40 (.75)	2.67(1.52)	1.91(1.38)	2.81(1.30)	2.73
Staff exchange between agencies.	2.95(1.04)	2.60(1.42)	1.80(1.44)	2.42(1.47)	2.48
Joint use of farmers' group for training.	3.37 (.79)	2.80(1.32)	1.93(1.45)	2.69(1.46)	2.74
Co-funding of farm broadcasting programmes.	3.25 (.87)	2.73(1.40)	1.89(1.46)	2.35(1.44)	2.62

Figures in parenthesis = standard deviation, Mean ≥ 2.5 = agree, < 2.5 = disagreed

funding. Largely, the findings is consistent with Tugrul et al. (2001), which reported that the common linkage mechanisms adopted among agencies in extension were joint problem diagnosis, programme planning and review, exchange of personnel and joint resource use. Nevertheless, effective mechanisms should put in place concrete procedures, arrangements, devices and channels to allow communication between the agencies in the system. Furthermore, effectiveness of interaction is influenced by intensity of contact, formality of contact, awareness of other stakeholders' functions, and relevance of services. Hence appropriate arrangements for linkages should be such that facilitate regular contact, stipulate functions and benefit and are institutionally regulated.

3.1.1 Differences in Professionals' Perception of the Linkage Arrangements among Agencies

Analysis of variance on professional's perception of linkage arrangements show significant difference ($P \leq 0.05$) in respondents' perception of the following linkage options: linkages should exist only among public sector agencies ($F=8.420$), linkages should be limited to informal/interpersonal relationship, ($F=3.817$), joint training of extension workers ($F=4.480$), research projects/programme jointly funded ($F=3.883$), joint diagnostic survey ($F=3.763$), annual/quarterly workshop/conference ($F=4.193$), joint use of SMS for training ($F=12.333$), staff exchange between agencies ($F=6.617$), co-funding of broadcast programme ($F=10.052$) and joint use of farmers group ($F=11.419$). A non-significant difference was shown in their perception of options that extension agencies should exist independent of the other ($F=1.612$), joint use of facilities ($F=.990$), free access to bulletin, annual report ($F=1.788$) and use of liaison committee ($F=1.777$). The agencies opted to forging effective linkages among them, though with varying opinion with respect to certain arrangements but expressed consensus to use of bulletin, annual report, joint use of facilities, use of liaison committee and that the agencies should not exist independent of the other. Based on the greater number of options ($>50\%$) that were significantly different, the hypothesis was rejected.

3.2 Strategies for Enhancing Linkage among Agencies in Agricultural Innovation Transfer Sub-system

Table 2 shows professionals' perception of the strategies that are essential for effective linkages among agencies involved in extension service delivery or transfer of innovation. The overall mean scores for the variables show that extension staff of the agencies agreed to the strategies of adopting improved personnel management practices (3.09), training managers/directors to provide linkage leadership (3.24) increasing access and use of ICT in the agencies (3.18), adopting a practice of sharing research information (3.11), plan orientation programme for extension professionals on linkage (2.95), building linkage responsibility into job description (2.84), adopting a practice of symbiotic coordination of technology transfer (2.82), forming integrated field teams (2.79), allocating operating fund to linkage (2.77), adopting comparative advantage approach to extension outreaches and programmes. (2.76), increasing the use of electronic communication facilities (2.75), allocating staff time to linkage activities (2.75), and forming coordinating/liaison committee (2.55). The respondents, however, showed negative attitude only to use of taskforce (1.61). The use of coordinating/liaison committee agrees with professionals' suggestion for a coordinating board for extension agencies in the country. (Williams 1985; Madukwe 1996; Madukwe and Anyanwu 2000).

Individual agencies, however, varies in their perception of the linkage strategies. LGs respondents disagreed to the use of individual electronic communication, (2.36), while the profit NGOs disagreed to forming integrated field teams (2.37), forming coordinating/liaison unit (2.15), and specialization/ professionalism of extension information (2.28). Furthermore, the non-profit NGOs disagreed to adopting practice of symbiotic coordination of technology transfer at the grass root (2.42) and adopting comparative advantage approach to extension outreach programmes (2.19). The results show that the agencies disagreed to those strategies that may likely threaten the objectives, mandates and financial position of the organizations. Thus, the integration of the strategies identified by the individual agencies may require public enlightenment, creation of awareness and re-

Table 2: Mean scores of strategies for effective linkages among extension agencies

<i>Strategies</i>	<i>ADPsM</i>	<i>LGM</i>	<i>Profit NGOsM</i>	<i>Non-profit NGOs M</i>	<i>Overall mean M</i>
Allocating staff time to linkage activities	2.77(1.00)	2.60(1.26)	2.72(1.05)	2.92(1.41)	2.75
Allocating operating funds for linkage with other agencies	2.86(1.03)	2.56(1.24)	2.71 (.96)	3.04(1.08)	2.77
Building linkage responsibilities into job descriptions	2.84 (.96)	2.76(1.19)	2.74(1.21)	3.15 (.67)	2.84
Training managers/directors to support and provide leadership to linkage	3.25 (.93)	3.22 (.95)	3.17(1.20)	3.38 (.89)	3.24
Forming integrated field teams (diagnostic survey, priority setting)	3.16 (.98)	2.69(1.40)	2.37(1.40)	2.89 (.99)	2.79
Forming coordinating/liaison committee/unit	2.70 (.96)	2.60(1.25)	2.15(1.37)	2.81(1.20)	2.55
Use of task force.	1.67 (.83)	1.58(1.06)	1.63 (.93)	1.54 (.76)	1.61
Increasing the use of individual electronic communication	2.89 (.90)	2.36(1.30)	2.67(1.19)	3.23 (.95)	2.75
Increasing access and use of information communication technology in the agencies and among personnel	3.30 (.65)	3.11(1.07)	2.87(1.15)	3.58 (.50)	3.18
Adopting a practice of symbiotic coordination of technology transfer at grass root	3.28 (.75)	2.93(1.40)	2.37(1.32)	2.42(1.58)	2.82
Adopting a practice of sharing research information among the agencies.	3.37 (.70)	3.04(1.24)	2.74(1.41)	3.62 (.57)	3.16
Establishing operative legal framework for linkage and appropriate agricultural policy	3.11 (.86)	2.73(1.23)	2.50(1.46)	2.54(1.33)	2.76
Adopting improved personnel management practice in the agencies	3.28 (.82)	3.16(1.26)	2.72(1.4)	3.19 (.94)	3.00
Specialization of agricultural/extension information	3.23 (.98)	2.73(1.18)	2.28(1.46)	3.08(1.09)	2.83
Planned orientation programme for extension professional on linkages	3.28 (.67)	3.00(1.24)	2.59(1.33)	2.81(1.30)	2.95
Adopting comparative advantage approach to extension outreaches and programmes	3.11 (.79)	2.80(1.29)	2.61(1.37)	2.19(1.60)	2.76

Mean ≥ 2.5 = agree, < 2.5 = disagreed; Figure in parenthesis = standard deviation

orientation of the practitioners and administrators. This is because it demands some degree of restructuring in the organization and modus operandi /operation of the agencies. Also, strategies employed to facilitate interaction largely depend on the policy, institutional and resource context of the nation.

3.2.1 Difference in Professionals' Perception of Strategies for Enhancing Linkages among Agencies in Agricultural Innovation Transfer Sub-system

One way analysis of variance (ANOVA) show that there was no significant difference ($P \leq 0.05$) in respondents perception of the adoption of allocating staff time to linkage activities ($F = .341$), allocating operating fund to linkage

with other agencies ($F = 1.307$), building linkage responsibilities into job descriptions ($F = 1.042$), training managers ($F = .252$), forming liaison committee ($F = 2.455$); use of task force ($F = .152$) establishing operative framework ($F = 2.560$) and adopting improved personnel management ($F = 2.311$). The results show that the respondents of both agencies shared common views on the use of the strategies to enhance effective linkages. The respondents accepted the adoption of the above strategies with exception of the use of taskforce. On the other hand, there was significant difference ($P \leq 0.05$) in perception of forming integrated field teams ($F = 3.710$), increasing access and use information communication technology ($F = 3.863$), adopting a practice of symbiotic coordination of technology transfer ($F = 5.703$),

sharing research information among staff ($F = 4.987$), specialization of extension information ($F=5.860$), planned orientation programme ($F = 3.413$), adopting comparative advantage approach to programmes ($F = 3.586$) and establishing operative legal framework for linkage ($F=2.560$). The adoption of the above linkage strategies should vary with organizations and employed based on organizational culture and policy environment. Overly, there was significant difference in perception of greater proportion of the strategies among the agencies, therefore the hypothesis was rejected.

3.3 Factor Constraining Linkage in the Agricultural Innovation Transfer Sub-system

The overall mean scores for the constraint variables show that the major constraints to linkage were inadequate sources of fund (3.36), poor government commitment to extension (3.33), low mobility of professionals (3.01), inappropriate government policy (2.91), poor training opportunities for professionals (2.90), limited physical resources (2.84), poor access to knowledge on new technologies (2.80), limited qualified human resources for linkage leadership (2.72), long administrative procedure (2.70), inequality/gap in qualification and salary scale of staff (2.60), poor attitude and low morale of extension workers (2.60), organizational rigidities (2.54), lack of rule for interaction (2.50) and differences in orientation (2.55) (Table 3). The professionals perceived that overlapping mandates/ objectives (2.43), poor macro system linkage (2.36), excessive organizational fragmentation (2.24), influence of international/donor mandates (2.12), lack of farmers' interest in extension (2.23) and traditional public characteristics of most extension information (2.22) were not constraints.

Specifically, professionals from LGs indicated that organizational rigidities (2.44), difference in orientation of personnel (2.29), general poor attitude and low morale of extension workers (2.44) were not constraints. Also, the profit NGOs considered that organizational rigidities (2.37), long administrative procedure (2.35), differences orientation of personnel (2.40), and low morale of extension workers (2.20) were not constraint to linkage in the sub-

system. Contrary to the above views, the non-profit NGOs professionals, with the exclusion of organization fragmentation, (2.15), perceived all the constraint variables as major impediments to linkage in the agricultural innovation transfer system (Table 3). Reaction by profit NGOs may be as a result of low level of specialization in most profit oriented NGOs in the country. Besides, the limited commitment and involvement in extension practice and the overall agricultural innovation system may have influenced their reaction. Generally, the agencies perceived most of the variables as constraints to enhanced linkages among the agencies. This agrees with the findings that linkage system in Nigeria is characterize by problems such as inappropriate research policy and institutional arrangement for linkage, poor quality personnel and decision making methods; conditions at on farm levels trials and inadequate finance (Agbam 1999).

Also reporting on research – extension system, Williams et al. (1990) confirms that variables limiting effective linkage were differences in recruitment policies, conflicts between extension workers and researchers in the choice of research priorities, location of different ministries and reliance on technical solution to agricultural problems. Above all, he observed that research extension typology in Nigeria shows unequal status among agencies and top-down decision making procedure. The findings further corroborated with Agbam (1998) who reported that past efforts on research extension linkage in Nigeria showed that poor funding is one of the biggest problems facing linkage activities. Hence stimulating linkage culture in the sub- system may remain a mirage under poor funding and policy environments.

3.3.1 Difference in Professionals' Perception of Linkage Constraining Factors

One way analysis of variance (ANOVA) show that there was no significant difference ($P \leq 0.05$) in respondents perception of overlapping mandates/objective ($F=1.99$), limited qualified human resources in the agencies ($F=1.850$), lack of adequate source of finance ($F = 1.850$) limited physical resources ($F=1.013$), poor access to knowledge or information ($F = .795$), organizational rigidities ($F = 2.434$), weak le-

Table 3: Mean scores on factors constraining effective linkage among agencies in agricultural innovation transfer sub-system

<i>Constraining factor</i>	<i>ADPsM</i>	<i>LGs M</i>	<i>Profit NGOM</i>	<i>Non -NGO profit M</i>	<i>Overall means M</i>
Overlapping mandates/objectives	2.53 (.89)	2.22(1.16)	2.38(1.04)	2.81 (.90)	2.45
Limited qualified human resources in the agencies for linkage leadership	2.61(9.4)	2.69 (.93)	2.67 (.99)	3.08 (.98)	2.72
In adequate sources of finance	3.47 (.66)	3.31(1.02)	3.15(1.01)	3.58 (.86)	3.36
Limited physical resources (ICTs mobile van)	2.95 (.83)	2.78(1.15)	2.67 (.97)	3.00 (.80)	2.84
Poor access to knowledge and information on new technologies	2.74 (.90)	2.76(1.15)	2.76(1.04)	3.08 (.87)	2.80
Low mobility of experts/professionals	3.28 (.80)	2.98(1.10)	2.50(1.24)	3.35 (.94)	3.26
Poor logistic support and incentive for linkage	3.54 (.60)	3.02(1.10)	3.02 (.95)	3.46 (.51)	3.26
Organizational rigidities	2.56 (.87)	2.44(1.03)	2.37(1.02)	2.96 (.72)	2.54
Long administrative procedure/administrative bottleneck associated with public agencies	2.74 (.86)	2.82 (.96)	2.35(1.14)	3.04 (.82)	2.70
Weak legal framework/lack or rule for interaction/linkage	2.46 (.83)	2.29(1.10)	2.52 (.91)	2.92 (.93)	2.50
Poor macro system linkages	2.18 (.85)	2.22(1.04)	2.39(1.06)	2.92 (.80)	2.36
Excessive organizational fragmentation	2.31 (.91)	2.18(1.00)	2.23 (.92)	2.15 (.88)	2.24
Inappropriate government policy in agriculture	2.91 (.91)	2.82 (.96)	2.7 (.98)	3.42 (.77)	2.91
Poor/differences in orientation of personnel of the agencies	2.72 (.91)	2.29(1.06)	2.4 (.91)	2.88 (.77)	2.55
Influence of international/donors mandates	2.42 (.89)	1.01 (.90)	1.65 (.87)	2.65(1.06)	2.12
Lack of farmer's interest in extension	2.11(1.05)	2.77(1.03)	2.15(1.03)	2.58(1.10)	2.23
Gap in qualification/salary scale of staff of the agencies	2.51(1.09)	2.42(1.10)	2.67(1.86)	2.96 (.87)	2.60
General poor attitude and low morale of extension workers	2.93 (.88)	2.44(1.01)	2.20(1.00)	2.96 (.87)	2.61
Poor training opportunities for professionals	3.14 (.88)	2.82 (.96)	2.54(1.11)	3.15 (.96)	2.90
Traditional public characteristic of most extension information	2.16 (.70)	2.24(1.05)	1.90 (.94)	2.81 (.80)	2.22
Poor government commitment to extension	2.28 (.77)	3.38 (.08)	3.20(1.02)	3.61 (.70)	3.33

Figure in parentheses = standard deviation

gal framework ($F = 2.553$), excessive organization fragmentation ($F = .264$), lack of farmers interest ($F = 1.324$), gap in qualification and salary ($F = 1.669$) and poor government commitment to extension ($F = 1.463$). The respondents' view in this case should be upheld in addressing constraints to effective linkages among the agencies. On the contrary, the result revealed significant differences in perception of low mobility of experts ($F = 6.026$), poor logistic support ($F=5.078$), long administrative procedure ($F=3.404$), and poor macro system linkage ($F=4.058$). The non-significant variables were greater in number (>50%) than the significant factors. Therefore, the hypothesis that there is no significant difference in perception of the linkage constraints factor was accepted.

3.3.2 Relationship between Linkage Constraining Factors and Problems of Public Extension Agencies (ADP and LG)

The linkage constraining factors were positively and significantly correlated ($P \leq 0.05$) with the problems of public extension organization. Each linkage constraining factors was positively and significantly correlated with about 2 – 5 problems of the public agencies.

This implies firstly that the problems constraining effective operation of the public sector agencies are the underpinning of linkage constraining factors in the agricultural innovation transfer sub- system. Secondly, the findings suggest that forging, facilitating; and strengthening linkages among agencies in in-

novation transfer sub-system will largely reduce component and individual organizations' problems. Negative and significant relationship ($P \leq 0.05$) occurs only between lack of adequate sources of finance and inefficient use of existing resource. Inefficient use of resources characterized most public system due to the civil service altitude of workers and so is not positively influenced by adequate funding. The table further indicates that poor communication/interaction among staff, untimely supply of input/planting materials, and dispersed settlement pattern of farm household, were not correlated with any of the linkage constraining factors at $P < 0.05$. This means that these variables as impediments to effective operation of the public sectors were not associated with linkage constraints and will not be positively or negatively influenced or changed with forging effective linkages among the agencies. It is therefore evident that forging effective linkage among agencies in the innovation transfer sub-system is a step forward to institutional reform, enhancing effectiveness and efficiency of service; and cost-effectiveness in extension delivery system. According to Tugrul and Ajit (2002), linkages are designed to optimize distinctive goal of the agencies under agency's specific constraints, and component constraints,. Invariably, interaction among agencies could lead to solution of the problems faced by individual agency and subsequently enhanced improved performance of the system.

Furthermore, Clay and Shaffer (1984) confirmed that linkage and networks among actors or organizations at the same area underlie the effectiveness of both NGOs and development intervention. Besides, linkages formed facilitate the development of a collective voice of the agencies especially in policy arena. There are also benefits of synergies from greater efficiency of resource use.

4. CONCLUSION

Professionals in the agricultural innovation transfer sub-system were favorably disposed to enhancing linkage among agencies in the system. The findings show that agencies opted to forging effective linkages among them, though with varying opinion with respect to certain arrangements. Overall, free access to annual re-

port, magazine, and bulletin, joint use of facilities and use of liaison committee were approved by the respondents. The strategies perceived appropriate for linkage include allocating staff time to linkage activities, allocating operating fund to linkage with other agencies, building linkage responsibilities into job descriptions, training manager for linkage leadership and other. However, because of varying views of the professionals on greater number of the strategies, the adoption of the linkage strategies should vary with organizations and employed based on organizational culture and policy environment. Also, the integration of the strategies identified by the individual agencies may require public enlightenment, creation of awareness and re-orientation of the practitioners and administrators. This is because it may require some degree of restructuring in the organization and modus operandi /operation of the agencies.

The major linkage constraining variables identified by the respondents were inadequate sources of fund, poor government commitment to extension, low mobility of professionals, inappropriate government policy, poor training opportunities for professionals, limited physical resources, poor access to knowledge on new technologies, limited qualified human resources for linkage leadership, organizational rigidities, lack of rule for interaction, differences in orientation and others. Linkage constraining factors were positively and significantly correlated ($P \leq 0.05$) with some problems of public extension organizations. It is, therefore, evident that forging effective linkage among agencies in the agriculture innovation transfer system is a step forward to institutional reform, enhancing effectiveness and efficiency of service; and cost-effectiveness in extension service system, particularly in the public agencies

The study recommends that policy makers and development planners should put in place policies and framework that could stimulate and enhance linkages among agencies. Regulatory mechanism is also expedient for effective functioning and use of the linkages. More over integrating linkage leadership training and orientation into most professional conferences/workshops is not out of place. Individual organizations should re-orientate their staff towards favorable altitude and culture of interaction and flexibility in mandates and operations.

ACKNOWLEDGEMENTS

The authors hereby acknowledge Prof. A.C. Anyanwu and Prof. M.C. Madukwe of the University of Nigeria, Nsukka for being supportive throughout their research.

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