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## Practitioners' perception of challenges and effectiveness of Nigerian research-extension-farmer-input linkage systems

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### Abstract

The Agricultural technology system (ATS), which, in Nigeria, is called the Research-Extension-Farmer-Input Linkage System [REFILS] comprises individuals who are expected to interact and effectively perform activities geared towards generation, dissemination, supply and use of innovations to achieve food security and poverty alleviation. However, the impact of the system is far below expectation due to challenges experienced by components of the linkage system. This study therefore assessed research and extension practitioners' perception of the component-wise challenges and effectiveness of Nigeria's REFILS. The seventy two (72) high calibre research and extension practitioners who participated in the National Extension Planning Review Meeting (NEPRM) for 2010 constituted the respondents. Findings show that practitioners were mostly males (75%), mean age=50.1 years, years of experience ( $\bar{X}$  =21.3years) and 75% had post graduate degrees. The study also revealed weak perception of linkage effectiveness (grand  $\bar{X}$  =2.016) with report writing ( $\bar{X}$  =2.671), management interactions ( $\bar{X}$  =2.522), policy formulation ( $\bar{X}$  =2.387), as activities with strongest linkage effectiveness. Linkage effectiveness scores were weak in activities such as mass media communication ( $\bar{X}$  =1.298), link with input and service providers ( $\bar{X}$  =1.314), liaison services ( $\bar{X}$  =1.429) and joint programme implementation reviews ( $\bar{X}$  =1.462). Furthermore, analysis showed significant relationships between sex ( $r=-0.690$ ), educational qualification ( $r=0.598$ ) and years of working experience ( $r=0.506$ ). Component-wise, most serious challenges ( $\geq 50\%$  indication) to REFILS effectiveness include poor motivation, inadequate and erratic funding, dearth of capacity building opportunities, inadequate capital for farmers, absence of strong farmers' organizations, poor participation of input agencies and poor coordination. The study concludes that practitioners were weak in linkage effectiveness, especially in field level activities due to various component-wise challenges. The study recommends improved funding support and involvement of relevant stakeholders, especially farmers' organizations and input agencies in REFILS activities by government, private and donor agencies to enhance food security in Nigeria and by extension Africa.

**Keywords:** *Agricultural technology systems, linkage effectiveness, challenges, practitioners, Nigeria*

### Introduction

As a system the, Agricultural technology system (ATS) is made up of sub-systems and components which are linked together. Linkage entails communication and working relationship established

between two or more organizations or individuals pursuing commonly shared objectives in order to achieve regular contact and improve productivity as implied by Swanson, (1997); Doamekpor, (2006); Faborode and Laogun, (2008). Linkage is facilitated through role performance of individuals who function in the component institutions that make up the ATS. Links are about people and no linkage mechanism can succeed unless individuals are motivated, work together and recognize that they depend on one another to reach a common goal (Doamekpor, 2006). The performance and strength of the system is a function of the intensity of linkages between and among components of the system (Dimelu and Anyanwu, 2008). The interaction/linkage process involves communication and feedbacks among the actors- researchers, extensionists, input suppliers, marketers and others with the client system. No single component can independently make the desired impact which argues for effective linkages between and among components.

According to Agunga et al. (2014), to be effective results in enhanced quality and efficiency of agricultural production, improved local participation and human resources development. Effectiveness is the act of achieving the intended result in fulfilling a function while linkage effectiveness is achieving the intended result of linkage in this case REFILS. This shows that any activity performed by individuals in any of the component organization with linkage focus is aimed at food security and poverty alleviation. Thus socially desirable, economic viable and ecologically sustainable innovations must emanate from effective and efficient ATS. Solutions to global challenges such as food insecurity, poverty, increasing population, climate change, environmental degradation and inequalities in access and control of resources is innovation. Innovation according to Bruin and Meerman, (2001) refers to component technologies, the ability to create new forms of organization, including marketing, platforms for action or not using certain technologies any longer. Innovations emerge from the synergistic interaction among complementary stakeholders/institutions in the agricultural systems. Based on the major functions/roles, mandates and policies, the organizations are classified into three sub-systems: knowledge/technology generating, transfer and utilization (Dimelu and Anyanwu, 2008).

Swanson (1997) posited that each part or level of agricultural technology system (ATS) can be broken down into its constituent subsystems, components, functions, and corresponding linkages. The structure of an organization should reflect and support the work functions and processes that need to be carried out at sub-system/component level for goal achievement in the larger technology system. Linkage roles/functions translate to activities performed by stakeholders including research and extension practitioners in the system. Examples include management/policy formulation, collaborative or adaptive research and demonstrations, trainings/workshops, field monitoring, needs assessment, print and electronic mass media programmes, reporting, and backstopping. These linkage activities exist at National, Zonal, State, Local Government and cell/community levels.

Linkage is necessary for identifying research problems, to ensure technologies are relevant, adaptation of recommendations to local conditions and provision of feedback to researchers. The implication of weak linkages cannot be over emphasized. Swanson, (1997); Agbamu, (2005); Kim, *et al.*, (2009) identified weak linkage between research, extension organizations, and farmers as one of the most difficult institutional problems in most developing Nations. It is thus imperative for stakeholders to be effective in linkage role performance which are technical, managerial and organizational for overall goal achievement.

Nigeria transitioned from the linear model of the 1960s to REFILS model entrenched in the Training and Visit (T&V) approach funded by the World Bank since the 1980s. The linear model was criticized as top-down and that it limits feedback (Axinn, 1988; IITA, Bruin and Meerman,

2001; Critchley, 2007). The T&V has been described as the driving force of REFILS in Nigeria (Faborode and Laogun, 2008). Thus ATS should adopt participatory approaches. This will ensure inclusion of all stakeholders and that innovations are demand-driven (Pretty and Volouhe, 1997). Meaning that relevant innovations from ATS are expected to emanate from effective linkage in order to achieve food security and alleviate poverty. An essential role of extension is to facilitate linkages among stakeholders in ATS.

Nigeria's REFILS has been assessed as weak due to several reasons such as poor logistic support, use of inadequate number and poorly trained personnel, low participation of clientele in programme development (top-down communication approach and centralized decision making process). Others include policy inconsistencies, poor and irregular funding, inefficient supervision, duplication of services and irregular evaluation, failure of input suppliers to ensure effective and timely distribution to farmers, poor coordination and conflict of interests between researchers and extension workers (Torimiro and Adedoyin, 2005; Faborode and Laogun, 2008; Arokoyo, 2009 and Abdullahi and Issa, 2013). The challenges could be categorized as those related to: (a) individual practitioner, (b) their respective organizations, (c) farmers, (d) input providers, (e) government/policy issues and (f) research-extension linkage. The challenges identified are mainly from reports and position papers. There is dearth of empirical evidence on linkage effectiveness and component-wise challenges as perceived by high caliber research and extension practitioners. This study thus attempted to fill this gap.

### **Purpose and objectives**

The main purpose of this study was to assess practitioners' perception of their linkage effectiveness in performance of linkage functions and component-wise challenges to REFILS. The study specifically addressed the following objectives:

- 1) Described the personal characteristics of research and extension practitioners,
- 2) Assessed respondents' effectiveness in performance of some linkage activities/functions, and
- 3) Identified the perceived component-wise challenges to the effectiveness of REFILS: as relate to:
  - self (challenges individual research and extension practitioner faced),
  - respective organizations the respondents/practitioners belonged,
  - challenges faced by farmers,
  - challenges of input or other service providers/marketing,
  - policy/government issues/actions that affect REFILS and
  - research-extension linkage challenges (as the two core professionals constituting the respondents).

### **Methods and data sources**

Seventy two 72 research and extension practitioners from research institutes and extension outfit (Agricultural Development Programmes (ADPs)), who participated in the annual National Extension Planning Review Meeting (NEPRM) of 2010, held at National Agricultural Extension Research and Liaison Services (NAERLS), Zaria constituted the respondents. Copies of the

questionnaire were administered to all, 63 copies were retrieved out of which seven (7) were invalid hence 56 was used (87.5%). The sections of the questionnaire addressed the specific objectives.

Practitioners' perception of effectiveness in linkage functions was measured on a 3-point scale of: 3= very effective, 2= effective, 1= not effective (mid-point=2.00) comprising 16 items of activities/functions the practitioners carry out in the ATS. The minimum score attainable =16 and maximum= 48.

Challenges to the REFILS components in ATS were obtained using open-ended questions which were in sub-sections: self, institution, farmer, input providers/marketers, government/policy and research-extension linkage. The listed challenges against each component were presented using frequencies and percentages. Challenges with percentage of  $\geq 50\%$  indication were considered serious/important.

Data analysis employed descriptive and inferential statistics Pearson's Product Moment Correlation (PPMC) at .05 level of significance was used to test the null hypothesis:

***H<sub>0</sub>***: there is no significant relationship between personal characteristics of practitioners and their linkage effectiveness scores.

## **Results and Discussion**

As presented in Table 1, majority of the respondents were males (75.0%) an indication that males dominate the research and extension practice at high level management. High proportion of the respondents was within the age range of 41-60 (83.9%) with mean age of 50.1years. This is an indication that the practitioners were adults. They had post graduate degrees (85.0%), with working experience of between 11-30 years (67.0%) with mean of 21.3years. More belonged to extension institutions (58.9%). The personal characters clearly show that the respondents were high caliber extension and research staff. The respondents were more educated than the extension workers in Agunga *et al.*, (2013) the study carried out in Turkey where only 28.6% had post graduate degrees.

**Table 1: Personal characteristics of the respondents n=56**

<b>Variables</b>	<b>Frequency</b>	<b>%</b>	<b>Mean</b>
<b>Sex</b>			
Male	42	75.0	
Female	14	25	
<b>Age</b>			
<40	5	8.9	
41-50	22	39.3	50.1years
51-60	25	44.6	
>60	4	7.1	

<b>Total Working Experience</b>			
<10	4	7.1	
11-20	20	35.7	21.3years
21-30	26	46.4	
>30	6	10.7	
<b>Highest Qualification</b>			
HND/B.Sc/PGD	14	25.0	
M.Sc/Professional Cert	23	41.1	
Ph.D	19	33.9	
<b>Institution Type</b>			
Research	23	41.1	
Extension	33	58.9	

**Practitioners’ perception of effectiveness in REFILS functions**

As shown in Table 2, the grand mean for linkage effectiveness ( $\bar{X} = 2.016$ ) was just about the cut-off point of 2.00 an indication of marginal effectiveness in self rating which is subject to bias. Report writing had the highest mean ( $\bar{X} = 2.671$ ), management and implementation issues ( $\bar{X} = 2.522$ ), policy formulation ( $\bar{X} = 2.481$ ), collaborative/joint research activities ( $\bar{X} = 2.387$ ), joint adaptive research and demonstrations ( $\bar{X} = 1.2.355$ ), interagency publications and report ( $\bar{X} = 2.345$ ), information dissemination and farmers’ trainings ( $\bar{X} = 2.316$ ), joint trainings and workshop ( $\bar{X} = 2.131$ ) and joint needs assessment/problem identification ( $\bar{X} = 2.127$ ). However, practitioners were not effective, were weakest in activities such as, mass media communication ( $\bar{X} = 1.298$ ), linkage with inputs and other service providers ( $\bar{X} = 1.314$ ), liaison services ( $\bar{X} = 1.429$ ) and programme implementation reviews ( $\bar{X} = 1.462$ ). This is an indication that core field activities usually implemented in the client system were not effectively carried out which could be attributed to poor funding and poor motivation. The weak linkage effectiveness contradicts Ekumankama et al., (2007) in which extension agents were rated highest on regular and timely field visits to farmers.

**Table 2: Practitioners’ linkage functions and mean scores of effectiveness**

<b>FUNCTIONS/ACTIVITIES</b>	<b>Mean</b>	<b>Std Deviation</b>
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Policy Formulation	2.481*	.703
Management and implementation	2.522*	.188
Collaborative/joint Research activities	2.387*	.250
Joint Adaptive research and demonstrations	2.355*	.229
Joint Trainings and workshop	2.131*	.104
Joint Supervision	1.811	.417
Joint field monitoring and evaluation	1.732	.354
Information dissemination and farmers' trainings	2.316	.312
Interagency Publications and report	2.345*	.333
Linkage with input supply and other service Providers	1.314	.312
Liaison services	1.429	.167
Joint needs assessment/problem identification	2.127*	.667
Report writing	2.671*	.534
Backstopping/technical assistance	1.878	.342
Programme Implementation reviews	1.462	.386
Mass media communications	1.298	.273
<b>Grand Mean</b>	<b>2.016</b>	

*\*≥2.00 =Linkage effective*

**Component-wise challenges to REFILS identified by the respondents:**

The challenges identified by 50% and above of the respondents as shown in Table 2 for REFILS components:

**Respondents' self-related-** greatest challenges were low self drive (87.5%) probably by poor motivation to work (87.5%), poor access to fund to perform and logistics (85.7%), dearth of update courses/inadequate training opportunities (64.3%) which could contribute to low self drive/poor motivation. The low self drive is contrary to Agunga et al. (2013) in which 71.4% extension workers were satisfied with their work.

**Organization-wise-** Respondents' serious organizational challenges were (73.2%) poor funding (85.7%) and, shortage of working materials and obsolete facilities and dearth of training

opportunities, too much administrative bottlenecks/bureaucracy (60.7%). This agrees with Issa et al, (2010)

**Farmer-related challenges** were absence of strong farmers’ organizations (83.9%). This agrees with Abdullahi and Issa (2013) that links are made with individual farmers not with their organizations. The finding contradicts Emordi and Madukwe (2010) that farmers in rice innovation system had strong links with researchers, policy personnel, technology transfer agencies and consumers. Others are inadequate capital/ financial resources (82.1%), low level of education (64.3%). This could limit participation and uptake of technologies.

**Input-related-** constraints were exclusion/poor participation of input agencies in REFILS activities (64.3%) will affect input supply and consequently uptake of technologies.

**Government policy related:** Poor funding of agriculture and rural development programs (89.7%), non creation of enabling environment for policy and program effectiveness (82.1%) and unfavourable/inconsistent policies and programs (69.9). This agrees with the positions of Agbamu (2005) and Issa *et al.*(2010).

**Research-Extension Linkage:** poor coordination (92.9%), duplication by NGOs and Private sector (50.0%) and inadequate involvement of private sector (91.8%). These findings corroborate those of Dimelu and Anyanwu (2008) that factors constraining linkages were policy, organization, attitude and motivation related.

**Table 3: Practitioners’ perception of component-wise constraints to effectiveness in linkage function**

<b>CONSTRAINTS TO LINKAGE EFFECTIVENESS</b>	<b>Frequency</b>	<b>%</b>
<b>SELF RELATED CONSTRAINTS</b>		
Poor self-drive due to low motivation and condition of service	49	87.5*
Poor access to fund to perform & logistics	48	85.7*
Dearth of requisite knowledge and skills	11	19.6
Poor and irregular Supervision	11	19.6
Dearth update courses/inadequate training opportunities	36	64.3*
Relationship with head & others	2	3.6
Too much work load/time shortage	14	25.0
<b>ORGANISATION RELATED CONSTRAINTS</b>		

Poor and erratic funding	<b>48</b>	<b>85.7*</b>
Poor staffing & high staff turnover	18	32.1
Poor management	12	21.4
Too much administrative bottlenecks/bureaucracy	34	60.7*
Bad leadership	7	12.5
Shortage of working materials and obsolete facilities	41	73.2*
Poor institutional arrangement/ placement problems	5	8.9
Poor staff participation/	8	14.1
Poor linkage/synergy with other organizations	19	33.9
<b>FARMER RELATED CONSTRAINTS</b>		
Inadequate capital/ financial resources	46	82.1*
Dearth of proven technologies for adoption	21	37.5
Absence of strong farmer organization/ elite/ and non farmers dominate	<b>47</b>	<b>83.9*</b>
Exclusion from program planning, implementation and evaluation	13	23.2
Farmers do not have time to attend trainings/activities	15	26.8
Low level of education	36	64.3*
<b>INPUT RELATED CONSTRAINTS</b>		
Low demand, unavailability/high cost if inputs	8	14.3
No effective coordination among input agencies	12	20.7
Exclusion/poor participation of input agencies in REFILS activities	<b>36</b>	<b>64.3*</b>
Input agencies not interested	14	25.0
<b>GOVERNMENT POLICY-RELATED</b>		

<b>CONSTRAINTS</b>		
Neglect / Poor funding of agriculture and rural development programs	<b>50</b>	<b>89.7*</b>
Non creation of enabling environment for policy and program effectiveness	46	82.1*
Unfavourable/inconsistent policies and programs	39	69.6*
<b>RESEARCH-EXTENSION LINKAGE CONSTRAINTS</b>		
Poor coordination	<b>52</b>	<b>92.9*</b>
Rivalry/competition among organizations	9	16.1
Duplication by NGOs and Private sector	28	50.0*
Inadequate involvement of private sector	51	91.8*

\*challenges indicated by  $\geq 50\%$  of respondents

### **Relationship between Linkage effectiveness and personal characteristics of the respondents**

There were significant relationships/correlation between effectiveness in linkage functions and each of sex ( $r=-.690$ ;  $p=.000$ ), educational qualification( $r=.598$ ;  $p=.000$ ), total working experience ( $r=.506$ ;  $p=.000$ ). This means that females and practitioners with more education and years of experience were more linkage effective. The more educated practitioners and those with longer duration of working experience are likely to be more effective in carrying out their functions as education could give more understanding/knowledge of goals and task to perform while experience enhance proficiency.

**Table 4: Relationship between personal characteristics of respondents**

<b>Variable</b>	<b>r-value</b>	<b>p</b>	<b>Decision</b>
Sex (dummy)	-.690**	.000	Significant
Age	-.279	.055	Not significant

Educational Qualification	.598**	.000	Significant
Total working experience	.506**	.000	Significant

### **Implications for agricultural extension and food security in Africa**

A major finding is that agricultural research and extension practitioners/respondents' linkage effectiveness was stronger in activities that relate to management than field level activities. Practitioners with higher education and longer years of working experience tended to be more linkage effective. Furthermore, various challenges to REFILS components including low self drive of practitioners, poor funding, training and logistics support, dearth of strong farmers' organizations, low participation of input agencies and poor coordination could have hindered linkage effectiveness consequently goal attainment of the agricultural technology system (ATS) in Nigeria.

Whatever approach agricultural technology system (ATS) of any country adopts, the components remain and their effective linkage is the only way to achieve effective and efficient innovations generation, dissemination, supply and utilization system that will enhanced productivity for food security at all levels. These include national, sub-regional, regional (Africa) and global levels. Thus component-wise challenges need to be addressed by policies and actions aimed at achieving effective linkage and impact of REFILS in Nigeria and by extension Africa. This is based on the premises that Nigeria's population is significant and problems of ATS in developing nations are similar. Extension should facilitate linkages which is one its key functions at all levels from community, national, sub regional, Africa and global levels.

### **Conclusion and recommendations**

Effectiveness in linkage functions was not very strong in Nigeria's REFILS due to various component-wise challenges. The linkage functions effectively performed were mostly management and less of field level activities. Females, the less educated and the more experienced practitioners, were more linkage effective. Major challenges to REFILS effectiveness as relate to individual practitioners, their respective organizations, farmers, input/marketing and government/policy revolve around funding and institutional challenges.

Based on the findings the following are recommended:

- More female practitioners should be engaged and staff adequately motivated through continuous training, provided adequate remuneration and incentives to retain the experienced ones across the country;
- Inclusion of all REFILS stakeholders in public and private sectors and farmers' organizations through policies on role definition and coordination to enhance effectiveness,
- Improved funding of institutions by government, donors and NGOs and ensuring that field level activities are implemented, and

- Effective ICTs usage by stakeholders will help to adequately link the Nigeria's ATS-REFILS for sustainable technology generation, dissemination, distribution and usage for enhanced productivity.

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