DEVELOPMENT OF A CONCEPTUAL MODEL BASED ON FACTORS AFFECTING THE STRENGTHENING OF LINKAGE BETWEEN ACTORS OF AKIS

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ABSTRACT

Solutions to strengthen the linkage between the main actors of AKIS have been increasingly sought and are being embedded into national and international policy. This study investigates the conditions, action strategies, and consequences of strengthening the linkage between actors of AKIS. Eight main areas were identified from a Grounded Theory Analysis of the literature. “Proper Social Capital” as an intervening factor and “Capacity Building in Human Resources” were found to be the console conditions influencing the strengthening of the linkage between the actors of AKIS. The identified contextual factors were: “Infrastructure & Enabling Environments”, “Active Actors”, “Flexible & Efficient Structure”, “Continuous Monitoring & Evaluation”, and “Transparent Vision & Mission”, as the action strategies for strengthening the linkage between actors of AKIS. Finally, the consequence of strengthening linkage was “socio-economic achievements synergistic”.

Keywords: Agricultural Knowledge and Information System, AKIS, Grounded Theory, Linkage, Paradigm Model.

INTRODUCTION

The main purpose of this study was to identify factors affecting the strengthening of the link between the actors of AKIS. This study tried to find the answer to this question through a deep literature review of how

this system works in different countries using a grounded theory approach. Based on this, we tried to develop a model that captures the main factors that are a part of AKIS. This study contributes to the identifying factors affecting the strengthening of the link between actors of agricultural knowledge and information systems. Therefore, in this research, we were looking for answer to the following questions:

- What are the conditions affecting the linkage?
- What action strategies be adopted?
- What will be the consequences of using action strategies?

METHODOLOY

In order to develop a conceptual model that explains the effective factors in strengthening linkages between different actors of AKIS, a grounded theory approach was used to systematically analyze large bodies of texts to construct theoretical models that are "grounded" in the text. This methodological approach was based on the principle of openness and flexibility. New insights formed during the study will affect the ongoing research processes. Therefore, a grounded theory through systematic data collection and analysis pertaining to a particular phenomenon was applied.

1. Data Collection:

Research papers published between 1970 and 2016 that were related to linkage and strengthening interactions between different actors within AKIS were searched. The samples were chosen through Google scholar database by searching for abstracts that contained either the keywords "Linkage", "Interaction", "Agricultural Extension", "Land-grant Universities", "Networking", or "Information Exchange". After eliminating unrelated articles, 36 research papers related to the linkages in AKIS were retained in the sample.

2. Data Analyses:

The data analysis procedure followed the standard format as outlined in the prior grounded theory work by Strauss & Corbin (1990). Beginning with open coding, initial categories were formed in the data keeping in mind the factors affecting the strengthening the link between actors of AKIS. Then the data were assembled using axial coding to identify a paradigm model, explaining a central concept to the phenomenon and its relationship to causal conditions, outcomes, action/interaction strategies, intervening conditions, and context.

3. Validity and Reliability:

Coding was conducted by using frequent and various well-documented contents from credible and original sources. A panel of experts approved the quality of data. In addition, a panel of expert judgment in the area of AKIS approved the accuracy and reliability of the model. They confirmed that the issues of concern in developing the AKIS model are likely to be real and reliable and the formulated questions and instrument measure the right content. They commented on developing a clear description of an initial conceptual model. The process of data analysis moving from the text to theoretically constructed categories is shown in figure 1.

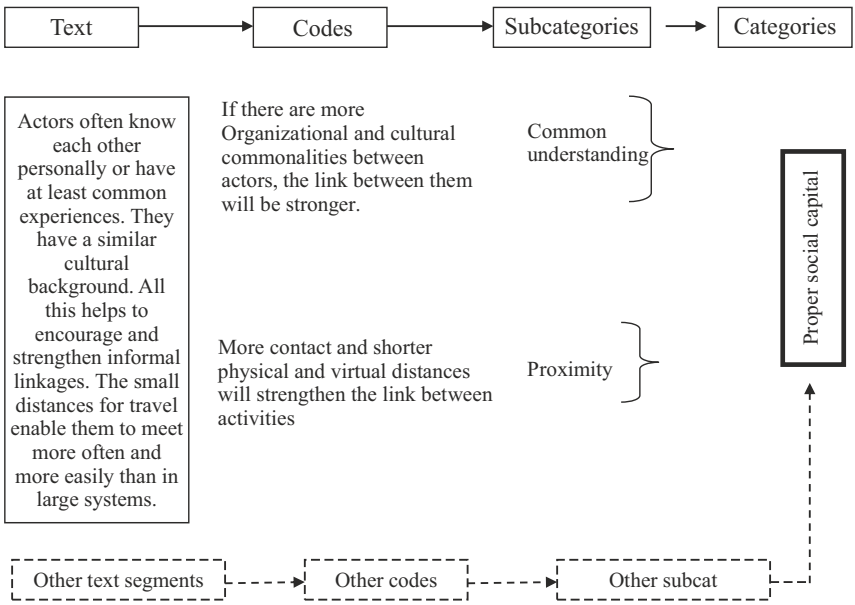

Figure 1: Data Analysis

4. Designing Paradigm Model:

Data were analyzed, recombined, and then placed into the components of the paradigm model as recommended by Strauss & Corbin (1990). The central phenomenon was followed by its context, the casual conditions, the action /interaction strategies, the intervening conditions that helped/hindered the action/interaction strategies, and the resulting outcomes. Causal conditions refer to the factors that lead to the occurrence of the phenomenon or the central idea. Contextual conditions were the

"specific set of conditions (patterns of conditions) that increased dimensionally at this time and place to create a set of circumstances or problems to which persons respond through actions / interactions (Corbin and Strauss 2008). Intervening condition are conditions that mitigate or otherwise influence causal conditions on the phenomenon. Action strategy is composed of goal-oriented activities which agents perform in response to the phenomenon and intervening conditions. Consequences are the result of using active strategies allowing for a more thorough explanation (Santos, Erdmann et al. 2016).

RESULT AND DISCUSSION

Result from Open and Axial Coding

In this section, some preliminary results obtained from the open and axial coding processes were presented. After open coding analyses, strengthening factors of linkage were categorized into 151 codes, 45 sub-categories, and eight main categories. The main categories were further analyzed using axial coding which is illustrated in Figure 2.

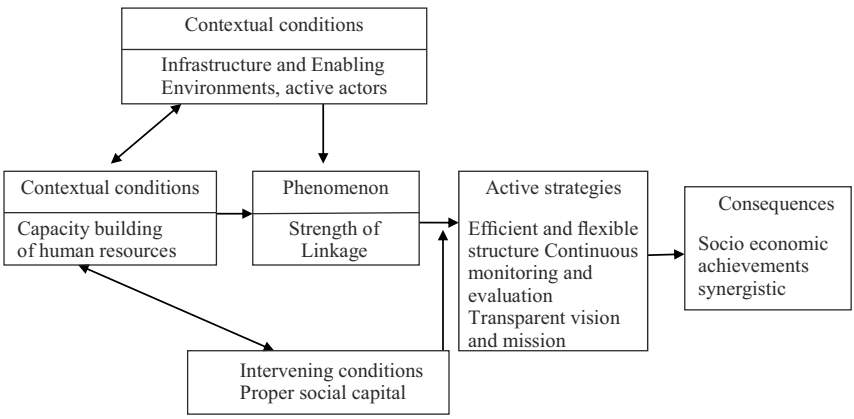

Figure 2: Paradigm model of strengthening AKIS through linkages

1. Consol Conditions of strengthening the linkage

Consol conditions for strengthening the linkage were identified as "Capacity Building in Human Resources". This category comprised of the following subcategories viz., "General management skills", "knowledge management skills", "Technical skill", "Community development skills", and "Human resources management".

Capacity building as enhancing the abilities and resources of individuals, organizations, and communities involved in the linkage to manage change (Coutts, Roberts et al. 2005) has a positive effect on changing an economic and social life. The results showed that capacity building at the level of organizational staff (human resource) was effective to improve the linkage between them. Capacity building of human and social resources was one of FAO/World Bank's guiding principles to assist in achieving the AKIS/rd objectives (Rivera, Qamar et al. 2005). They considered the capacity building as a transformative and highly influential factor, notably in the technical aspects of business training, an organization of local cooperative and establishment of community organizations. Bontis et al. (1999) defined human capital as the human factor in the organization; combined intelligence, skills, and expertise that gives the organization its distinctive character. The human elements of the organization are those that are capable of learning, changing, innovating, and providing the creative trust which if properly motivated can ensure the long-run survival of the organization. Davenport (1998) revealed that people possess innate abilities, behaviours and personal energy and these elements make up the human capital which is brought to their work. Armstrong (2014) also defined the human capital as knowledge and skills which individuals create, maintain, and use.

The FAO's comparative case study in ten countries on AKIS/RD showed that they have undertaken initiatives to build AKIS institutional resources through capacity building of human capital. For example, Cuba's AKIS pays attention to this factor through constant updating of staff (Rivera, Qamar et al. 2005). According to the World Bank, the Cuban government allocate 6.7 % of its gross national income to public education. Education in Cuba is in line with the developed world (Lobe 2001). In Cameroon's PNVRA, numerous research and extension staff have been trained by methods of adaptive as well as applied research station-type agriculture. In Morocco, training consists of ambiguous stakeholders in agricultural development. Moreover, the Special emphasis has been placed on training extension staff in order to update their knowledge level and improve their communication skills with farmers. Development of a nework of training centers as well as establishing of the National Centre of Extension Studies and Research actively promotes national training programs. Agricultural extension services have also been improved by institutionalizing precise tasks and sustained training programs for staff and farmers (Rivera, Qamar et al. 2002).

In addition to the skills needed by extension advisors, farmers and other actors of agricultural system, they need technical and management skills as well as the ability to operate in groups, use ICTs effectively, and analyze

market opportunities (Davis and Terblanche 2016). The extension as "an instrument of emancipation to uplift the poor" or a "pedagogy of oppressed" (Freire 1970) could be called "formative" extension or "human resources development" Carrasco 2001). Coutts and Roberts (2003) asserted that the outcome of extension is capacity building in individuals and communities. In addition, according to Bush (1992) universities can be directly and / or indirectly participated in the development of human resources. The following is an example of literature about capacity building of human being.

> "Participatory research methodologies that aim to get away from top-down strategies often continue to accord a central role in 'the experts', such as (in this case) 'linkage catalysts' or 'knowledge managers' whose job is to know to improve the performance of knowledge systems..."

> "The main activities of KACE include linking farmers and mainstream buyers by collecting information on the prices in different markets of various commodities on a daily basis from market vendors then availing them to the farmers in real time. Modern information communication technology (ICT) makes this possible through mobile phone handsets and personal computers..."

2. Contextual Conditions for strengthening the linkage

In the present day, contextual conditions of strengthening the linkage were identified as "Infrastructure and Enabling Environments" and "Active actors." Five subcategories fell under the Infrastructure and Enabling Environments category: "Legal environment," "Policy environment," "Availability of resources," "socio-economic environment," and "Location-based link."

The concept of an enabling environment is associated with a situation in which different actors and institutions can operate and grow because of the proximity, interaction, and capacity of different institutions, policies, and services. This term is increasingly used in reference to an array of external factors (Konig, da Silva et al. 2013) such as the policy, legal, cultural, social and economic environment.

The overall regulatory environment establishes basic conditions within which all actors operate and make decisions. Regulations may also enable or impede knowledge and technology transfer directly, contributing more or less to innovation, including in sustainability-enhancing technologies. In many cases, finding new solutions to improve linkages requires policy changes. The major problems of AKIS are often caused by a complex political and social dynamism of the system. The natural sciences can notify policy changes, whereas the political, social and economic sciences

have a lot to say about how these changes could be organized (Rivera-Ferre 2008). They have to prepare a legal framework for strengthening relationships as well as help to focus the natural sciences on finding solutions to minimizing the negative social and environmental impacts of agriculture.

The Active actors' category consisted of the following subcategories viz., "Joint Technical Committee," "Extension,", "Research," "Donor organizations," "Joint Technical Committee," "Market," "Joint Policymaking Committee," "Institutional Joint Council," "Higher Education," "Organizational Joint Committee," "R&D Unit in the private sector," and "farmers."

The actors' linkage with policymakers and decision-makers helps to provide a long-term institutional support to AKIS. Strengthening this link requires their proper understanding of the role of extension in the agricultural knowledge and information system. The following is an example of literature about infrastructure enabling environment and active actors:

> "Inefficient support services like seed multiplication system, input supply, agricultural markets, communication infrastructure and credits led to inefficient and unsustainable research-extension-farmer linkages by reducing the number of frontline staff and demoralizing researchers and extensionists...."
>
> "Inadequate funds for supporting the participation of partners in linkage activities limit the ability of researchers, extensionists, and farmers from full participation in the implementation of linkage activities..."
>
> "An integrated AKIS features a coordinating structure, often a public body, and the system is supported by national policies on AKIS and advisory services that frame the (inter)actions of AKIS actors..."

3. Intervening Conditions for strengthening the linkage

Intervening conditions for strengthening the linkage were identified as "Proper social capital." This category consisted of the following subcategories viz., "Common interests," "Forms of social capital," "Organizational Commitment," "Partnership," "social proximity," and "Common understanding."

Pretty (2003) has pointed out that the trust and connection among people, caused social capital and the joint action contributed to the coherence of individuals in their communities or societies. Actually, trust is an outcome of social capital.
One of the key indicators of social capital is membership in formal groups

and networks that are effective in developing social connections (Gregory 1999) facilitating collective action and securing benefits. As noted by Hoffman, Hoelscher, and Sherif (2005), social capital can increase knowledge management within an organization, help to facilitate the development of multiple intellectual capitals and make the communal action more efficient. Sharp and Smith (2003) stressed that collective action is needed for building social capital up. These actions accelerate the process of learning and facilitate the sharing of information and knowledge. In AKIS, conflict of interest and environmental pressures is inherent. Another characteristics of AKIS is enhancing synergy in the system if the linkages are established effectively. Synergy means a successful balance between multifaceted parts of the system and its diversity which can increase the integrity of the system. The extent to which actors understand and believe in common interfacing nature of the system and the importance of managing communications within the system is effective in improving links. In establishing an appropriate link among actors, the fulfilment of individual interests must be met by social capital and it requires a common policy, goals, and programs. Findings of research carried out by Munyua (2011) showed that there is a need to strengthen the capacity of farmers' groups and encourage them to joint action or form local groups. There are usually shared common interests, problems, information in groups and they support one another socially and enhance group dynamism (Meyer 2000; Onduru, Muchena et al. 2002). While in isolation, most farmers would be neither inclined nor able to access resources (McCampbell and Stewar 1992). The following is an example of literature about proper social capital.

> "In relatively small systems, as in The Netherlands and Israel, most researchers and advisors have studied at the same place or at a small number of institutions. They often know each other personally or have at least common experiences. They have a similar cultural background. All this helps to encourage and strengthen informal linkages..." (Hashemi, 2011).

4. Action strategies for strengthening the linkage

Action / reaction strategies for strengthening the linkage fell under the following categories: "Efficient and flexible structure," "Continuous monitoring and evaluation," and "Transparent vision and mission." Efficient and flexible structure consisted of the following subcategories viz., "Linkage diversity," "The nature of the link," "Methods and communication tools," "Structural adjustment," "flexibility," "Organizational cohesion," "Bureaucratic structure," "Structural decentralization," and "Centralized management".

The way that actors have linked to the system (system structure) and on the quality of the relationships created by these links (relational content) has an effect on the effectiveness of AKIS to empower stakeholders (Kaine, Doyle et al. 1999). Ragers (1976) believes that structural linkages among the research utilization system's components are provided by a shared conception of the system which is provided by use of a common "language" by members of the system and by the common sense of mission. Such internal linkage between researchers and users must be maintained over time. The link between the AKIS actors may be established in various social, organizational or academic contexts, and this is different in both centralized and decentralized sections of the system (Kaine, Doyle et al. 1999). Network structure and the performance of individual network members have a significant impact on the ability of an AKIS to facilitate technology transfer (Kaine, Doyle et al. 1999). Extension, research and education organizations almost adopt a flexible structure to reduce costs and increase profitability. Downsizing decentralization, job-redesign, etc., can be more adaptable to the flexible organizations. Fwamba (2013) in a research has recommended all organizations that provide extension services should come up with a structure that allows sharing of information through AKIS tools and ICT. The following is an example of literature about efficient and flexible structure.

> "Research and extension should not be seen as separate institutions which must somehow be linked..."
>
> "The 'level of integration' refers to the formal links between AKIS actors. A fragmented AKIS is characterized by several independent knowledge networks that operate in parallel..."

Continuous monitoring and evaluation are comprised of the following subcategories viz., "Evaluation methods," "Management of financial resources," and "Performance Monitoring". Evaluation is defined as 'the application of social science methods to measure goal attainment' or 'the systematic investigation of the merit or worth of an object' (Dart, Petheram et al. 1998). The term monitoring also relates to a management context in which it is a process of systematically collecting information in a consistent manner to meet service basic information needs (Dart, Petheram et al. 1998). Boyaci and Yildiz (2017) have suggested that forming an appropriate and multi-stakeholder monitoring and evaluation process encouraged the interaction and linkages in the AKIS. Hashemi (2001) has asserted that critical appraisal of any proper mechanism for monitoring, evaluation and impact estimate of their respective used by various subsystems have effected on current AKIS toward sustainability.

Actually, this assessment is as leading pre-requisite of "networking process". In addition, Social network analysis techniques provide an opportunity to assess the relationship between actors of an AKIS while sustaining relatively stable other factors such as organizational structure and the general nature of the innovation. The following is an example of literature about continuous monitoring and evaluation:

> "As an AKIS diagnosis is a single analytical step at a certain moment, monitoring and evaluation are meant as a public responsibility to be fulfilled repeatedly. It becomes increasingly important as advisory services and innovation activities receive more and more attention within Rural Development Programmes (RDP)...."

Transparent vision and mission are included in the following subcategories viz., "Goals," "Function," "Transparency of Perspective," "National Perspective". In any organization, after the objectives are established, the functions are determined, personnel requirements are assessed and the physical resources needed to accomplish the objectives are assessed and provided. All of these factors must then be incorporated into a structural design that will help achieve the aims. Finally, appropriate responsibilities are defined. Linkages may depend on the goals of knowledge transfer. There are three types of knowledge transfer pattern used by researchers. Diffusion with the aim of the promotion of knowledge and creating the awareness of this knowledge among potential clients. Dissemination with the aim of creating knowledges among specific groups of clients and change in their behaviour. Implementations with the aim change the attitude of the potential clients to modern knowledge and innovation. Griffin (2004) asserted that the compatibility of innovation clients goals with the purpose of the agricultural policy is one of the important features of theirs in the context of knowledge transfer. The following is an example of literature about transparent vision and mission.

> "An integrated AKIS features a coordinating structure, often a public body, and the system is supported by national policies on AKIS and advisory services that frame the (inter)actions of AKIS actors..."

5. Consequences for strengthening the linkage

The consequences of strengthening the linkage were categorized as "Socio-economic achievements synergistic." Subcategories of the consequences included "Internal synergy," "value chain efficiency," Improve productivity," "improve learning," "Strengthen the Skill," "Commercialization of findings," Achieving Technology Compatible," "Supply of knowledge," and "Strengthen the link."

Improving agricultural production may not be achieved without relevant and reliable agricultural information (Boyaci and Yildiz 2017). Links in the AKIS present the exchanged knowledge and information between actors and of strengthening the linkage helps the effectiveness of the value chain. Roling and Engel (1991) stated that the purpose of AKIS working synergistically is to support decision-making, problem-solving and innovation in agriculture. In fact, the actors of the AKIS, by moving in the direction of completing the role of each other, help to auto-improve system, and this is the meaning of the system's synergy. Networking and creating the link among subsystems have been shown to be an effective way of coordinating a shared activity and crossing boundaries, disciplines, organizations, hierarchies, and scales (Wielinga 2000). Actually, good learning and innovation networks have asserted to be a sufficient vehicle for empowering stakeholders to consider new options (SCAR 2015). The following is an example of literature about socio-economic achievements synergistic:

> "Improved linkages between researchers, extension personnel, and educators in different institutions helped to reduce duplication of efforts and encouraged sharing of experience and best practice..."

> "Effective communication links between researchers and extensionists are vital in the modification of technological recommendations and in initiating further research: such links enable new technologies and management practices to be suited to local ecological conditions..."

Abraham Blum (2017) identified 18 points on which relative strength and weakness of the Links between Actors of AKIS depended their effectiveness in the respective AKS. Hence, these 18 points should be used as "Checkpoints" when analysing Linkage strength of different Actors of AKIS. These are: Systems Approach, (2) Users control, (3) Influence over surroundings, (4) Mass of New Technologies, (5) Utilization orientation, (6) Social Distance, (7) Common Sense, (8) Client Ratio, (9) Users Education, (10) Common knowledge Management Systems, (11) Cooperative Control, (12) Knowledge Exchange, (13) Freedom from Law Enforcement, (14) Informal Linkage, (15) Smaller Regionalization, (16) Interfaces, (17) Mutual Exchange, (18) Knowledge Policy

CONCLUSION

Results from a deep investigation of valid literature indicate that strengthening linkage among actors plays an important role in AKIS as well as its success to achieve system's objectives. Synergy is an indicator of the distinction between actors' tasks and the effect of integrated tasks. The improvement of synergy results from more coordination among

actors and strengthening linkage among them. There are different sets of public research and extension institutions and production organizations in the system. Given the different objectives of these organizations and the wide range of motives of individuals in the organizations, it is essential to adopt a flexible and bureaucratic structure. Structural decentralization can improve technical ability and enhance synergy among the system's actors when the entire system enjoys a centralized management. Successive linkages among actors create a chain. Identifying this chain is very important and helps the improvement of the value chain effectiveness. RAAKS methodology is used for the analysis of the system linkages, whereas viewpoint survey methodology is imperfect and non-accurate.

In studying connection and linkages among actors, it should be taken into consideration that the linkage itself is not necessarily important, rather what need to be examined is that what is the purpose of the creation of this linkage and that what objectives it is going to be met. Oladele (2017) added that in 87.8 per cent cases the most important Linkage Activity is "Problem Identification" between the Actors of AKIS. Therefore, the principle of transparent perspective and mission as an active strategy needs to be addressed. AKIS has to pay attention to long-term requirements of all the system's actors so that it could define appropriate cooperative linkages amongst them to achieve common goals.
Wang Dehai and Lin Yonggong (2017) did the Linkage Analysis in China and found that weak Agricultural Policy and the Management of Extension within this policy is the main reason of wider gaps in Linkages between Actors of AKIS. To bridge these gaps, therefore, great efforts are needed not only by policy makers but by researchers and extensionists.

Adopting national comprehensive policies on mechanisms of linkage among the system's actors will increase system efficiently. It is notable that establishing linkage requires funding. Thus, the ways it is funded have to be predicted.
Adopting strategies is influenced by appropriate social capital. In establishing a linkage among actors, social capital should be substituted for individual interests supply. The degree of actors' understanding of common aspects and development of this domain affects the improvement of linkages. In fact, the balance between diversity and common interests is able to increase integration in the system. The smaller AKIS subsystem, the better their understanding of each other and the deeper linkage among actors. Cultural, social, and economic conditions as well as technical infrastructures are effective in selecting the types of interactions among the system's actors. It is necessary to regard the fact that linkage among actors is established in different cultural, social, economic, organizational, or university domains as an infrastructural principle and

enabling environment. In addition, linkage among actors influences the original phenomenon (strengthening linkage among actors). Actually, linkage efficacy is defined in relation to time, place and specific conditions. Reforming organizational rules and procedures, strengthening market infrastructures, facilitating financial exchanges and allocating adequate resources can strengthen linking mechanisms. Obtaining long-term institutional support of AKIS entails establishing linkage with policy-makers. Policy-makers, in their turn, establish appropriate linkages with AKIS when they reach a proper understanding of the role of this system in agricultural development. Another key factor that affects strengthening linkage is the presence of active actors. Linkage among main factors of the system requires mediators so that knowledge and information in the system could flow well. Collective organizational committees, councils, and working groups are mediating actors that can lead to the improvement of the relationship between extension and research. Associations and institutions which are active in the chain of farm to market are also effective in the linkage between procedures and extenders.

Strengthening linkage would not be realized without professional and capable human force. Capacity making at staff level is a prerequisite for improving linkage among actors. Some people under names such as "linkage catalysts" and / or "knowledge managers" help to strengthen the linkage. Lack of management skills and low capacities of local communities for managing projects are factors that influence strengthening linkage among actors.

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