In search of enhanced Agricultural knowledge sharing framework for farmers in low income countries: The case of Ethiopia

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In search of enhanced Agricultural knowledge sharing framework for farmers in low income countries: The case of Ethiopia

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ABSTRACT

This study is aimed at uncovering the model and the practices of knowledge sharing and flow in the agricultural knowledge centers established by a project named “Improving Productivity and Market Success” (IPMS). The goal was to improve agricultural productivity through market-oriented development to enhance livelihoods for rural populations. The twenty eight Agricultural Knowledge Centers established by IPMS project formed a network of alliances, and we assumed information and knowledge flow as multilateral and reciprocal processes. This preliminary study is informed by theorization of Nahapiet and Ghoshal that identified three dimensions of social capital theory: relational, cognitive, and structural capital. A positivist case study research methodology as suggested by Yin and Shanks was used, while an in-depth interview was conducted with the resource manager and coordinator of the knowledge centers. The information gathered was summarized and categorized along the three dimensions of the social capital theory. The findings reveal that structural arrangement created for managing and coordinating the project can potentially be used as a conduit for agricultural knowledge flow. The study also revealed that absence of formal management practice does impact the structural and cognitive social capital that enhances inter-center knowledge sharing. Comprehensive future studies are recommended for valid conclusions.

Key words: Information flow, Information Sharing, Social Capital Theory, Relational social Capital, Structural capital, Cognitive social capital

INTRODUCTION

The Ethiopian economy is mainly based on agriculture, which contributes 45% of the GDP (Gross Domestic Product) and more than 80% of exports, and employs 85% of the population. The major agricultural export crop is coffee, providing approximately 35% of Ethiopia's foreign exchange earnings (EU and FDRE, 2009). Ethiopian agriculture is heavily dominated by small peasant farms, backward agricultural technologies, and heavily dependent on unpredictable and often insufficient rainfall. As a result, the agricultural productivity is very low. Over the years,
various efforts have been made to boost productivity through technology transfer initiatives and irrigations. Various donor-driven productivity enhancing projects, such as Sassakawa - 2000 have been undertaken (UN, 2004).

In the year 2005 International Livestock Research Institute (ILRI) in collaboration with the Federal Democratic Republic of Ethiopia Ministry of Agriculture and Rural development launched a project named Improving Productivity and Market Success (ILRI, 2009). The goal of this project was to contribute to improvements in agricultural productivity and production through market-oriented agricultural development to improve livelihoods for the rural population (IPMS, 2010). To achieve this goal, four key programs were identified: Knowledge Management, Capacity development of partners, Participatory marketable commodity development, and Development and promotion of recommendations for scaling out. One of the expected outcomes of the project was the establishment of functional knowledge management system operationalized at District, Regional, and Federal levels and highlighting innovations and appropriate technologies (ILRI, 2010). To realize this outcome twenty eight knowledge centers were established throughout Ethiopia.

Organization and Operation of the knowledge Centers

The IPMS project currently operates in ten districts at various regions. At each district, knowledge centers are organized where the farmers can access information on how to grow a new crop, maintain livestock, or simply access the contact details of other farmers or traders.

Each center is equipped with 5 Computers, Television set, DVD players, and a library containing books, manuals, and training guides in printed form and on CD or DVD (ILRI, 2009). The project distributes printed materials obtained from organizations such as Food and Agriculture Organization (FAO) and International Fund for Agricultural Development (IFAD). At each knowledge center, dial-up Internet connection is available but not used frequently due to high usage charges.

In addition to providing regularly updated market information, the centers are considered as hubs to promote a culture of knowledge sharing and encouraging collaboration among farmers and extension workers. The project also seeks to improve the links between farmers and traders, and create opportunities for small-scale producers to sell their products to new markets. In doing so, the farmers would have a chance to increase their incomes. The IPMS project supports individual and organized groups of farmers to improve their negotiating power and food processing skills. Particularly, the TVs and DVD players are used to show training videos and recordings of farmers demonstrating crop management techniques. At times, the centers show entertaining films in order to attract farmers and their families to the knowledge centers. In order to provide information for agricultural extension workers, researchers, policy makers and to any stakeholder interested in the Ethiopian Agriculture, IPMS has developed Ethiopian Agriculture Web Portal which can be located at http://www.eap.gov.et/. A diagram of the IPMS project is shown in Figure1.
From the interview held with knowledge management advisor of IPMS project at ILRI, Ethiopia on Nov 2, 2010 and from review of reports, we have learnt that some knowledge centers have produced video footages on bee keeping, fruit nursery management, onion production and marketing, soil conservation and rice cultivation. The recordings are burned on CDs / DVDs and are distributed to other centers where they are used as training and motivational materials.

![Diagram of IPMS project spatial coverage]

**Figure1:** Spatial coverage of IPMS project *SNNP (Southern Nations and Nationalities and peoples Region).**  
*Source: Drawn based on facts obtained from IPMS project document and interview result.*

As indicated in Figure 1, the IPMS project is implemented in four regional administrations and in selected ten districts. The project is owned by the Federal Ministry of Agriculture and Rural Development. International Livestock Research Institute is in charge of implementing the project. The project is actually implemented at district level and some capacity building activities are done at the corresponding zonal, regional, and federal level. The state Minister of Agriculture is the board chair of IPMS project.
LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The theoretical foundations of this study draws on two key concepts: Knowledge flow and the social capital theory. First, following the explanations given by Gooderham (2007) we considered the twenty eight Agricultural Knowledge Center established by IPMS project as potentially forming network of alliances and we assumed information and knowledge flow as multilateral and reciprocal process. Furthermore, we treated knowledge flow, knowledge sharing, and knowledge transfer interchangeably. Knowledge is also considered in its two forms, tacit and explicit.

Secondly, we considered social capital basically as a network of individuals with shared norms, beliefs, and trust (Koka and Prescott, 2002). Over the years researchers have viewed organizations as purposive social actors and have extended the logic of social capital to the firm level (Burt, 1992; Tsai and Ghoshal, 1998). Organizations establish a variety of ties in the course of executing their activities. Such ties include buyer-supplier relationships, strategic alliances, and joint memberships in industry associations, amongst others. These ties enable organizations to exchange a variety of information, knowledge, and other forms of capital. Relationships are critical for knowledge creation and transfer, both tacit and explicit (Levin and Cross, 2004). Inter firm relationships thus represent social capital for two reasons. First, the network created by inter firm alliances can be viewed as conduits for information. Information flows through these conduits because people in different firms linked to each other meet and talk. Consequently, information and knowledge diffuse through the network. Possession of key information and control of information flow create entrepreneurial opportunities (Burt, 1992, 1997). Second, interactions between firms establish a pattern of obligations and expectations that are based on norms of reciprocity and equity.

The social capital theory since its introduction by Colman in 1988 has been used from different perspectives. This study builds on theorization as used by Nahapiet and Ghoshal (1998) and cited in Gooderham (2007). They distinguished three dimensions of social capital: the relational, the cognitive, and the structural. The link and interactions between the three dimensions of the social capital theory is portrayed using Figure 2.

![Figure 2: Social capital determinants of knowledge flow in district knowledge centers (extracted from Gooderham, 2007).](image-url)

The relational dimensions of social capital refers to such facets of personal relationships as trust, obligations, respect, and even friendship, which together increase the motivation to engage in knowledge exchange and teamwork. According to Goodeham (2007) the significance of this dimension of social capital as drivers of knowledge flows has received empirical support through case studies conducted by Bresman et al (1999) at three Multinational Corporations. Following the approach by Goodeham (2007) we have drawn a proposition for relational dimension as follows:

**Proposition 1**: The greater the degree of relational social capital that has been developed between district level knowledge centers, the greater the degree knowledge transfer and knowledge flow between them.

Furthermore, Goodeham (2007) described cognitive dimension as shared interpretations and systems of meaning, and shared languages and codes that provide the foundation for communication. According to Nahapiet and Goshal (1998) as cited in Gooderham (2007), the cognitive dimension of social capital lies in effectuating the development of the relational dimension of social capital rather than directly on knowledge transfer. In other words sharing ‘a view of the world’ is a necessary prerequisite for sufficient levels of trust to be developed that in turn stimulates knowledge exchange. As indicated in Figure 1 under each region there are at least two districts currently running the IPMS project (except for the SNNP region), the remaining have common regional language which is, the official working language of the region. This helps to build common understanding and mutual trust and eventually helps to build sound relationships that facilitate knowledge flow at regional level. Moreover, all regions in Ethiopia extensively speak the official national language of Ethiopia, Amharic. This also facilitates inter regional knowledge flow. With all these assumptions we have formulated proposition for the social capital dimension as follows:

**Proposition 2**: The greater the degree of cognitive social capital that has been developed between Knowledge centers at district and regional levels, the greater the degree of relational social capital between the centers.

According to Goodeham (2007), the structural dimension of social capital refers to the presence or absence of specific network or social interaction ties between units of the multinational corporation and the overall configuration of these ties. Goodeham (2007) citing Nahapiet and Goshal (1998) further stated that the structural dimension is as such not directly associated with the transfer of knowledge. Instead, its significance for the transfer of knowledge is through the ways in which it ‘influences the development of the relational and cognitive dimensions of social capital’.

Apparently, network ties facilitate social interaction, which in turn stimulates the development of the cognitive and relational dimensions of social capital. Thus, a precondition for the development and maintenance of relational and cognitive dimensions of social capital is that of sustained social interaction, which is extremely important when the knowledge to be transferred is not codified (Goodeham, 2007). In this study the cognitive dimension of social capital is hypothesized as follows:

**Proposition 3**: The greater the degree of structural capital that has been developed between knowledge centers, the greater the degree of both cognitive (3a) and relational social capital (3b).
The propositions ranging from 1-3b are summarized in Figure 3. Apparently, sufficient degrees of relational social capital must be in place to enhance flow of agricultural knowledge among district, zonal, and regional knowledge centers in Ethiopia. And this is dependent on sufficient degree of cognitive and structural social capital. Therefore, the issues is how best to develop these two forms of social capital. To explain this issue very well Gooderham (2007) recommended assessing the impact of the external environment and the role of management initiated practices on the formation of the cognitive and structural social capital.

Regarding the potential bearings of the external environment Ghemawat’s (2001) as cited by Gooderham (2007) distinguished various dimensions that impacts on the formation of inter unit social capital including geographic distance, cultural distance, and economic distance. In the context of this study the geographic and cultural distances are expected to have effect on the smooth flow of knowledge between knowledge centers located at different regional settings. Cultural distance refers to variation in shared language and shared experiences among actors tied in the network of alliance. The spatial distance simply denotes geographic distance and its bearings on the formation of cognitive social capital. Propositions 4 and 5 are introduced to address the potential impact of geographic distance and cultural variation on the degree of structural and cognitive social capital.

Proposition 4: The greater the spatial distance between agricultural knowledge centers in Ethiopia, the weaker the degree of structural social capital.

Proposition 5: The greater the cultural distance between agricultural knowledge centers in Ethiopia, the weaker the degree of cognitive social capital.

With regards to management practices, Gooderham (2007) expressed the need for management routine and practices that negate the impact of the external environment and promotes the development and maintenance of social interaction and the cognitive social capital. Three sets of practices or mechanisms are identified: transmission channels, motivational mechanisms, and socialization mechanisms. Transmission channel refers to formal integrative mechanisms such as liaison personnel, inter-unit task forces, Intranet system, face to face meetings and workshops that may be used for sharing tacit and explicit knowledge. Proposition 6 states the role of transmission channel for knowledge sharing.

Proposition 6: The greater the magnitude of transmission channels between agricultural knowledge centers in Ethiopia, the greater the degree of structural and social capital between them.

Appropriate socialization mechanisms are supposed to be instrumental for having shared goals and mutual understandings at organizational level. These socialization mechanisms have to be achieved despite the impact of cultural distance. According to Gooderham (2007) a key driver of cognitive social capital is therefore mechanisms that effectively address the cultural diversity of agricultural knowledge centers located at different regions as well as the parochialism found across its units by stimulating the creation of a corporate that is embraced by employees working at the district knowledge centers and farmers regardless of cultural, economic, or educational background. Proposition 7 states the link between socialization mechanism and cognitive social capital.

Proposition 7 states the link between socialization mechanism and cognitive social capital.
Proposition 7: The greater the use of socialization mechanisms by the management bodies of IPMS, the greater the degree of cognitive social capital. Motivational mechanisms aimed at rewarding knowledge sharing behavioral outcomes helps to underscore and objectify the vision to foster and sustain knowledge flow. Proposition 8 states the link between motivational mechanisms and the degree of cognitive social capital.

Proposition 8: The greater the use of motivational mechanisms designed to promote knowledge sharing between agricultural knowledge centers, the greater the degree of cognitive social capital.

CONCEPTUAL MODEL

The conceptual model is adopted from the work of Gooderham (2007). The model brings together all the propositions stated above and considers the impact of the external environment on the formation of structural and cognitive social capital.
Figure 3: Conceptual model of knowledge flow in district knowledge centers (extracted from Gooderham 2007).
In this study the effect of the degree of economic and educational distance on agricultural knowledge flow at district level considered to be insignificant and disregarded. Virtually, all district knowledge centers are found to be in a comparable economic and educational level.

OBJECTIVES OF THE STUDY

The general objective of this study is to learn as to how knowledge may flow through the web of communication links potentially created by agricultural knowledge centers established by the IPMS project. The study address key questions about the extent to which management initiated practices by the project leaders influence the structural, relational, and cognitive dimensions of social capital and contributed for the smooth flow of knowledge across district knowledge centers.

RESEARCH METHODOLOGY

A positivist case study research methodology was be used for this research. According to Yin (1994) as cited by Pare (2001) a case study research is appropriate when a phenomenon to be investigated is broad and complex, when the boundaries between the phenomenon and context are not clearly evident, when a holistic and in depth investigation is needed, and where the existing body of knowledge is insufficient to permit the posing of causal relationships. Moreover, According to Yin (1994) as cited by Shanks (2002) case study typically combine data collection techniques such as interviews, observation, questionnaires, documents and text analysis; both qualitative data collection and analysis methods, which are concerned with words and meanings, and quantitative methods, concerned with numbers and measurements may be used.

According to Cavaye (1996) as cited by Shanks (2002) a case study research approach is widely used within the information systems community. Case studies can be undertaken within a positivist or interpretive paradigm, may be deductive or inductive, may involve single or multiple cases using literal or theoretical replication and may use qualitative and quantitative data.

This study used the interpretive approach where qualitative data will be gathered and analyzed on external and internal variables cited in Figure 3 and understanding and meaning is derived out of the instruction of actors in the system. The external variables that impact the structural and cognitive social capital, degree of spatial distance and degree of cultural distance were considered. As Ethiopia is geographically big country, districts within a specific region tend to have large geographic distance which makes travelling and communication difficult; interregional geographic distances also present significant challenges.

Apart from this, virtually all regions in Ethiopia have regional language which is the working language of the region. For interregional communication, mainly the national language or the English language is used. This may tend to hinder interregional knowledge flow as the levels of proficiency in national language tend to vary along
districts within different regions. Therefore, we investigated whether appropriate management strategies and practices are in place to deal with spatial and cultural distances.

With regard to the internal environmental variables impacting the structural and cognitive social capital among knowledge centers, the presence or absence of communication channels, socialization, and motivational mechanisms were assessed.

In order to elicit relevant information that address the external and internal environment, facts were be gathered from the IPMS project coordinating office at IRLI Ethiopia, from Federal Ministry of Agriculture and Rural Development IPMS project office, and from OROMYA regional state Bureau of Agriculture and rural development. All these offices are located at Addis Ababa, Ethiopia. Most of the internal and external variables mentioned in Figure 3 are of managerial and strategic in their nature. Semi structured interview guide (see the Appendix 1) were used to gather information from appropriate officers engaged in managerial and strategic issues of IPMS project in their respective organizations.

Furthermore, relevant documents pertaining to the initiation, design, development, and operation of the IPMS project will be gathered and analyzed. In addition the agricultural web portal developed by the project we reviewed and made observations while contents are uploaded on the portal. We also tracked the interaction made through the web portal in order to access directions for this and future studies.

**DATA ANALYSIS**

The data collected were analyzed and categorized in major thematic areas such as Transmission Channels, Socialization Mechanisms, Motivational Mechanisms, Structural social capital, Relational social capital, Cognitive social capital, and degree of knowledge flow. These thematic areas include the main dimensions of social capital theory. We assumed that this analytic approach would help us understand the extent to which favorable conditions have been created to enable the structural, relational, and cognitive social capital developed and knowledge flow facilitated.

Facts gathered through document analysis were framed to fall within one of the thematic areas and are expected to substantiate the information gathered through interview and observation.

**PRELIMINARY RESULTS OF THE STUDY**

For this first phase of the study, a couple of interview sessions were held with the knowledge management advisor of IPMS project at ILRI, Ethiopia on Nov 2, 2010 and Nov 6, 2010. For items and structure used in the interview,
please refer Appendix 1. The advisor (respondent) was asked to describe briefly how each regional knowledge center operated, the type of knowledge these centers shared among themselves, the mechanism put in place to facilitate knowledge sharing, the mode of information flow between the head quarters and regional knowledge centers, the type of problems encountered in the course of sharing knowledge, and the measures taken to rectify communication barriers.

The respondent pointed out that each center has at least five computers, a printer, and Internet access. In the case of Zonal and Regional centers, IPMS has also provided a network file server and has networked the computers. At district and Zonal levels, the project has also provided a TV Set, a DVD player, a generator, and printer. The centers are run by the respective government agriculture extension unit in each respective location. IPMS Research and Development Officers (RDOs) establish the centers in each location in close collaboration with the respective agriculture office and provide support as needed. In some instances, IPMS hires technical support personnel to support a given center. The project has provided several rounds of ICT training for those who run these centers as well as Knowledge Center coordinators. The project has also purchased computer-based-training (CBT) materials to enable on-going training of personnel.

Regarding the knowledge these centers share among themselves, the respondent stated that the knowledge centers are used as digital libraries, where users can access information on CD/DVD or the Internet, traditional libraries, where users can read books, manuals, training materials provided by the project on which other materials are added by the respective entities, and a meeting place where district level staff can hold informal meetings, brainstorm on selected topics, or give seminars utilizing the audio-video tools provided by the project.

Furthermore, the respondent described the forum or mechanisms that have been put in place by ILRI Ethiopia to facilitate knowledge sharing. The IPMS project generally strives to show new Methods, Approaches, and Processes (MAP) for knowledge sharing. Some of the MAP activities introduced by the project include: 1. Study tours – where participants visit local or remote areas to see what others have done and share their experiences and learn from the experiences of others. 2. Field days: where the achievements of pioneering farmers are shared with the broader community. 3. Community of Practice – where small information groups with similar interests regularly share experiences with interested members of the group. 4. Seminars, workshops, training sessions and other similar events are organized as needed to share knowledge with carefully targeted stakeholders.

The respondent was also asked to cite the type of problems they encountered in the course of sharing knowledge between the knowledge centers. The response suggested that the problems encountered are mainly in setting up the centers as well as sustaining the centers in good operational conditions. These can be divided into several key areas, including: 1. People – Lack of technical capacity on the people running the centers and also using the centers. 2.
Process – Lack of adequate experience in setting up and following up on processes for running such centers. 3. Technology – Lack of infrastructure (electricity, Internet access) to setup and maintain such centers. 4. Organizational framework – Sometimes, it is difficult to introduce a new initiative into organizations that have been operating a certain way for a long time.

In subsequent interview sessions, the respondent was asked to describe the inter-center information and knowledge sharing strategies if any, as to how each centers look at each other, whether there is a spirit of positive competition or collaboration. Finally the respondent was asked to comment on the outcomes achieved by the project so far. He stated that there is no formal inter-center knowledge sharing mechanisms. There were two national workshops where information using CD/DVD as well experience among the centers at district, Zonal, and Regional levels were shared. Informal knowledge sharing among the centers is strongly encouraged. Some intra-region centers do occasionally share their experiences. With regard to how each centers look at each other the respondent commented as follows:-

“I believe most center are focused in doing what they can to get the most out of their own centers and don’t look much beyond that into the affairs of other centers – although that is encouraged”.

At the end, the respondent was asked to highlight key outcomes achieved so far. And he forwarded the following:

“A study done by a Masters degree student on the role of ICT in Agricultural Knowledge Management development considering four IPMS district Knowledge Centers in 2009 sponsored by IPMS, showed that there is now opportunities for more diverse, more timely, and more volume of knowledge and information because of the establishment of these centers – compared to the situation before the establishment of the centers. Other internal and external monitoring and evaluation exercises also attest to that”.

CONCLUSION AND FUTURE WORK

The preliminary fact finding exercise made reveals pertinent information that will be used as a basis for future comprehensive studies. The IPMS project has put in place sound hierarchical and network structural arrangements for managing and coordinating the project. The top-down structure is mainly used as a mechanism for channeling directives and reporting relationship. The same structure may be modified and used for knowledge sharing and knowledge flow among knowledge centers. Appropriate procedural guidelines may be developed to streamline the inter center communications and knowledge flow. In this way sound structural dimension of social capital will thrive and develop.

The knowledge sharing mechanism introduced by the IPMS project MAP, Methods, Approaches, and Processes that involves study tours, field days, community of practice, and seminars and workshops are instrumental for the
transfer and flow of both explicit and tacit agricultural knowledge. This endeavor creates a fertile ground for socializations and for the creation of cognitive and relational social capital.

The study also revealed the absence of planned or formal inter-center knowledge sharing mechanisms. An attempt has been made to bring together centers and stakeholders using two national workshops which created a forum for knowledge sharing. However, the study indicated a wealth of knowledge that could have been shared among regional knowledge centers consistently.

The social capital theory was found to be appropriate theoretical lens to investigate the practice, pattern, and mode of knowledge flow among agricultural knowledge centers in the context of Ethiopia. Drawing appropriate measures from each dimension of the social capital theory and by identifying key impacting variables from the internal and external environment, comprehensive studies are required in order to generate valid outcomes that may inform the academic and partitioning communities.
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Appendix

Interview Guide

International Livestock Research Institute (ILRI)

Introduction

As has been indicated in the letter from IT doctoral office dated 09/02/2003 Ethiopian Calendar Addis Ababa University, the information being gathered for this study is purely for academic purpose. Proprietary and Privacy matters regarding the organization will be kept in due care and will not be shared with without your consent. The outcome of the study will be reported to your organization, as it would have some practical relevance.

1. Would you please mention how ILRI at Addis Ababa campus conduct research and disseminates the output?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

2. How many research sites or sub offices IRLI has in Ethiopia

____________________________________________________________________________________

3. How do researchers based in each of these sites exchange information or share knowledge

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

4. What mechanisms do ILRI use to transfer research outcomes to end users or farmers?

____________________________________________________________________________________
____________________________________________________________________________________

5. I read about the project being run by ILRI, Ethiopia called “Improving Productivity and Market Success (IPMS)” launched in 2005 having 28 regional information knowledge centers spread thought Ethiopia, would you please give us the following information regarding this project:

5.1. How each knowledge centers operate

____________________________________________________________________________________
____________________________________________________________________________________

5.2. What kind of knowledge these centers share among themselves

____________________________________________________________________________________
5.3. What forum or mechanism ILRI-Ethiopia has put in place to facilitate knowledge sharing

5.4. How information flows between the ILRI head quarter based at Addis Ababa and the regional knowledge centers

5.5. Would you mention the types of problems you encountered in the course of sharing knowledge in between the knowledge centers, if any

5.6. What measures were taken in order to solve the problems cited in Q#5.5

6. Would you please mention the overall strategy and policy of ILRI-Ethiopia for managing and sharing knowledge

Thank you very much for your kind participation!!