Full Length Research Paper

Networks among agricultural stakeholders in the Southwestern Highlands of Uganda

Fungo B.[1]*, Clark L.[2], Tenywa M. M.[3], Tukahirwa J.[4], Kamugisha R.[4], Birachi E.[5], Wanjiku C.[5], Bizoza A. R.[6], Wimba B.[7], Pali P.[8], Adewale A.[8] and Olowole F.[8]

[1]Faculty of Forestry and Nature Conservation, Makerere University P. Box 7062 Kampala, Uganda.
[2]Institute of Development Studies, London NW6 4BT, UK.
[3]Makerere University Agricultural Research Institute, Kabanyolo (MUARIK), Uganda.
[4]African Highlands Initiative (AHI), Kabale Uganda.
[5]International Center for Tropical Agriculture (CIAT), Kigali, Rwanda.
[6]National University of Rwanda (NUR), Butare, Rwanda.
[7]INERA-Bukavu, Democratic Republic of Congo.
[8]Forum for Agricultural Research in Africa (FARA), Accra-Ghana.

The aim of this study was to explore the interactions that exist among agricultural stakeholders in the southwestern highlands of Uganda as a way of identifying opportunities and gaps for operation of Innovation Platforms (IPs) under the proof of concept of Integrated Agricultural Research for Development (IAR4D) research project. The specific objectives were to (i) characterize the agricultural stakeholders in the study sites (ii) determine the nature, diversity and relative importance of horizontal and vertical networks that exist among stakeholders in the Southwestern Highlands of Uganda. Data were collected from both stakeholder analysis and household interviews in Kabale and Kisoro Districts. Results show that extension staff, local governments and farmer groups accounted for approximately 75% of all categories of stakeholders in the area. Most of these organizations started after 10 to 15 years ago following the return of relative political stability in Uganda. Generally, stakeholder interactions in site with limited ARD intervention are more limited compared to their high-intervention counterparts. Sites with "good" market access have more institutions operating there but majority are isolated from each other. At household level, an individual household has networks with approximately two different organizations most of which are farmer groups or credit associations. The greatest proportion of horizontal networks that a household has is with fellow farmers. In order to make the value chain complete, establishment of IPs should pay special attention to including the private sector such as input and produce dealers. Facilitating IP actors to identify critical challenges and opportunities, and effectively articulate them will ensure cohesion. It is also critical to periodically monitor and evaluate stakeholders in terms of the quality of the networks to minimize conflict situations.

Key words: Networks, stakeholders, integrated agricultural research for development (IAR4D), Southwestern highlands, Uganda.

INTRODUCTION

Past approaches to Agricultural Research and Development (ARD) that followed the "technology generation-transfer-adoption" model and subsequent ones had a design flaw in focusing on the supply of new knowledge from research to farmers rather than providing a mechanism for nurturing the innovative capacity of multi-stakeholders to make markets work and address recurrent production and market risks in complex farming systems (Tenywa et al., 2011). Multi-stakeholder approaches to ARD are being encouraged because of the associated benefits such as improved social capital the value individuals derive from their connections, group processes, and knowledge utilization (Gulati et al., 2002; Raider and Krackhardt, 2002; Brass et al., 2004; Hall,

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2006; Totterdell et al., 2008).

Hall (2006) noted that strengthening the linkages and interaction among ARD actors has been considered as key to improved efficiency and effectiveness of ARD efforts aimed at raising the level of economic performance of rural economy through increased productivity. Empirical studies of the consequences of networks have discovered associations between the number, structure, strength and content of network ties and a range of individual and organizational outcomes, including personal influence, job performance, innovation, career success, satisfaction and affect (Brass, 1984; Flap et al., 1998; Forret and Dougherty, 2004; Totterdell et al., 2004).

Integrated Agricultural Research for Development (IAR4D) is a new approach that is envisaged as a superior way to conducting ARD. The IAR4D approach involves five critical stakeholder categories (Research, Extension, Farmer, Policy maker and Private Sector) come together in and Innovation Platform (IP) to jointly identify and articulate the critical problems along a value chain, and be able to identify and implement potential solutions to overcome this problem. Ultimately, the income and livelihood of farmers will be improved. The Forum for Agricultural Research in Africa (FARA) coordinated sub Saharan Africa Challenge Program (SSA-CP) is conducting a study to test whether the IAR4D research approach is superior to conventional ARD initiatives. An Innovation Platform (IP) is the core of the Integrated Agricultural Research for Development (IAR4D) approach. The IP is a coalition, collaboration, partnership and alliance of ARD actors (that is, public and private scientists, extension workers, representatives of farmers, farmers' associations, private firms and non-governmental organizations, and government policy makers). These actors communicate, cooperate and interact to set priorities, develop concepts and plans to promote agricultural productivity and profitability (FARA, 2009). This is because increasing agricultural productivity supported by appropriate policies and markets without doing harm to the natural resource base can help improve the welfare of all members of society. It is envisaged that when the aforementioned actors work together as an IP, the benefits are greater than the aggregate of the individual actors working separately.

IPs can act as powerful tools for farmers to build social capital that helps them avert risks associated with agricultural investments. Networks among stakeholders help to ensure that the IP is cohesive and consequently, there is direct and continuous interaction, communication and knowledge sharing among the IP actors, quick and continuous feedback from end users (farmers) at all stages of research for development, and timely integration of new knowledge into the innovation process using experiential learning, monitoring and evaluation and the continual feedback. The number, diversity and strength of the networks among actors are critical factors determining the sustainability of the IP.

The sub Saharan Africa Challenge Program (SSA-CP), coordinated by Forum for Agricultural Research in Africa (FARA) is conducting a study to test whether the IAR4D research approach is superior to conventional ARD initiatives. To be able to foster effective partnerships among IP members ahead of the IAR4D study, there is urgent need to understand the nature of existing networks among various actors in the agricultural setting and the dimensions where improvement is required. This information is also useful for future impact studies to understand the contribution of IAR4D approach in improving interactions among stakeholders. In this study, we explored the interactions that exist among agricultural stakeholders in the southwestern highlands of Uganda where part of the study is being conducted. The objectives were to (i) characterize the agricultural stakeholders in the study sites (ii) determine the nature, diversity and relative importance of horizontal and vertical networks that exist among stakeholders in the Southwestern Highlands of Uganda. This study is part of the sub Saharan Africa Challenge Program (SSA-CP), which is testing the concept that the IAR4D approach is superior to conventional ARD approaches in delivering research outputs to farmers.

Study area

The study was conducted in four sub counties (Bufundi, Chahi, Nyakabande and Rubaya) in the Southwestern Highlands of Uganda, which is one of the three Pilot Learning Sites (PLS) of the SSA-CP. The Lake Kivu Pilot Learning Site (LK PLS) is located on the border region between Uganda, Rwanda and the DR Congo (Figure 1). It is a highland agro-ecological zone (AEZ) characterized by steep slopes, deep good volcanic soils and ample rainfall that offers good potential for agriculture. The area receives mean annual rainfall ranging between 900 to 2,200 mm and has medium to long growing periods (180 to 270 days) (Komutunga and Musiitwa, 2001). The principal food crops grown include sorghum, millet, Irish and sweet potatoes, peas, maize, beans, and bananas. Some cash crops such as tea and coffee are also grown in addition to other tree species for fruit and forestry products. Despite the apparent rich natural resource endowment, the Lake Kivu (LK) Region is considered one of the poorest and most densely populated areas of Africa, with densities ranging from 400 to 700 persons/km^2 (Pender et al., 2004). This has led to over-exploitation of the natural resources. Over 90% of the population derives their livelihood from agriculture and other natural resource based enterprises on less than 0.6 ha per household. Nearly 60% of the land area is intensively cultivated and poverty in the region is directly linked to the low and deteriorating productivity and profitability of these enterprises. The region has also
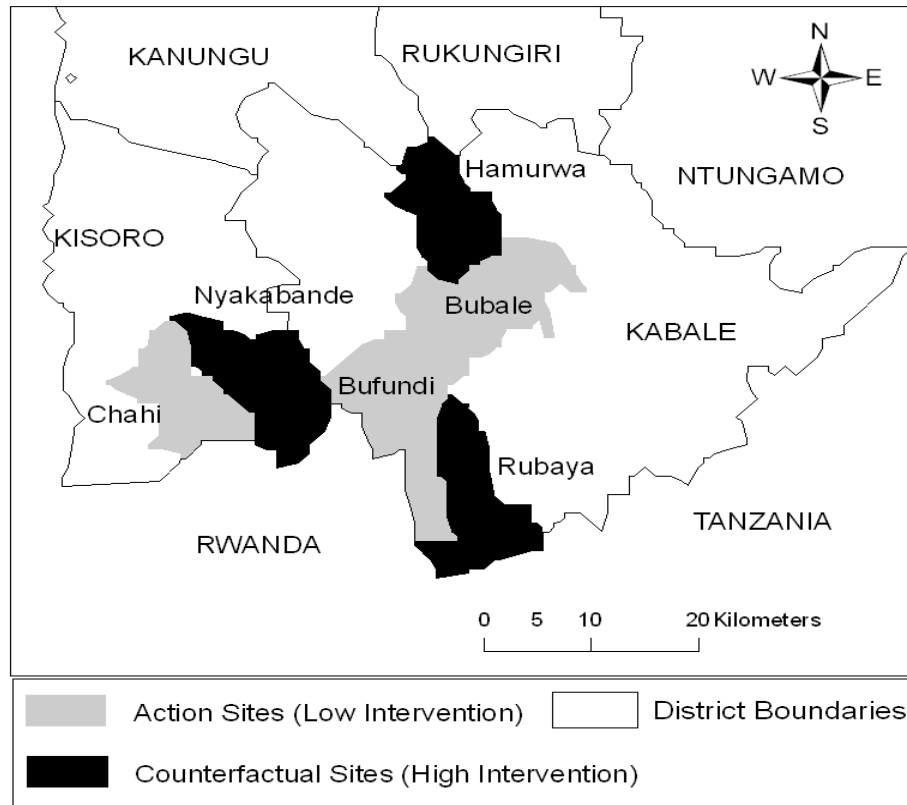
Figure 1. Study sites in southwestern Uganda.

experienced recurrent volatility of conflicts with sporadic conflict still continuing in some parts of DR Congo. The principal challenge in LK is thus to contribute to improved food and nutrition security, increased household incomes and improved quality of the (Pretty et al., 2006) natural resource base by applying IAR4D to develop, test and promote technological, institutional and policy innovations based on integrated watershed management (IWM) concepts.

Methods

Stakeholder analysis was conducted in the four sub counties in May 2008. The selection of the sub counties was based on previous level of intervention by development projects and access to market. The detailed methodology of the site selection process can be found in Farrow et al. (2009). Eight sub counties were selected but for this paper, only four were use because of the uniformity of the biophysical and socio-economic environment. The selected sub counties were grouped in pairs, one representing the low (action sites) and high (counterfactual sites) interventions by development projects.

In each of the sites, provisional lists of relevant institution stakeholders were developed during consultative meetings with local contact persons and opinion leaders. The identified individuals and institutions were invited for a stakeholder meeting that took place at the sub county headquarters of each of the sub counties. During the meeting, members were introduced to the SSA-CP, and

its relevance to agricultural and natural resource research was highlighted. Participants were exposed to the assessment questionnaire that was developed to map the stakeholders and their activities. In a plenary session, participants were then guided on how to complete the questionnaire. In situations where a participant was unable to read and/or write, facilitators interviewed the respondents and completed the tool on their behalf. In order to understand the nature of benefits that arise from the existing interactions (social capital), households were asked to provide information about the role, type, frequency and perception of strength of the interaction in the last twelve months. The questions focused on interactions for exchange of agricultural information.

The household study followed a stratified random sampling design to compare the baseline situation of households and communities under the following three categories of communities; (i) IAR4D, (ii) conventional and (iii) no intervention of ARD. The first-level strata consisted of sub counties while second-level consisted of villages. These strata represent the extent to which agricultural research and development projects have intervened in the study area. The details of the site selection and basis for this categorization can be found in Farrow et al. (2009). Briefly, south western Uganda was divided into "good" and "poor" access. Each of these was further divided into two treatments referred to as Intervention (IP) and control (Counterfactual) with low and high level of intervention by research and development organizations, respectively. In each of the categories, 10 villages were selected randomly from a list of existing villages. Using a sampling frame comprising of names of household heads in the village as provided by local council leaders, 10 households were selected using random numbers for inclusion in the household interviews. Therefore, a total of 600 households were interviewed.

Table 1. Stakeholder representation by category and location in south-western Uganda.

Stakeholder category	Action		Counterfactual		Total	(%)
	Bufundi	**Chahi**	**Nyakabande**	**Rubaya**		
Farmer groups/Association	10	17	15	8	50	39.4
Local government Admin.	9	6	12	16	43	33.9
Extension	1	5	1	3	10	7.9
Faith-based organizations	1	3	1	4	9	7.1
Marketing	3	-	1	1	5	3.9
Financial and Credit	-	3	-	1	4	3.1
Research	-	1	-	2	3	2.4
International NGOs	1	-	2	-	3	2.4
Private sector (Input/produce dealers)	-	-	-	-	-	-
Grand total	25	35	32	35	127	100

Descriptive statistics were used to explore the characteristics of stakeholders' organizations and households. Network matrices showing ties between actors (group-to-group and group-to-individual) were generated. For each treatment network matrices centrality measures were computed using UCINET 6 for windows software (Borgatti et al., 2002).

RESULTS AND DISCUSSION

Nature of agricultural stakeholders

The categories of stakeholders analyzed during the study are shown in Table 1. Overall, Farmer groups had the greatest representation (39%), closely followed by Local government at 34%. Extension agents and faith-based organizations constituted 8 and 7%, respectively. The least represented category was the NGOs, followed by researchers. Credit organizations were represented by only 4% while the private sector was not represented at all.

The categorization of the stakeholders is not clear-cut, implying that a single stakeholder may fall in more than one category. For example, representatives from NGOs may also be doing extension work by the nature of the activities they engage in, extending services to farmers. For the purpose of this discussion, the principle service provided by the stakeholder was considered in the classification. In case of actors that provide multiple services, the major one is considered. Additionally, farmer organizations may grow and form a wide network across districts and even regions. For example, Kabale district Farmers Association and Kisoro District Farmers Association have a common umbrella association, the Uganda National Farmers Association (UNAFA) but also under Uganda National Farmers Federation (UNEFE). In the context of this study, however, farmer organizations means those that have agricultural and related activities as their major goal while CBOs may have a different goal such as health, persons with disabilities and orphans.

International NGOs such as Africare also provide extension services to farmers such as training in soil conservation and post harvest handling. Overall, Bufundi, which is an action site, had the least number (17) of stakeholder categories compared to the other three sites (Chahi, Nyakabande, and Rubaya) that had almost similar numbers (24, 27 and 25, respectively). Extension agents, farmer associations, faith-based organizations, community-based organizations and individual farmers were distributed among all the four sites. However, there were no research organizations and private sector in the action sites (Bufundi and Chahi). As indicated earlier, the former organizations/ Institutions usually exist in many areas independent of their remote location.

This categorization of stakeholders may have several limitations. For example, the criteria used to select and invite the representatives may sometimes be centered on well-established and popular organizations/institutions. Also, the responses of the stakeholders about the organizations they belong to may have been strategic in the sense that many local people are used to projects that target specific groups. To be able to benefit from these project interventions, local communities associate themselves with the category of people that the project is likely to benefit directly. To ensure that the spectrum of stakeholders was as wide as possible the research team held consultative meetings with local leaders and other knowledgeable individual to indentify groups or individuals that would provide relevant information to initiate and make the IPs operational. A clear explanation of the intention and processes of the IPs to the participants of the stakeholder meetings helped to normalize their expectations.

The age of majority stakeholder representatives ranged between 26 and 65 years (Figure 2). This represents an age bracket where individuals are active and can hold responsible positions in the community. Below 25 years, individuals may be considered immature since they are just emerging adults with little experience. Above 65, a person may be considered old and unable to contribute
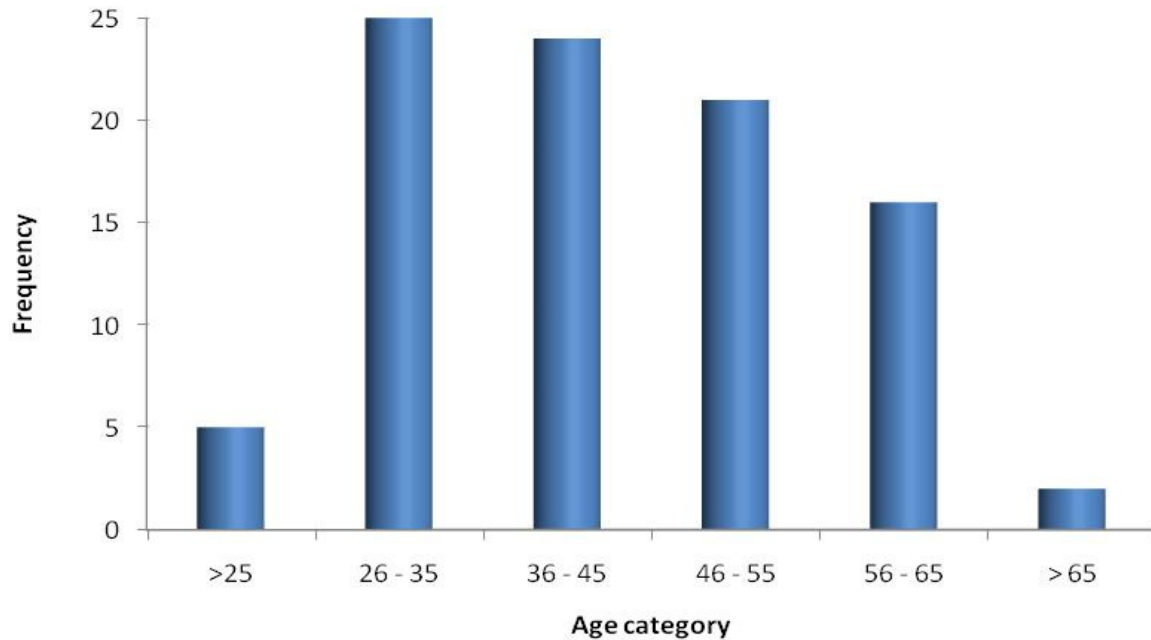
Figure 2. Age distribution of the age of respondents in study sites in Kabale and Kisoro under the Sub Saharan Africa challenge program.

much except in terms of experience. Additionally, there is a common practice for organizations to put much older people in positions of leadership but reserve the position of secretary, who is given responsibilities such as representation of the group, to a much younger and literate person.

The time partners have been in existence were classifies according to the political history of Uganda. According to the respondents, the organizations that existed before 1986 were mainly churches and local government (Table 2). Majority of CBOs, NGOs and credit organizations started between 1997 and 2006. This category or organizations represents institutions that are generally present in almost every community and are not much affected by political perturbations. Before 1986, the country was politically turbulent with a series of civil wars until the capture of power by the National Resistance army that has ruled since then. This shows that only a few organizations were working in this study area. The largest number of organizations (30%) started between 1986 and 1991 probably following the peace created after the end of the war. It would be expected that the number of organizations would continue increasing after 1991. Ironically, the years following 1991 experience the least number of emergent organizations. This could be related to the series of policy changes that were taking place during 1991-1996, including the making of the constitution in 1995.

The farmer groups that existed before 1986 were actually cooperative societies that were part of the country-wide arrangement that provide a joint voice for small-scale farmers at policy level. These arrangements were hierarchically well-organized but operationally wanting because of limited financial capability. Because of limited mobility of representatives as challenged by financial and in some cases topographic environments, representatives do not consult their subsidiaries but rather their personal views. Election of representatives was mainly through voting but also through other methods such as seconding of leaders of existing groups. Other important policies that were developed during this period include the Nation Agricultural Research Policy, National Environmental Action Plan and the National Policy for the Conservation and Management of Wetlands. Once dramatic policy changes are expected, the tendency for people to resent from making long-term plans that may be affected by the policy changes. In support this tenet, the years 1997-2001 through 2002 - 2006 experienced equally high emergence of new institutions at 24 and 25%, respectively.

## Existing partnerships by site

Horizontal linkages

The interactions among institutions are shown in Figure 3. The stakeholders that were interviewed (Circles) indicated organizations they collaborate with (maroon squares) in the various aspect of agricultural value chain. The different colours show the category of stakeholder interviewed. Although the network suggests that there is

Table 2. Period of establishment of various stakeholder categories in south-western Uganda.

Stakeholder category	Before 1986	1986-1991	1992-1996	1997-2001	2002-2008	Grand total
Farmer groups/associations	2	8	6	8	23	47
Local government admin.	4	22	2	3	3	34
Extension	-	3	1	4	2	10
Faith-based organizations	2	-	-	3	1	6
Marketing	-	2	1	-	1	4
Financial and Credit	1	-	-	1	2	4
Research organizations	-	-	1	-	-	1
International NGOs	-	1	-	1	-	2
Grand total	9	36	11	20	32	108
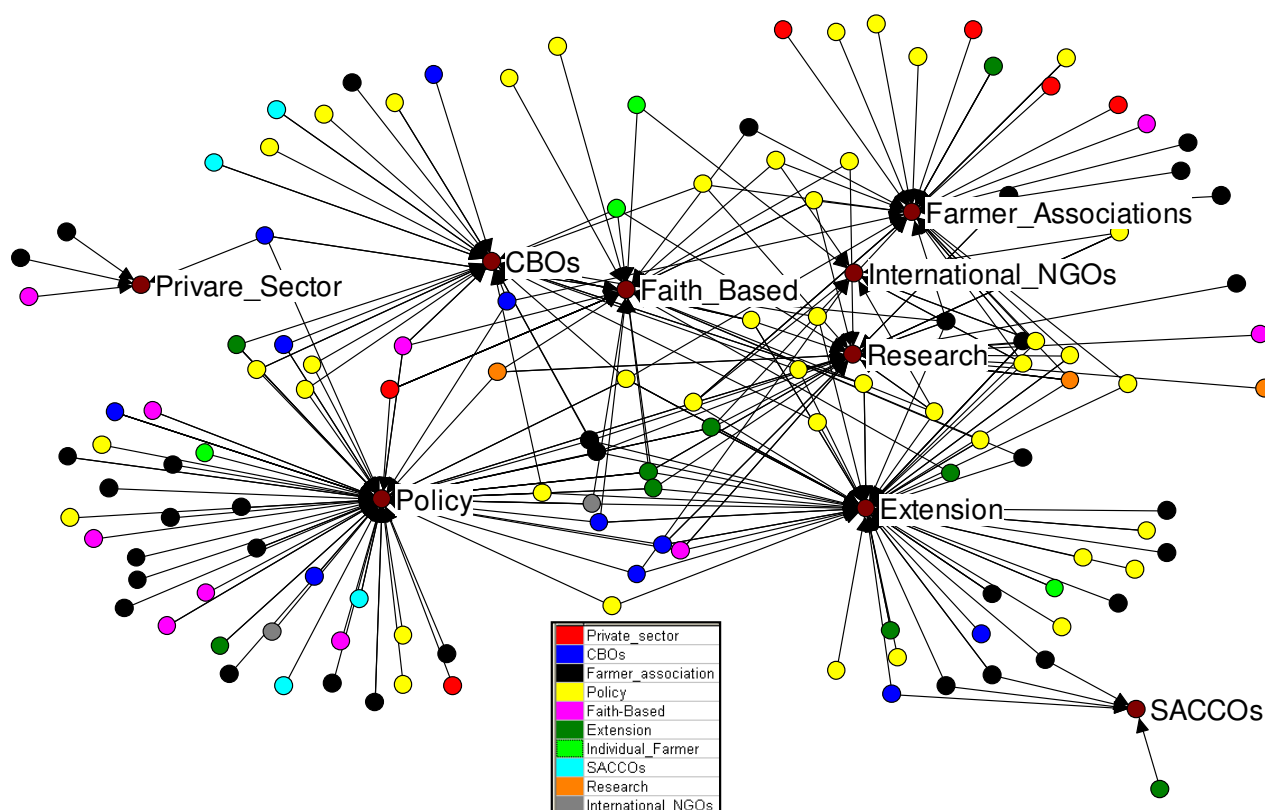
Figure 3. Interactions among agricultural stakeholder groups in southwestern Uganda (colour of the circle at arrow tail shows the organization that the respondent represents while the circle at the arrow head shows the type of organization that the respondent mentioned to be interacting with).

significant interaction among the organizations, it is important to note that some of the respondents interact as individuals rather than as institutions. For example, at the time these data were collected, NAADS had not started working in Chahi, but the respondents from Chahi mention having interacted with it. A closer look at the nature of interaction shows that they exchange not only agricultural information. Hence, it is logical to infer that these interactions have no definite boundaries. By introducing the Innovation Platforms, actors are better placed to identify sources of relevant information.

Additionally, the context of IAR4D is that the various partners discuss a common challenge/interest, rather than just interacting with a variety of partners. Data shows that approximately 36% of the respondents had participated in multi-stakeholder platforms. To better understand networks and their participants, an evaluation of the "location of actors in the network" using network

Table 3. Degree centrality measures for stakeholder interactions in Southwestern Uganda.

Statistic	Action		Counterfactual	
	Bufundi	**Chahi**	**Nyakabande**	**Rubaya**
Mean	1.9	2.0	5.0	4.7
Standard deviation	1.4	1.2	4.3	7.0
Sum	34.0	90.0	214.0	166.0
Variance	1.9	1.5	18.6	48.9
Minimum	0.0	1.0	1.0	0.0
Maximum	5.0	6.0	19.0	32.0
Centralization (%)	10.3	3.2	5.9	14.7
Heterogenuity (%)	8.5	3.1	4.1	9.7

metrics was conducted. Measuring the network location is finding the "centrality" of a node. These measures give us insight into the various roles and groupings in a network -- who are the connectors, mavens, leaders, bridges, isolates, where are the clusters and who is in them, who is in the core of the network, and who is on the periphery? We used the three most popular individual centrality measures to describe the social networks in the sites in Kabale and Kisoro.

Hanemann and Riddle (2010) define degree centrality as a measure of the number of direct connections a node has. A node with the highest direct connections in the network is considered to be the most active in the network. It is thus a 'connector' or 'hub' in the network. The authors observe that it is common wisdom in personal networks that "the more connections, the better." However, this is not always the case. Where those connections lead to and how they connect the otherwise unconnected is equally crucial.

Overall, institutions in the counterfactual sites (Nyakabande and Rubaya) have larger number of linkages with other organizations compared to the action sites (Bufundi and Chahi) as indicated by the degree centrality (Table 3). This was expected and in fact validates the site selection criteria that aimed at selecting contrasting sites in terms of actors and their interaction. As indicated in the network map, Chahi has relatively more organizations compared to Bufundi but the number of linkages for each organization does not exceed six. For a network to be considered fairly stable, the centralization should be 50% and above. All the sites generally have low level of network centralization that ranges from 3.2 to 14.7%. Low level of centralization implies that once one or a few actors leave, the network can very easily crumble.

Despite the generally low level of centralization of the four sites, Rubaya had the highest centralization of 14.7% followed by Bufundi, then Nyakabande and least was Chahi. In order to improve on the centralization of the networks, more of the relevant stakeholders should be identified and involved in the IPs. Suitable examples include transporters and credit organizations in Bufundi,

who can contribute to farmer credit and overcome the transport challenge to help farmers reach the market more easily. The sole reliance on NAADS causes the network to be highly centralized rendering it prone to crumbling once such a partner exits the system.

Newman (2005) suggests that betweenness centrality is, in some sense, a measure of the influence a node has over the spread of information through the network. A node with high betweenness has great influence over what flows and what does not in the network. Such a node is 'between' two important constituencies of the network. According to Hennemann and Riddle (2010), betweenness is a measure of the centrality of a node in a network, and is normally calculated as the fraction of the shortest paths between node pairs that pass through the node of interest. The advantage of such an actor is that it plays a powerful role in linking certain members of the network. The unfortunate bit is that it is a single point of failure. Without it, the actors it connects will be cut off from information and knowledge in network or some network components (cluster) (Hennemann and Riddle, 2010)

Of all the four sites, Nyakabalde showed the highest betweeness centrality of 24 while the others had values ranging from 0 to 1.1 (Table 4). The netwok is disconnected, implying that the individual actors seem to operate on their own with no mediation role in the system probably because they do not benefit from the relationships or the cost of maintaining them is high in terms of time and resources. The implication for this study is that in as much as several organizations exist, they do not link up enough to be able to improve on social capital, group processes and knowledge utilization as shown in some studies (Brass et al., 2004; Gulati et al., 2002; Raider and Krackhardt, 2002). The brokerage role is not played by any of the organizations that exist in the study area. An innovation platform is expected to play a key role in linking several actors in order to ensure that information to one organization/individual is quickly and efficiently circulated to the other partner to realize the benefit of quick information feedback in agricultural research and development processes.

Table 4. Betweenness centrality of networks of agricultural stakeholders in Southwestern Uganda.

Statistic	Action		Counterfactual	
	Bufundi	Chahi	Nyakabande	Rubaya
Mean	0.3	0.0	23.9	1.1
Standard deviation	0.8	0.0	47.8	4.1
Sum	5.0	0.0	1027.0	39.0
Variance	0.6	0.0	2286.7	16.5
Minimum	0.0	0.0	0.0	0.0
Maximum	3.0	0.0	238.3	23.5
Centralization (%)	1.1	0.0	12.8	2.1

Table 5. Closeness centrality for action and counterfactual sites in South-western Uganda.

Statistic	Action		Counterfactual	
	Bufundi	Chahi	Nyakabande	Rubaya
Mean	6.1	2.3	3.8	3.2
Standard deviation	1.0	0.1	1.6	0.9
Sum	109.5	102.1	164.3	113.0
Variance	1.1	0.0	2.5	0.8
Minimum	5.6	2.3	2.3	2.9
Maximum	9.8	2.5	8.5	7.1

Closeness centrality defines the pattern of partners' direct and indirect ties that allows them to access all the stakeholders in the network more quickly compared to other members (Newman, 2005; Heinemann and Riddle, 2010). The partners have the shortest path to others and are in an excellent position to monitor the information flow in the network. Closeness centrality is inversely related with the ease of accessing a given partner in the network (Heinemann and Riddle, 2010). Again, Bufundi Sub County has a higher closeness centrality than the other sites (Table 5). This implies that it is more difficult for stakeholders in Bufundi to link up with each other in case they wish to discuss an issue. Ironically, Chahi has the best closeness centrality, probably because it is more accessible than even Rubaya. In terms of service provision, low closeness centrality helps partners to quickly provide or find information that they require to for a particular segment of the value chain.

Chahi, Nyakabande and Rubaya had almost equal number of stakeholder representatives but Bufundi had slightly less. Bufundi is the most disadvantaged in terms of access. Movement within the sub county and to the nearest township is more difficult in compared to other sites such as Nyakabande and Chahi. Although Rubaya is equally hilly, there have been several roads established under the phased-out Area-Based agricultural Modernization Program as well as Africare, which was not the case for Bufundi Sub County. There were 17% women among the stakeholder representatives and about half belonged to farmer groups.

Vertical linkages

Vertical interaction refers to the relationship between an individual, and institution at a lower level with institution or individual at a higher level. This relationship is important because it influences the flow of superior knowledge to lower levels and also information from lower to higher levels for inclusion in policy formulation. Results show that in the vertical dimension, farmers/households interact with various organizations working in the area (Figure 4). On average, an individual farmer interacts with five different organizations, most of which are Community-based or credit associations. National programs such as National Agricultural Advisory Services (NAADS) and Area-Based Agricultural Modernization Program (AAMP) have the highest interactions with households in Kabale and Kisoro. By their nature, these programs provide farmers with inputs such as seeds, fertilizers and farm implements. It is not unusual that farmers will obviously recognize these immediate benefits provided by these organizations. This could explain why these programs feature prominently in the networks mentioned. However, the sustainability of these hand-out schemes is questionable because farmers' capacity is sustained for as long as the program runs. To ensure sustainability, it is necessary to develop networks that contribute to stakeholders direct benefits such as access to credit, provision of transport for input/output, and frequent relevant information.

Experiences from similar programs suggest that the
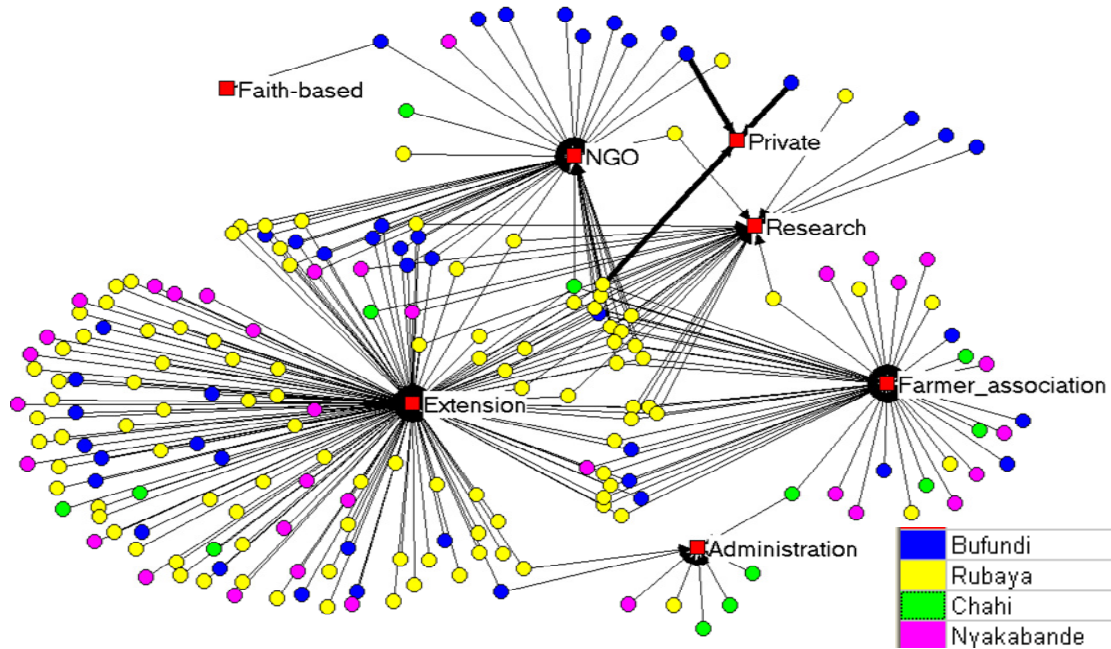
Figure 4. Vertical linkages between households (circles) and organizations (red squares) in the agricultural sector in Southwestern Uganda.

farmers farming systems reflected in the relatively high number of household that mentions it in their networks. At community level, this impact is evident from the focus group discussions where AHI was mentioned frequently for promoting *Acasia* ssp. under the land care the program.

Totterdell et al. (2008) found that managers and team leaders had greater propensity to connect with others than other employees in the organization, which implies that having this propensity may incline individuals to adopt or be adopted for certain roles within or among organizations. In particular, managers and team leaders were more inclined to form weak ties and bridging ties, and these are precisely the kinds of tie that have been associated with acquiring power and influence in organizations (Brass, 1984; Brass et al., 2004).

The organizations mentioned more frequently by households include NAADS, AAMP and Africare and account for approximately 80% of all the networks identified (Figure 5). The remaining percentage is shared among all the others with some having only one tie (those at the periphery of Figure 5). Generally, organizations that have a wider geographical scope of operation such as the aforementioned (NAADS, AMMP and AFRICARE) have relatively larger number of people they interact with compare to local ones. The more localized organizations, such as farmer groups, interact with only a few individuals and such individuals do not themselves interact with other organizations. However, AAMP and Africare have wound up their activities in the region but farmers still remember the activities undertaken,

suggesting that they had significant impact on farmers' livelihoods.

By the nature of their operation, these dominant organizations a have specific focus in a given area. For example, NAADS organizes farmers to select a specific enterprise and focus on a particular point in the value chain such as "soil fertility improvement for potato production". In the same area, CARE may be promoting "improved varieties of beans". This implies that for each of these enterprises, information flow to and from such farmers is limited. Ideally, an IP in such an area should facilitate existing stakeholders to be aware of the on-going work so that they strive to solve the most critical problem first and take into account the entire value chain instead of solving isolated problems in various chains.

Once a particular chain if fully functional, the IP may switch to another enterprise. The challenge of such an arrange will always be how to facilitate dialogue among the various stakeholders to have common understanding of the critical problem. This can be overcome through continued training of IP actors in needs assessment and effective knowledge-sharing. More so, the quality of linkages needs to be periodically assessed to identity interests, roles and responsibilities in order to enhance the relevant ones and reduce or eliminate detrimental ones.

Benefits from stakeholder networks

The findings for all the stakeholder categories show
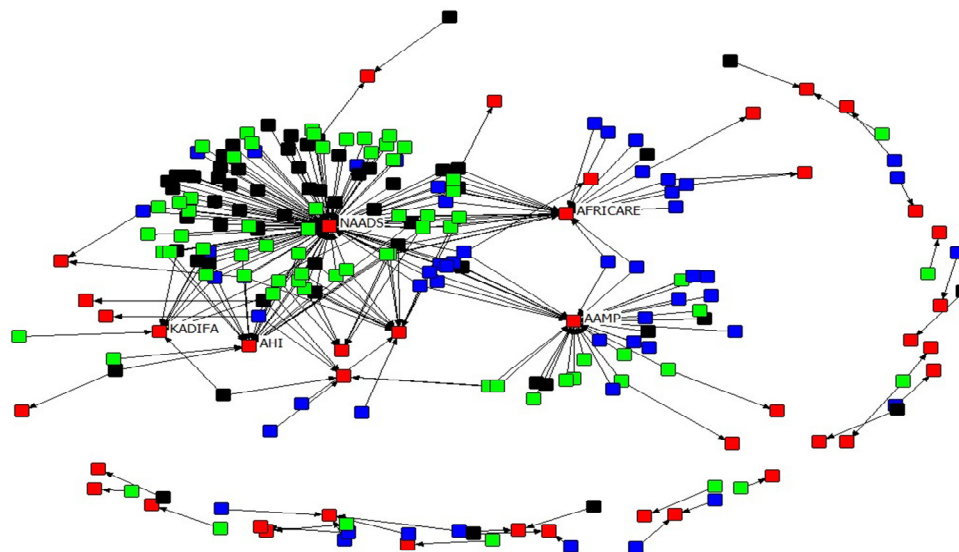
Figure 5. Most prominent agricultural stakeholders in southwestern Uganda. (Red = Organization mentioned; Green = Male headed-households and Blue = female-headed households).

Table 6. Reasons why farmers interact with organizations in Southwestern Uganda.

Stakeholder type	Purpose of interaction (N=570)				
	Information exchange	Commercial business transaction	Material exchange	Money exchange	Others
Administration	12	3	1	2	-
Extension	270	15	13	10	1
Faith-based	1	-	-	-	-
Farmer association	77	11	5	6	-
NGO	57	12	-	-	-
Private sector	1	6	-	-	-
Research	52	13	-	2	-

closure of the program is immediately followed by the recession in production. In Rubaya, for example, African Highlands Initiative (AHI) has made significant impact on that majority (83%) of the interactions involve mainly information exchange (Table 6). Other interactions involve materials exchange, money/credit exchange, commercial business transactions, and others which take 10, 3 and 2%, respectively. This situation is a positive one in terms of innovation platforms because information exchange is a critical ingredient of the knowledge economy, which we believe is the current global situation. The innovation platform is valuable in this case because it completes the gap in information loop of a given site. With respect to the first tenet stated in this paper, this is a positive situation and there is hope that the IAR4D approach will contribute to improved livelihoods that the conventional approach has failed to do. Overall, majority of the interactions (41%) take place on a daily basis while 25%, 16, 12 and 7% take place on a weekly, monthly and annual basis, respectively (Table 7).

General, the stakeholders perceive the interaction with their partners to be above moderate as majority indicated (Table 8). The results further show that the perceived strength of the interaction is independent of the type of partners interacting. As noted earlier, organizations interact significantly among themselves. Similarly, the nature of interaction that households have with fellow farmers comprises 80% to 90% (Figure 6). The other part of the interaction is with other actors such as community leaders, extension agents, researchers, traders and NGO staff. These results show that there is limited vertical interaction between the households and other stakeholders at a higher hierarchy in the network. This puts a limit on the extent that information can flow in the social network. This is the observed trend for all the four sites in this study.

The trend these days is that most organizations prefer to work with farmer groups rather that with individual farmers. Therefore, the high interaction between organizations working with farmers reflects this fact.

Table 7. Frequency of interaction between households and organizations promoting ARD interventions in Southwestern Uganda.

Stakeholder	Frequency of interaction					
	Daily	Weekly	Monthly	Every 6 months	Annually or less	>1 year
Administration	7	3	4	2	1	1
Extension	87	92	66	39	27	3
Faith-based	-	-	1	-	-	-
Farmer association	21	27	23	21	9	-
NGO	18	18	7	15	11	-
Private sector	-	7	-	-	-	-
Research	29	11	12	9	6	-

Table 8. Perception of households about the strength of interaction with organizations in Southwestern Uganda.

Stakeholder category	Perception of strength of interaction				
	Very weak	Weak	Moderate	Strong	Very strong
Administration	-	1	6	11	-
Extension	12	7	98	141	54
Faith-based	-	-	1	-	-
Farmer association	7	4	25	49	15
NGO	2	2	22	30	12
Private sector	-		1	3	3
Research	1	2	19	39	5
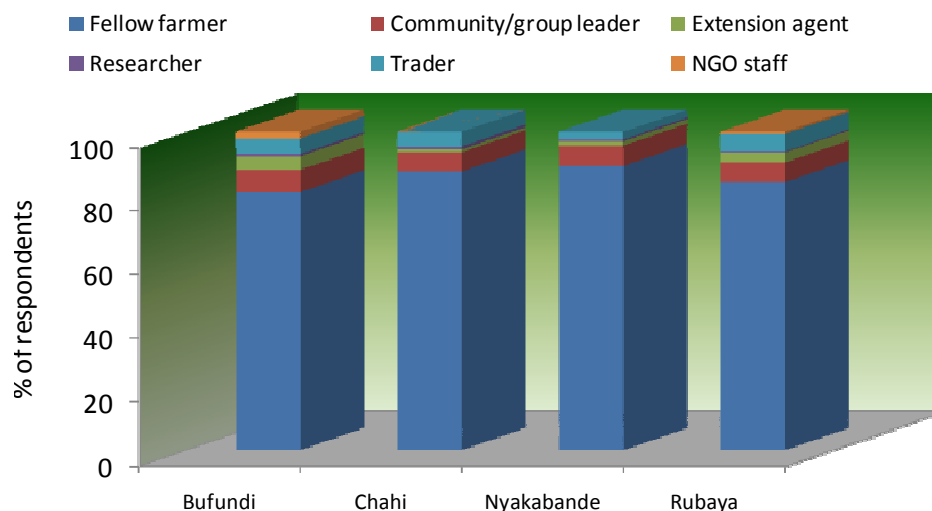
Figure 6. Role of farmers in household interaction in Kabale and Kisoro Uganda.

Latham (2000) suggests that vertical (hierarchical) relations such as those between individual households and people in authority (for example the workers of extension organizations), are the types of social relations relevant for understanding trust in authority. On the other hand, horizontal (equal, democratic) relations such as those between households or between organizations are relevant for understanding trust in civil society. He describes these as vertical and horizontal types of social capital. Recent empirical work (Knack and Keefer, 1997) challenges the significance of vertical and horizontal relations for social capital. It reinforces the need to understand empirically the impact of network hierarchies upon social capital. While the questions of whether social networks are characterized by vertical or horizontal relations – specifically how democratic a network is – and whether this is important for social capital remains a major theme in the social capital literature, this aspect of

network relations also remains under-investigated. Those studies which have investigated this characteristic of networks typically ask about decision-making processes within networks or about the nature of rule enforcement as indicators of vertical and horizontal relations.

CONCLUSIONS AND RECOMMENDATIONS

Several types of organizations operate in southwestern Uganda but extension, local government and farmer groups, account for approximately 75%. Most of these organizations started after 1986 following the return of relative political stability in Uganda. Generally, action sites have fewer networks among organizations compared to the non-action sites. Even among actions sites, those with good market access have more institutions operating in the area. However, majority of the organizations operating in the action sites are isolated from each other. Overall, local government and national programs such as National Agricultural Advisory Services (NAADS) and Area-Based Agricultural Modernization Program (AAMP) have the highest number of networks, although they are mainly with farmer organizations and government extension agents. On average, an individual farmer about two networks with different organizations most of which are farmer groups or credit associations. The greatest proportion of networks that household in southwestern Uganda have are with fellow farmers. We recommend that the establishment of IPs should pay special attention to including the private sector such as input and produce dealers in order to make the value chain complete. For the IPs to make meaningful contribution to improving the vertical networks (among individual farmers and institutions), it is imperative to streamline communication mechanisms such as the use of mobile telephones, which most farmers have at the moment. A mechanism for coordinating the identification of new potentially relevant actors, monitoring and evaluating existing ones, as well as facilitating overall IP activities are inevitable central to improving useful networks among IP actors.

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