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\*Corresponding author: Rugema Semaana Hilary, Department of Extension and Innovation Studies, College of Agricultural and Environmental Sciences, Makerere University, P.O. Box 7062, Kampala, Uganda  
E-mail: [hrugemabusiness@gmail.com](mailto:hrugemabusiness@gmail.com)

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## FOOD SCIENCE & TECHNOLOGY | RESEARCH ARTICLE

# Information quality, sharing and usage in farmer organizations: The case of rice value chains in Bugiri and Luwero Districts, Uganda

Rugema Semaana Hilary<sup>1\*</sup>, Haroon Sseguya<sup>2</sup> and Paul Kibwika<sup>1</sup>

**Abstract:** Information is the connection of all components of a value chain network, activities and operations. Information transfer depends on the level of trust and interaction in the structure of the chain's information system. This study was conducted on information quality, sharing and usage by two OSCAs in the rice value chain in Luwero and Bugiri districts, Uganda. The methodology used involved use of semi structured interviews, check lists for focus group discussions and key informant interviews. Seven focus group interviews were conducted, with an average attendance of six members per group (42 members) in Bugiri and 42 members in Luwero district. Interviews were also conducted for 30 key informants. A total of 114 respondents were interviewed in focus group discussions and as key informants. The information was analyzed with NVIVO software. Findings indicate that information sharing, type, quality content and usage of information depended on trust. Trust was a result of regular interactions among the network actors to learn more about each other. The result was exchange of more important and valuable information within the OSCAs. However, reliability of the information from actor perspective

### ABOUT THE AUTHORS

Rugema Semaana Hilary is an Agronomist working with Kali and Salts (K+S GmbH) a fertilizer company in Kassel Germany and PhD candidate at the Department of Extension and Innovation Studies, Makerere University, Uganda. His research interests lie in Partnerships and value co-creation approaches aimed at enhancing rural livelihoods.

Haroon Sseguya is a Technology Scaling Specialist at the International Institute of Tropical Agriculture (IITA). His research interests include agricultural extension systems; agriculture, food security, nutrition and livelihoods programming; monitoring and evaluation; technology dissemination; communication for development and capacity building for rural and development organizations.

Paul Kibwika is associate professor at Makerere University with research interests in agricultural knowledge systems; innovations management and social transformations; and adaptive management and sustainability. He is also a trainer and facilitator of institutional change, strategic planning and social skills enhancement.

### PUBLIC INTEREST STATEMENT

Information sharing, with in farmers organizations in Uganda creates a connection between all components of the organization. At the OSCA rice value chain, information transfer depends on the level of trust and interaction with in the network components, of the chain's information system. This permits actors to learn and exchange valuable information. The study used qualitative, exploratory case study approach, to describe information quality, sharing and usage process in farmer Organizations. Findings reveal that, high level of trust among actors motivates them to exchange quality information and cooperate. Further more the OSCAs conditions for social exchange are strongly linked to the relational dimensions, of actors sharing social bonds, and interaction. The reciprocal interactions have an influence on feed back, usage and quality of shared information. The study recommends for the need to include feedback among the actors to enable establish trust and genuine sharing of information to address information gaps.

varied, with information from government actors being the least reliable and that from the private actors being the most reliable. Feedback was also an impediment to information sharing, caused by lack of trust among some actors. We recommend that it is imperative to have feedback within and among actors to enable establish trust and genuine sharing of information to address specific information gaps.

**Subjects:** Agriculture & Environmental Sciences; African Studies; Sociology; Interpersonal Communication; Development Communication; Development Studies; Sustainable Development; Rural Development; Information Technology

**Keywords:** information sharing; interaction; trust; value chain network; one stop centers

### 1. Introduction

Information is an integral component of a value chain network because it connects all components, activities and operations. Information is critical in agricultural development because it is a tool for communication and coordination between stakeholders. It serves as a channel for assessing trends and shaping decisions (Collence, 2012). The Agricultural sector strongly needs to create, share and disseminate up-to-date and appropriate knowledge and information (Lotfi, Mukhtar, Sahran, & Zadeh, 2013). In this study information sharing refers to the extent to which One stop center farmer associations (OSCA) openly communicate quality, important and sensitive information to their partners (Hilary, Kibwika, & Sseguya, 2017). Information sharing serves as an essential approach for the survival of enterprises and enabler of value (supply) chain integration (Shou, Yang, Zhang, & Su, 2012). Recently, the concept of information sharing has attracted the attention of scholars, most previous work was on effect of information and knowledge sharing on performance (Rashed, Azeem, & Halim, 2010). Various scholars (Grootaert & Bastelaer, 2002; Hopp, 2014) argue that there are many factors enhancing value chain performance in addition to information sharing including trust and interaction. Trust depends to a large extent on information sharing and interaction. Relevant information shared between value chain members requires actors to trust and rely on their partner's capability to operate. Thus, there is seemingly an interplay between information sharing, interaction and trust. All these factors seem to be critical for improving value chain performance. Trust in this study is the confidence that partners have about each other's reliability and integrity, to regularly share quality information and put it to use.

At the OSCAs, information sharing is considered a process that comprises the content, type, and frequency of the information shared between and among actors. The significance of information sharing depends not only on what information is shared, but also on when and how it is shared (Li & Lin, 2006). In other words, both the content and quality of the shared information must be considered. In this study, content refers to the nature of information that is shared including planning, production, processing and market information. Information quality refers to aspects such as accuracy, timeliness, adequacy and credibility. It is widely acknowledged by scholars that efficient information sharing resulting from trust helps partners to improve the overall performance of the value chain as a whole (Yu, Yan, & Cheng, 2001). Through trust and interaction important pieces of information and ideas are brought together to facilitate innovation (Hall, 2007). In the OSCA rice value chain, innovations result from vertical alignment of multiple partners, such as producers, suppliers, distributors, and retailers. At this level, partners collaborate on upstream processes or downstream processes, or both. Usually, all partners have a peer relationship and are heavily dependent on each other. Through intense collaboration, they leverage the inventory, transportation, facility and information to maximize the total benefit of the value chain. The value chain is based on intensive information exchange through business documents, actual demand, and various forecasts. For smallholder farmers in the OSCAs to participate in information sharing along the rice value chain, actors must partner with them in their associations and cooperatives (Hilary et al., 2017).

The One stop center farmer’s association approach (OSCA) presents an elating setting for exploring the information sharing, quality and usage process in farmer organizations. In 2001, Sasakawa Global 2000, an international non-governmental organization, undertook the innovation of establishing farmer-based organizations to provide members with a range of services, from supplying inputs and agro-processing enterprises to improving market linkages. Twelve One-Stop Center Associations (OSCAs), each made up of 30–40 village-based groups within service catchment areas of about 5,000 farmers, were established in Uganda and are engaged in different crop value chains. Innovation in the OSCAs is driven by new information, knowledge, practices, and technologies, and involves engaging different actors along the value chain. The OSCA approach involves various categories of multi-sectoral actors – farmers, rural financial intermediaries, development agents, commercial based entities, local leaders, NGOs, and the National Agricultural Research Organization (NARO) (SG2000, 2006).

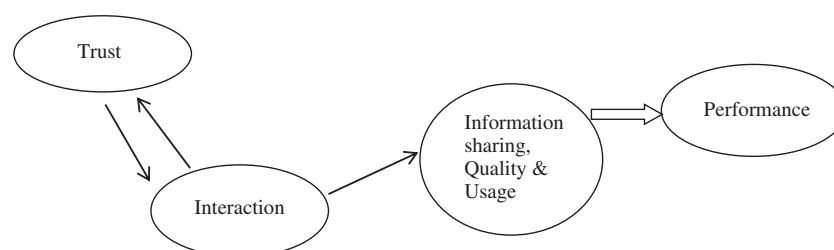
The OSCAs are characterized by overextended chains of actors meaning long chains between the different chain members (Bibangambah, 2002). These in turn have led to poor access to appropriate information (UNCTAD, 2006). This is caused by lack of information networks within the chain. In order for effective information sharing to take place with in over extended chain actors, there should be a trust based collaborative potential. Trust and interaction have received attention from a number of scholars who have extensively investigated its impact and relevance in actor relationships. However less attention has been given to trust and interaction in information sharing (Bonte, 2008). This research addresses the fundamental question of how trust and interaction influence the information sharing process, the quality and usage of the information in the OSCAs.

## 2. Theoretical frame work

This study is guided by the social exchange theory, developed by scholars Homans (1961), Blau (1964) and Emerson (1962). Social exchange theory posits that human relationships are formed by the use of a subjective cost-benefit analysis and the comparison of alternatives. The theory shows how the rewards and costs associated with interpersonal relationships collaborate with peoples’ expectations from them. This theory comes from the idea that closeness is the key to all relationships; that people communicate to become closer to one another. The theory states that there are rewards and costs to any relationship and that people try to maximize the rewards while minimizing the costs (Homans, 1961). This study uses the social exchange theory as a scope for explaining practices related to a number of prominent concepts in the study such as: Trust; quality of information, information sharing across networks; and interactions. Conditions for social exchange in the OSCAs are strongly linked to the relational dimensions, for example: actors share social bonds and interact; they maintain high levels of trust; and they are known to one another through long-term dependent relationships (Figure 1).

The Conceptual model shows the influence of trust on interaction and information sharing, quality, usage and eventually on performance. The paths denote the information sharing process resulting from trust to share and trust to interact, influence on quality of information and usage hence performance. Interaction creates the capacity to share information, interaction also has an influence on the quality of information that is shared and the usage of the information. However actors make decisions negating what to share, how to share and with whom to share information. Actor

**Figure 1. Conceptual model showing the effect of trust on information sharing, interaction and performance.**



willingness to share depends on the trust, openness honesty (which influences the type and quality as well as usage of information) and frequency of interaction. Interaction and sharing is two way (reciprocal). Joint sharing and pooling of risks creates interdependence and strengthens partnerships.

### 3. Methodology

A qualitative case study design was used to gain in-depth understanding (Yin, 2013) of the information quality, sharing and usage in two cases (OSCs) namely Bugiri Agribusiness Institutional Development Association-(BAIDA) in Bugiri district and Ziobwe Agali Awamu Agri-business Training Association (ZAABTA) in Luwero district. The study was conducted in February and March 2015, 13 years after the establishment of these OSCs. The two cases were selected based on their functionality, as well as information sharing processes in the value chain and period they have been engaged in rice value chain activities. Luwero and Bugiri districts account for 60% of the rice produced in Uganda (Haneishi et al., 2013). BAIDA and ZAABTA OSCs are involved in information sharing that hinges on the principle of interdependence efforts between production to the consumer (Hailey, 2000). Focus group discussions (FGD) were conducted with representatives from each of the OSCs. Seven FGDs were conducted, each one attended by six participants on average (42 members) at BAIDA and seven FGDs each attended by six participants (42 members) at ZAABTA in Luwero district, hence a participation of 84 members in the FGDs. The FGDs focused on investigating the information sharing process, sources, frequency of contact with each actor and types of information, reliability, applicability of the information and gaps, quality of information that is shared, and the general usage. In addition, 30 key informants comprising of leaders of the farmers' associations, and representatives of development partners were also interviewed to complement and validate information obtained through the FGDs. A total of 114 respondents were interviewed both in the focus group discussions and the key informant interviews. Additional data on information sharing in the rice value chains were obtained through reviewing of documents and records of the OSCs.

Nvivo software was used to organize, re-arrange and manage the interview data for analysis.

A multi-stage coding process was also used, to understand important common issues (Charmaz, 2006). Data was coded at three successive stages out of which themes relating to the study objectives emerged.

**Stage 1:** Open coding of the data was done from each focus group discussion word by word and line by line.

**Stage 2:** Focused coding was done to generate common categories relevant to the study objectives across the actors, generating a total of 50 focused codes.

**Stage 3:** Axial coding was done with the aim of developing categories and linking them to each other. Fourteen (14) axial categories were developed: Type of information, Quality of information, Interaction channels, methods, skills development, language used, information value, complex technologies, information sources and changes, information reliability, information and applicability, information linkages, information gaps. Interviews were digitally audio-recorded and fully transcribed for analysis. Interview transcripts were formatted to facilitate importation into Nvivo. Different interviews were assigned different colours for easy distinction. A log of the data that was entered was kept in the software, codes and memos were automatically assigned a date and time stamp. This helped trace the development of the codes. Specific text strings were also conducted across the interview sets.

A review of the transcripts was done once more, explanatory quotations were highlighted and coded using the 14 axial categories. Some of these quotations have been used in the results and discussion section. The emergent themes were again contemplated and the 14 categories were found to be connected with one another; these were further condensed, culminating in four major

**Table 1. Concepts and categories of the study data**

Concepts	Categories
Means	<ol style="list-style-type: none"> <li>1. Channels</li> <li>2. Methods</li> </ol>
Content	<ol style="list-style-type: none"> <li>1. Type of information</li> <li>2. Quality of information</li> <li>3. Reliability of information</li> </ol>
Usefulness	<ol style="list-style-type: none"> <li>1. Communication</li> <li>2. Skills development</li> </ol>
Challenges	<ol style="list-style-type: none"> <li>1. Language barriers</li> <li>2. Value attached to information</li> <li>3. Sophisticated technologies</li> </ol>

themes; (1) information sharing means (2) content, quality and reliability of information (3) usefulness of information (4) challenges of information sharing (see Table 1). The themes were linked to the study objectives. A particular category could apply to more than one major theme. The process allowed to reflect on the data broadly and in detail. As a means to check for validity and to counter potential biases in the study, the preliminary findings were discussed with some actors who had played a key role in information sharing. The validity of the findings was further assured by identifying appropriate quotations for the issues under discussion and cross checking with members of the research team, and with secondary literature.

#### 4. Results and discussion

Information is vital for the effective functioning of the OSCA business. It has been described as the lifeblood of the OSCAs. This study established that for information sharing to take place and for information to have good quality and be used effectively, there must be trust and interaction among the different actors. At the OSCAs, trust and interaction are key in the information sharing process and these are apparent in four distinct ways: (1) information sharing means, (2) content, quality and reliability of information (3) usefulness of information (4) challenges of information sharing.

##### 4.1. Information sharing means

Information sharing means are the channels through which information is transferred and exchanged from one person or source to another (Uzezi, 2015). In information dissemination, there is a process which involves exchange of ideas, facts and opinions, between persons that send a message and the persons that receive it. This study established that in the OSCAs among the major means through which information is shared include face to face interactions and networks.

##### 4.1.1. Face to face interactions and networks

This study revealed that the major means of transfer and exchange of information from one person or source to another, involved face to face sharing of Information also known as interpersonal communication. This was done through meetings, interaction with the leaders, JICA volunteers, and through community association traders, as well as mobile phones and institutions. Face to face interactions enabled sharing of the most required information by the members of the OSCAs and farmers in the rice value chain. The kind of information shared was on supply of agricultural inputs (seed, fertilizer), new technologies and innovations, pest, climatic conditions, and diseases and credit facilities, markets amongst others. The study further identified other vital information on new methods of farming, storage facilities, trading, marketing, loan and credit facilities as the most sort after information. The required information if accessed in time would enhance agricultural practices and yields. The study identified institutions such as Abi trust, Agri net and Akorion, as the most

approached by ZAABTA to provide the farmers and members of the OSCAs with market information, as indicated by the center manager ZAABTA:

Abi trust now trains and provide the members with information on savings, record keeping, market access, capacity roles, and has worked with the farmers association, village agents to provide marketing information on a weekly basis particularly on Fridays. This information that is provided through networking with institutions like Abi -trust has helped change attitudes of the members towards better farming methods and regarding farming as a business looking at quantity and quality. (Center manager ZAABTA, March 20th 2015)

A similar statement was echoed by the Center Manager BAIDA, who emphasized the important means of information sharing by institutions and the importance of the shared information in increasing trust and in changing the mindset of the members. The Center manager BAIDA mentioned that:

Before there were a lot of post harvest losses and a farmer would only be satisfied with only two bags of rice. But as time went on, face to face networking with different actors from different institutions such as WFP availed new information on production and market availability. Farmers now see the importance of having extra sacks that they can sell, farmers mind set has changed and they are now aware of the value chain and treat rice production as a profit making business. (Makaka Moses, Center manager BAIDA, February, 23nd, 2015)

Through face to face interactions members are able to access price information, this helps to guide in making the right decisions on the kind of enterprise to engage in. Men have moved to Busia district to grow rice and tomatoes, because they get up to eight million shillings and above from an acre. Our members are now opting for rice because rice prices are good. Very many households and youth today have gone into rice production and processing because of the readily available market. Farmers and OSCA members now understand the price dynamics which enable them to plan considering the fact that they are now aware of market prices which they use to forecast what the future will look like. (Florence Kalinaki, Chairperson BAIDA, February 23nd, 2015)

Information sharing in the OSCAs depends on the networks that exist. Networks that exist at BAIDA and ZAABTA enabled sharing of information with in and among the actors. Information sharing helped generate collective knowledge this concurs with Constant, Kiesler, and Sproull (1994). Collective knowledge and information of the prices and availability of markets enhanced collective marketing. As a result of the face to face interpersonal communication, innovative approaches to marketing challenges were devised. Frequent actor interaction among diverse actors enhanced the capacity to continuously innovate to fit within the rice competitive business this is in agreement with Hall, Mytelka, and Oyeyinka (2005, p. 2). Granovetter (1985), also argues that the ability for interaction among individuals within groups and organizations builds trust. The study findings are also in line with Uzezi (2015, p. 351), who states that frequent interaction (face to face and other means of interaction) increase the level of trust, interpersonal relationships and enable actors to know each other to generate action. They thus, share information regularly and use the information to create a common understanding. The existence of trust among the OSCA actors fosters willingness to engage in cooperative interaction as confirmed by Usoro, Sharratt, and Tsui (2006, pp. 1–9). Where the level of trust among actors is high, actors are more motivated to exchange quality information and cooperate. At the OSCAs there is more robust decision-making among the actors because decisions are made based on sufficient, accurate and timely information.

The study further revealed that, information sharing through networking with the members of BAIDA and ZAABTA led to establishment of further partnerships. This increased farmer integration along the rice value chains, as elaborated by the Deputy Country Director Sasakawa Global 2000;

New partnerships have emerged fostering better markets for the farmers. At BAIDA World food program (WFP) has visited the community and shared market information through face to face interaction, local news letters, and notice boards. This led to setting up of local bulking sites. The sites are connected to satellite marketing centers that feed into a warehouse receipt system. In 2010 a Memorandum of understanding was signed with the WFP to increase farmers' access to grain markets under the purchase for progress -P4P initiative. In 2009, a partnership was launched with the Uganda National Agro-Inputs Dealers Association (UNADA), aimed at strengthening the ability of member dealers to offer sound agricultural advice and encourage repackaging of products with smallholder customers in mind. This was formalized in a Memorandum of understanding in January 2010. (Batson Kayaayo, Deputy Country Director SG2000, March 25th, 2015)

The above statements indicate that networking and face-to-face interaction in information sharing are among the effective means of information sharing. Accordingly, the advances in information technologies provide just additional opportunities to facilitate timely and accurate exchange of information. This is upheld by Valenzuela and Contreras (2014, pp. 48–70) who state that physical interactions enable the building of strong and stable inter-personal relationships. The OSCA approach of face-to-face interactions creates better relationships and raises the level of information sharing.

#### 4.1.2. Use of extension approaches

4.1.2.1. *Community association traders (CATs)*. Traditionally, agriculture extension is seen as playing an intermediary role between technology developments by researchers and farming communities (Semana, 1999). This has typically involved communicating information on how to apply technical knowledge and skills geared towards increasing agricultural production. A new and major means of information sharing is through the Community association traders also commonly known as CATs at the OSCAs. These are community traders who deal in agricultural inputs and market for produce. They also provide agricultural information and training to the communities they live in. Community association traders are responsible for availing new information, technologies and inputs. This study found out that community association traders play an important role as means of information sharing regarding new technologies and innovations. CATs have groups and people they cater for in terms of information and technology sharing as indicated by the center manager ZAABTA;

If farmers and other ZAABTA members are not called to the training center to receive information, the CATs take the information directly to the farmers and association members. Community Association Traders (CATs) work hand in hand with village agents. These are commission agents who work directly with the farmers. They are backstopped by sub county extension workers and undergo intensive training by resource persons from Uganda National Agri input Dealers Association (UNADA) and National Agricultural Research Organization (NARO) as well as Makerere University. All these institutions provide new knowledge, information and technologies to the farmers and members of the association directly or indirectly through the CATs. The information and technologies are on rice seed, fertilizer, planting methods and post-harvest handling and value addition. (Center Manager ZAABTA, March 20th 2015)

The study also established that, the CATs work with a team of village agents who provide and share information up to the grass root. The village agent approach was introduced by USAID through Akorion company limited. The focus is on the information and service delivery to promote farmers' production and marketing activities through the use of Information and communication technology. The Information is implemented using Ezy-Agric software suite and the service delivery is implemented using the middle value chain actors called village agents. As explained by the chairperson ZAABTA;

Currently, the ratio of extension workers to farmers in Luwero is low, there is a limited information flow which directly affects the productivity and profitability of our members and farmers. Companies like Akorion came in to fill the gap at the same time they engaged the youth in productive and well-paying jobs in agriculture as middle value chain actors called the village agents. Akorion has helped us connect to markets by providing timely information, the company connects producers (farmers), buyers, sellers, input suppliers, exporters, crop insurance companies and financial institutions among others. (Kazibwe Harry Henry, Chairperson ZAABTA, March 20th, 2015)

The statement above indicates that there is high level of interaction among the different actors. The interactions resulted into introduction of innovations by the private sector such as the ICT system that enabled traders, processors and other buyers to express their needs to the village agents. The needs were aggregated by the ICT system to match up demand, while taking care of logistical issues such as location and transport requirements that have increased the level of trust and information sharing, this concurs with Uzezi (2015, p. 350).

**4.1.2.2. The mobile phones.** Mobile phone technology has rapidly expanded all over the world as well as in developing countries (Anjum, 2015), including Uganda. In the districts of Bugiri and Luwero, where the study on information quality, sharing and usage in farmer organizations was conducted, mobile phones have leapfrogged traditional telecommunications technology, in that mobile connectivity is the most prevalent and accessible form of infrastructure. The mobile telephony has proliferated across the districts, as one of the means of providing livelihoods information to rural communities. The mobile phone approach is an innovative approach to information sharing that research and other development actors have taken advantage of, to share information and technologies. The traditional source of agriculture and marketing information sharing was through the agricultural extension workers. This research evidences that mobile phones were commonly used to improve access to crucial linkages among key actors with in the OSCA rice value chain, in order to facilitate knowledge-sharing and access to agricultural information. The Community Association Traders (CATs) and village agents, used different modes of communication including the mobile phones to connect diverse actors along the rice value chain. For rural populations, geographically dispersed and isolated from knowledge centers, the information and communication capabilities of the mobile phone has been more valuable as communicated by the district agricultural officer Bugiri;

... Information that is communicated through the mobile phone is mainly on market availability and prices. The CATs use short messaging service (SMS) to send messages to a defined community of rice farmers, processors and buyers and respond to their questions by providing answer services. The SMS messages are short and therefore limited such as for alerts to change in weather, pest and disease outbreaks and market prices. The basic functions of a mobile phone as used by the CATs and village agents is sending and receiving text messages that are invaluable in increasing efficiency by improving the flow of information along and between the rice value chains. (District Agriculture Officer Bugiri, February 25th, 2015)

The foregoing statement implies that mobile phones play a role in providing relevant information (Table 2), and technologies. This is a significant contribution to agriculture and development as a result of access to quality information.

#### **4.2. Content, quality and reliability of information shared**

Information facilitates the coordination and synchronization of the rice value chain processes. These relate to the planning, sourcing, production and supply of rice and its products along the value chain. Information sharing among OSCA rice value chain actors influences the chain members' behavior and decision-making as well as performance in the chain. Availability of information at the right time and place is essential to ensure the seamless flow of the chain activities and processes. The amount of information conveyed in a particular context, the aspects such as the accuracy, time-lines, adequacy, reliability, credibility, understanding of the message as well as the ease of use of information exchanged, influence the quality of information that is shared with in the OSCAs.



**Table 2. Mobile phone providing information for rice value chains**

Activity	Purpose	Out come
Improving access to financial services	Mobile money payments to access agricultural inputs	Increased access of financial services for rice production and processing
	Micro money lending	
Providing Agriculture information	Farmer help line	Delivery of relevant information on rice production and post-harvest handling techniques, commodity pricing and weather information
Enhancing market access	Agricultural trading platform	Enhancing the link between commodity exchanges, between traders, buyers and sellers of rice

Information does not simply flow but is continually being transformed and adapted through communication. This study established that communication of quality information assists OSCAs to improve information exchange among the chain partners. Quality information is vital for the effective functioning of the OSCA businesses and has been described as the lifeblood of organisations as stated by Poee, Mafini, and Loury-Okoumba (2015, pp. 1–11). This study revealed that in the OSCAs, quality information is shared openly, and involves communication of important and sensitive information to its partners. Information sources play a very significant role in the type, quality, accuracy, credibility and reliability of information that is shared. In the OSCAs good information sources enable the actors access relevant, timely, reliable, easily understood and usable information. The OSCAs have built good relationships based on trust with their different partners to ensure quality information. Trust and shared vision amongst chain partners are fundamental in influencing information quality this concurs with Li and Lin (2006).

This study further revealed that information sharing at the OSCAs was a result of trust and interaction among the different actors. This influenced the type, quality and content of information that was shared, provided channels for information flow and gain of access to valuable information. Villena, Revilla, and Choi (2011), suggests that network members should establish a system with frequent interactions to exchange more reliable information. The study found out that there were frequent interactions, which permitted network actors to learn more about each other, to build trust and exchange more important valuable information. The study further revealed that the type and content of information that was shared in the OSCAs of BAIDA and ZAABTA in Luwero district (Table 3) included price information, market availability and access, quality standards for produce, rice agronomy information, agriculture planning information and credit access.

As regards rice agronomy, the information shared consisted of type of seed, where to plant, when to plant, crop spacing, weed, pest and disease management. Marketing information included: how and when to access market, quality standards and volumes for the market. Credit access information included Credit terms, duration and mode of payment of the credit. Initially, information was sourced solely from the district production offices and extension agents, but later NGOs (JICA, SG2000) also availed information.

The type of information sourced by the farmer association members included rice agronomy and postharvest handling. As a result of partnerships, information regarding market access and quality aspects is now provided by market information agencies, that have partnered directly with the farmer associations (Agri-net and USAID Feed the Future Akorion Company Ltd).

This study revealed that extension workers were one of the main face-to-face sources for agricultural information. Community members expected government ran programs to provide information and inputs, to them. Yet despite this desire for support and the visibility of extension workers, most

**Table 3. Source, type and content of information that is shared**

District and OSCA	Source of information	Type of information	Content of information
Bugiri-BAIDA	District production office, Extension agents, JICA, SG2000	Rice Agronomy & access to inputs	Planting calendar, land preparation, planting, fertilization methods, weed management, pest and disease control, agricultural inputs availability including fertilizers, improved variety of rice seeds, herbicides and pesticides
	Agri net, info trade, Community Based Facilitators, TV, Radio, Mobile phones	Market access and Pricing	Source of market, volumes required, quality standards
	Centenary bank Opportunity banks,	Credit access	Credit terms, duration and mode of payment
	NARO, SG2000	Post-harvest handling	How to harvest, transport, clean, dry and store
Luwero-ZAABTA	District production office, Extension agents, SG2000, NARO, MAAIF	Rice Agronomy and access to inputs	Planting calendar, land preparation, planting, fertilization and weed management, pest and disease control, agricultural machinery, and equipment and water for irrigation, extension education for the Community based facilitators and traders of inputs
	Radio, TV, Newspapers, Mobile phones, Agri net,	Market access and Pricing	Source of market, volumes required, quality standards
	Opportunity banks mobile banking, Zirowwe Sub-county Sacco	Credit access	Credit terms, duration and mode of payment
	SG2000, JICA	Post harvest handling	How to harvest, transport, clean, dry and store

Acronyms: SG 2000-Sasakawa Global 2000, JICA-Japan International Cooperation Agency, Sacco-Savings and credit cooperatives, NARO-National Agricultural Organization, MAAIF-Ministry of Agriculture Animal industry and Fisheries. ZAABTA-Zirowwe Agali Awamu Agribusiness Trainers Association. BAIDA-Bugiri Agribusiness trainers Association.

community members claimed that they did not actively engage with the services, nor have contact with extension workers on a regular basis. A BAIDA member explained;

In the past, information on production and marketing was provided by the production department and disseminated by extension workers alone. However most times it was very unreliable. With increasing involvement of private actors in value chain activities at the OSCAs, reliable agricultural information is delivered on time. If i wanted information on the price of rice seed, or market for rice produce, i can access the information immediately and i will know the prices and where to go. (OSCA member, BAIDA-Bugiri, February 20th 2015)

Similarly, at ZAABTA production and market information was also got from the private sector because of its accuracy, timeliness and reliability. There was thus increased access to information by all actors involved in the rice value chain in Zirowwe sub-county, as indicated by center manager ZAABTA;

Initially unreliable market information was provided by the production department and extension agents. However involvement of the private sector enabled development of innovative ways of access to accurate and reliable information. We now receive market information on a regular basis. Private limited companies like Akorion and Agri-net focus on timely information and service delivery, they are reliable and we trust them. The linkages to Agri-Net were coordinated by Sasakawa Global 2000. (Center managers-ZAABTA, March, 20th, 2015)

Information on credit access is provided by the banks, which was not the case before. At BAIDA and ZAABTA Centenary bank and Opportunity banks respectively, have access to the members of the association and have trained them on savings and credit, as indicated by a members;

Unlike in the past years when banks were an enemy of the people by providing loans and confiscating people's property. Banks today are competing amongst themselves on who provides the best and most reliable information, training and loan services [Centenary bank]. This bank regularly visits us in our homes to give guidance on how we should use the agricultural loans, and the loans officers are very friendly when interacting with us, we now trust them, they listen when one has a problem. (OSCA member, Nabukalu sub-county Bugiri district, February 22nd, 2015)

The study found out that as a result of the direct and regular interactions with the banks by the farmer association members, village savings and loan association schemes have emerged with in the associations affiliated to the banks. Members are saving up to 91 million at BAIDA and 95 million at ZAABTA. In addition the banks have enabled acquisition of credit to the farmer association members to buy inputs and equipment. The banks have provided OSCA members with training on how to save.

The above statements show that initially there was a problem with the government departments that provided unreliable information and were not trusted. This was attributed to the lack of motivation to work by government staff. This has resulted into the lack of zeal to look out for any new information and knowledge, that would benefit the community. Information content was often pre-packaged and produced without consulting the communities to which it was disseminated. Partners that worked with the OSCAs, using community-driven approaches including the private sector to avail production, processing and market information, were successful in building trust with the members of the community and OSCAs. This is in agreement with the social exchange theory as stated by Cook and Emerson (1978, pp. 721–739), which recognized that information landscape is shaped by multiple actors through a variety of communication channels. In the approaches used by the OSCAs, information transfer is viewed as an interactive process involving a flow of information among many different actors. It is the relationships and trust between actors, their social setting, the nature and intensity of their interactions that determine information sharing.

#### **4.3. Usefulness of information sharing**

Information sharing has been regarded as an effective predictor factor of a value chain's effectiveness. Information sharing contributes largely to improved relationships between suppliers by facilitating efficient coordination and responsiveness as well as integration of partners' information systems. Effective sharing of information at the OSCAs between rice value chain actors, fosters the reduction of unwarranted wastage and costs in the value chain. This thus leads to increased resource management. The need for ensuring availability and easy access of information to those reliant on it is fundamental. Information sharing has enabled building of trust. Trust is viewed as an antecedent of cooperation (Handfield & Bechtel, 2002). Since network actors at BAIDA and ZAABTA, belong to different independent entities, they tend to keep some of their own information private, for their own benefit; hence, sharing of information cannot always be effectively realized, because of fear of the free-riding of information. A well-developed trust relationship, however, has been critical to overcoming this obstacle for strategic information sharing as indicated by a member of BAIDA;

As we begin to trust each other, we become more willing to share our information and resources without worrying about opportunistic behavior by our partners. We all have similar problems and have to share information on how to solve them. (BAIDA member, Nabukalu sub-county Bugiri district, February 22nd, 2015)

A trusting relationship encourages interaction among value chain actors and further enhances the benefit of information sharing. This study found that trust between members of BAIDA and other actors within the rice value chain stimulated favorable attitudes and behaviors and therefore created the willingness to interact and share important information. Regular interactions, with the partners created openness, honesty and a connectivity that enhanced the willingness to exchange valuable information without worrying about inappropriate use of that information this is in agreement with Fawcett and Magnan (2004). Overall, trust helped mitigate the information imbalances inherent in inter-actor exchange by allowing the more open and honest sharing of information within the BAIDA OSCA actors. Trust was widely recognized as playing a crucial role in the OSCA rice value chain information integration.

Similarly, at ZAABTA, trust enabled sharing of relevant information that helped change the mind set of members of the OSCA towards new and better farming methods. Lack of trust in agriculture extension workers resulted into farmers being reactant in accessing information from them. However, with a number of actors working jointly to provide timely and relevant information to OSCA members, trust was built even with the extension workers as indicated by a ZAABTA member;

In the beginning we did not trust the extension workers. However, with increased involvement of NGOs in training extension workers to provide better services, we started trusting the extension workers. The information accessed as a result of the partnerships by ZAABTA include agronomy information on row planting, use of improved seed, weed management, pest and disease control and post-harvest handling. The use of the shared information has enabled us increase rice yields and reduce post-harvest losses. (ZAABTA member, March 20th, 2015)

Shared vision helps OSCA members understand the benefits of information sharing. This in turn, increases the quantity and quality of information sharing in communities. Well-managed information sharing programs as observed in the OSCAs, reduce costs, and improve value chain performance this is also confirmed by Cheng et al. (2011, pp. 374–384). Information sharing is important in enabling well informed decisions. Relevant information shared between OSCA value chain members requires them to trust and rely on their partner's capability so as to make informed decisions to operate. Thus, there is seemingly an interplay between information sharing, and trust and all these factors seem to be critical for improving value chain performance.

#### **4.4. Challenges with information sharing**

Information asymmetries among value chain actors result in inadequate information leading to undesired consequences. This is a result of acts that leave others to bear the costs of their actions (Akerlof, 1970). Fawcett and Magnan (2004), highlight that most organizations are unwilling to share information that may put them at a competitive disadvantage. As a result, tremendous amounts of information remain inaccessible to other value chain actors. Information sharing in a value chain is entirely dependent on the willingness of individual organizations to share information openly, honestly, and frequently. According to this study that was conducted at the OSCAs of BAIDA and ZAABTA, members encountered almost similar challenges in accessing and sharing agricultural information and knowledge. Specifically, findings indicate that major challenges included: the lack of feedback from actors who interacted with the OSCAs, existence of a lot of undocumented information, language barriers and limited knowledge on use of Smart phones were the key challenges of information sharing. Other challenges were unavailability of information providers (the extension workers), low awareness of available information and sources, inadequate resources to enhance information sharing, and high levels of illiteracy limiting understanding of shared information.

#### 4.4.1. Lack of feed back

Feedback is a form of communication that provides information as well as a strategy for building trust and strengthening relationships (Sebastian, Davis, & Chappell, 1998). Feedback is essential in managing information flow in order to work effectively and, probably even more importantly, to build relationships with all value chain actors. An impediment to information sharing is the resistance to share information, caused by lack of trust. Poor information sharing can damage trust this impedes information sharing; it is a vicious circle. Without trust, communication becomes limited. The study revealed that some information seekers never give feedback, as indicated by the chairperson ZAABTA;

Most information seekers especially PhD and Masters students as well as researchers from NARO, come to ZAABTA seeking information which they use for their own benefit. They obtain knowledge, however, they never give feedback. The information which they take is documented by them, we feel exploited, hence we do not trust them because they use our information to make money. (Kazibwe Harry Henry Chairperson ZAABTA, March 20th 2015)

The limited feedback from information seekers led to lack of trust between them and the ZAABTA members. This reduced communication with some actors, affecting the taking of important decisions. Some partners seek information from ZAABTA, which is then used elsewhere. The information is then used to promote similar activities as those promoted by ZAABTA to make economic benefit. There is a risk of acting against one another's interests rather than working toward common objectives. Given these concerns, ZAABTA only shares low-quality information with some partners, that is not helpful in making important decisions. This concurs with Pardo, Cresswell, Thompson, and Zhang (2006, p. 2) who argue that in some cases a low level of trust can contribute to a contentious and unfavorable setting for exchange of even basic information. Positive feedback is very important in information sharing to avoid information distortion. Feedback with the OSCAs information sharing systems, signifies the completion of communication and confirms that information has been jointly understood this is also confirmed by Sebastian et al. (1998, p. 57–61).

The study further established that there is a lot of undocumented information at the ZAABTA OSCAs. Members working at the OSCAs have vast information on agriculture including; farming techniques, farmer group activities and organization, prospects, achievements and plans. However these are not documented and thus cannot be shared with other relevant stakeholders. This contributes to loss of information along the chain. The study further revealed that language barriers, limited information flow from the OSCAs to the farmers affecting farmer development. Also revealed by the study was that, almost all available information especially the crop production hand books from NGOs and NARO are in written in English. These have barely been translated into the local languages for the farmers to comprehend. This has an influence on OSCA members perceptions and attitude in regard to information shared.

The study established that at ZAABTA many farmers did not trust the information shared. The result was farmers looking down on those who shared the information and selectively taking on some information while leaving out what was not considered important.

The statements imply that information gaps exist due to language barriers and mind set of some actors. In order to reduce the information gaps the ZAABTA OSCA management started encouraging local translation of information material. This enabled trust building to gradually take place, causing a mind set change among the ZAABTA members and farmers. And building a trusted network for individuals to share information. This is in agreement with Razavi and Iverson (2006, pp. 459–468). It is important to value and consider all actors when designing certain type of information material.

#### 4.4.2. *Limited knowledge on use of smart phones*

Today world over, with the aid of high-speed cellular network, any video, audio, or multimedia files can be shared as information material. The information sharing process has become a tremendously fast and interesting process (Anjum, 2015). Mobile phones have increased the effectiveness of a communication process. It is because of mobile phones that we are sure of an any-time any-where communication possibility. However there are challenges of limited knowledge on use of smart phones faced especially in the rural areas of Uganda. The study revealed that, there was greater access to mobile phones than to other information sharing tools such as the computers for Internet. Mobile phones were useful in accessing agricultural information in the study area, however this was done on a small scale. The Commodity Association Traders-(CATs) and a few of the village agents used their mobile phones to access and share agricultural information. There were challenges of limited knowledge on use of smart phones and unreliable network connectivity. There were also high costs of air time further limiting the usefulness of mobiles. Some of the users claimed to use their phones to share agricultural information, while only a handful said they used them to access information about local markets. There was however, some distrust in the content received on phones as expressed by some village agents. Though some did not specify why they doubted what they received on their phones, others commented that the commodity prices on sent to the phones do not match what they find at market as indicated by one village agent;

Much of the information we receive on our phones is on commodity prices of agricultural produce. However, this does not match what is on the market, worse still it is in English, those that cannot read are left out. (Village agent, BAIDA—Bugiri district, February 23rd 2015)

Smart phones were allocated to village agents by Akorion, however, at BAIDA most village agents do not know how to operate or use the new technology on the gadgets to access information. Even those who know how to access information do not have the package that they can use to access the smart phone extension service. This would enable them access agricultural and weather information. (Makaka Moses-Center Manger BAIDA—Bugiri district, February 23rd 2015)

Involvement of different actors into the information sharing process using mobile based technology to overcome the limited farmer to extension worker coverage, has helped in solving the problem of access to extension services. Use of mobile phones in sharing of experiences between and among the actors is made easy. At the OSCAs training on the use of the mobile phones is emphasized by those promoting the technologies especially on how to access business market information and phone packages. The challenge is the applications are not so good for the common rural person and the farmers. The applications do not follow any generic blueprint nor design for specific target market, and lack localized contents. This concurs with Lanjouw and Lanjouw (2001, pp. 1–20) who states that most of mobile agriculture applications are not user-friendly, consideration of literacy levels should be made.

In sum, the case studies of the BAIDA and ZAABTA OSCAs illustrate that the information sharing arrangements, quality and usage of information, are dictated by the level of trust and interaction. Trust among the OSCA actors due to level of interaction influences the feedback process and taking important decisions that guide coordination of the OSCA rice value chain activities. There is evidence from the study that information sharing brings major benefits for the OSCAs. Through interaction with different partners, the OSCAs have benefited from improved technologies such as the mobile phone make information sharing easy. This analysis contributes to social exchange theory by proposing effective ways of sharing information enhanced by interaction and trust. The degree to which information is shared in the OSCA rice value chains relies heavily on the extent to which actors are socially integrated with one another.

A trusting relationship encourages interaction and openness, influences the quality and usage of information among OSCA rice value chain actors.

## 5. Conclusion

Information sharing, at the OSCAs creates a connection between all OSCA components, activities and operations. As a result, information transfer depends on the level of trust and interaction with in the network components, of the chain's information system. This permits network actors to learn more about each other and exchange more important valuable information. Where the level of trust among actors is high, actors are more motivated to exchange quality information and cooperate. At the OSCAs conditions for social exchange are strongly linked to the relational dimensions, of actors sharing social bonds, interaction; and maintaining high levels of trust. The reciprocal interactions have an influence on feed back as well as quality of information that is shared and how it is used. The study therefore recommends that there is need to include feedback with in and among the actors to enable establish trust and genuine sharing of information to address information gaps. There is further need to establish genuine partnerships between actors including local leaders, to address specific information gaps. For effective information sharing, and to ensure quality information, it is important to pay attention to the means used for potential participants to build relationships that enhance trust.

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The authors declare no competing interest.

### Author details

Rugema Semaana Hilary<sup>1</sup>

E-mail: [hrugemabusiness@gmail.com](mailto:hrugemabusiness@gmail.com)

ORCID ID: <http://orcid.org/0000-0003-4939-7144>

Haroon Sseguya<sup>2</sup>

E-mail: [h.sseguya@cgiar.org](mailto:h.sseguya@cgiar.org)

Paul Kibwika<sup>1</sup>

E-mail: [pkibwika@caes.mak.ac.ug](mailto:pkibwika@caes.mak.ac.ug)

<sup>1</sup> Department of Extension and Innovation Studies, College of Agricultural and Environmental Sciences, Makerere University, P.O. Box 7062, Kampala, Uganda.

<sup>2</sup> International Institute of Tropical Agriculture (IITA), East Africa Hub, Plot 25, Mwenge Coca-Cola Road, Dar es Salaam, Tanzania.

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