

**Knowledge Networking among Women's Groups, Finance Institutions  
and Extension Administration in Rahad Agricultural Scheme- Sudan**

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**Abstract:** The Establishment of the Rahad Agricultural Scheme in Eastern Sudan in the 1970s established an agricultural innovation system where different actors are networking to provide better livelihoods within the irrigated scheme area. The objectives of the paper are presenting the connections of women groups and their networking to the extension and finance institutions in the scheme area and trying to relate it to the theorizing of agriculture knowledge and information system, so new roles and connections are suggested to improve the performance of Rahad Agricultural Scheme. System thinking is the methodology to analyze knowledge networking among extension, and finance institutions from one side and among women's groups on other side. Accordingly, Rapid Appraisal of Agricultural Knowledge Systems (RAAKS) and Social Network Analysis were conducted to identify roles and knowledge sharing among Women Groups, Saving and Social Development Bank and Extension Administration in Rahad Agricultural Scheme. Results of this research showed that most Women Associations interviewed had a sense of independence from the Women's Union activities, while the Women's Union expressed closer connections and had a sense of ownership over the Women's Associations

activities such as saving funds and Quran learning lessons. Some Women Groups in Rahad Agricultural Scheme are actively engaged in non -farming micro-finance projects through their connections with Saving and Social Development Bank. However, their farming and livestock keeping activities are not recognized by Extension Administration in the scheme and not financed by the schemes finance institutions. Building of multi hubs model (connecting actors with training and capacity building) is the strategy to improve knowledge networking between women's groups, Extension Administration and Saving and Social Development Bank. In this manner, the extension can be the knowledge broker who can connect actors and communicate information in order to improve the networking among the studied actors which would enhance the performance of agricultural innovations in Rahad Agricultural Scheme as a whole

**Keywords:** SNAS, RAAKS, Rahad Agricultural Scheme, Women Groups

## INTRODUCTION

The Rahad Agricultural Scheme was established in 1977 and situated within 14° 23 – 13° 30 north and 34° 22-35°55 east. It is located 260 km south east of Khartoum, the capital of Sudan, and El-Fau City is the headquarters of the scheme. It is irrigated from two sources, the Rahad River from autumn to summer and the Blue Nile River during winter. The total cultivated area in the scheme is 147,698 hectares (Benedict *et al.*1982 ; Rahad Agriculture Corporation 2010).

One of the reasons for establishing of the Rahad Agricultural Scheme was to shift the sustainably based economy of indigenous agro-pastorals surrounding the area of the scheme to a more intensified cultivation, so the government of Sudan anticipated that the standard of living – income, housing, nutrition, education, and values of those people – would be improved (Benedict *et al.* 1982). In accordance with that planning, tenants were settled and allotted farming units of 9.2 feddan (1feddan=4200 m<sup>2</sup>) to plant cotton, ground nuts, and fodder crops. According to cultural norms, land title deeds were leased to male headed households emphasizing the masculinity of farm

work among several Sudanese social groups or tribes. The Ministry of Agriculture in Sudan appointed the Rahad Agricultural Corporation to be the responsible institution for managing the Rahad Agricultural Scheme; the corporation was responsible for providing agricultural inputs and assessing costs against profits, while tenants were responsible for farming the land and would receive profits from their production (Benedict *et al.* 1982).

Agro pastoral tenants within the scheme area are accustomed to rain fed farming of sorghum and livestock rearing but not to irrigated farming and cotton crops specifically. According to cultural norms, in case of Rahad Agricultural Scheme, farming lands were leased to male headed households. Gender roles among agro pastoral tribes has been studied by Sorbo (2003) in Eastern Sudan, his studies revealed that women are responsible for rearing of small ruminants and household chores while cattle and sorghum farming are entitled to men during rainy seasons. Many tenants in Rahad Agricultural Scheme, particularly agro-pastorals, preferred not to work on their own fields due to a lack of prior agricultural experience and a dislike for particular field operations such as cotton picking. This situation generated extra demand for labor. In the initial years of the scheme, around 50,000-60,000 seasonal labors of whom 95% are from western regions of Sudan had migrated to work in the scheme. Laborers in the Rahad Agricultural Scheme worked on cotton picking, weeding, and cleaning crop residues (Benedict *et al.* 1982). Gender roles in farming for social groups from western Sudan were studied in literature and proved to be that women are actively working in farm specially, seeding, weeding and harvesting see for example (Ibrahim 1982; Umbada and Abdul Galil 1986). Therefore, in this context, most of farm work practiced by women in Rahad Agricultural Scheme is mostly affiliated with women from western Sudan and to limited extent to women of agro pastoral groups who were settled within the scheme premises (Rahad Agriculture Corporation 2010).

Knowledge can be defined as ‘information combined with experience, context, interpretation and reflection’ or a high value of information ready to apply to decisions and actions (Suefert and Krogh 1999). knowledge can be classified according to different criteria ; type of knowledge and level of

knowledge for type of knowledge the notions of explicit knowledge , the represented, coded and communicated knowledge and explicit knowledge, the heavily rooted experiences which is difficult to communicate are central notions. The levels of knowledge include the spaces where knowledge are impeded and communicated such as individuals, groups and organizations. Knowledge develops as a result of dynamic and interaction between implicit and explicit knowledge or by making connections between new knowledge and what is already known. For this to happen, interconnection between type of knowledge and level of knowledge is needed or formal and informal networks needed to be created (Suefert and Krogh 1999). Social networks are known to be the pattern of friendships, advice, and communication or support that exists among the members of the social system (Valente1996).

To conduct this research we questioned knowledge on farming and livestock keeping and the level where this knowledge is mostly communicated among institutions and women groups in area of Rahad Agriculture Scheme. In other words we tried to formulate the existing networks where the knowledge is represented and communicated in order to realize weak networks and how it can be strengthened and developed. Our argument in this research is since knowledge on farming and livestock keeping as well as social exchange networks (Conway and Steward 1998) are well communicated between and among the scheme administration, finance institutions and women groups, empowerment of women in Rahad Agricultural Scheme would be achieved and thus the performance of agricultural innovations within the scheme will be improved. Power relations might be re –organized or re- balanced through knowledge sharing and awareness when all actors are reconnected and new relations are being created in the network of the Scheme.

Establishment of the mechanized Rahad Agricultural Scheme within area where pastoral live and rain fed farming were formally practiced has enforced a situation of knowledge development as different actors in Rahad were exposed to a new knowledge in farming and livestock keeping. This research has studied the connections or the network among actors in Rahad Agricultural Scheme specifically, women groups, finance institutions and extension administration which represent the level where knowledge is

communicated. Our argument in this research is that, as knowledge on farming and livestock keeping as well as social exchange networks (the pattern of friendships, advice, and communication or support that exists among the members of the social system) are well communicated between and among the studied actors, empowerment of women in Rahad Agricultural Scheme would be achieved and thus the performance of agricultural innovations within the scheme will be improved.

Objectives of the research were to:

- Understand the structure and pattern of communication for finance institutions, extension and women groups in Rahad Agricultural Scheme.
- Relate finance institutions'', extension administrations' and women groups' connections to the theorizing of Agricultural Knowledge and Information Systems
- Suggest new roles and connections to improve the knowledge networking among extension administration, finance institutions and women groups in Rahad Agricultural Scheme

## **MATERIALS AND METHODS**

### **Women Union and Women Associations**

Women's Union in the scheme is a part of the Sudanese Women's General Union which was formed in 1990 as a national voluntary nongovernmental organization (SWGU 2010). The union is institutionally aligned with the Sudanese Council of Voluntary Agencies (SCOVA) of the Ministry of Humanitarian Aid (SWGU 2010). The SWGU has branches in the different states of northern, southern, eastern, and western Sudan (SWGU 2010). These branches extend from centers to local levels to villages forming branches and sub-branches (SWGU 2010). Women Union representative in Rahad Agricultural Scheme was interviewed.

Officially and unofficially registered, associations for women are found within the scheme villages, by officially registered we mean associations that

are recognized by the Humanitarian Commissioner Aid in the Sudan (a state organization that supervises and coordinates the performance of non governmental agencies). The RAAKS team managed to interview six Women's Associations in the Rahad Agricultural Scheme; two in the north of the scheme, two in the middle of the scheme, and two in the south of the scheme

### **Knowledge and Information System Thinking**

System thinking is an approach developed by scientists to study the world and how to intervene in it; more specifically, it is an approach to studying agricultural innovations as settings where knowledge and information interact and are exchanged by different stakeholders or actors (Engel 1997). System thinking may not be the only valid way to do so, but it has been widely adopted by many disciplines (Engel 1997; see also Röling, 1992). Although there is no agreed definition on what system thinking is in literature, it is referred to as *'an image or metaphor of the adaptive whole, which may be able to survive in a changing environment'* (Scheckl and Scholes 1990 cited by: Engel 1997).

Knowledge system thinking is a diagnostic approach that would either aim to implement better interventions, or an investigator would learn more about the function of the system (Engel 1997). Choosing knowledge system thinking will help one understand the nature of knowledge held by different actors. RAAKS is a tested, participatory action research methodology used to approach agricultural innovations with change and can be implemented in phases, where each phase has its window to diagnose and better organize innovative performance of studied actors. (Salomon and Engel 1997; Hulsebosch 2001). This study used RAAKS to show the suggestions to improve knowledge and information system within Rahad Agricultural Scheme.

### **Sampling method**

Purposive sampling was conducted, as the researcher aimed to include actors concerned with innovations achieved by the Rahad Agricultural Scheme.

After approaching the Rahad Agricultural Scheme Administration, researchers decided to conduct snowball sampling in order to interview actors within the scheme (Bryman 2001). Snowball sampling allowed the researchers to move from one actor to the next during interviews by asking Who else do you think is involved with agricultural innovation in the Rahad Agricultural Scheme. A structured questionnaire was used with 15 actors defined by the snowball sampling in order to collect information on actors' roles and objectives, however, for purpose of this paper, the researcher is presenting results of 4 main actors representing the flow of knowledge and information within the scheme namely, Rahad Agricultural Scheme Administration as the source of extension education, and source of knowledge on farming, Saving and Social Development Bank, the finance institute in the scheme that is directing micro finance projects in the scheme area, Women Union and Women Associations who represents women groups in the Rahad Agriculture Scheme.

#### **Data analysis**

Maxqda10, and coding strategy software method was used to analyze and interpret textual data (Iverb, 2007).

Maxqda helped the researcher process content analysis (Corbin and Straus, 2008) for data collected using semi-structured interviews and group discussions (Bryman 2001). Maxqda 10 was used to analyze data on the roles of the 4 relevant actors in exchanging knowledge and information on farming within the Rahad Agricultural Scheme (RAAKS phase A). The researcher developed codes and sub-codes as the raw data from interviews was divided into different conceptual levels so that meanings could be inferred out of the textual content (Corbin and Straus 2008). Meanings of texts were merged and compared using the technique of retrieved codes in Maxqda 10 (Iverb 2007). Finally, concluding points or summaries of actors' roles were drawn by the researcher's consensus and thoughts.

Codes of the 4 actors' roles were the sources of actors' knowledge, the type of knowledge. The sources of actors' knowledge were divided into sub-codes of formal source of knowledge and informal source of knowledge.

The type of knowledge was divided into knowledge of cropping, knowledge of livestock keeping, and knowledge of organizational skills.

### **Social network analysis**

In order to analyze the research study data, social network analysis measurements were used. Social network analysis is a methodological perspective that has been developed within the social sciences domain. According to Wassermann and Faust (1994), social network analysis stems from the importance of the relations connecting interacting entities. Therefore the analysis does not view the individual entities as the unit of analysis, but it considers individual entities and the relations connecting them as the unit of analysis (Wassermann and Faust1994). Those individual entities could be individuals, groups of the same type or identity, or they could be of different types. Entities in social network analysis are called actors, who are individual entities connected to others with relationships (Wassermann and Faust 1994). Relationships connecting actors are known as relational ties; there could be different kinds of relationships connecting actors, i.e. biological relations, affiliations, behavioral interactions and others (Wassermann and Faust 1994). Hence this research is concerned with understanding how information is being communicated between actors of the Rahad Scheme; it is important to see how actors are related to each other in the scheme. Therefore, social network analysis is a suitable analytical perspective to approach answering some of the research questions. Measurements of social network analysis are presented in the following section (Wassermann and Faust 1994).

### **Measurements of social network analysis**

In this section, some of the measurements that are used in social network analysis will be presented, stressing the measurements that were used by the researcher.

Socio-gram or a graph is one way of representing relational matrix data, where some elements, represented as points in the graphs, are connected by lines. The lines are representatives of different types of relationships that connect the elements (Scott 2000).

In graphs the pattern of connections matters, but not the size or the position of the points in the graph. Therefore, graphs are always used to express directed relationships, undirected relationships, and valued relationships. In the directed graphs, the pattern of relation can be traced from one point to another. *“The directed graph is represented in a drawn form; attaching an arrow head to each line direction of the arrow indicates the direction of relation”* (Scott 2000).

In the Rahad Agricultural Scheme network and graphs have been used by researchers to indicate the direction of relations between defined actors ; women’s identities( Women’s Union, Women’s Associations), finance institutions( Saving and Social Development Bank) and Rahad Agricultural Scheme Administration ( Department of Technology Transfer ) (Borgatti and Freeman2002).

## RESULTS AND DISCUSSION

### **Rahad Agricultural Scheme Administration’s network**

The Rahad Agricultural Scheme Administration (**Extension and Technology Transfer Department**) is the technical body managing farming operations in the scheme area. There were two ways contacts between the scheme administration and the Agricultural Bank to facilitate credits for farmers see fig. 1 to study scheme’s network. Rahad Agricultural Scheme Administration had contacts with almost all actors at the level of the scheme with exception of Women’s Union and Saving and Social Development Bank who were peripheral actors in this network

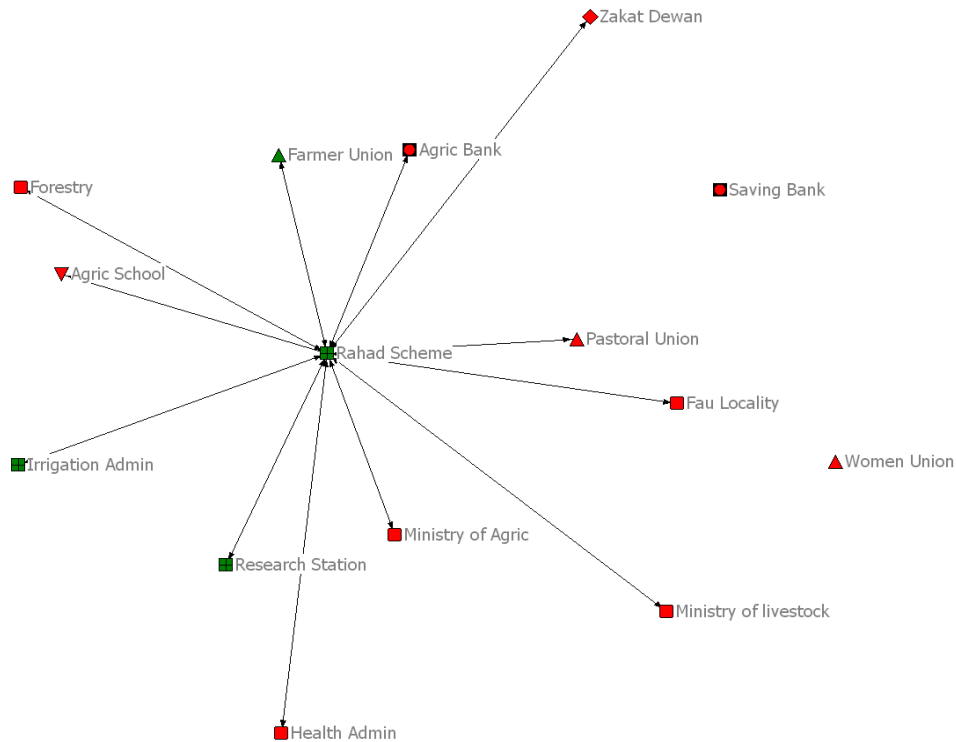


Fig.1.Rahad Agricultural Scheme Administration's network (field data 2010)

↔ Two way connection, → One way connection

Rahad Agricultural Scheme Administration connects to most actors in the network.

Women Union and Saving and Social Development Bank are peripheral in this network

### The network of Saving and Social Development Bank

The Saving and Social Development Bank is a private credit institution that contacts the Women's Entities (Women's Union and Women's Associations) in order to organize the disbursement of micro-projects for Women's Associations and livestock owners (fig. 2 demonstrate the bank's network).

### Knowledge networking in Rahad Agricultural scheme

The Saving and Social Development Bank was isolating itself from most government institutions within Rahad Agricultural Scheme.

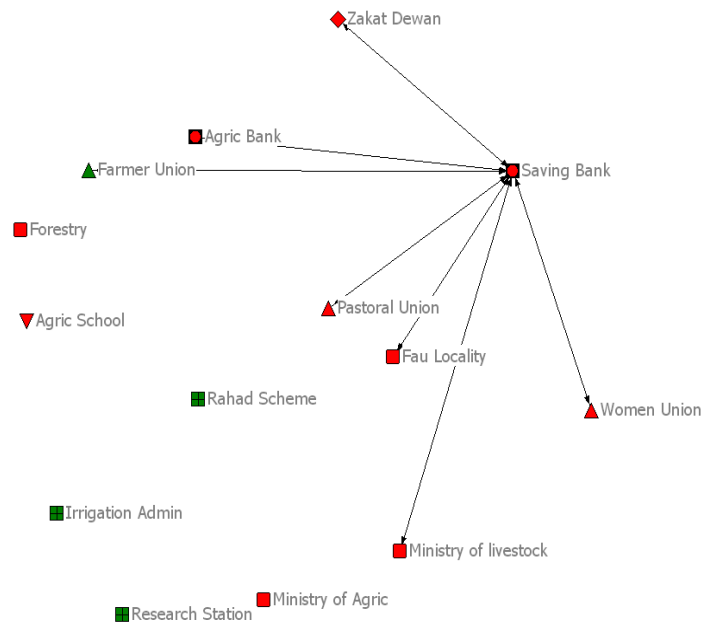


Fig.2. Saving and Social Development Bank's network (field data 2010)

↔ Two way connection, → One way

Saving and Social Development Bank contacts mainly Women Union and Pastoral Union to facilitate finance of micro projects run by the bank at El fau locality

### The network of Women's Union

Women's Union is mainly communicating with Saving and Social Development Bank to organize micro finance projects for women in El fau locality (Fig 3 note the union's network). The Women's Union is connected to the El Fau Locality (the administrative unit where Rahad Agricultural Scheme is located), but the actor expressed weak financial support from the locality for the Women's Union activities. The few communications which the union enjoys led to a peripheral position for the union within Rahad Agricultural Scheme.

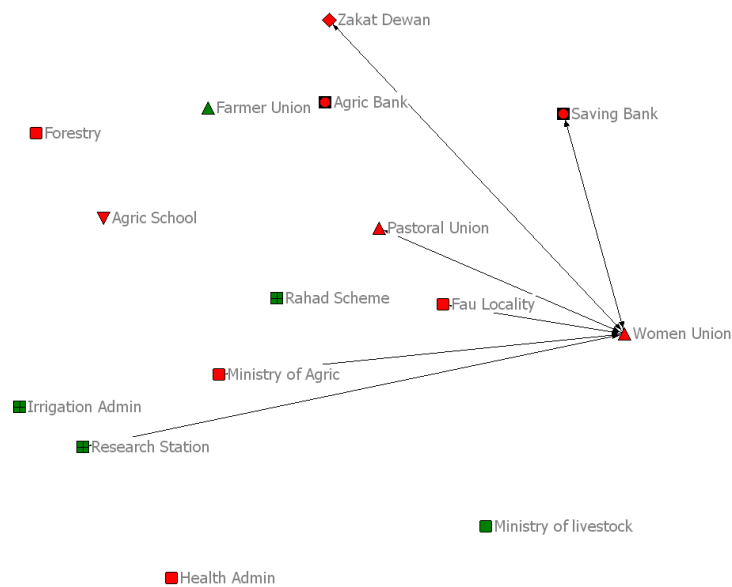


Fig.3. Women Union's network (field data 2010)

↔ Two way connection, ← One way

Women Union communicates with Saving and Social Development Bank and El Fau Locality Executive office

### **The network of Women's Associations**

Women's Associations have access and connections to Women's Union. The Union managed to contact the Saving and Social Development Bank to finance some Women's Associations (only officially registered ones). The aim of the financing is to increase women's income through projects of animal raising and small enterprises of trading. This registration took place in October 2011 during the second field trip. Unfortunately, we have no information whether any of the interviewed women's association had been financed by such projects by the Women's Union. Therefore, it cannot be judged whether Women's Associations coordinate with the Women's Union in microfinance projects on farming and animal keeping, however, joint implementation of activities such as political or religious meetings sometimes exists between the Women's Union and Women's Associations (SWGU 2010).

Women's Associations were asked whether they coordinate with the Women's Union. One Women's Association considers their groups to be independent from the Women's Union *"It is good that we gather and read the Quran. In the election time, they came (Women's Union) and promised us many things, but they just came to gain support from us, and then we saw nothing"*.

Ties between the Women's Union and Women's Associations in the Rahad Agricultural Scheme cannot be directly worked out; most associations interviewed had a sense of independence from the Women's Union activities, while the Women's Union expressed closer connections and had a sense of ownership over the Women's Associations.

### **Women's Association connections to the Saving and Social Development Bank**

The Saving and Social Development Bank in El Fau locality finances either individual's micro-projects or groups' micro-projects of farming and animal raising. According to the actor, financing through groups is easier to manage because they can guarantee payback or receive payment.

There was only one Women's Association financed by the Bank called Amna Eltyeb, however, they could not continue the financing process because it was asked to provide a guarantee of 20 million from the locality. According to the women's representative, *"The locality would not give us the 20 million, and I cannot guarantee all of them, so we dropped the project"*. Some Women's Associations were not aware of micro-finance projects held by the bank, for example, in a group discussion, when RAAKS team asked whether members of the association knew about micro-finance projects offered by the Saving and Social Development Bank, they found that not all women in the association knew about them. Therefore, information about activities of the bank is not equally shared among women, though many ideas of micro-finance projects had been expressed by women in group discussions in addition to that some projects run by the associations are failing due to lack of awareness in projects financing and lack of information in market )

In the following Phase C of RAAKS is discussing the idea of a multi hub model to improve connections between the Rahad Agricultural Scheme Administration (extension dept), finance and women entities.

#### **Rahad Administration, Saving and Social Development Bank and Women Groups network**

The connection between the Women's Associations and the Saving and Social Development Bank existed, however, information and awareness of the bank's activities is not known or shared by all women in the associations. Therefore, the Women's Associations and Saving and Social Development Bank are weakly connected together from other results; we found that the Saving and Social Development Bank is connected with the Women's Union. Therefore Saving and Social Development Bank can be a hub and its followers are Women's Union, Women's Associations. This hub can lead to create better connections of Women Entities by coordinating running of micro economic projects. Ties between the Women's Union and Women's Associations in the Rahad Agricultural Scheme cannot be straightforwardly worked out as some associations acknowledged the connection to Women's Union and others did not. Also it is found that there is no connection between the Rahad Agricultural Scheme Administration and farming activities of

Women's Associations, therefore, the extension department in the Rahad Agricultural Scheme needs to map the activities of Women Entities in the scheme area in order to provide direction for better connections and networking of relationships Fig4. In other word Extension in Rahad Agricultural Scheme can be a hub and its followers are Women Entities (Krebs and Holley 2004).

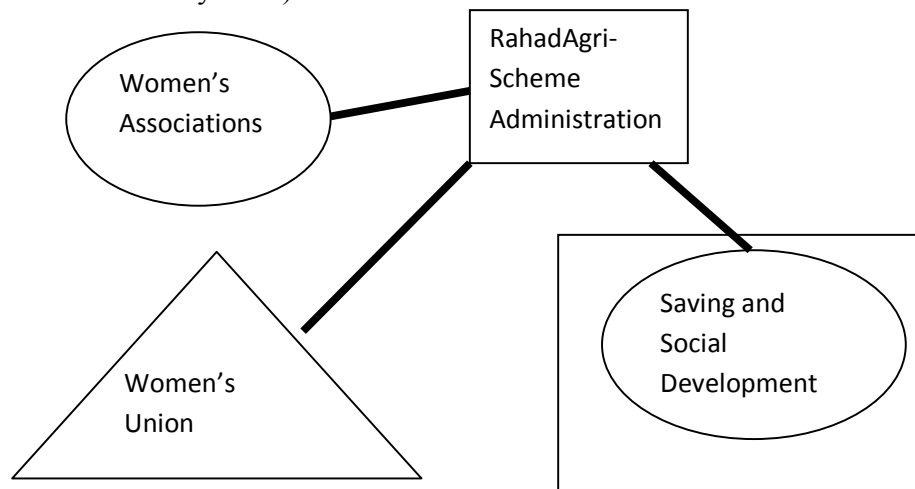


Fig. 4. Multi Hub demonstrating relations built between women groups Extension and Finance in Rahad Agricultural Scheme where in this model Extension is the weaver which introduces actors to each other and manage the relations

## CONCLUSION

- The Extension and Technology Transfer Department in the scheme is the hubs introducer, who would introduce the hubs to its followers and then may later manage the network.
- A workshop that gather Women's Union , Women's Associations and Extension Dept need to be conducted, where, a participatory discussion can be held as the three actors can identify their strategic contacts within the net .
- Conducting such a workshop can also let Extension, Women's Union and Women's Associations recognize their weak connections and put practicalities to improve it.

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## التشبيك المعرفي بين المجموعات النسوية، مؤسسات التمويل وإدارة الإرشاد في مشروع الرهد الزراعي، السودان

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**المستخلص:** ان انشاء مشروع الرهد الزراعي بشرق السودان في السبعينات من القرن الماضي هدف لتكوين منظومة مبتكرات زراعية تؤدي الى تشبيك وارتباط عدة فاعلين بعلاقات لتقديم سبل كسب عيش افضل في منطقة المشروع . تهدف هذه الورقة الى عرض ارتباطات المجموعات النسوية وتشبيكهم مع جهاز الارشاد ومؤسسات التمويل في منطقة المشروع ثم ربط هذا التشبيك بتنظيم منظومة المعرفة والمعلومات الزراعية وذلك لاقتراح ادوار وارتباطات جديدة بين المجموعات النسوية حتى يتحسن اداء مشروع الرهد الزراعي . طريقة تفكير المنظومة هي المنهجية التي اتبعت لتحليل التشبيك المعرفي بمنطقة المشروع بين جهاز الارشاد ومؤسسات التمويل بالمنطقة ممثلة في بنك الادخار والتنمية الاجتماعية من جهة وبين المجموعات النسوية من جهة اخرى . تبعا لذلك فقد تم تطبيق منهج التحليل السريع لنظم المعرفة الزراعية وتحليل التشبيك الاجتماعي لمعرفة ادوار وطريقة مشاركة المعرفة بين المجموعات النسوية، بنك الادخار والتنمية الاجتماعية وادارة الارشاد بمشروع الرهد الزراعي. اظهرت نتائج الدراسة ان الجمعيات النسوية بمنطقة المشروع تمارس انشطتها باستقلا لية عن اتحاد المرأة بالمنطقة بينما عبر اتحاد المرأة بانه اقرب للجمعيات النسوية ويتعامل بروح الرعاية للأنشطة التي تنظمها الجمعيات النسوية كصناديق التوفير وخصص حفظ القران الكريم. بعض الجمعيات النسوية تنخرط بفاعلية في مشروعات التمويل الاصغر غير المزرعية التي تقدمها بنك الادخار والتنمية الاجتماعية ولكن انشطتهم في رعاية الحيوان والزراعة لا يتم اعتبارها من قبل جهاز الارشاد بمشروع الرهد الزراعي كما انها لا تمول من مؤسسات التمويل بالمشروع. بناء نموذج تجميعي ( ربط عدد من الفاعلين للتداخل بعلاقات تدريب ورفع قدرات) هو الاستراتيجية لتحسين تشبيك المعرفة وتبادل المعلومات بين المجموعات النسوية و الارشاد وبنك

الادخار والتنمية الاجتماعية بمنطقة المشروع ، بهذا المنحى سيكون الارشاد هو  
مخترق المعرفة الذي سيربط الفاعلين ويوصل المعلومات حتى يتحسن التشبيك بين  
الفاعلين كالذين تم دراستهم، الامر الذي سيؤدي الى رفع اداء منظومة المبتكرات  
الزراعية بمشروع الرهد الزراعى