

Entrepreneurial mindset and institutional innovations triggered by rice parboiling video in Benin

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Abstract

To improve rice parboiling in Benin, an improved parboiling process with new equipment is being released. Farmer-to-farmer video (initiated by Africa Rice Center) was used by four local NGOs in the Department of Collines to disseminate the technology. In order to explore changes that have been made in this rural area following the use of this learning approach, 160 women and 17 women's associations were surveyed in 16 villages where the video was shown. Qualitative and quantitative data were collected using focus groups, semi-structured interviews, participant observations, questionnaires and photographs. The video had not only improved women's creative spirit, but also their motivation and awareness about the importance of parboiling as a revenue-generating activity. Women have become organized around rice parboiling leading to the creation of associations, more appeals to NGOs for additional training in rice parboiling, improved service delivery and improved packaging and marketing of parboiled rice. Improving women's entrepreneurial spirit contributed to improving the quality of parboiled rice and therefore to an increase in its price, which increased women's revenues and strengthened social cohesion. The video favored not only the improvement of extension methods used by facilitators, but also the strengthening of relationships among facilitators, rural communities, women processors, microfinance institutions, and input and output markets. Women had more access to formal credit because of their improved organization. Rice producers who attended the open-air video shows at the same time as the women rice processors became more willing to sell rice on credit to the women. The results of this study have allowed us to understand how video can favor the development of institutional innovations and reinforce relationships between facilitators and rural entrepreneurs.

Introduction

Rice cultivation has been recognized by the United Nations as a major source of food that can improve food security, eradicate poverty and achieve (at the international level) the Millennium Development Goals (FAO, 2006). In sub-Saharan Africa, rice is grown and consumed in about 40 countries by over 20 million farmers (WARDA, 2006). The crop also has cultural significance in the lives of many African populations, especially for rituals and ceremonies (Brydon, 1981). Rice also plays an important role in the region's economy, where US\$ 1.2 billion are spent on rice imports per year (WARDA, 2006). Rice production and processing activities are often gender-differentiated in rural areas, where women are generally responsible for post-harvest operations — packaging, threshing, transport, drying, parboiling, winnowing, husking, storage, marketing (Norman and Kebe, 2006). In Benin and Nigeria, for example, local rice is often parboiled before being husked. These parboiling operations are often conducted on a small scale by women of rice perimeters and are a significant source of income (Misari, 2002). These generated revenues help the majority of farming households to cover expenditures related to housing, clothing, children's education, and investments in other revenue-generating activities. The many rice post-harvest activities give jobs to millions of people, particularly women in rural areas.

Rice parboiling, which consists of precooking rice before husking, is an important operation that improves rice chemical and eating quality (Nonfon, 2005). Traditional paddy parboiling, practised in Benin by women processors, is not efficient and does not result in good-quality rice (Houssou, 2005). With a view to improving the parboiling technique in order to have quality rice after husking, Institut national de recherches agricoles du Bénin (INRAB) developed improved parboiling equipment. This new technology aims at quantitatively and qualitatively improving the yield of locally produced rice while maintaining its eating qualities and market value.

Despite the technical and economic performance of the innovation demonstrated by research, dissemination is a major factor in its adoption. Agricultural extension in Benin uses various approaches to disseminate technologies. Following the launch of structural adjustment programs to reduce public expenditure, the Benin government withdrew from the agricultural sector. The staff levels of agricultural centers were reduced, limiting State intervention in agricultural extension. The number of farmers who need extension services is far higher than the number that agricultural extension agents can handle in each region. Consequently, farmers were organized to enable them to empower themselves and, gradually, NGOs began to invest in agricultural development and extension. Various approaches at different levels of farmers' participation are used. Some

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extension agencies continue to use the ‘top-down’ approach. This traditional extension approach is now seen as outdated, paternalistic, inflexible, bureaucratic, inefficient and therefore less able to cope with the dynamic demands of modern agriculture (Rivera *et al.*, 2000). This calls for the use of participatory approaches, such as farmer field schools (FFS) and participatory learning and action-research (PLAR), to engage farmers in problem-solving, adult education, and experimentation, and to allow them to draw their own conclusions (Nederlof and Odonkor, 2006; Defoer *et al.*, 2004). But the scaling up of these participatory methods remains a key challenge and their function and position in the R&D continuum may need to be re-assessed (Van Mele *et al.*, 2005). To strengthen rural learning, Africa Rice Center (AfricaRice) and partners have developed a series of farmer-to-farmer videos according to the zooming-in zooming-out (ZIZO) approach (Van Mele, 2006).

As part of the process of popularizing the improved rice parboiling method, rural video (initiated by Africa Rice Center) was used by four local NGOs in the Department of Collines to disseminate this technology. Previous experience with farmer-to-farmer video showed that this approach stimulates women to innovate technologically and develop an entrepreneurial mindset (Van Mele *et al.*, 2005; Zossou *et al.*, 2009a). This study identifies and points out how learning through video can trigger entrepreneurship among rice processors, build and strengthen social cohesion, lead intermediaries to improve their training methodology and strengthen the collaboration between them, parboiling women and other markets actors.

The concept of ‘farmer-to-farmer video’

In order to better make information accessible to target groups involved in the rice sector in Africa and develop learning among farmers, the Learning and Innovation Systems Program of AfricaRice developed a communication and farmer education approach known as ‘farmer-to-farmer video’. This was made possible by the experiences of the Head of the Program who led the development of the ZIZO approach (Fig. 1) that is complementary to existing extension and learning approaches such as PLAR and FFS. While PLAR and FFS deal with learning among farmers, trials and modification of technologies, the video deals with results obtained by developing training tools in collaboration with PLAR farmers. The content of the learning process is therefore brought to farmers themselves, with translations into their local languages. In this way the video is likely to trigger agricultural innovations.

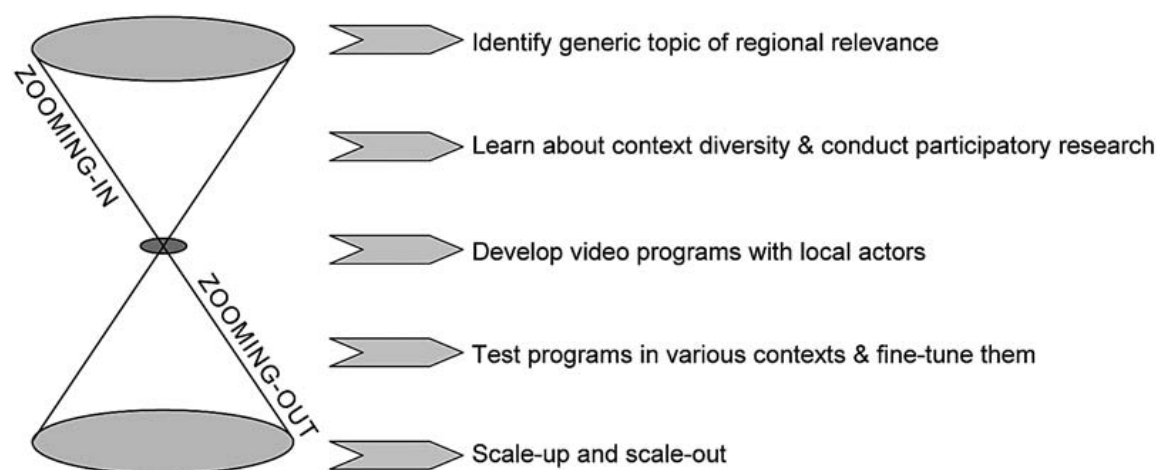


Figure 1. Zooming-in zooming-out: A new approach for scaling up sustainable innovations (Van Mele, 2006)

This ZIZO methodology starts with a broad stakeholder consultation to define regional learning needs. Only then are communities approached to get a better understanding of their ideas, knowledge, innovations and the words they use in relation to the chosen topic. During this phase, farmers are ideally engaged in PLAR or FFS type of activities (zooming-in). Farmer-to-farmer videos are then produced with a few selected communities building on the principle of communication of ideas rather than transfer of technology. Consequently, when showing the draft videos to further villages, new innovations may be identified and added, and confusing parts clarified (zooming-out) (Van Mele, 2008).

The first videos produced on rice and using this approach were: *Seed Sorting*, *Seed Flotation*, *Seed Drying* and *Seed Preservation*. The results and impacts of this approach have been conclusive and the videos have been translated into various local languages in several African countries, including Benin, The Gambia, Ghana, Guinea, Mali, Ethiopia and Uganda. In 2009, videos on rice were translated into more than 30 African

languages by AfricaRice and used to build the capacities of more than 500 organizations and over 130 000 farmers.

The video that is the object of this study — *Cashing In with Parboiled Rice* — was developed in 2005 by AfricaRice in collaboration with Institut national de recherches agricoles du Bénin (INRAB), the NGO VECO Benin and SONGHAÏ Center (WARDA, 2005). This video was produced following a major concern of agricultural research about promoting local parboiled rice and weaknesses noted in the traditional parboiling method used in Benin. The video was produced with rural women who were involved in experiments related to testing the improved method of rice parboiling in Benin. It was initially produced in French and Fon (a local language). Translations were made later into other languages, such as Yoruba, in order to reach a wider audience. In addition to a few conventional training workshops on the improved parboiling method, four local NGOs (Castor, Levier pour le développement local durable [LDLD], Rabemar and Un Monde) were encouraged by AfricaRice to organize video projections in 80 villages in central Benin.

Rice parboiling methods

Traditional method of rice parboiling

Several traditional methods of parboiling paddy rice are used in the various rice-producing regions of Benin; all use the same equipment made essentially of an aluminum marmite.¹ The oldest methods consist of soaking paddy rice in fresh water for about 12 hours. The paddy rice is then drained and precooked in small quantities in marmites. After this precooking, the paddy is spread out to dry in the sun. Usually, rice is dried on the hills or on the floor without any care. At the end of the drying operation, the paddy can be husked or stored.

Improved method of rice parboiling

The improved method of rice parboiling consists of using improved equipment made of an aluminum marmite and a parboiling plate, which is a container like a bucket with holes in its lower quarter. The fundamental principle of this new equipment is precooking rice using steam. Table 1 summarizes the major operations carried out during rice parboiling using the improved technology.

Table 1. Key steps and ideas for improved rice parboiling

Major step	Key steps and ideas
1. Washing	<ul style="list-style-type: none"> Properly wash paddy in a basin containing a large quantity of water (3 L for 1 kg of paddy) Pour the cleaned paddy into a basket to drain the water
2. Soaking in hot water	<ul style="list-style-type: none"> Pour the paddy into a pot with clean water and heat it to 60°C You can use your fingers to test the temperature — when the water gets so warm you can no longer dip your fingers into it, remove the cooking pan from the fire Let the paddy cool over night
3. Washing	<ul style="list-style-type: none"> Remove the paddy from the water Wash it with clean water and drain in a basket
4. Pre-cooking with steam	<ul style="list-style-type: none"> Pour the paddy into the parboiling vat previously placed on top of a pot containing about 10 L water — the water in this pot must not touch the bottom of the vat so the rice will not be cooked Boil the water — the steam generated passes through the holes in the vat and pre-cooks the rice Stop boiling when you observe that most of the husks on top have opened — this is usually in less than half an hour
5. Drying	<ul style="list-style-type: none"> Dry the parboiled paddy in the sun on tarpaulin or on drying areas for less than 2 hours — drying in the hot sun for too long can cause the grain to crack (as happens with clay or earthen pots that dry too fast) Properly spread and continue drying in the shade on a tarpaulin Test the rice between your teeth to check if it is dry enough to mill — when dry enough, it gives a dry cracking sound

Source: Zossou *et al.* (2009b).

Research methodology

This study was conducted for 6 months in 16 villages where the video on the improved rice parboiling process was shown in 2006. Data were collected from 160 women parboilers selected using a simple random sample of 10 women parboilers per village, and from 17 groups of women parboilers. We also interacted with the local artisans, trained in making the parboilers, and NGOs staff.. Data collected were both qualitative and quantitative. Qualitative data were collected using focus group techniques (to find out the importance of rice parboiling at the village level); participant observations (to see how women put into practice knowledge learned

¹ A tall covered pot.

during video sessions); photographs (to illustrate local innovations); and semistructured interviews (to understand the various social dimensions that influence rice parboiling in a context of rural entrepreneurship). Quantitative data were collected using structured interview techniques during which questionnaires were administered to women individually.

Women's motivation for rice parboiling was analyzed and ranked. During surveys, women were scored according to their interest in rice parboiling. This first score was based on a subjective measure of the interest with which women spoke about parboiled rice as an income-generating and home-consumption activity. Women with a high interest in parboiling rice were scored 2, those with a moderate interest scored 1, and those with little or no interest scored 0. A self-ranking was also organized by women to classify themselves according to their degree of motivation for rice parboiling: 0 for no motivation, 1 for moderate motivation, and 2 for high motivation. Then, an average score of the motivation was determined according to the scores of the self-ranking and the ranking based on their interest. Women who scored less than 1 were those who had little motivation, those whose score was between 1 and 2 ($1 \leq \text{score} < 2$) had moderate motivation, and those who scored 2 had high motivation.

To assess rural women's entrepreneurial mindset, we also measured their behavioral change toward parboiling rice. Behavioral change toward parboiling was measured by the proportion parboiled rice to paddy rice produced or purchased per year by each woman. Women whose ratio was 1 were those who parboiled all their rice; those whose ratio was between 0.5 and 1 ($0.5 \leq \text{ratio} < 1$) parboiled over half their rice; and those with a ratio was below 0.5 parboiled less than half.

The development and strengthening of the social capital and triggering of institutional innovations were elicited from groups of women. Specifically, we investigated the role of NGOs as facilitators; and collaboration among women themselves, and with NGOs facilitators, microfinance institutions and other stakeholders of rice marketing. These data were collected by monitoring activities of women and NGOs, and using focus groups and semistructured interviews.

Quantitative data such as women's motivation, their behavioral change with regard to rice parboiling, the objective of rice parboiling, and organizing them into groupings were analyzed using the Wilcoxon, Kruskal–Wallis and chi-square tests.

Three months after the first data collection, the results were validated in an exchange workshop with NGOs at AfricaRice. During this workshop, in addition to presenting the results of the study and discussions around these results, there were working sessions during which NGO staff worked in small groups to answer some key additional questions. This workshop was crucial in the methodology because, in addition to the complementary information, it allowed us to improve the quality of results obtained and therefore the objectivity of the study. Two years after the first data collection, we went back to the field to discuss the level of changes noted in the results of the first data collection with the NGOs.

Results

The majority of women parboilers (74%) were in the age group 25–40 and most of them were young active women. The majority of them were married (86%) and the average size of the household was 6.2 ± 2.1 members. Most women were illiterate (69%) with agriculture as their main activity. Rice parboiling was their second major activity (92%). In total, 74% of the surveyed women had watched the video on parboiled rice in their villages.

The video stimulated women's entrepreneurial mindset

Showing video reinforced women's awareness about the importance of rice parboiling

In the past, the majority of women used to sell rice in the form of paddy because they had not mastered or had ignored the technique of parboiling rice that could give a good-quality product. After seeing the video, women significantly increased the proportion of their rice paddy stock that they parboiled (Table 2).

Table 2. Women's awareness of the importance of parboiled rice before and after seeing the video (n=119)

Proportion of rice stock parboiled	Before seeing the video	After seeing the video
Less than half of the stock	33.6 a	0.0 b
More than half of the stock	64.7 a	30.3 b
Total stock	1.7 a	69.7 b

Values in the same row with different letters are significantly different at 1% according to Wilcoxon's test ($Z = -10.479$; asymptotic significance 2-tailed = 0.000).

Before video presentations, very few women were parboiling all their paddy (1.7%). The non-parboiled rice was often sold in the form of paddy. After watching the video, the majority of surveyed women (69.7%) started

parboiling all their rice. Women no longer sold rice in the form of paddy, but in the form of parboiled and husked rice. It is now very difficult to buy paddy rice from women because most of them prefer parboiling it to add value to it.

Watching the video improved women's motivation to parboil rice

Women's motivation to parboil rice also improved significantly after the video projections (Table 3).

Table 3. Women's motivation to parboil rice before and after watching the video (n=119)

Women's motivation	Before seeing the video	After seeing the video
Low	32.8 a	0.0 b
Average	66.4 a	27.7 b
Total	0.8 a	72.3 b

Values in the same row with different letters are significantly different at 1% according to Wilcoxon's test ($Z = -10.490$; asymptotic significance 2-tailed = 0.000).

After the video screenings, most women (72.3%) were totally motivate to parboil their rice. NGOs confirmed this strong motivation of women to parboil rice and agreed that there were many positive changes in their dedication to this activity, which is now considered a revenue-generating activity.

Women developed rice parboiling activity to make money

The video resulted in wide-scale dissemination of rice parboiling technology and also encouraged women into this revenue-generating activity. Those who already knew about it improved their method by adopting the improved rice parboiler or innovating with local resources to apply both the ideas of pre-cooking paddy with steam and conserving steam during rice parboiling (Zossou *et al.*, 2009b). Those who did not know about parboiling discovered it and adopted it to generate revenue. Many women understood that they can make a living with this activity that does not involve their village alone, but all Benin and west Africa. Mrs T. Prisca from the village of Awaya (commune of Dassa) was a seamstress, but left this profession to take up rice parboiling after watching the video. She became a member of the executive council of one of the women parboilers' associations formed after video screenings in her village. She thinks that she can now easily cover school fees for her children with revenues from rice parboiling. Table 4 categorizes women according to the goal of their parboiling (self-consumption or for sale) and whether or not they saw the video.

Table 4. Percentage of women parboiling rice to make money or for self-consumption depending on whether they had seen the video

Objective	Saw the video (n=41)	Had not seen the video (n=119)
Self-consumption	31.7 a	11.8 b
For sale	68.3 a	88.2 b

Values in the same row with different letters are significantly different at 1% according to chi-square of Pearson's test ($\chi^2 = 6.550$, $df = 1$, P -value = 0.010).

The percentage of women who had watched the video and parboiled rice for sale was significantly higher than those who parboiled rice for sale without having watched the video. During interviews, women said that, in the video, they had been much impressed by the quality of parboiled rice after husking. This convinced them that marketing paddy rice is not as profitable as marketing parboiled rice, because parboiling adds value to rice when done correctly. They were therefore convinced that by trying to follow what is advised in the video, they could have good-quality rice and make parboiling a revenue-generating activity. For example, A. Antoinette in the village of Segbeya (Savalou) had been unable to master the technique of rice parboiling and was selling her paddy rice. Shortly after watching the video, she started parboiling rice for her own consumption. Seeing that using practices advised in the videos improved the quality of her rice, she began parboiling rice for the market. Later, she convinced one of her neighbors to appreciate parboiled rice, who had not liked it at all previously. This neighbor, totally convinced about the importance of parboiling rice, adopted the activity to make money.

In the local markets, the quantities of parboiled rice increased and the quality improved. Many producers abandoned certain crops such as cotton for rice production. For example, the village of Alladji (commune of Savalou) — well known as a big cotton-producer — abandoned cotton in 2008 for rice cultivation, planting 20 ha of rainfed rice. Increase in rice production in the villages made paddy more available for women processors who are active almost all of the year. However, there is still a scarcity of paddy because of the increase in demand and because many women are interested in parboiling. Therefore, demand are not being met. Rice

quality improvement also impacted the price of parboiled rice, which has not decreased on the markets despite the increase in supply.

The video reinforced the social capital and triggered institutional innovations

Organizing women into associations

Following the video screenings, women in the villages started to organize themselves into associations to parboil rice. During interviews, women said that they were impressed by the way women parboiling rice in the video were organized. They understood that with better organization, they also could better develop this activity. There was a significant relationship between watching the video and the organization of women into associations to undertake rice parboiling (Table 5).

Table 5. Percentage of women parboiling rice in association depending on whether the video had been screened or not

Rice parboiling	Video not shown (n=41)	Video shown (n=119)
Individually	48.8 a	19.3 b
In association	51.2 a	80.7b

Values in the same row with different letters are significantly different at the 1% level according to Pearson (chi-square = 11.544, df = 1, P-value = 0.001).

Women who had watched the video were those who had a tendency to organize themselves into associations. For example, in the villages of Doumè, Owodoun, Zongo and Lèma (commune of Savalou), associations of women rice parboilers did not exist before video presentations. Right after the presentations, associations were formed by women themselves to parboil rice for sale. At the same time, communication was reinforced among women concerning marketing of parboiled rice.

Reinforcing relationships between women and facilitators

Watching the video encouraged women to request more NGO facilitators. These requests included mainly support-advice in post-harvest operations (additional training in rice parboiling and in constructing improved stoves, requests for financial support to acquire drying fields, parboiling equipment, organization of parboiled rice marketing, etc.) and pre-harvest operations (acquisition of agricultural inputs and new rice varieties). Women's interest in parboiling and their dedication to better organize themselves has led NGOs to help them and facilitate their access to the improved parboiler. Our survey showed that women's associations in the villages were formed with technical support from facilitators to make an association at the communal level. This improvement in relationships between women and facilitators from NGOs created confidence in carrying out this activity. This made women more willing to work with NGOs in an atmosphere of confidence. NGOs also often requested women's association services to parboil rice that they were promoting in their structures. The video therefore reinforced confidence in the collaboration between parboilers and NGOs.

Reinforcing collaboration between women and formal and informal microcredit providers

With the reinforcement of collaboration between women parboilers and NGOs, facilitators from NGOs helped women compile applications for credit and submit them to microfinance institutions. However, the majority of these requests were rejected because of poor past experiences between the microfinance institutions and certain producers in the region. NGOs then undertook an awareness campaign with producers who were not paying back their debts in order to facilitate women's access to credit. Through their advice, facilitators helped some women parboilers obtain informal credit: purchase of paddy rice on credit from producers, loan negotiation with relatives or close friends, tontines (popular saving and credit system), and others. NGOs also helped women compile applications for credit and submit them to institutions in charge of granting credits from Benin government to the poorest people. These applications were successful and the credit obtained has helped women collect rice during periods of abundance and parboil it during period of scarcity, selling it for a higher price, thus improving their revenues.

Reinforcing relations between the different actors of parboiled rice commercialization and marketing

Facilitators from NGOs developed contacts between women parboilers and traders/promoters of local rice. NGOs therefore served as intermediaries between local rice marketing actors and women parboilers to whom information is conveyed as soon as there is demand. NGOs often requested services of some women's associations to parboil rice. Women were often paid at the end of the activity on the basis of the number of working hours or days. For example, women parboilers' associations in the villages of Zongo and Lèman (commune of Savalou) often delivered this kind of service to LDLD (NGO) and for a local development actor (M.A. Cesaire), who is promoting hulling machines and local rice. A product is well appreciated and marketable

when it is well packaged and attractive, so NGOs were exploring with women how to improve the packaging. Advice and technical support from NGOs helped women to improve parboiled rice presentation to give it added value and to make it more attractive through its packaging. Thus, women started to better package parboiled rice that was usually sold on the markets using *tongodo* (local measurement). Packages of 1 kg and 5 kg were often made by women's associations to give the product added value. Moreover, the four NGOs surveyed had started to support women's associations technically for exhibitions of their products at annual fairs. Palatability sessions are organized during fairs to promote local parboiled rice and attract more customers. Two years after the first data collections, the NGOs continued to support women in rice commercialization in stores and big urban markets (Cotonou). They also continued to connect them to storekeepers, huskers, large traders of parboiled rice, etc..

Improving the role of NGO facilitators and their intervention method

The populations' interest in learning videos led staff from NGOs to understand the importance of image in agricultural extension. NGOs did not previously use video in their work. The passion people had for video during screenings raised the awareness of NGO facilitators on the importance of image in agricultural extension. Therefore, images such as pictures, figurines and diagrams are increasingly used to catch people's attention. Being aware of the importance of image in interventions in rural areas, managers of NGOs budgeted for purchasing projectors, laptops, generators and cameras. LDLD, for example, used pictures taken during its interventions in some villages as illustrations in other villages. NGO RABEMAR screened videos on parboiling in two other villages in a prelude to an intervention on HIV/AIDS. These screenings were highly appreciated by women in the villages concerned, who also started to be interested in rice parboiling. Increasingly, pictures of women taken during training sessions on improved parboiling have been used to convince other women to invest in this activity.

Discussion

Video screenings in villages assisted large-scale dissemination of improved technology of rice parboiling and led women processors to understand the importance of this activity and to be interested in it. Video seems to have a high potential for large-scale dissemination of information during development activities (Lie and Mandler, 2009). Local technological innovations triggered by the video on rice parboiling (Zossou *et al.*, 2009b) have led to improved rice quality and the development of parboiling as a revenue-generating activity. Relations between women parboilers and NGOs have been reinforced, thereby creating an atmosphere of confidence. This situation led NGOs to create and strengthen relations between women and formal and informal microcredit providers on the one hand and traders and local rice promoters on the other hand. NGOs have also improved their agricultural extension and intervention approach in rural areas.

Strengthening social links among women, facilitators from NGOs, private sector, and formal and informal microcredit providers is crucial for sustainable development of the rice sector. Hall and Pretty (2008) point out that the reconstruction of social capital is a very important element of the institutional reform necessary to ensure that collective action will be reinforced between farmers and government in the transition toward sustainability. Video also reduces many communication biases in rural areas and promotes equitable access to information. In most rural areas in Africa, communication between rural women and men who are not from their family is often limited by social norms (World Bank, 2008). With the majority of extension agents being men, this is a gender bias in communication (Katungi *et al.*, 2008; Lahai *et al.*, 2000; Squire, 2003). Video screenings in villages give men and women the same chance to access information, thus reducing problems of gender bias. Videos also reduce the problems of dependence on leaders in the associations, because they allow all members of the same group to have access to the same information (Zossou *et al.*, 2009a). Changes prompted by the video on the social capital are also due to the role of facilitation assumed by NGOs to improve women's access to improved materials and credit, and to the improvement of commercialization. As stated by Röling and Wagemakers (1998), besides technologies, learning, facilitation, institutions and policy contribute to agricultural sustainability.

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