Technological and Institutional Innovations Triggered by a Farmer-to-Farmer Rice Parboiling Video in Central Benin

Espérance Zossou[1]

Keywords: entrepreneurship, learning, rice video, social capital, training

Abstract

In Africa, rice production and processing tasks are allocated on a gender basis, with women being responsible for much of the drudgery involved in processing. Parboiling rice is an important processing activity in the north and centre of Benin. Good parboiling reduces the breakage rate during milling and greatly enhances the nutritional quality of rice. Parboiling is mainly done by women in and around rice production areas, and is an important income-generating activity. The traditional rice parboiling method is still dominant but does not yield quality rice. To address this, an improved rice parboiling technology was introduced in central Benin through two training methods: conventional training workshops and farmer-to-farmer video (initiated by the Africa Rice Center). To compare these two methods of changing women's rice processing practices, we interviewed 160 women and 17 women's groups who had been exposed to one or both of the learning approaches in 16 villages. In addition, we interviewed 40 women processors in four control villages that had received no intervention at all. The video was well appreciated by both the non-governmental organisations (NGOs) and the target population as a good learning tool in rural areas, and had reached three times more women than the conventional training workshops. While conventional training was biased by participant selection, stakes in per diem payment and monopoly by the elite class, video helped to overcome local power structures and reduced conflict at the community level. Women who watched the video enhanced their creativity and adapted the learning to their environment by developing appropriate technologies. They improved their rice parboiling, leading to better-quality rice. As well as triggering local NGOs to improve their training methodology, farmer-to-farmer video also strengthened NGOs' relations with rural communities, and relationships between the women rice processors and input and output markets.

INTRODUCTION

The Training and Visit (T&V) system was the principal agricultural extension approach in Benin from 1985 to 1999. This approach was based on producing large amounts of purely technical advice, using standardised, detailed and rigorously monitored schedules of contact farmer visits and staff training sessions. T&V drew heavily on the adoption and diffusion of innovation (Leeuwis, 2004). However, farmers were dissatisfied with these extension activities because their real needs were not taken into account (Moumouni, 2005), and there were calls for changes in the traditional public extension systems, which were seen as outdated, top-down,

[1] Africa Rice Center (AfricaRice) / ULg, Gembloux Agro-Bio Tech, 01 BP 2031, Cotonou, Benin.

paternalistic, inflexible, bureaucratic and inefficient, and therefore less able to cope with the dynamic demands of modern agriculture (Rivera and Zijp, 2002).

The success of any sustainable development programme is determined largely by the level of farmers' participation (Axinn, 1997). As extension systems are increasingly decentralised and fragmented, non-governmental organisations (NGOs) and the private sector are redefining their roles to fill certain niches. To strengthen rural learning and support the multitude of existing and emerging service providers, the Africa Rice Center (AfricaRice) has developed a series of farmer-to-farmer videos according to the zooming-in, zooming-out (ZIZO)[2] approach, which leads to locally appropriate and regionally relevant videos (Van Mele, 2006). The video 'Cashing In with Parboiled Rice' was developed according to the ZIZO approach in collaboration with women rice processors in Benin, who were primarily involved in participatory technology development on parboiling.

From 2005 onwards, four local NGOs used a conventional methodology that consisted of 2-day community workshops, during which experts demonstrated the process for improved parboiling to women. In addition to workshops, with technical and financial support from AfricaRice, NGOs organised public screenings of the parboiling video, followed by facilitated group discussions, in 80 villages in late 2006 in central Benin.

In this paper, we compare the effectiveness of conventional training and video as rural learning approaches, and discuss the challenges of such videos in creating technological and institutional changes among service providers and rural entrepreneurs.

MATERIALS AND METHODS

Field surveys were conducted from November 2007 to May 2008 in five municipalities in the Collines Department of Benin, where local NGOs (Castor, LDLD, Rabemar and Un Monde) operate to strengthen the rice sector. The surveys covered 16 villages where the video had been shown in late 2006 and where conventional training was carried out once between 2005 and 2007, plus four control villages where no intervention had taken place. In total, 200 women rice-parboilers (10 per village) and 17 women's groups were interviewed. The villages and the women were selected randomly. Local artisans trained in making the parboilers and NGOs staff were also interviewed.

Both qualitative and quantitative methodologies were used. Qualitative data were collected through focus-group discussions (to obtain an idea about the role of parboiling at the village level); participant observation (to analyse how the women applied the learning gathered from the video in practice); photography (to illustrate and discuss the technological innovations); and semi-structured interviews (e.g. to understand various social dimensions influencing parboiling as a rural enterprise). Quantitative data were collected through structured questionnaires with 200 women. Women's motivation for rice parboiling was assessed by both a subjective measure of the interest with which women spoke about parboiled rice and a self-ranking organised by women to classify themselves according to their degree of motivation to

[2] ZIZO is a method of video-making that evolves around five guiding principles: (i) identify generic topic of regional relevance; (ii) learn about context diversity through participatory research; (iii) develop videos with local actors; (iv) test videos in various contexts and fine-tune them; (v) scale-up and scale-out.

parboil rice. Behavioural changes towards parboiling were assessed by the ratio of parboiled rice to paddy produced or purchased per cropping season by each woman, in order to gain an idea of the women's entrepreneurial mindset.

To understand how social cohesion was built and strengthened, some indicators – such as the level of the women's participation in group work, as well as the level of collaboration between women, NGOs, formal and informal credit institutions and traders in parboiled rice – were assessed through regular observations of women's activities, focus groups and interviews.

Quantitative data were analysed using analysis of variance (ANOVA), logistic binomial regression models, Wilcoxon and chi-square tests. Three months after these initial investigations, the results were validated during a workshop at AfricaRice with NGO field staff and scientific colleagues. This provided additional feedback and stimulated learning between partners.

RESULTS

Effectiveness of Conventional Training and Video

Conventional training involved NGO field staff, who directly trained a few selected women (26% of women surveyed) in a central village and hoped they would share their learning with others when they returned to their villages. Participation was affected by the provision of a per diem, and the fact that leaders of existing farmers' groups typically chose friends or relatives to take part in the training, ignoring the actual target women. Most of the women who participated in the training workshops were mainly interested in receiving a per diem (81%). As the selection of women to take part in training was not based on motivation to promote rice parboiling in their localities, nearly two-thirds of the women surveyed did not even know that conventional training workshops had taken place.

Video-mediated learning helped to overcome participant selection bias through local power structures, and reduced conflict at the community level. However, other factors may have influenced whether women could take part in the video shows. Therefore we introduced some socio-economic factors (ethnic group, age, number of dependents in the household, educational level of women, importance of rice parboiling activity, experience, religion, membership of a farmers' organisation, awareness of the importance of rice parboiling, and their motivation for the activity) in a logistic binomial regression model (Table 1) to better appreciate which factors could affect participation in public video screenings at the village level. Analysis showed that none of these factors influenced the viewing ($P>0.1$).

Table 1 Socio-economic factors considered likely to influence the viewing of the video in villages*

Variable	Estimated parameters	Standard error	Probability
Ethnic group	–0.049	0.054	0.362
Age	–0.003	0.024	0.903
Number of dependents in household	–0.009	0.099	0.926
Woman's educational level	0.139	0.104	0.181
Importance of rice parboiling activity	–0.172	0.251	0.493
Experience	0.042	0.039	0.279
Religion	–0.084	0.218	0.702
Membership of farmers' organisation	0.303	0.404	0.453
Awareness of the importance of rice parboiling activity	0.303	1.108	0.235
Motivation of women	0.315	1.098	0.774

*As determined by the logistic binomial regression model.

Box 1 Technological innovations made by women for parboiling rice (*n* = 160)*

Innovations based on the principle of parboiling paddy with steam

1	*2*	*3*	*4*
Women adapted a perforated base to their pan to pre-cook the paddy with steam (17.5%)	Women who cook local couscous with steam started to use the same equipment to parboil their rice (2.5%)	Women put wooden sticks in the pot and covered these with a bag before putting in paddy for parboiling (10.0%)	Women put yam fibres between wooden sticks and bag before putting in the paddy (1.2%)
5	*6*	*7*	*8*
Women put a bowl upside down in a pot with a little water and placed a bag on top of the bowl before adding paddy (10.0%)	Women put paddy in a locally sold sieve, placed on top of the pot with water (2.5%)	Women used a basket adapted to the pot so that the basket did not touch the water in the bottom of the pot (13.7%)	Women placed wire in the bottom of the pot containing a little water; a bag was put on the wire before rice was added (1.2%)

Innovations to seal the junction between pot and parboiling equipment for steam conservation

1	*2*	*3*	*4*	*5*
A mixture of cassava flour and water applied at the junction (11.9%)	A mixture of cooked maize flour with water or *akassa* (local meal) (26.2%)	A mixture of ash from firewood with water (3.1%)	A mixture of clay and water (6.2%)	Use of clothes to close the junction (58.1%)

*Some women combined innovations.

Women in villages had an equal chance to watch the video, confirming the democratic character of community-based, video-mediated learning. Video reached 74% of surveyed women and was well appreciated by both the NGOs and the target populations as a good way to disseminate the technology widely and to entertain rural communities.

Technological Innovations Triggered by the Video

In villages where the video had not been shown, the improved parboiler was not used. In those where the local NGOs had intervened and facilitated access to the improved parboiler, 58% of the women started to use the improved equipment, individually (24%) and in groups (56%; that is, 22% used the equipment both individually *and* in groups). Some 72% of those who had watched the video but did not have access to the equipment innovated creatively using local resources, compared with 19% of those who learned through training. Video screening also encouraged women pay attention to reducing the loss of steam and using local resources innovatively to conserve energy during parboiling (Box 1). Future research will need to address the practicality

of seeing the technology on video without practising it if intermediaries are not able to facilitate access to the technology.

Apart from enhancing women's creativity, the parboiling video influenced women's behaviour to deliver good-quality rice by improving rice handling practices (before and after the rice is parboiled).

Entrepreneurial Mindset Triggered by the Video

The parboiling video influenced women's awareness of the importance of improved rice parboiling to deliver good-quality rice. Consequently, women became more motivated and became increasingly involved in rice production and parboiling (Table 2).

Some women left their primary activity to take up rice production and parboiling, which they considered more profitable, as the story of Mrs T. Prisca from Awaya village in Dassa shows. Although a dressmaker at first, after the video shows she left this activity and began parboiling rice. She became president of a women's rice-parboiling group in her village. She said that rice-parboiling income allowed her to pay for her children's education.

Table 2 Motivation and behavioural changes (%) towards rice parboiling after watching the video*

Changes		**Before watching video**	**After watching video**
Women's motivation to parboil rice†	Low	32.8 a	0.0 b
	Moderate	66.4 a	27.7 b
	High	0.8 a	72.3 b
Rice parboiling level‡	Less than half of the rice parboiled	33.6 a	0.0 b
	Over half of the rice parboiled	64.7 a	30.3 b
	All the rice parboiled	1.7 a	69.7 b

*n = 119: number of women who watched the video in villages where it was shown.

†Values in rows with a different letter are significantly different at the 1% level by Wilcoxon test. Z = –10.490; two-tailed asymptotic significance = 0.000.

‡Values in rows with a different letter are significantly different at the 1% level by Wilcoxon test. Z = –10.479; two-tailed asymptotic significance = 0.000.

More women who watched the video parboiled rice for sale (88.2%) than did so for household consumption only (11.8%). Subsequently, larger quantities of parboiled rice could be found in local markets, of better quality and fetching a 35% higher price than traditionally parboiled rice.

Behavioural and Institutional Changes Triggered by the Video

The video motivated women to start parboiling in groups (Table 3) and to formulate group-based requests for credit and training, for example on the development of improved stoves. Most of the women surveyed (88%) improved their collaboration with NGO staff by meeting them at least once a month to discuss rice processing. NGOs, impressed by women's entrepreneurial spirit and the improved quality of rice, helped women to link up with input and output markets.

Table 3 Percentage of women who parboiled rice individually or in a group in villages where the video was shown

Parboiling activity	Women who didn't watch the video (*n* = 41)	Women who watched the video (*n* = 119)
Individual	48.8 a	19.3 b
Group	51.2 a	80.7 b

Pearson's chi-square = 11.544, df = 1, P = 0.001.

As the women gained experience and built confidence, they began to sell their services in parboiling to NGOs and traders, who started to promote their parboiled rice in urban areas. Responding to women's requests after the video show, NGO facilitators helped to strengthen their marketing capacities (processing, packaging, labelling and commercialisation).

The local NGOs started to facilitate women's access to micro-finance institutions and to informal credit providers, who proved more responsive due to the trust being created. Rice producers who attended video shows became more willing to sell rice on credit to women.

Strengthening their role as facilitators, NGO staff also supported women to organise themselves better. The experience with the video made them realise the power of pictures, so they modified their conventional training to include videos, pictures and diagrams.

DISCUSSION AND CONCLUSION

Video-mediated learning has allowed wide dissemination of the technology, as the images really caught the target groups' attention. Significantly more women who watched the video used the technology, confirming a study by Gandhi *et al.* (2008) in which video increased the adoption of certain practices sevenfold over a classical training approach.

Farmer's innovations are often shaped by capital limitations, and mainly rely on locally available resources, among which knowledge is key. Sustainable agriculture must take into account farmers' creative ability to adapt basic principles of new technologies to local realities. Farmer-to-farmer videos are ideally suited to illustrate these principles, to expose rural people to new ideas and practices, and to encourage them to create their own innovations.

In many rural settings, development interventions are male-biased because women farmers are restricted by social norms in communicating with men outside their families (Katungi *et al*., 2008). Public video screenings helped to overcome this bias, because they give an equal chance to all community members, men and women, to learn. Another advantage of video is to dilute the negativity that can be associated with information ownership, because all the community can receive the information at the same time in the villages.

Moreover, video-mediated learning has strengthened the social capital among women's groups and improved the trust between actors in the rice value chain – a key weakness of markets in Africa (Fafchamps, 2004). Many organisational and institutional changes have taken place among women and intermediaries, and have led

to improved collaboration between them and the input and output markets. Well made, high-quality videos showing functional technologies and their underlying principles can help a good part of the audience to adopt and adapt these technologies, much more easily and probably more cheaply than face-to-face extension. 'Innovative farmer information systems are a blended learning process in which face-to-face interaction, learning by doing, learning through evaluation and experience, participatory research, etc. convert the generic information into location specific knowledge and then empower its members through horizontal transfer of knowledge' (Gakuru *et al.*, 2009). Farmer-to-farmer video learning is an excellent way to strengthen rural extension in developing countries.

The results of this research have already led to three publications: Zossou *et al.* (2009a, 2009b, 2010).

ACKNOWLEDGEMENTS

I thank all the staff from the NGOs (VECO, LDLD, Rabemar, Un Monde and Castor) for their support during the field research; and Paul Van Mele, Simplice D. Vodouhe, Jonas Wanvoeke, Savitri Mohapatra and Philippe Lebailly for their contributions and comments on an earlier version of this paper. The Government of Japan kindly supported AfricaRice's post-harvest research and integrated rural learning approach.

The role of communication tools and strategies used by various knowledge intermediaries, and the impact on rural livelihoods and markets, is part of my ongoing PhD programme.

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