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FOOD SCIENCE & TECHNOLOGY | RESEARCH ARTICLE

The distribution of farmer learning videos: Lessons from non-conventional dissemination networks in Benin

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Abstract: Commercial channels can be non-conventional networks for disseminating agricultural information, especially if farmers are willing to pay for a DVD with learning videos. Using purposive sampling, we selected retailer and involved them in selling videos compiled in a DVD. Inside the jacket of DVD, we pasted a sticker listing a phone number that buyers or video viewers could call for further questions. We interviewed 341 of the buyers who called that number. After the phone interviews, snowball sampling was used to select 180 farmers for face-to-face interviews in order to validate the information collected during the telephone interviews and to understand the behavioural changes triggered by watching the videos. Within four months of first distributing DVDs to retailers, 80% of the 700 DVDs were sold. Distributing videos through commercial channels gives a fair chance to everyone to learn, since the DVDs were sold on the open market at an affordable price. About 84% of the DVDs were sold at 1 USD, suggesting that all of the respondents were willing to pay for learning DVDs; 86% of respondents said they now spent less money on pesticides after watching the videos. Private sector actors can become “new extensionists” and distribute agricultural information to rural populations.

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PUBLIC INTEREST STATEMENT

This paper describes farmers' willingness to pay for a learning DVD for self-directed learning in a context where the public sector extension services can no longer adequately provide extension services due to budgetary constraints and the limited number of extension workers. The study showed that the private sector, for the first time, successfully sold learning DVDs in Benin, a country where farmers used to receive agricultural information free of charge. Findings revealed that besides farmers, many other people need agricultural information. Unfortunately, they are often excluded from the conventional extension services. Videos dissemination through NGOs and farmers associations often ignores them. Therefore, non-conventional agricultural information dissemination through commercial networks gives a fair chance to anyone who is interested in agriculture to learn from training videos.

Subjects: Environment & Agriculture; Communication Studies; Development Studies

Keywords: learning videos; DVD sellers; agro-input dealers; self-directed learning; willingness to pay for information; extension cost-sharing

1. Introduction

Information and knowledge are indispensable for empowering small-scale farmers. But their access to adequate knowledge, improved technology and other relevant information remains a critical issue since there are not enough extension agents to reach all farmers who would like to receive extension services (Bentley, Van Mele, Harun-ar-Rashid, & Krupnik, 2015). In Benin, the number of extension agents is insignificant compared to the hundreds of thousands of farmers that they should advise (Ministère de l'Agriculture, de l'Élevage et de la Pêche, [MAEP], 2008). There is therefore a limited coverage of extension services across the country and challenges in adapting technological packages to the specific and diverse needs of the communities are critical issues. When relevant agricultural information is available, most of it is published in foreign languages such as French or English (UNESCO Institute for Lifelong Learning, 2010) and not in the local languages. The illiteracy rate of people in Benin between 15 and 24 years is 58% while the youth literacy rate is greater than the adult literacy rate (UNESCO Institute for Statistics, 2013). Language differences and illiteracy can impede the communication of improved technology unless they are taken into account (Peterson, 1996). To overcome the above obstacles, farmer-to-farmer training video has been promoted as a new method for agricultural extension (Van Mele, Wanvoeke, & Zossou, 2010). This extension method, which combines visual and verbal communication channels, appears to be an appropriate extension tool for developing countries as this medium is suited for the transmission of skills, information and knowledge (Vidya & Chinnaiyan, 2010). Video allows for the standardisation of information for accurate transmission, in situations where high quality trainers may not be available, and is suitable for low literacy populations when available in local languages. A video extension initiative by the Africa Rice Centre (AfricaRice) in Benin has confirmed the enormous potential of this media (Van Mele et al., 2010). Several studies highlight the potential of training videos to build farmers' capacity for innovation (Chowdhury, Hambly Odame, & Hauser, 2010; Van Mele, Zakaria, Ara-Begum, Ar-Rashid, & Magor, 2007). Thus, agricultural extension is more effective with the use of training videos which clarify complex agro-ecological principles (Chowdhury, Odame, Thompson, & Hauser, 2015).

Training videos have now become a proper agricultural extension tool in which many development agencies invest in order to communicate farming information to smallholders (Van Mele, Bentley, Harun-ar-Rashid, Okry, & van Mourik, 2016; Zossou, Van Mele, Vodouhe, & Wanvoeke, 2009). However, sustainable and wide distribution of videos is still a challenge since farmers' access to them is generally supported by donors through NGOs, extension services, farmers' organizations and local radios (Bentley, Van Mele, Zoundji, & Guindo, 2014; Okry, Van Mele, & Houinsou, 2014). Bentley, Van Mele, Touré, and van Mourik (2013) reported that the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has supported the distribution and use of some 10,000 copies of the Fighting Striga videos in Mali through many local organizations. In Benin, AfricaRice has supported farmers' access to the parboiling rice video via several local NGOs (Zossou et al., 2009). The distribution and screening of videos on maize, wheat and rice seeding machinery was supported by USAID in Bangladesh, where many individuals and organisations were willing to show them to farmers without any support from a donor (Bentley et al., 2015; Okry et al., 2014). In Ghana, the farmers' video viewing club was supported by the World Cocoa Foundation to train farmers on cocoa integrated crop and pest management (David & Asamoah, 2011).

Agricultural extension services that use farmer learning videos are still dependent on donor funds, as are conventional extension methods (Rutatora & Mattee, 2001) where farmers receive agricultural information free of charge. Therefore rural populations rely mainly on outside agencies for access to videos (Van Mele, 2011). In addition, some organisations that had agreed to distribute Digital Video Discs (DVDs) to farmers, instead, they handed out the DVDs as freebies at conferences and meetings in which farmers are less represented (Van Mele et al., 2016). In other cases, one farmer

receives several copies of a DVD while his neighbours get none (Bentley et al., 2014). However, Van Mele (2011) found that farmers would watch videos on their own or with their family or neighbours if sustainable video distribution mechanisms were in place. These mechanisms should take into account some limitations of the current video dissemination. Because video shows are greatly appreciated, farmers want their own copies of learning videos. But, the physical distribution of DVDs demands careful planning and a monetary expense, in which most organizations are reluctant to invest. Even if organisations such as Access Agriculture made videos available for free to farmers via a website, e.g. www.accessagriculture.org, the absence of the internet and related technologies in most developing countries can make it difficult to download videos. In Benin, farmers' access to internet and agricultural education TV programmes was not commonly used as communication tool for dissemination of training videos. Despite the limited number of extension workers in the country, there is not yet any policy to take advantage of ICTs in the agricultural sector in Benin.

For the sustainable use of video as an agricultural extension tool, it could be wise to broaden video distribution beyond projects and NGOs, taking into account developing world contexts in which ICT infrastructure is limited, and look for mechanisms whereby farmers would be willing to share the cost of extension, by buying learning DVDs and screening videos on their own. Building on existing non-conventional agricultural information dissemination networks, such as entertainment DVD sellers, agro-input dealers, vegetable sellers, and motorcycle-taxi drivers to disseminate agricultural information using videos, could lead to a self-sustained way of making new information available to farmers. As a growing number of rural households make daily use of African movies and music videos for entertainment (Ifukor, 2013), it is necessary to look at the information sharing mechanisms that DVD sellers' networks generate, and to analyse how they can strengthen agricultural innovation systems and rural learning. Also, as agro-input dealers are major agents supplying the inputs that improve agricultural productivity (Poullisse, 2007), they might be interested in selling DVDs on agriculture.

In this paper, we analyse the contribution of non-conventional networks (DVD sellers, agro-input dealers etc.) in agricultural information dissemination and assess the farmers' willingness to pay for agricultural information and use. We conclude by discussing the role the private sector could play in the sustainable dissemination of agricultural technologies based on training videos, how farmers could be involved in rural extension cost sharing and by identifying some policy issues.

2. Theoretical framework

The theoretical framework of this study is based on understanding self-directed learning (SDL) abilities, an important adult learning component (Brookfield, 1986) which continues to be a goal in today's educational system (Candy, 1991). Alexander and Murphy (1998) found that learning is as much a socially shared undertaking as it is an individually constructed enterprise. Jarvis, Holford, and Griffin (2003) noted that learning is an individual initiative, but culture and social context form the background for it. Learning is generally taken to entail some kind of internalisation of that which is "learned", which can only be directly experienced by individuals. Griffin and Brownhill (2001) noted that SDL is an essential component of lifelong learning and a lifelong learner must become a self-directed learner who knows not only how to learn, but how to put it into practice as well. The SDL encompasses four dimensions: (1) personal autonomy, (2) the willingness and capacity to conduct one's own education (self-management), (3) a mode of organising instruction in formal settings (learner-control), and (4) individual, non-institutional pursuit of learning opportunities in the natural societal setting (Candy, 1991). As adult education is voluntary rather than compulsory, Houle (1961) identified three broad categories of learner orientations: (1) goal-oriented in which learners' motivation was instrumental, (2) activity-oriented in which learners were motivated by the social activities and interaction which learning may offer and (3) learning-oriented (simply for the sake of learning). This categorization acknowledges that many adult learners were self-motivated, which led to their personal growth and development. Knowles (1975) made a great contribution to the development of adult learning theory and was much more concerned with what self-directed learning implied for teachers and learners. He justified the main reasons for adopting self-directed learning as:

- Self-directed learners are better learners: people who take the initiative in learning, learn more and better than those who sit passively waiting to be taught.
- Adults do not need teachers, since they are perfectly capable of taking charge of their own learning.
- The de-institutionalization of education, in the form of open and independent learning systems, creates a need for learners to develop appropriate skills.

The emerging theory of SDL articulates the concepts of self-determination, self-regulation and self-efficacy within a common framework and is mainly concerned with adult education in which teachers use processes for promoting practice change through learning and personal development (Carré, Moisan, & Poisson, 2010). The idea of a progression from dependency to self-direction or personal development is not unique to student instruction (Grow, 1991). However, SDL theory barely dealt with agricultural development and farmers' learning. But, as extension workers are essentially adult educators who help learners take responsibility for their own learning (Grow, 1991). The concept of self-directed learning in this study refers to the farmers' involvement in sharing the costs of extension by buying learning DVDs and watching them. Although the SDL theory has faced considerable criticism and has been the target of much debate over the years, it has become one of the most frequently used approaches for predicting adult readiness for self-direction in learning (Grow, 1991; Knowles, 1975).

Indeed, the choice of this theoretical framework for the study is justified by two main reasons. First is the limited coverage of extension services across the country due to insufficient funds and the lack of appropriate strategies to involve farmers in sharing the costs of extension (MAEP, 2008). Second, in the future, more learning will be based on self-directed learning skills and activities because of the development of ICTs (Tuttle, Lee, Kohls, Hynes, & Lindner, 2004), which creates distance learning opportunities in formal and non-formal education (UNESCO Institute for Information Technologies in Education, 2002). To foster deeper and more meaningful formal and informal learning, there is a need to understand and develop farmers' self-directedness (Grow, 1991). In addition, the theoretical framework of the study is supported by the shift which has occurred in extension services over the years. This shift calls for changes in the traditional public extension systems, which are predominated by the transfer of technology approach, described by Rogers (1983), to a field that sees itself as promoting practice change through learning or personal development (Rivera & Zijp, 2002).

3. Material and methods

The DVD used in this study was a compilation of nine farmer-to-farmer videos on vegetable growing, available on the website of the international NGO Access Agriculture and downloaded from www.accessagriculture.org, with permission and support from Access Agriculture which facilitates local language translations and distribution of training videos. The selected videos were compiled in a DVD titled "Improving vegetable production" (Table 1) with a language menu that allowed the viewer to watch the videos in French, English and three West African languages: Fon (spoken in Benin), Yoruba (spoken in Benin, Nigeria and Togo) and Bambara (spoken in Mali). The videos show all the different steps from sowing to harvesting and processing. The content of these videos is based on farmers' needs and scientific principles as explained by farmers who have already tried the practices. Vegetable-growing videos were chosen for this study because over the last decades, most agricultural research-and-development in Benin has focused on staple crops and cash crops such as maize, rice, cassava and cotton. However, vegetables are increasingly produced in every region of Benin, but limited by technical knowledge (Moustier, Mbaye, de Bon, Guerin, & Pages, 1998; Programme d'Appui au développement Agricole Périurbain Sud Bénin [PADAP], 2003). World Bank (2007) found that vegetable production yields ten times more revenue from land than cereals if farmers access relevant information on the production technologies. The cost of compiling and copying the DVD was about 1,125 FCFA (about 2 USD). The videos can be watched in any order, and each one can stand alone. Seven hundred copies of "Improving vegetable production" DVDs were disseminated through the entertainment DVD sellers, agro-input dealers, and a vegetable seller and a motorcycle-taxi driver to test these groups as non-conventional agricultural information dissemination outlets.

Table 1. Content and duration of farmer-to-farmer training videos on the “Improving vegetable production”

No.	Video title	Duration	Short content description
1	Managing nematodes in vegetables	15:42	Nematodes are dreadful worms that live in the soil and in the roots of many different crops and weeds. Nematodes are easier to prevent than to control. The secret is to: grow healthy seedlings; destroy all sources of nematodes in and near your vegetable field; rotate with crops that are resistant to nematodes; and avoid introducing nematodes from other fields
2	Making a chilli seedbed	14:30	Use quality seeds in a seedbed of one meter wide. Make furrows about every 15 cm. Do not sow too many seeds too close together or the seedlings will be too tall and weak and they will break easily when transplanted. Protect the seedbed from the hot sun and hard rains by covering it with straw, palm leaves or other mulch. Protect the seedlings from pests and animals by putting an insect net over your seedbed
3	Insect nets in seedbeds	11:35	Grasshoppers and snails can be a serious problem for any vegetable seedbed as they chew the tender stems of seedlings. To protect their young crops many farmers use pesticides. While pesticides are expensive, they are also dangerous for the health of farmers, consumers and the environment. You can protect your seedlings by putting an insect net over them
4	Transplanting chillies	11:35	This video shows the importance of good planning and knowledge. We can reduce losses by following good practices when installing the seedbed, preparing the field and transplanting chilli seedlings
5	Drying and storing chillies	11:00	Farmers have come up with their own clever ways to harvest, dry, grade and store their chillies. To remove the pain in their hands after harvesting the chillies, they use various techniques. Videos developed with farmers in Benin
6	Making chilli powder	10:30	It is very important to have a product that doesn't change, that is of the same quality, the same taste, the same colour and that is well presented
7	Drip irrigation for tomato	14:23	Farmer groups and individuals in Burkina Faso explain the benefits and challenges of a low-cost drip irrigation system, and show how such a system is set up. A social innovation is included that relates to organic matter management
8	Reviving soils with mucuna	14:30	Farmers explain how a mucuna cover crop helped to revive their highly degraded soil, and suppress the noxious weeds <i>Striga</i> and <i>Imperata</i>
9	Managing soil fertility	6:50	Integrated soil fertility management is based on maximising the use of organic fertilizers, minimizing the loss of nutrients and optimizing the use of inorganic fertilizer. Microdosing and mulching are featured

The first eight videos were developed by Agro-Insight (a private company based in Belgium) for the International Fertilizer Development Centre (IFDC) and the last one was produced by Countrywise Communication (a British video production company) for International Fund for Agricultural Development (IFAD), the International Institute for Environment and Development (IIED), the World Bank Institute, and Vrije Universiteit Amsterdam, between 2012 and 2014 with farmers in Benin, Togo and Burkina-Faso who had received training under various projects funded by IFAD, USAID (United States Agency for International Development) and DGIS (Directorate General for International Cooperation, the Netherlands). The videos were produced according to the zooming-in, zooming out method (Van Mele, 2006) whereby underlying scientific principles of technologies and local innovations are explained with a narrator in an easy-to-understand language, interspersed by farmer interviews. In each video at least four experienced men and women farmers show and explain various aspects of the techniques.

The field work was conducted in four main phases. First, we conducted an exploratory study from May to June 2015, on the entertainment video selling system in six main municipalities of the Republic of Benin (Parakou, Porto-Novo, Sèmé-Podji, Cotonou, Abomey-Calavi, and Lokossa). In each municipality we interviewed 28 mobile entertainment videos vendors, three entertainment video vendors with small stores and six entertainment videos suppliers. As Cotonou is the biggest city in Benin, we also interviewed four mobile entertainment videos vendors, two entertainment videos vendors with small stores and one entertainment videos supplier selected in Cotonou. In total, 199 entertainment DVD sellers were involved in the exploratory study and all of them had at least three years of experience in the entertainment video trade and were available for the interview. This study helped to get a clear understanding of the strategies of entertainment video distribution, the supply mechanism and the price variation.

In the second phase (July 2015), we visited the main vegetable production areas along the Guinea Coast of Benin, in the southern part of country (White, 1983). This zone extends from the Atlantic Coast and stretches between 1°45' and 2°24'E and 6°15' and 7°00'N to the west and 6°15' and 7°30'N to the east (Akoègninou et al., 2006). We selected the municipalities of Sèmè-Podji, Cotonou, Ouidah and Abomey-Calavi for the study. These municipalities are the major urban and peri-urban vegetable-producing areas of Benin (Adégbola & Singbo, 2001). They are also the main towns of the country where the entertainment video trade is well developed. During this phase, we also visited agro-input dealers, vegetable sellers and motorcycle-taxi drivers' network and included them in the research cases because they might be interested in selling DVDs on agriculture. The network of vegetable sellers is comprised of organic vegetable producers in southern Benin (Ouidah, Sèmè Kpodji, Toffo, and Tori) and consumers. Vegetable sellers act as dealers. They request the service of motorcycle-taxi drivers to deliver vegetable to their customers.

In the third phase (August to November 2015), we used purposive sampling (selecting distributors who were willing to participate in the study). Thirteen distributors were chosen based on their (a) engagement and readiness to work with the researcher without interruption during the study period and (b) geographical accessibility. Purposive sampling can select information-rich cases for in-depth study (Clark, Creswell, Green, & Shope, 2008). After the selection, each distributor signed a contract and committed to collect data such as the name, phone number and address of the DVD buyers, for follow up. Based on our exploratory study, we suggested selling a DVD at a minimum of 500 FCFA about 1 USD, in an area where 63.5% of the population lives on less than 1 USD a day (Institut National de la Statistique et d'analyse Economique, [INSAE], 2015). Any surplus above 500 FCFA went to the seller. Each distributor was rewarded with 200 FCFA (0.40 USD) per each DVD sold as motivation to collect the requested data. The distribution of DVDs was a spontaneous sale like the entertainment videos distribution.

Table 2 shows in each selected area, the category, number of distributors involved in the study and the sampling size.

Daily phone contact was kept with the sellers in order to be informed on their progress or any other matters related to the DVD sales. Researcher also visited each of them every week. Data collected were entered and processed in MS Excel. From August to November 2015, a telephone survey was conducted with 341 viewers who had called us. The phone conversation was conducted using a checklist and organized around topics such as personal data (name, profession/activity, years of experience in activity and place of residence etc.), access to agricultural information, use and sharing of videos, prices of training videos and willingness to pay, people's perception of videos in local languages etc. We also organized a meeting in Cotonou with all thirteen "Improving vegetable production" video distributors on 24 October 2015. Our discussion lasted about two hours and focused on the sellers' motivation, marketing strategies for learning videos and type of feedback or specific demands expressed by the buyers.

In the last phase (June 2016), snowball sampling was used to select 30 vegetable farmers who had watched the videos and 15 who had not seen the videos, based on their willingness to meet us during the field survey in each municipality where videos were sold. We individually interviewed in total 180 vegetable farmers, followed by a field visit to see some of the innovative practices that people had mentioned in the interviews.

Table 2. Category, number of training videos distributors by areas and sampling size

Areas	DVD vendors	Agro input dealers	Vegetable seller	Taxi-moto driver	Sampling size
Cotonou	4	4	1	0	9
AB-Calavi	0	1	0	1	2
Seme Podji	0	1	0	0	1
Ouidah	1	0	0	0	1
Total	5	6	1	1	13

All collected data was analysed using an ethnographic method based on thematic trends in respondents' statements (Sanjek, 2000). We used quotes to bring respondents' views into the analysis either as testimonies or as concluding statements. Self-directed learning including motivation analysis was used to assess buyers' or viewers' willingness to pay for learning DVDs and sellers' engagement in selling the videos. The changes in behaviour were measured through frequency-determination statements (never, once, and more than once).

4. Findings and discussion

4.1. Agricultural information access, using and sharing through videos

From August to November 2015, entertainment DVD vendors, agro-input dealers, a vegetable seller and a motorcycle-taxi driver successfully disseminated 562 training DVDs. This was their first experience selling agricultural DVDs. None of the 199 entertainment DVD sellers interviewed in the first phase of the study had ever sold agricultural videos. Buyers were highly motivated to pay for the DVDs for self-learning. Table 3 shows the number of DVDs sold by each distributor. Figure 1 highlights the number of DVDs sold per type of distribution network and Figure 2 indicates categories of buyers.

A surprisingly large number of buyers called after watching the videos (Table 4). About 60% of the people who bought the DVD (341 viewers) actually called the phone number pasted into the DVD jacket. About 64% wanted to know where they could get more videos and equipment used in the videos they watched (e.g. equipment to establish a drip irrigation system). We were surprised to realise that about a third of the people who were phoning us were from far away. They were in Togo,

Table 3. Number of training DVDs sold by each distributor

No.	DVDs distribution network	Name of seller/Shop (location)	Percentage of DVD sold (number of DVDs received)
1	Agro-input dealers	Accueil paysan (Cotonou)	91 (n = 170)
		Zocli boutique (Cotonou)	100 (n = 40)
		Chez Patouto (Cotonou)	76 (n = 50)
		Balogoun boutique (Sèmè-Podji)	74 (n = 30)
		Déguenon (Ab-Calavi)	89 (n = 55)
		SEBA 3D SARL (Cotonou)	80 (n = 10)
2	Entertainment DVD vendors	Anagonou Martin (Ouidah)	60 (n = 30)
		VINAIM (3 distributors, Cotonou)	92 (n = 180)
		Dansou Appolinaire (Cotonou)	74 (n = 35)
3	Vegetable seller	Déguenon Edgar (Cotonou)	80 (n = 30)
4	Taxi-motor driver	Bossou Benjamin (Abomey-Calavi)	57 (n = 30)

Table 4. Synthesis of feedback received from the videos viewers

No.	Synthesis of feedback from viewers	% (n = 341)
1	We would like to meet you since you are doing wonderful things for us farmers	87
2	Thank you for making videos in our own language with experienced farmers	78
3	We wanted to know where to get more videos and equipment (e.g. irrigation equipment) used in the videos	64
4	We are applying knowledge acquired from videos because we have learned so many things that we didn't know	89
5	We are not vegetable farmers but after seeing the videos, we are preparing to start vegetable production	11
6	We are watching the videos with family, friends and want just to thank you for this initiative	51
7	After seeing the videos, we are able to recognize nematode and control it	73

Figure 1. Number of training DVDs.

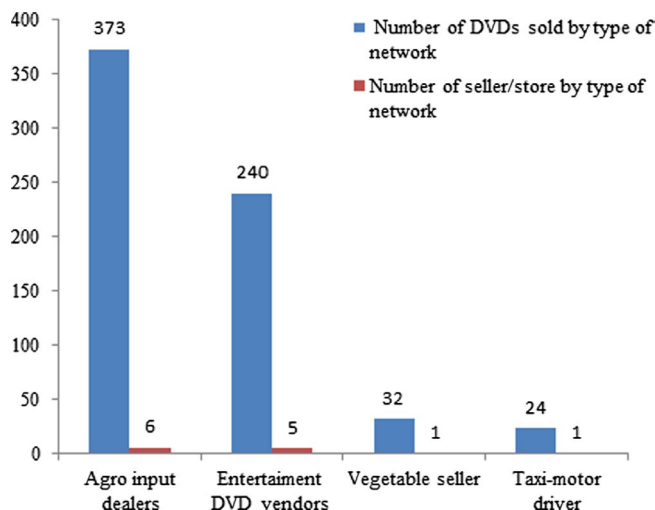
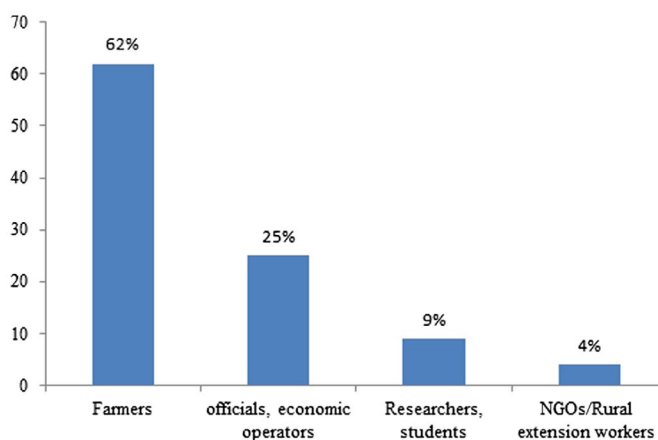


Figure 2. Categories of buyers of training DVDs.



Nigeria, Niger Burkina-Faso and northern Benin, even though we only offered the DVD for sale through retailers in the large cities of southern Benin. A few made phone calls to give testimony about the quality of the videos and to express gratitude.

The people who bought the DVD had watched the videos, usually several times, with their family, friends and farm hands. Forty-one percent (41%) of the 341 respondents or viewers borrowed DVD players from friends or family to watch the videos, but it was astonishing to learn that nearly one person in five bought a DVD player (20–30 USD) after buying our DVD, so they could watch the videos. This is a further indication that the buyers were willing to pay for information.

There was also some organisational and social dynamism around learning through videos. For example, the President of Regional Union of Vegetable Producers Cooperatives of Atacora-Donga (Union Régionale des Coopératives de Producteurs Maraîchers de l'Atacora-Donga) bought the DVD while traveling to Cotonou. After watching the videos with his family and friends in the municipality of Péhunco (northern Benin) he was very excited and organized the first video shows in the municipality of Djougou where 126 representatives of associations of Vegetable Producers from 13 municipalities of the departments of Atacora-Donga attended. Although the videos are not in their local language, the viewers were very impressed with the content and made a request to purchase 50 DVDs for distribution among their associations in each municipality. Unfortunately, the request was not totally satisfied because there were only 27 DVDs available.

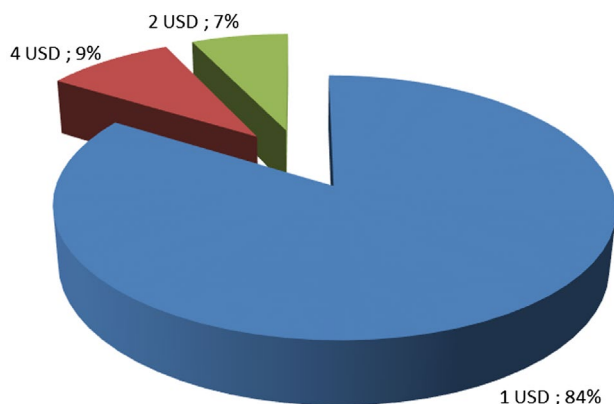
In another experience, the Executive Director of local NGO who bought the DVD invited us to attend a video training session with farmers to show us the NGO's interest in using DVD to train farmers on vegetable production. The farmers (82) and NGO staffs (5) were enthusiastic to attend that training session and were fascinated to see smallholders like themselves growing vegetable in other areas or countries. During the training session, we noticed that some farmers had (pirated) copies of our DVD and the Director of NGO quickly apologized and told us that he took the initiative to make 10 copies our DVD and give it to farmers in order to help them watch videos by themselves. We were also surprised to hear that two evangelic churches in rural communities organized sessions to watch the videos several times on Sunday before church. This suggests that churches leaders can also play a role in agricultural information sharing in rural communities. Even if farmers buy learning videos as individuals, video creates an environment that generates social learning by conveying ideas of mutual interest among peer farmers and by provoking discussion afterwards.

Besides farmers, people from other walks of life also bought the DVD and watched it. They were government officials (active or retired), and agro-dealers. Some of them were investing in oil palm plantation, orange and pineapple production. They bought the training DVD and watched it with their farm workers. Most of these people were also about to start vegetable production. Some people said they own land in peri-urban areas and now they are eager and motivated to engage in part time farming. This shows that farmers are not the only ones who need agricultural information. Unfortunately, these people are often excluded from the conventional extension services. Non-farmers are often missed when videos are disseminated through NGOs and farmers' associations. Non-conventional agricultural information dissemination networks give a fair chance to anyone who is interested in agriculture to learn from training videos.

Figure 2 shows that students, researchers, students' parents, extension workers etc. also bought the training DVDs. The following statement from an agro-input dealer who sold DVDs indicates how clients feel about videos as a rural extension tool: *"All those who buy videos return after watching them, congratulate and encourage us for this nice initiative of disseminating agricultural information through the videos. Apart from farmers who are fond of training videos, a researcher of INRAB (Institut National des Recherches Agricoles du Bénin) came to buy two DVDs and three days after he returned to take thirty DVDs to distribute in his network of researchers"*.

Table 2, Figures 1 and 2 reveal the buyers' eagerness to invest in quality agricultural training videos. While agricultural extension services are becoming dependent on donor funds, farmers' eagerness to buy training DVDs is a sustainable support to the delivery of agricultural extension services. Following Mekoya, Oosting, Fernandez-Rivera, and Van der Zijpp (2008), when farmers adapt or use the new technology themselves and apply it in their local context, the potential of successful and sustained adoption increases.

Figure 3. Price of training DVDs.



4.2. Prices of training videos and people eagerness to pay

The DVD was sold at different prices (Figure 3). About 84% of the DVDs were sold for 1 USD (500 FCFA, local currency)¹, the same as for an ordinary imported entertainment video. Locally produced videos are protected by law and are sold for between 2 and 4 USD. Price is an important market variable. However, some customers were willing to pay a relatively high price for the learning DVDs (4 USD). We found that DVD buyers are clearly motivated to invest money in order to learn. This confirms Leeuwis (2004) conclusion that what people do depends in part on their perceptions of the consequences of certain practices; the perceived likelihood that these consequences will emerge; and their valuation of such consequences in relation to a set of aspirations.

4.3. Determinants of people's willingness to pay for training videos

After watching the videos, the respondents were asked to propose the prices they would be willing to pay for a DVD. Although respondents could easily repeat the price they paid (1 USD), some buyers were willing to pay more. About 50% of the respondents said that the "Improving vegetable production" videos could be sold for 4 USD (Table 5). About 3% kept the price at 1 USD, while 12% suggested selling the DVD at 10 USD and 11% would offer more than 10 USD. But, putting one or many training videos on a single DVD does not influence people's price suggestion. The following quotes suggest that people are willing to pay more for the videos.

With all this great information that I have seen in the videos, even 20 USD a copy is cheap. Thank you so much for thinking of us who are forgotten by the extension agents. All of the nine videos are very interesting and effective tools for technology transfer to farmers. Whatever the price, we know that you are helping us. (M. Fabrice DOSSOUVI, vegetable farmer who borrowed DVD from a friend and watched it)

My dear, knowledge is priceless. Selling this DVD of nine useful videos at 20 US dollars is not expensive. With my workers, we have learned a lot through this great initiative which primarily benefits those of us in agriculture and having the bad luck to never be visited by extension agents. (M. David OROU BASSA, Accountant by training and professional vegetable farmer)

The above statements are representative of most of the buyers or viewers. All the respondents welcomed these convincing videos which respond to farmers' learning needs and do not necessary need further explanation. In self-directed learning, personal attributes such as motivation, willingness, capacity to conduct one's own education, goal or activity orientation could be the driving force behind people's decision to buy training DVDs. Some authors have advocated service fees to sustain the provision of agricultural services to farmers in developing countries (Ulimwengu & Sanyal, 2011). The results from this study suggest that farmers will pay for information.

4.4. Videos in local languages as driving force

One of the marketing strategies used by the DVD distributors was to inform people that they could watch the videos in their own language. The fact that the training videos could be watched in local languages was well appreciated by distributors, buyers and viewers. The findings also revealed that 66% of the buyers who speak French fluently preferred to watch the videos in their local languages. Making information available to rural communities in their own language is important for attracting users and increasing the accessibility of the information, and therefore increases impact.

Table 5. Users' prices proposition after watching videos

Categories of prices (USD)	Percentage of buyers (n = 341)
1	3
2	22
4	50
10	12
>10	11
No proposition	2

4.5. Behavioural change

Farmers who watched the video enhanced their creativity and adapted the learning to their environment. Before watching the videos, farmers were not aware that they could spend less money on pesticides to manage pests and diseases in vegetables. So farmers invested a lot of money in pesticides. After watching the videos, many viewers (Table 4) realized that they could use lower amounts of pesticides. The farmers seriously applied the knowledge acquired from videos and 81% of them realized that they had the lower production cost. This highlighted how videos helped farmers to recognize the shortcomings of their current farming practices and become willing to try and engage in alternative forms of farming. This is in line with Bentley et al. (2013) who stressed that in Mali, people who watched striga videos improved their understanding of striga’s biology and the damage it causes. Table 6 showed some technological practices triggered by the videos.

The study shows also some organisational innovations triggered. One of the nine videos dealt with drip irrigation for tomato. In this video, farmers explained the benefits and challenges of a low-cost drip irrigation system, and showed how such a system is set up. Two out of six agro-input dealers who distributed the DVDs are starting selling the drip irrigation kit because of the increased demands of farmers to buy it. One of sellers has taken the lead and channelled the demands towards a large company specialized in drip irrigation in Niger and the second seller found his way to the Chinese market. This spontaneous arrangement between the agro-dealers to find solutions to the new demands created by the DVDs they are distributing shows that videos dissemination through the private sector can trigger organisational innovations that in turn sustain extension. Agro-input dealers reaction to market demand created by the videos, in contrast to many development projects, where farmers often stop using the technology as soon as the projects end. Many projects prefer working with groups of farmers, which only function when the project is there to hold the group together. Development projects should offer room for farmers to experiment with novel technologies, like drip irrigation, and working in groups may be the easiest way for the project to get a critical mass of farmers together, but then the project should engage with the private sector for the project sustainability.

5. Discussion

The aim of this article was to explore the role of private sector like DVD sellers, agro-input dealers, vegetable sellers, motorcycle-taxi drivers as non-conventional networks for agricultural information dissemination. Self-directed learning was used as theoretical framework to understand farmers’ self-determination, self-regulation and self-efficacy which are key components of adult learning process. Based on this conceptual framework we assumed that when farmers take the initiative to spend their own money to buy a DVD, they learn more and better than those who sit passively waiting to be taught. This is in line with the study of Pretty, Guijt, Thompson, and Scoones (1995) who

Table 6. Practices changes

Some practices developed in videos	Technical practices adopted (n = 120)	
	Before watching videos (%)	After watching videos (%)
Rotate crops to control weed, pest and improve soil fertility	16	92
Use compost to improve soil fertility	25	97
Protect the seedlings from pests and animals by putting an insect net over the seedbed	0	56
Use resistant plant varieties to reduce damage to plants	39	99
Use mucuna to cover crop and revive degraded soil	0	4
Spend less money in the pesticides to manage pests and diseases	0	86

stressed that the highest level of participation is self-determination or mobilisation; people participate by taking initiatives independently of external institutions to change systems. When farmers take the responsibility for knowledge development by buying and watching a video, the video becomes a sustainable extension tool, since the success of any sustainable development programme is determined by the level of participation of farmers (Axinn, 1997). Learning is accomplished best when farmers experiment from their real need rather than being taught or told what outside people think is their need. Our findings suggest that when the right videos are made available to farmers at the right place they find their own way to watch them. This is best illustrated by our finding that nearly one person in five bought a DVD player after buying our DVD. These respondents were motivated to further invest in learning. The study showed that the private sector, for the first time, successfully sold learning DVDs in Benin, where farmers used to receive agricultural information for free. This is in line with Swanson (2008) who highlighted the role that the private sector can play in agricultural extension services if agricultural technology is available and sold by the private sector.

Apart from farmers, many other people (agribusiness entrepreneurs and officials) need agricultural information and pay for learning DVDs. Unfortunately, they are often excluded from the conventional extension services in Benin. In the context of limited resources (financial, human), to engaging farmers in the learning process, training video dissemination through the private sector seems the best and most cost-effective method to reach more people, to give a fair chance to anyone who is interested in agriculture to learn from training videos. Policy makers must formulate a national extension policy that is inclusive, promotes self-directed learning and advocates pluralism in service provision. In this study, those who bought the DVD and could not afford a DVD player relied on friends and relatives to watch the videos. This probably rested on elements of moral economy and social solidarity that consider knowledge as a public good. Some NGOs and farmers associations also organised public screenings for large groups of farmers. Many vegetable farmers associated with NGO members and leaders of farmers' associations were really enthusiastic about attending a video training session. The participants of the training session were fascinated to see smallholders like themselves growing vegetables in other countries. All of the farmers who attended the video shows wanted to buy DVDs for their own learning and expressed the need for buying other videos because they found that the farmers in the videos were experts and more convincing than "glégan" (rural extension agents).

When NGOs, farmers associations or individual farmers received training DVDs for free, the farmers are less motivated, and they express less self-organisation (e.g. they want to be supported with a power generator, television set and a DVD player. This constrains knowledge development in the process of SDL which focuses on self-determination, self-regulation and self-efficacy.

None of the viewers who called asked for clarification of the content of videos. This means that the viewers did understand the videos and were delighted to find training videos and excited to use them. The farmers had to place the phone calls themselves and pay for them, suggesting that they were motivated and sincere about ringing up to express appreciation for the videos. The videos aroused much interest with viewers who are motivated to apply knowledge acquired from videos. The viewers also encouraged the researchers to continue making videos and wanted to know where they could find more videos and buy drip irrigation equipment. Hinett and Weeden (2000) noted that feedback is essential for learning and plays a significant role in learners' development by providing knowledge required for improvement and due to the lack of it, the learner progress is hard to judge (Raaheim, 1991). When the training videos are well designed with a clear content and made or translated into local language, viewers understand the key points and do not need to have an extension worker or an expert for facilitation. Training videos are therefore powerful tools for self-learning. The video self-training method is an innovative and cost-effective method in agricultural extension.

Many of the people who bought the DVD actually called the senior author at the phone number pasted into the DVD jacket. It is highly unusual to get feedback from so many viewers. Clearly, the DVDs had ended up where people needed them. One truck driver from Niger told us he was passing through

Benin when he noticed the DVD and bought one as a gift for his brother, who was just starting to grow vegetables. Many Africans living in cities have family in rural areas and support their relatives as much as they can. Goods are often delivered across thousands of kilometres, using a network of taxi drivers, bus drivers, and people they know along the road who can pick up a parcel and put it on the next truck. The DVDs were travelling widely, with no particular encouragement from us or the sellers. When NGOs or farmers associations distribute training videos, almost all of the DVDs stay in the villages that get them. It is expensive and challenging to reach many geographically dispersed remote smallholder farmers with little formal education in developing countries (Pritchett & Woolcock, 2004). Agricultural technology dissemination via non-conventional agricultural information dissemination networks or private sector could be an ideal option. Accordingly, this paper proposes innovations in agricultural extension services using an open system, non-project approach in scaling-up farmer training.

The study also revealed that farmers spend now less money on pesticides to manage pests and diseases because they adapted their management practices following knowledge acquired from the videos. This can be used as a starting point for policy makers to make farmers aware of the benefits of sustainable agriculture, in order to reduce farmers' dependence on synthetic pesticides.

6. Conclusion

In the context of client-oriented, pluralistic agricultural extension provision, the need for multiple approaches for agricultural extension and for targeting methods to meet specific training objectives and clients is widely acknowledged and training videos could be one of the most powerful tools for self-learning and involving rural people in sharing extension costs. While agricultural extension services are becoming dependent on donor funds, cost-sharing through DVDs could be a sustainable support to the delivery of extension services. This study provides substantial evidence that training video dissemination through commercial channels can be effective when done via existing structures (agro-input dealers, entertainment DVD sellers etc.) and based on people's training needs. Improving extension is not only looking at what new skills extension workers require, but also about developing new distribution channels for quality extension materials. This dissemination model could be recommended as a continuous process of rural extension approaches in which agro-input dealers, entertainment DVD sellers, motorcycle-taxi drivers and others become "new extensionists". To maximize the contribution of training videos, they need to be integrated into agricultural extension services, along with changes in policy and institutions supporting sustainable agriculture. This will help the country to take advantage of ICTs in the agricultural sector in order to compensate for the limited number of extension workers and declining budgets for agricultural extension.

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Competing Interest

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Note

1. Locally produced entertainment DVDs cost about 1,000 and 2,000 FCFA and their abusive duplication is banned by the law.

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