

Disseminating price information through mobile phone: are Malagasy farmers ready for it?

Hélène David-Benz¹, Norontsoa A.H. Andriandralambo², Noro C. Rahelizato³

ABSTRACT

Improving agricultural markets by providing a better access to information is the main objective of Market Information Systems (MIS). Most MIS have adopted mobile phones but their effective use by farmers remains marginal. Why do producers not mobilize the MIS as expected? Based on light surveys to recipients, we analyze the adequacy of the use of SMS to disseminate information to small farmers. In Madagascar, two main MIS, working respectively on the rice and vegetable markets, recently introduced the use of mobile phone to collect and disseminate price information. After a few months of the development of new dissemination tools, feedbacks from the targeted producers were collected. Results show that mobile phone penetration is uneven: depending on the area, 46% to 75% of the households, and very few farmers make use of it. The level of understanding of the SMS on price information ranks from 0% in the most remote areas to 60% around the capital city, where farmers are more familiar with mobile phones and more connected to markets. A large majority of farmers sees these SMS as an improvement to their general knowledge; fewer declare that they will use them for marketing. Most declare that they are willing to pay to receive these SMS. However, the main constraints are: (i) rapid “disappearance” of the recipients due to a change in phone number or a loss of the phone itself, (ii) technical constraints such as difficulties to recharge the battery and/or poor phone network coverage, (iii) cognitive limits of the farmers, with low level of education and limited practice of SMS. The role of an informational “mediator” (farmer leader, field staff), as well as more comprehensive knowledge on market situation transmitted through complementary media appear fundamental to enhance the farmers’ ability to take advantage of the dissemination of information by SMS.

Keywords: Market information system, ICT4D, mobile phone, rice, vegetables, smallholders, Madagascar.

¹ UMR MOISA, CIRAD, TA C-99/15, 73 rue J.-F. Breton, 34398 Montpellier cedex 5, France ; benz@cirad.fr

² AM2DT, ED GRND, Ecole Supérieure des Sciences Agronomiques, Université d’Antananarivo, Madagascar ; norontsoaannie@gmail.com

³Ecole Supérieure des Sciences Agronomiques, Université d’Antananarivo, Madagascar ; raheli@hotmail.com

1. INTRODUCTION

The efficiency of agricultural markets in developing countries is often constrained by the asymmetry of information among actors along the value chains, with farmers being at the weakest position (Fafchamps and Gabre-Madhin, 2006). Market Information Systems (MIS) rational is built on this statement, with the assumption that reducing information asymmetries by providing a better access to information would improve their spatial and temporal arbitration capacity as well as their market power (Shepherd, 1997; David-Benz et al. 2012; Arias et al., 2013). MIS were massively developed in the developing countries in the 1980s and 1990s, along with agriculture market liberalization (Galtier et al., 2012). From early 2000s, a second generation of MIS emerged (2GMIS), based in most cases on information and communication technologies (ICT) and particularly mobile phone. The purpose was to develop real decision-making tools for famers and market actors (Galtier et al., 2014). The rise of mobile phone brought-up a wind of modernization in rural areas and new prospects for MIS. Several case studies highlight the positive impact of mobile phones on market performances (Jensen, 2007; Aker, 2010). However, effective use of 2GMIS by farmers in developing countries remains marginal (Galtier et al., 2014), and their efficiency remains limited and controversial (Fafchamps and Minten, 2012; Goyal, 2010).

Why do farms fail to adopt the 2GMIS as expected? What do they think about the information disseminated and how do they behave towards them? What are the constraints linked to farmers' adoption of the 2GMIS? According to Galtier et al. (2014), the failure of the 2GMIS to meet farmers' needs is largely due to (i) the lack of close monitoring and evaluation of the very fast progress in the innovations, and (ii) the risk of exclusion of smallholders' with regards to access to ICTs. Compliance with the needs of the target population as well as its capacity to use SMS-based devices have been highlighted as one of the conditions for the MIS effectiveness (Garuku, Winters and Stepman, 2009; Burrell and Oreglia, 2015). This communication is addressing these assumptions. It is based on rapid surveys of recipients at the initial stage of development of new dissemination tools by the two most important MIS in Madagascar: the Rice Observatory (OdR) and the Vegetable Economic Information System (SIEL). The focus is on the suitability of the use of SMS to disseminate information to smallholder farmers. Firstly, the literature review draws the state of the art about MIS and their impact on farmers. Then, the different steps of the surveys and the methodological elements are presented. The results focus first on farmers' access to market and to market information. Then, feedbacks from farmers, after few months of information dissemination are analyzed. Lastly, the main constraints of market information dissemination through SMS are highlighted before concluding.

2. LITERATURE REVIEW

A wide range of studies have stressed the positive impact of ICT on economic development in rural areas, and notably their capacity to improve access to market information (Dixie and Jayaraman, 2011; World Bank, 2012; Musingafi and Zebro, 2014). But the difference between the impact of using a mobile phone *per se* and that of mobile services providing market information is not always very clear. Agriculture Market Information Systems (MIS) collect, process and disseminate information on agricultural markets. They are basically focused on prices, but the range of information can be wider (availability of products, individual offers, buyers/sellers contacts etc.). In developing countries, many MIS were set-up in the 80's and 90's,

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as part of supporting programs to the agricultural market liberalization (Shepherd, 1997; Egg & Galtier, 1998). They target both actors directly involved in agricultural chains and in policymaking. Regarding the first ones, the objective is to improve market efficiency, by reducing information asymmetries. As for the seconds, the objective is to contribute to agricultural trade policy making and monitoring (David-Benz et al., 2012; Galtier et al., 2014).

But the effectiveness of the first generation of MIS in providing services to market players appeared soon limited (Shepherd, 1997; Egg&Galtier, 1998; Robbins, 2000; Tollens, 2002). MIS have been facing technical challenges (lack of reliability of data, transmission delays, different quality of products not taken into account ...), institutional ones (lack of reactivity associated with public institutions), and financial ones (unsustainable funding, based mainly on projects). Egg et al. (2013) stress that they also bump into more fundamental problems related to the truly functioning of the markets, that was not really taken into account in their design (information circulation between agents, institution arrangements between seller and buyers...). From the late 90s, the rapid penetration of mobile phone in developing countries and a growing concern to improve farmers' access to markets have sparked off a renewed interest in MIS. New MIS were developed in Africa, Asia and Latino America, whereas many of the older ones engaged in deep changes: a new generation of MIS emerged, named 2GMIS (David-Benz et al., 2012).

The innovations developed, thanks to mobile phones technology, have brought about real improvements from a technical point of view. They have broadened the range of products and markets covered, as well as the categories of information available. The time lag between data collection and information availability for users has been dramatically reduced. These improvements strengthen the potential of MIS to meet more efficiently the needs of market players.

However, the use of mobile has several limits: first of all, it increases the gap of access for the poorest (sparse coverage in rural areas, difficulty to use SMS for illiterates, cost). MIS based solely on mobile phone might reinforce inequalities, rather than improve market access for the poor (Galtier et al., 2014). Dissemination by radio makes it possible to reach a wider audience, but its success is strongly linked to the involvement of local communities in the definition of program content (Sulaiman et al., 2011). Furthermore, Gakuru et al. (2009) highlight that agricultural producers cannot be considered as mere consumers of information; in-depth knowledge about the communities are needed both to define their needs of information and to promote learning, based on dialogue and exchange. In addition, the more communication media are sophisticated, the more the users need a support to understand the information and the way it can be used. Such dimension is currently inadequately taken into account by MIS (David-Benz et al., 2012). Burrell and Oreglia (2015) argue that “abstracted information often loses its usefulness once it is extracted from actual trade relationships”; the value of information is then directly linked to the credibility of its source and the quality of the relationship with the source (which implies that it should not be limited to the supply of a supposedly “neutral information”).

Several authors have attempt to measure MIS impact on market participants, particularly on farmers. Most of them found a significant impact on the producers' income (Svensson and Yanagizawa, 2009; Goyal, 2010; Kizito, et al, 2012; Nakasone, 2014; Courtois and Subervie, 2014). In other cases, the impact is much less noticeable or not significant (Fafchamps and Minten, 2012; Mitra et al, 2013). However, the econometrics methods that are used (propensity score matching, randomized control trial) bump on methodological challenges when applied to

MIS (Staatz et al., 2014). Moreover, they focus mainly on measuring impact on income (selling price, quantity sold) but they don't bring much understanding of the determinants of adoption vs. non-adoption (where as one of the main issue is often that the actual users of MIS are very few). More qualitative assessment by users and light monitoring, less heavy to implement, could be useful to guide and adjust the dissemination of information, but they are seldom mobilized.

3. MATERIAL AND METHODS

The choice of the case studies was driven by three factors: (i) rice and vegetables are contrasted food-crops, for which market information can lead to different categories of arbitration; (ii) the two oldest Malagasy MIS are covering these crops; and (iii) these two MIS have recently adopted mobile phone technology.

3.1. Choice of rice and vegetables sectors for the case studies

Malagasy farmers grown rice mainly for self-consumption. It is the staple food in Madagascar, with an average of 97 kg/pers./year (INSTAT, 2011). It is grown primarily to cover the needs of farmers' households. Conversely, vegetables are mostly grown as cash crops. Rice can be stored and commercialized on long distances, when most vegetables are highly perishable and not storable. Rice fields are only dedicated to rice (at least during the rainy season), when vegetables can be mutually substitutable in the cropping systems. Therefore, these crops illustrate different potential uses of market information (temporal arbitrage, spatial arbitrage, and changes in cropping systems or seasonal cycles).

3.2. Market Information Systems involved

In Madagascar, the development of the MIS started in 2005 with the setting of the Rice Observatory (OdR) and the Vegetable Economic Information System (SIEL). The first one mostly used to disseminated French written bulletins though Internet (targeting mostly institutions and large traders) when the second one used to display weekly prices in blackboards disseminated in rural markets and broadcast through local radios (targeting mainly farmers). Both systems recently introduced mobile phone in the collection and the dissemination of market information: in 2014 for the OdR and in 2016 for the SIEL.

3.3. Surveyed areas

For the rice's case study, two among the most important rice growing areas of Madagascar where chosen:

- The neighboring districts of Soavinandriana and Miarinarivo in the Itasy Region (accounting for 8% of the national rice production), which have an easy access to the capital city of Antananarivo⁴, and a relatively limited rice price seasonal fluctuations (average of 53% between harvested prices and lean prices – 2011-2013);
- The district of Bealanana in Sofia Region (accounting for 7% of the national rice production), extremely landlocked⁵ and where seasonal price fluctuations are very high (average of 90% between harvested prices and lean prices – 2011-2013).

For the vegetables case study, the investigation area is the large peri-urban belt of Antananarivo, which is the area of intervention of ASA program (radius of about 30 km). Eight from the sixty communes of the ASA program were selected for the baseline survey. The feedback survey covered almost all the communes of the program.

The both cases, the choice of surveyed communes or villages aims at illustrating the different degrees of isolation and ease of access to the market. The assumption is that the contrast of situation in terms of isolation and accessibility leads different choices in terms of marketing strategies.

3.4. Baseline survey on structures and strategies

To analyze the structural features of farm households and understand their marketing practices, we mobilized an approach based on the Sustainable Livelihoods (Scoones, 1998; DFID, 1999). In each of the three production areas, a two-stage purposive sampling was carried out (based on the choice of the villages and that of the households), in collaboration with local partners of the Inforiz project and the ASA program.

For the rice study, within each region, we selected 5 to 6 communes with different degrees of isolation and availability of agriculture services. Only farmers producing more than their family consumption needs were targeted (ie. farms with at least 0.5 ha of rice area). The survey was carried out between November and December 2013. A total 582 farms were surveyed: 280 in Sofia and 302 in Itasy. In the case of vegetables, 220 farm households were surveyed from mid-September to mid-October 2016. Of them, 40% are farm leaders and are among the direct beneficiaries of the ASA program, 37% are socially close from these leaders (same farm organization or informal proximity) and are among the second step the program beneficiaries, and the remaining are non-beneficiaries farmers from the same villages. Among them, 48% were SMS recipients.

The questionnaires were focused on the structural characteristics, the marketing strategies and constraints, the access to information, and farmers' perceptions and expectations towards MIS.

3.5. SMS dissemination and feedback survey on early appraisal of farmers

⁴ The Itasy region is served by a good national road (RN1). The main rural market (Analavory) is 100 km away from Antananarivo.

⁵ 100 km of an almost unpaved road between the main city of the district (Bealanana) and a national road (RN4). Then 415 km of a degraded national road to Antsiranana (main urban center of the North of Madagascar) or 690 km to Antananarivo.

With the support of the project Inforiz (2013-2016) for OdR and of the ASA program (2016-2018) for SIEL, a selection of prices was sent weekly via SMS to a sample of farmers. Relevant markets and rice varieties / type of vegetables were selected for each site, based on the first results of the baseline surveys, and on previous studies on local markets (Perry and Randriambololona, 2010; Arimoto et al., 2013; Orbell, 2015). For rice, 70 recipients were chosen among farmers that were interested in receiving market information, according to the baseline survey, with both farmers benefiting or not from the support of a project. For vegetables, 353 recipients were chosen among farmers involved in the ASA program.

After a few months of weekly SMS, feedbacks from the recipients were collected. The objective is to have an early appraisal of the new dissemination methods and be able to adjust them rapidly.

For rice, SMS on a selection of 12 prices were sent weekly to a sub-sample of 140 farmers and 60 extension staff from the baseline survey from April 2014. In May and June 2014, a rapid qualitative field survey provided preliminary feedbacks about the shape and the understanding of the messages (Chimirri, 2014). These first feedbacks were collected from 30 farmers and 15 extensionists. Following this first investigation, the SMS were simplified and made more explicit. Flyers presenting briefly the OdR and explaining the abbreviations have been dispatched to all recipients. A second survey (using a closed questionnaire) was implemented between November 2014 and January 2015. This survey targeted 70 farmers and 35 extension staff (including as much as possible the ones which have already been interviewed during the first feedback). For SIEL, data were collected from 129 SMS recipients: 90 via field surveys and 39 via light telephone interviews. After clearing outliers, 109 observations were actually analyzed.

The questions were related to the effectiveness of the reception and understanding of the SMS, the relevancy of the chosen products and markets, the perception of reliability and usefulness of the information received and the willingness to pay for it.

3.6. Complementary radio programs and educational modules

In the two rice growing area, weekly radio programs of about five minutes each have been developed. These programs displayed the prices of the week (on a selection of markets and types of rice), the trend compared to previous weeks, and some explanations or contextualization. Four educational modules about rice market and marketing have been designed. Extension staff of the local partners was trained in each area. They in turn had to train 50% of the farmers that received SMS.

4. RESULTS

This section put emphasis on: (i) farmers' access to market and to market information, (ii) farmers early appraisal of the information dissemination, and (iii) the main constraints of price dissemination by SMS.

4.1. Access to market and means used by producers to get market information

4.1.1. Farmers' access to market

In Madagascar, rice is grown first for self-consumption and the marketed share is limited (20% to 27% of the national production, according to different national sources; World Bank, 2011). As our sample targets farmers with more than 0.5 ha, which potentially produce more than their family needs, rice producers sell on average 56% of the rice harvested (excluding farmers that also collect rice, and then sell more than what they produce). Previous analysis show that their marketing strategies are determined by their livelihood assets (notably rice-cultivated area, number of permanent and hired workers, access to credit and membership to farmers' organization) as well as the physical constraints to access the market (remoteness) - David-Benz et al, 2016. Farmers with better asset endowments tend to sell larger quantities of rice, and are able to store it in order to sell when price gets higher. Moreover, they look more actively for market opportunities. Conversely, the ones with more limited assets usually sell straight after harvest at low price, at farm gate. Isolation plays in a more unexpected way: farmers have larger growing areas in remote areas and sell larger quantities of rice. Their strong physical constraints to access market make them more dynamic to look for buyers and to find information about market situation.

Vegetable production in peri-urban area is more directly oriented towards markets. However, the orientation differs strongly among products. For potatoes, 40% of the production are for self-consumption, whereas it is only 4% for tomatoes or onion, and 11% for green beans. The majority of the farmers in the sample sells directly on the field or on farm (54%), whereas 17% sell on the village market and 29% on larger markets. The proximity of the road has a major impact on marketing options: in the most remote sites, no farmer goes selling to local or urban markets, whereas in villages located along main roads, the share of farmers selling in urban markets goes up to 73%.

4.1.2. Farmers access to information about the market situation

Most farmers have a good knowledge about prices on their nearest market but much fewer get information about prices in the main cities, apart from vegetable growers in the suburbs of Antananarivo that are rather well informed about prices in the capital city (see Table 1). A minority has a broader view of the market, as the best-selling periods or the products availability in the markets, even among vegetable growers around the capital, for whom the problem of market glut can sometimes be critical. It can be noticed that farmers are much more aware about quality issues in the case of vegetable than in the case of rice.

Table 1. Market information access for farmers

	Prices in the nearest market	Prices in Antananarivo markets	Prices in distant markets	Best / worst period to sell	Availability in the markets	Availability in other production areas	Quality requirement
Sofia, rice	98%	40%		29%			29%
Itasy, rice	96%	17%		90%			13%
Peri-urban, vegetables	80%	65%	15%		18%	36%	90%

Source: our surveys.

Direct communication is by far the main source of information. Farmers communicate either with neighbors who have the opportunity to circulate or with collectors they met in the village or

at the market. For the most remote area of Sofia, where farmers have rather large quantities of rice to sell, they get information as well from their relatives in town. Only 5% of farmers from Itasy said that they get market information from radio and 4% in peri-urban from MIS. Actually, radio is mostly used for entertainment, and agriculture related programs are scarce.

4.1.3. Mobile phone penetration and use

Considering rural areas, mobile phone is not as well spread in Madagascar as in many other African countries. In 2010, only 17% of rural households had a cell phone (INSTAT/DSM, 2011). More recent statistics of rural populations are not available, but the World Bank indicators show a slowdown in mobile cellular subscriptions in the recent years. It rose from less than one mobile cellular subscription per 100 people in the early 2000's to 40% in 2011; since then, it stagnated between 37% and 44%. This can be attributed to the economic crises during the political transition period.

Farmers in the sample appear to be rather better equipped with mobile phone than the average Malagasy family farms. Yet, it is still far from being generalized (Table 2). In most family which has at least one mobile phone, someone knows how to use SMS. But it can be the oldest child and not the head of the family. Mobile phone is rather used for personal matter. Very few farmers make use of it to communicate with buyers before selling or to know about market situation.

Table 2. Mobile phone penetration and use

	Sofia	Itasy	Peri-urban
Have a mobile phone ¹	46%	63%	75%
Know how to use SMS ²	48%	70%	89%
Use mobile phone to contact buyers in order to know their prices	11%	11%	0%
Use mobile phone to contact buyers in order to propose an offer	13%	8%	4%

¹ At least one mobile phone in the household

² At least one person in the household know how to use SMS

4.2. Farmers' first feedback about price information diffusion

4.2.1. Comprehension of the price information disseminated by SMS

A selection of prices from main rural assembly markets and main urban markets were sent as "push" SMS over some weeks before the surveys. The understanding level of the message content differs strongly according to the context. In the Sofia and Itasy Regions, the first SMS were sent without any preparation of the recipients. They were in most cases misunderstood. Very few producers could immediately seize the meaning of the abbreviations (12 prices were introduced, with abbreviations of rice types in 2-3 letters and markets names in 4-6 letters). Having no idea of the source of the messages, many farmers were suspicious and destroyed them without making further inquiries. In a village, rumors of satanic messages have even spread out! The problem was soon identified thanks to the first qualitative survey. Flyers explaining the purpose of the messages, the source of data and the meaning of the abbreviations have been

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Paper number: 103

distributed to the recipients and the messages have been simplified (limited to 8 prices, with the name of the rice types and the markets almost fully spelled out and with the indication of the source as *Observatoire du Riz*). The rate of understanding significantly improved: from 0% of the farmers to 55% in the Sofia Region, and from 50% to 80% in the Itasy Region (**Erreur ! Source du renvoi introuvable.**). In Itasy, where all farmers rapidly got the flyers, the level of reception and understanding was much higher than in Sofia, where the distribution of flyers was scattered and delayed. The initial familiarity with SMS appears to play an important role as well: in Itasy, where globally 70% farmers are familiar with SMS, 50% of recipients understood the first messages at first sight; in Sofia, where only 48% are familiar with SMS, nobody understood them immediately.

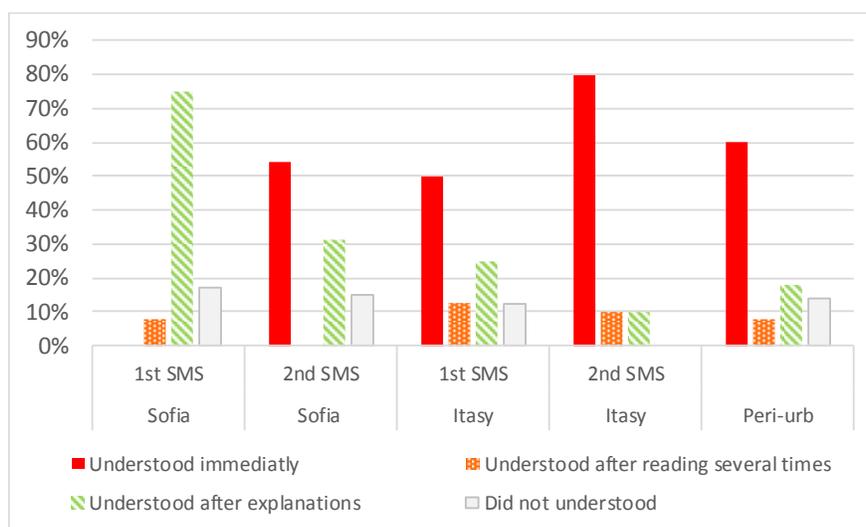


Figure 1. Level of understanding of price SMS

Source: our surveys

The ease of understanding was slightly better in peri-urban areas than in the Itasy Region and much better than in the Sofia Region, with no preliminary sensitization. This reinforces the trend observed in the two rice growing areas: the more the farmers are familiar with SMS, the more they are able to catch rapidly the meaning of the messages sent by the MIS. 60% farmers declare that they immediately understood the messages. But, as in the case of rice, there was some misunderstanding about the nature of the messages: in a village, conflicts emerged because some of the leading farmers, which didn't receive the SMS (because they were not in the sample), thought that it was related to mobile money sent by the project to few "privileged" farmers. In all cases, and mostly where the immediate understanding was very low, as in Sofia, direct interactions with field officers or between farmers increased the level of understanding.

4.2.2. Perception of the usefulness of the information received and willingness to pay

The opinion of most farmers is positive about the information they received and most of them found it reliable. They perceived it first of all as an improvement of their general knowledge about market; some farmers saw possibilities of commercial use of it, to better negotiate and build their marketing strategy. To go more into details, the majority of rice farmers saw it just as

a way to get a better overview of the market (56% and 50% respectively for Sofia and Itasy), 22% of farmers in Sofia and 35% in Itasy believed that this information can be useful to manage storage, and respectively 17% and 25% to negotiate in better conditions. Only 10% of the farmers considered it as useless. However, SMS reception or listening to radio programs (see below) would not alter the main sources of information for rice producers: in Itasy, it is always through the collectors that most members are aware about rice prices, while in Bealanana it is going weekly to the market. Among vegetable growers around Antananarivo, 62% saw the messages just as general information, whereas 27% thought that they could use it to better negotiate or to build their commercial strategy. For 15% of the vegetable growers, it is useless.

The messages were sent free but it was asked to the farmers if they were ready to pay to receive them steadily. All the respondents were willing to pay in the case of rice, and 80% in the case of vegetables. But the amounts announced are most cases very modest, with an average of 1900 MGA per month for rice farmers and 900 MGA per month for vegetable farmers (which is the equivalent of about 0.6 and 1.3 kg of rice respectively). Although these amounts have to be considered very cautiously, as they are only declarative statements, they provide the indication that there is a willingness to pay to obtain price information.

4.3. The main constraints of price dissemination by SMS

4.3.1. Lessons learned from SMS sending experiments

One of the major initial constraints is the rapid “disappearance” of the recipients. Either because they lose their mobile phone and then change their phone number, or because they switch to another phone company that make a better commercial offer, or because they give their mobile to a relative, or because they indicate someone else phone number when the list of the recipients is set. For rice growers, within less than one year after the baseline survey (where phone numbers were collected and willingness to receive information through mobile phone was checked), almost half of the 70 recipient farmers surveyed said that they had not received the SMS (53% Sofia, 38% Itasy). Among vegetable growers, 40% said they did not receive the messages (or that they did not notice it). Registering phone numbers of farmers that declare that they are interested in receiving price information or relying on field staff that identify who is potential interested is thus not enough. A periodical follow-up and updating is needed.

Another range of constraint is more strictly technical:

- Rural electrification is still scarce (only 5% rural household have access to electricity; INSTAT, 2011) and recharging batteries is often an issue;
- The coverage of mobile phone companies is limited in rural areas; even around the capital city, farmers need to move to specific places to be able to use their mobile phones;
- Some very cheap mobile phones are not suitable for receiving SMS.

The penetration of mobile phone has been steadily increasing in Madagascar, as in other developing countries, but its use is still constrained by the general lack of communication infrastructures. Mobile phone companies, after focusing mostly urban areas, are increasingly targeting rural areas in recent years, promoting solar energy charging points, power banks and small kits of connection.

Apart from technical problems, learning issues need to be closely considered. SMS with market information are just a succession of more or less abbreviated elementary information. They need to be first correctly read, the meaning has to be understood, confidence in the quality of the content must be gained, and ultimately the appropriate knowledge is required to be able to turn the information into decision and action.

4.3.2. Mobile phone vs. use of other means of communication

Despite the hazards of reception, farmers have overwhelmingly approved the use of SMS for the dissemination of market information (97% for rice, 85% for vegetables) and wish to continue to be informed; either those that have received the SMS or not. But it is far from being the only possible way to disseminate prices.

In the two rice areas, radio programs were broadcasted through local radios during the same period than the SMS disseminations. They were more comprehensive than SMS, including the prices of the week, the trends compared to previous weeks, and some explanations or contextualization. It appeared that in rural areas, radios (especially local ones) have mainly a recreational function: they broadcast mostly music and very few educational programs. They have a poor geographical coverage and only 55% of our surveyed farmers regularly listen to radio. Moreover, the capacity of a market program to reach farmers deeply depends on the choice of the radio. In Sofia, where the programs were broadcasted by local radio that have a poor coverage, they were only heard by 18% of the sample. In Itasy the results were much more satisfying: the market program was broadcasted by the leading rural radio of the area and 53% of the producers have heard it. The advantage of radio must be acknowledged in terms of apprehensibility: for the producers that have heard the program (taking both regions together), the level of immediate understanding is very good (92%), and higher than the SMS (69%).

It was asked to the rice farmers if they would prefer other means of communication than SMS or radio to get market information. Unsurprisingly, as mobile phone penetration and radio coverage are the lowest in Sofia region, several alternatives are preferred: 50% suggest billposting and/or face to face communication with farmer leaders (34%), field staff (16%) or traders (13%). In Itasy, SMS or radio are the preferred for two thirds of the sample; 16% suggest billposting and the remaining face to face communication. In the peri-urban area, SMS from a MIS was largely acknowledged as a suitable way to get market information – for 85% of the farmers of the test. About one quarter of the recipients, found that some other means of communication could be more adapted. But only few of them actually suggest other means of communication, like billposting, meetings, radio.

5. CONCLUSION

Farmers' feedbacks following a few weeks of information dissemination via SMS provides mitigated results. Most farmers who have received the messages acknowledge some interest of getting price information via SMS. They are rather confident about the quality of the data and are even ready to pay for it in the future. Yet, these positive statements need to be balanced.

Firstly, they are only declarative statements, after short-period dissemination: (i) no farmers had actually the opportunity to use the information for cropping or selling decision; (ii) the willingness to pay was just declarative.

Secondly, the use of mobile phone faces several technical constraints in rural areas of Madagascar, especially in the most remote ones. Despite a fast increase in recent years, the ownership of mobile phone is still not widespread among farmers. Moreover, it is very heterogeneous among areas: from 46% of the households in the most remote area (although our sample is focused on the top 50% farms in terms of cultivated land), up to 75% the peri-urban area. Its use for professional matter is marginal. Out of town, mobile phone coverage is often limited to some specific locations and access to electricity is still the privilege of a minority.

Thirdly, the actual rate of reception of the sent SMS is low (globally about 50%), although only farmers with high potential to be interested in price information were selected for the tests. The “disappearance” of recipients demonstrates the very fast turnover of mobile phones and phone numbers. This instability of ownership makes mobile phone users’ identification and conservation a main challenge⁶. A close field follow-up of the recipients is required to avoid losing most of them in few months.

Fourthly, learning issues need to be closely considered. SMS with market information are just a succession of more or less coded elementary information. First, farmers need to be familiar with the syntax used and understand the meaning of the message, then they must be confident in the quality of the content, and ultimately they must have the appropriate knowhow to turn elementary information into decision and action. SMS alone cannot be enough. To reach a significant share of farmers, they need to be backed with more comprehensive explanations about the content of the messages, the way to interpret the information, and how to use it. It must be underlined that in the farmers’ perception, getting better information on price does not mean systematically getting better selling prices: the majority sees it rather as a source of general knowledge. It then cannot be surprising that no major changes in behavior and marketing performances are noticeable, at least on the short term. That does not mean that improving knowledge, as a capacity building, is not necessary. However, assessment of the impact of this knowledge implies a much broader view than just measuring differences in selling prices or quantities sold (which is what impact assessment studies of MIS generally do).

Relying only on mobile phone to disseminate market information would exclude a significant portion of farmers who fails so far to have access to such communication tool or are unfamiliar with SMS. The MIS can be a driving force to popularize the use of mobile phones and SMS for business purpose at farmers’ level, but this would require major training efforts. Beyond the technical accessibility and the capacity to use SMS, the enhancement of farmers’ ability to understand the meaning of the information spread through SMS and use is critical. Diverse complementary broadcasting tools are needed (mobile phone, radio, blackboards), as well as a learning process through direct interaction with extension service agents.

More fundamentally, the possibility of choice needs to exist. Choice in the cropping calendar and the varieties grown, choice between selling on farm to a single collector that comes to the village or going to an active gathering market with more competition among buyers, choice between selling after harvest at low price or storing for some months before selling. Even the best

⁶This turnover might be reduced in the future. Since 2016, a new regulation has been set up in Madagascar: each phone number is registered with the subscriber identity, in order to facilitate the recovery of the phone number, in case of loss of the SIM card or the mobile phone. But the effectivity of the implementation or this low is not known.

information system would not solve the lack of technical support, the problems of remoteness, the imperfection of credit market, the missing storage facilities, the lack of collective action between farmers. Indeed, as highlighted by Arias *et al.* (2013) or Galtier *et al.* (2014), improving access to market for small farmers must be tackled in a more holistic way.

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