

FINANCIAL REASONS FOR THE ADOPTION OF NEW AGRICULTURAL TECHNIQUES. The case of Lake Alaotra, MADAGASCAR

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ABSTRACT

The importance of the agricultural sector in the economy of a developing country prompts various agencies to seek innovative policies in agriculture. Innovation is always considered as a pathway to performance, whether in the primary, secondary or tertiary sector. It can bring technical or organizational changes but especially financial ones. With regard to the financial management of farms, the question that arises is to know in what economic situation is innovation on the farm unavoidable?

Assuming that the precariousness of income from the farm justifies the use of an innovation process. This work provides analyses that determine the financial situation of farmers in Lake Alaotra, the epicenter of rice cultivation in Madagascar.

Keyword: Agriculture, Farmers, Income, Technique, Innovation, Development

INTRODUCTION

After 1960, the colonial companies were taken over by wealthy Malagasy or nationalized, and the limited availability of irrigated or even poorly irrigated rice fields at the bottom of the valley requires increased cultivation of the tanety. Pluri-activity has characterized the vast majority of families for a long time according to the various possible work opportunities, since there are always landless, migrant farmers living off their labor power. Secondly, it is mainly migration and demographic growth that have had an effect on the evolution of farms in this zone. The agricultural potential of the area attracts immigrants. All the people have their own strategies for exploiting the available land; there were no common management techniques. The rice-growing techniques in this area were still broadcast seeding and transplanting in crowds. Land pressure remains the main driver of farm development. All rice fields are exploited and new arrivals are forced to gradually exploit the tanety.

In recent years, the study of the functioning of farms in Madagascar has been developed, yet agricultural development actors and researchers have recognized that the diversity or heterogeneity of farms is a hindrance to the effectiveness of actions carried out with farmers. Each of the farmers evolving in the same socio-economic environment have a particular history that explains their current situation, and that will determine their future.

Since independence, successive agricultural policies in Madagascar have constantly promoted technical and organizational improvements to family farms in order to increase production and make them more profitable. They are mainly oriented towards improving rice yields, since rice is a staple food for the Malagasy people and a strategic product at the same time. This product is a major economic and social issue at the national level because two out of three (2/3) farmers in Madagascar are directly involved in this area. Innovation is seen as a pathway to performance in the agricultural sector. Through several organizations, farmers innovate, test new

practices, and evolve their activities in order to make the most of their environment or to adapt to its evolution (Bentz B, 2002). But the problem that arises is in what economic situation is innovation on the farm unavoidable?

In fact, the country is constantly improving agricultural policy frameworks to bring technical and organizational improvements to farms in order to increase productivity and secure farmers' income. The introduction of sustainable development policies in Madagascar is oriented towards improving living conditions in rural areas, opening up markets and enhancing the value of available resources by protecting the environment. Major policy changes in the context of structural adjustment have led to institutional changes at all levels, including the agricultural sector and rural development (Le Coq J.-F., Ribier V, 2005). But the institutional reforms have not been accompanied by an improvement in the optimal level of peasant income. It is clear that the income of peasants remains precarious, a situation accentuated by inflation and the depreciation of the national currency, Malagasy peasants have become poorer since 1960 (Salava, 2010). The objective of this work is therefore to analyze the financial situation of Malagasy farmers in order to justify the usefulness of an innovation process.

Despite the long-standing national rice policy, national production does not cover the need for self-consumption until now. Madagascar is the second largest country in sub-Saharan Africa in terms of irrigated area for one million hectares, or 30% of agricultural land (MAEP, 2006), despite the establishment of agricultural support services such as agricultural advice and credit.

Based on a hypothesis suggesting that the precariousness of income from farming justifies the use of an innovation process. The characterization of the farms presents the results after the series of statistical treatments and comparative analyses of the responses obtained by site concerning the evaluation of the economic situations of the farmers in the Lake Alaotra zone

First, the results are processed using Xlstat, a software program whose interface is based entirely on Microsoft Excel, both for data recovery and for the restitution of results. The quantitative variables are then filled in as numerical values, the qualitative variables have been coded as numbers in order to express the different modalities. Thus, we obtain a database containing all the farmers met in the field. The data can be processed using the usual statistical and graphical functions of the software.

I- CONCEPTUAL BASIS

The farming system is the reasoned combination of the productive activities of agricultural and non-agricultural goods and services practiced by farmers, as well as the nature of the resulting relationships with the environment" (Bertrand, 1989). The family farm is also both a decision-making center and a center of responsibility. Compared to a traditional business, the type of decision includes four levels of purpose: purpose four (immediate) is performance on the one hand and productivity on the other. Goal three is the return on the factors of production versus the satisfaction of needs. The common finality of the company and the farm is profit and the preservation of the environment. The "final" finality is sustainable profit versus family welfare.

This both horizontal and vertical approach to operational flows and factors of production gives rise to a series of complementary approaches to survival and sustainable livelihoods. A systemic approach thus makes it possible to characterize the levels of organization (crops, farms, territories, etc.) and to account for the overall functioning and dynamics of these systems.

The farm is thus a basic economic unit, finalized and constituted by its human, material and financial means. Its operating world is influenced by the internal and external environment. The innovation introduced can modify part or all of the agricultural practice because this unit is an open interdependent system

The operation of the farm is the set of decisions made according to the constraints and to achieve general and specific objectives. Therefore, land, human and financial factors are managed with the socio-organizational dimension.

According to the Petit Larousse (2002), to innovate means to create, invent or introduce something new in a particular field. This general definition is often adapted to the context in which it is used. Researchers, through their experience with this concept, have defined the term differently. They associate it with other concepts such as initiative, change, decision and strategy. Thus, several authors have defined innovation according to their perception. Among many others, Emmanuel-Y. (1999) has argued in a broader sense that innovation is a novelty introduced into an existing system in order to make it work better. In this case, the innovation is at the same time the invention of the new element which one proposes to introduce in the existing system, the process of the introduction and the process of the diffusion of the novelty.

According to Schumpeter (2004), innovation is "a new combination of factors of production". According to this author, an innovation in agriculture is "a new practice that leads to a new combination of factors, in a given

region or farm". These factors can be labor, land capital, farm capital, biological material, equipment, etc. This is a purely economic definition of innovation and leads to the consideration of its impact on income. Innovation is a means or a tool towards the development and social progress of farmers. In its simplest sense (Nigel Poole, 2006), innovation means novelty, doing new things or doing in a new way what one has always done

II- RESULTS

In relation to the objective of this work, the results focus on the financial situations of farmers by analyzing the income from this activity.

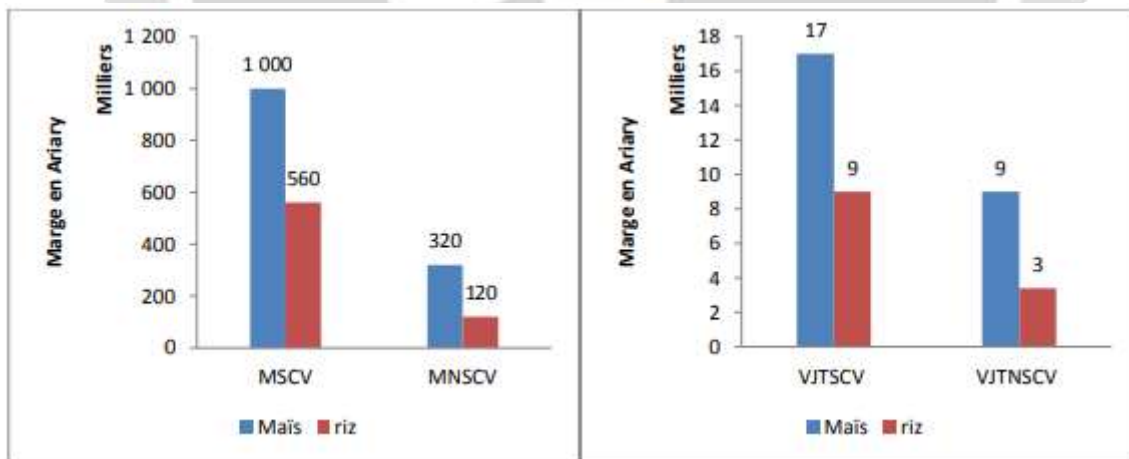
2.1 Farmers' income or gross margin

The income of the farmers interviewed is the sum of what they earn from agricultural activities and non-agricultural activities (off-farm). In the case of farmers in Lake Alaotra, they diversify their income sources to cover their annual needs. Rice cultivation, rainfed crops (in SCV and non SCV), fishing and livestock breeding constitute the main activities that generate income from agricultural sources. While non-agricultural activities are essentially small businesses or film projection.

As a result of simplified calculations made with interviewees, the DMC system is always profitable regardless of the type of main crop. Maize and rice are the main crops for DMC, so the margins on these techniques should be added to those of the cover crops, such as cowpeas or cowpeas. The following two figures facilitate the reading of the (annual) margins of the farms. In this study, the cases of maize and rice, the two most significant rainfed crops in terms of area cultivated and family income, are compared.

Maize is more profitable than rice. And in terms of rice cultivation, the importance of rainfed rice under DMC is greater than that of irrigated rice without DMC. Rainfed rice is beginning to be taken up by farmers because of land problems and the availability of suitable rice fields. But on the tanety, farmers give more priority to maize than to rice, hence the dominance of maize in terms of area farmed. In any case, the margin obtained with DMC systems remains very interesting compared to traditional systems. In terms of labor time, despite the additional work generated by the new techniques, the value of labor time is very satisfactory for all types of DMC crops (figure on the right).

Figure 1 : Comparison of margins of type 1 cropping systems calculated for 1ha



Legend: MSCV: Average margin on 1ha of DMC; MNSCV: Average margin on 1ha of the traditional technique; VJTSCV: Valuation of the day's work on semi-direct plant cover; VJTNSCV: Valuation of the day's work on traditional technique

Source : Authors, 2023

In short, the new DMC farming system is much more profitable in economic terms than traditional techniques. However, its adoption remains small even for the first beneficiaries of the innovation. As mentioned below, the prospects for expansion are not foreseeable; these are farmers who have sufficient land (tanety and baiboho) to meet their annual needs, using only the traditional technique. Farmers are not yet aware of the economic benefits of adopting DMC on their tanety and baiboho farms. They started with insignificant areas in relation to their

needs in terms of production and economic return on the one hand. Farmers in the Alaotra are also concerned about covering all cultivable areas during each normal cropping cycle.

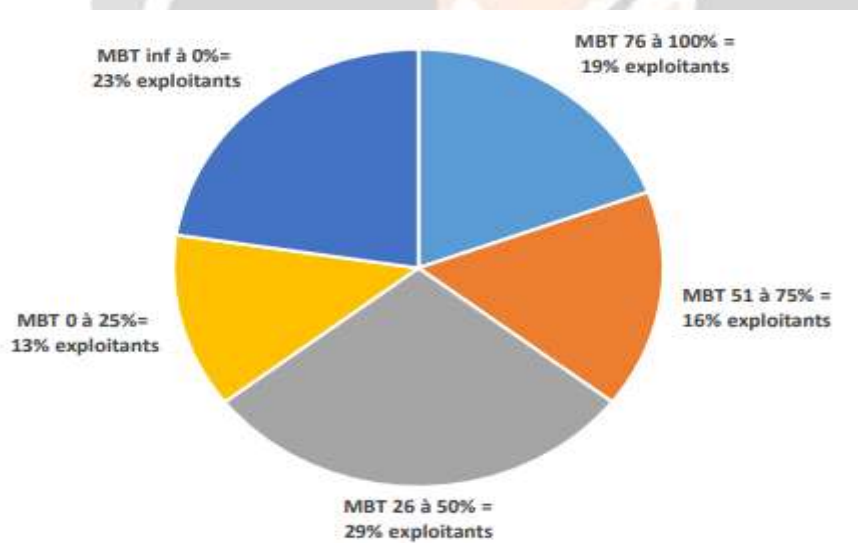
The practice of growing rice during the normal season has a very important social dimension for Malagasy farmers. It is a disgrace to the community if a Malagasy farmer does not grow rice in the normal year, regardless of the size of their field. However, DMC requires additional activities that may consume the time available during a given crop cycle. Without the availability of time and especially financial resources, the landowner must leave part of his or her tanety or baiboho if he or she is to meet the technical needs of DMC. This is why farmers with large areas (tanety and baiboho) limit the area reserved for DMC on their first experimental plots. The intention to expand is not yet observed on the site during our study.

For the majority of farmers, the total of income-generating activities has an annual gross margin of less than Ar.2,000,000. The annual margin varies from - 716.817 Ar (deficit) to 8.099.900 Ar. Thus, the 6% are in deficit. Negative rice margins produce this deplorable situation, a situation largely ignored by farmers.

2.2 Rice farming as a source of agricultural income

This paragraph combines income from rice production on irrigated rice fields and on MMR. Irrigated rice production is always the primary source of income, followed by rainfed rice production on DMC or not. For the rare off-season rice crop, tillage and sowing of the nursery is done in July, transplanting in August and harvesting in December. The 10% of farmers explained that rising water levels during the harvest period are the cause of the farmers' low yields. This is the explanation for the demotivation of this practice. The following figure summarizes the contribution of the rice margin to the total annual income of farmers. According to this figure, 23% of farms have negative rice margins, which are compensated for by other activities. On average, the share of rice cultivation in farm income is 47%.

Figure 2 : Contribution of rice income to household income



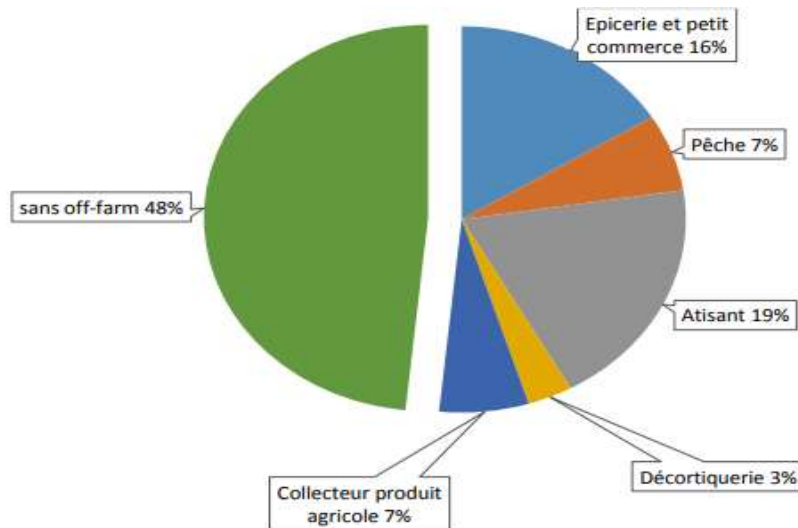
Légend: MBT less than 0%: Level of contribution to total gross margin less than 0% MBT 0 to 25%: Level of contribution to total gross margin between 0 to 25% MBT 26 to 50%: Level of contribution to total gross margin between 26 to 50% MBT 51 to 75%: Level of contribution to total gross margin between 51 to 75% MBT 76 to 100%: Level of contribution to total gross margin between 76 to 100% MBT

Source : Authors, 2023

2.3 Extra-agricultural activities sources of income

Off-farm activities also divide farms into two main groups. Almost half, or 48% of our respondents, do not practice these activities, and more than half, or 52%, do. One of the reasons for practicing non-agricultural activities is the small surface area of the rice fields and tanety. Farmers manage survival risks by diversifying their activities (agricultural or off-farm). The following figure shows an assessment of the distribution of off-farm activities encountered.

Figure 3: Main off-farm activities in the area

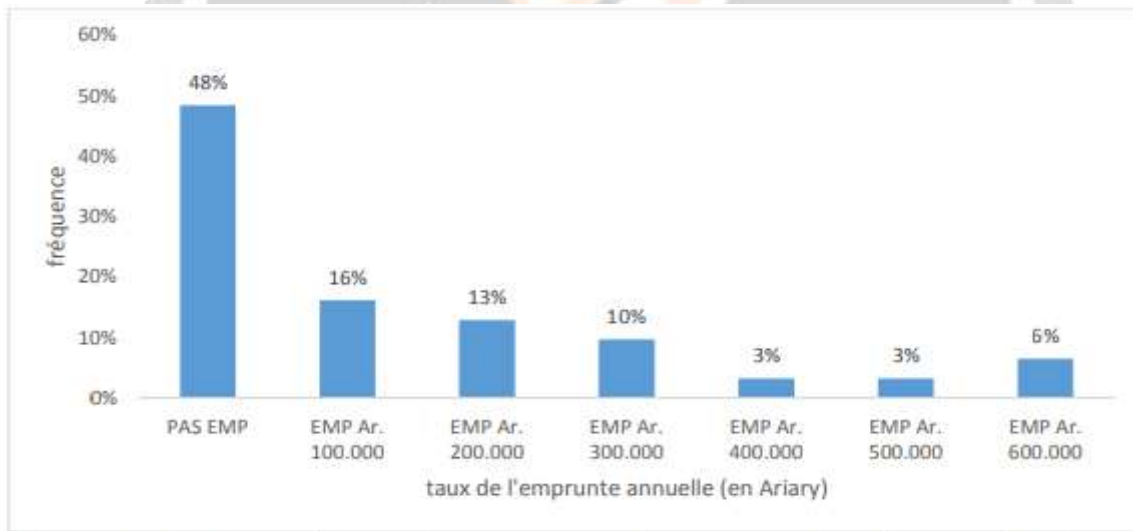


Source : Authors, 2023

2.4 Annual borrowing practice

Almost half, or 52% of farmers, borrow money from microfinance institutions, banks, or individuals, generally for agricultural purposes and with an average delay of one year, or rather during one cycle of a crop calendar. On average, the value borrowed by farmers is Ar 364,000. The following figure summarizes the results obtained during the farmers' interviews.

Figure 4: Amount of the annual loan (in Ariary)



Légend: NO EMP: farmers who do not borrow annually during the period of our data collection; EMP Ar. 100.000: farmers borrowed annually Ar.100.000 during the period of our data collection, and EMP Ar. 200.000 = Ar. 200.000, etc...

Source : Authors, 2023

III- DISCUSSIONS

The results presented above show that the income from farms remains precarious, the margins granted are not substantial enough and the farmers resort to other activities to ensure their daily needs. The results also show that

farmers resort to borrowing for agricultural purposes. This situation justifies the need to resort to innovation in farming.

In fact, the lack of cash flow still characterizes the farm in Lake Alaotra despite its large size. This situation still remains a specific characteristic of family farms. The surveys show that 80% of the households surveyed do not master family cash management for the next cropping season, even if the household has a rice surplus. Financial forecasts are lacking. Revenue management is in deficit, despite increased yields. Regardless of farmers' rice yields, most of them experience the same situation during the period from sowing to transplanting (the lean season). This situation affects about 90% of the farmers in this area. And the situation remains a vicious circle for Malagasy farmers in general. Farmers' strategies are based on diversification, all activities being complementary.

Rainfed rice cultivation is often synonymous with diversification of income-generating activities, despite its timeliness and performance compared to irrigated rice cultivation. It occupies a surface area on tanety that is roughly the same size as that of irrigated rice fields. The margins on rice growing and on other activities are almost equally divided. This means that diversification of activities is a peasant strategy for dealing with risks (food insecurity in rice, among others). However, in recent years, the influence of agricultural projects on the dissemination of the DMC technique has motivated farmers to use rainfed crops as a potential source of income. Comparative analyses of margins between different systems have shown that DMC techniques provide more margin despite a small difference in initial costs.

Given the agricultural potential and population pressure, farmers are diversifying their activities to meet their own consumption needs. Rainfed rice is the most dominant crop compared to irrigated rice. The latter is often in deficit (expenses incurred are much higher than the revenue obtained), yet rainfed rice is still considered a back-up activity. Rainfed rice and maize are the main crops grown in the area. Rainfed rice occupies the tanety because the irrigated areas have already been taken over by the first arrivals and are becoming insufficient.

Thus, farming is very important in the daily lives of farmers, as it ensures their financial and economic situation. However, the income from this operation is still not satisfactory, a situation that confirms our hypothesis that the precariousness of income from the farm justifies the use of an innovation process.

CONCLUSION

The results obtained allow us to conclude that the farm is not a sufficient financial source to ensure the daily needs of the household, so they resort not only to other income-generating activities but also to loans. However, in the face of these multiple and increasingly difficult situations, agricultural policies are only evolving at their own pace, with traditional rice farming remaining the main activity despite its low yield. In this context, innovation in agricultural practices is necessary to increase yields and productivity through the introduction of new techniques in order to improve the standard of living of farmers, because it should not be forgotten that family farms must satisfy both the needs of self-consumption and family income.

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