

THE FINANCIAL SUSTAINABILITY OF THE MICROCREDIT SCHEME CREATED THROUGH RICE BANKS.

CASE STUDY IN SIEM-REAP PROVINCE, CAMBODIA.



Rice Bank 1- Committee and Borrowers

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1. Introduction

The Kingdom of Cambodia is a country located in the Indochina Peninsula, Southeast Asia. The country suffered from many years of violent war, which ended only in 1998. Between 1975 and 1979, the situation was worsened by the bloody Khmer Rouge regime, which caused the Cambodian genocide and aggravated the situation of poverty and famine due to wrong agricultural and economic reforms. (Kiernan, 2014). After the end of the war, Cambodia's economic, political, infrastructural and educational system was destroyed and the population itself was devastated.

The area of my research, Siem Reap Province, was one of the last Khmer Rouge strongholds. The end of the war left it in a deep situation of poverty. Siem Reap Province is a rural area (Annex I), where the cultivation of rice paddies is widely spread. Despite tourism brought a substantial capital inflow due to the presence of the World Heritage Site of Angkor Wat, the situation for the rural inhabitants it is still difficult. According to the National Statistical Institute, Siem Reap Province has a poverty incidence rate of more than 50%, and has the highest gap of poverty among the Cambodian province, at 17.3%. (National Institute of Statistics, 2012). The rural villagers in this region lack of access to finance and markets, which constrains their economic development (Junning, Luyna, Sununtar, & PingSun, 2008). In the whole area, the poor subsistence farmers suffer from a heavy reliance on rice cultivation, aggravated by lack of infrastructure for irrigation, lack of modern agricultural skills and machinery, and increasing problem of chronic floods and drought (Junning, Luyna, Sununtar, & PingSun, 2008).

Despite the area is fertile and harvest are often rich, the farmers heavily rely on rice, being the biggest part of the income for the majority of the inhabitants of these areas. That means that rice is not just eaten but also sold for purchasing and covering any other necessary need: other kind of food, school expenses, medical expenses, etc..... According to the information given in the reports and during my fieldwork by Lotus and READA, two of the NGOs managing the Rice Banks' projects in this area, a few months after the rice has been harvested, the farmers face rice shortages and hunger (Lotus, 2011). According to the NGOs, the situation leads to issues of different nature, such as: negative impact on children's health and education, migration of villagers to richer cities and debt due to rice borrowing from local lenders at extortionate interest rate, up to 200% per year (Lotus, 2011). The issue of incurring debt from local lenders at very high interest rates, forces the farmers into a debt escalation, leaving them unable to stop the debt cycle. This is the driver that led local and international NGOs to conceive and implement the project of Rice Banks, credit institutions lending rice to the farmers in need with a low interest rate.

This work will focus on the functioning of Rice Banks and what are the drivers that make them self-sufficient. It is necessary for the survival of the Rice Banks to be financially sustainable. According to the Microbanking Bulletin (2005), the financial sustainability of a microfinance institution can be defined as "its capacity to cover all of its expenses by its revenue and to generate a margin to finance its growth. In other words, it is the capacity of a microfinance institutions to carry out its activities without the need for subsidies in the form of concessional loans or donations". In this case, it would mean the capacity the Rice Bank has to increase its rice deposit and to cover the costs of lending without appealing to external subsidies and rice top-up. Although many researches and evaluation have been conducted on how microcredit institutions can be financially

sustainable and which factors influence the sustainability, the answer is not univocal but varies according to the characteristics and *modus operandi* the institutions have (Zeller et al., 2002). Moreover, a microcredit scheme that works with staple food instead of money can face different challenges and its sustainability can be influenced by different factors than standard microcredit institutions.

The Rice Bank scheme is currently spreading around different countries in South-East Asia. In many Asian countries rice is one of the main agricultural products and a staple food in the standard diet. Many farmers are heavily dependent on rice production and are facing food shortage and adverse climate conditions situations (Yu & Shenggen, 2009).

Due to the recent development of this kind of microcredit institutions, there are still no academic research in relation to their functioning and their level of sustainability. The Rice Banks could be an important tool for fighting the food shortage of the poor farmers in Cambodia and the negative consequences it can bring. Therefore, investigating which are the characteristics driving the Rice Banks' financial sustainability, is important for understanding if these food bank schemes can effectively work autonomously and, successively, if the same scheme can successfully be implemented in countries with a similar socio-economic situation and similar agricultural production.

In order to generate information that could help to answer the question just stated, three sub questions have been developed to analyse three different determinants of financial sustainability. These factors are the interest rate, the relationship between the rice banks and the external financial sources and the reasons that can explain the differences.

- 1) Does the interest rate cover the Rice Banks' costs?
- 2) Are the Rice Banks independent from external financial sources?
- 3) Which factors can be held responsible for the differences in levels of financial sustainability between the rice banks?

The next paragraph will delineate the theoretical framework and the description of the case study analysed will follow in section three. In section four, the Research Design and Methodology will be explained. Then, the results will be analysed and presented in section 5 and, in the following part, there will be the discussion of the findings. The last paragraph will state the conclusions, including suggestions for possible further research.

2. Theoretical Framework

The concept of microfinance has existed in different forms for centuries, especially in Asian countries, where the practice of informal lending and borrowing has been historically traced back to several thousand years ago (MicroWorld, 2014). However, the origin of the modern microfinance can be traced back to only about 4 decades ago, with the foundation of loan institutions such as the Grameen Bank in Bangladesh, which started to institutionalize the process. After the start with few thousand clients in the rural areas of Bangladesh, India and Indonesia at the beginning of the 1970's, it widespread in many other parts of the world.

Currently, there are more than ten thousand microfinance institutions in the world, comprising different kind of institutions, such as credit unions and cooperatives, NGOs, government organizations, private companies and commercial banks (Lucarelli, 2005). According to the Microcredit Summit Campaign, in 2011 the estimated number of clients served by microfinance institutions in the world was about 190 million (Reed, 2011).

Before analysing the concept and theories behind the modern microfinance, it is important to define what microfinance is and what is the difference between microfinance and microcredit, two terms often used interchangeably. According to Otero (1999), microfinance is '*the provision of financial services to low-income poor and very poor self-employed people*'. These financial services generally include credit and savings, but can also include payment services and insurance. (Ledgerwood, 1999). Therefore, microcredit is one aspect included in the broad term of microfinance. Specifically, microcredit refers only to the service of giving micro-loans and does not involve any additional not-credit service, which are components of microfinance. (Qudrat-I Elahi and Lutfor, 2006). In this research, I will refer to the term microcredit since it is the service provided by the Rice Banks I will analyse.

Microcredit arises as a financial service for the poor people for accessing credit, with the ultimate goal of alleviating poverty (Hulme & Mosley, 1996). According to Khandker (1998), the objectives are to ease the credit constraints of households and/or provide them with a sufficient amount of liquidity that would permit them to start a personal income generating activity.

In the 1990's, two main different approaches to microfinance have been developed: the **financial systems approach** and the **poverty lending approach**. Both approaches agree on the ultimate goal, which is to alleviate poverty, serving as many poor people as possible in a sustainable way; yet, the means by which these goals should be reached differ. The financial systems approach "emphasizes large-scale outreach to the economically active poor—both to borrowers who can repay microloans from household and enterprise income streams, and to savers" (Robinson, 2001). The financial systems approach focuses on institutional self-sufficiency; taking into account the increase of microfinance services' demand in the world, this is considered the only way to meet the demand of the many clients that requests convenient financial services.

The poverty lending approach concentrates on reducing poverty through credit, often provided together with complementary services such as skills training and the teaching of literacy and numeracy, health, nutrition, family planning. Under this approach, credit is provided to poor borrowers, typically at below-market interest rates. The goal is to "reach the poor, especially the extremely poor with credit to help overcome poverty and gain empowerment". (Robinson, 2001).

The need of institutions that aimed to provide financial services specifically for the poor arises from the fact that majority of the regular Banks do not provide microfinance services because of the high cost these products have and the information asymmetries they encounter when providing credit to poor people in developing countries(Hulme and Mosley, 1996).

The high costs of providing micro loans is the reason why, even when the loans become very small, the interest rate cannot decrease below a certain minim threshold. CGAP explains that institutions providing micro loans have to cover three main costs: the cost of money lent and loan defaults, which are usually proportional to the amount lent, and transactions costs, not proportional to the loan requested (CGAP, 2016). The transaction costs include personnel's time to meet with the borrowers, processing the loan disbursement and repayment and monitoring. These costs are very similar and for small loans and for big loans. Due to these high costs, the interest rates applied are usually high in microcredit loans. Therefore, when loans gets very small, as it often happens in microcredit institutions, transaction costs cannot decrease below a certain threshold, constricting the microcredit institution to apply a high interest rate compared to the small amount borrowed. CGAP clearly explains the mechanism behind it: "Suppose that the transaction cost is \$25 per loan and that the loans are for one year. To break even on the \$500 loan, the MFI would need to collect interest of $\$50 + 5 + \$25 = \$80$, which represents an annual interest rate of 16%. To break even on the \$100 loan, the MFI would need to collect interest of $\$10 + 1 + \$25 = \$36$, which is an interest rate of 36%" (CGAP, 2016).

In addition, especially in rural areas of developing countries, many types of information are not able to flow freely but are segmented and circulate only within certain local network. That is the reason why local lender have an advantage in comparison to formal lending institutions: they have tight social ties with the borrowers and they can differentiate between high-risk and low-risk borrowers, charging appropriate interest rate (Stiglitz, 1990). The imperfect information in credit markets generates problems of *adverse selection*, *moral hazard* and *lack of enforcement*. Very often, the borrowers cannot provide a suitable collateral and it is difficult to enforce loan repayment (Besley, 1994). In order to overcome these information problems, an increasing number of microcredit institutions decided to provide credit to the poor based on a "social collateral" instead of the financial one required by formal finance institutions. That means that the social capital acquires great importance and is the social reputation within the network where the borrowers live that functions as a collateral for the loan repayment. The concept of social capital takes into account both internal ties, within the members of the lending group, and external ties, within the borrowers and the rest of the community. (Postelnicu et al., 2013).

In the microcredit industry, credit is provided through two main methodologies: the *individual lending* and the *group-based lending*. The differences between the two methodologies are relevant in the discussion of methods to overcome the information asymmetries just presented. The primary difference between these two approaches is the way loan screening, monitoring and enforcement are managed. In the individual lending, the microcredit institution is the main responsible of these processes. Conversely, in the group lending methodology, the processes of screening, monitoring and enforce repayment are mainly managed by the group of borrowers. The group-lending approach, in fact, is considered a way to mitigate the information asymmetries. With the group-based lending, the members select the other borrowers in the group and screen

each other, helping to overcome the adverse selection issues of formal credit institutions. Then, the members have to monitor each other after the loan has been granted, which can help to decrease the moral hazard problem. Finally, the borrowers usually have joint liability for the repayment and, in case a member defaults, the rest of the group will not be able to ask for more loans in the future, therefore enforcing repayment within the group (Brau et al., 2004).

The microfinance and microcredit institutions providing the financial services and all the implications just described above can assume different characteristics in relation to the socio-economic context where they are created and work (CGAP, 2011). The term includes a wide variety of organizations differing in legal structure, mission and methodology, keeping the goal of providing financial services to poor people. In the early years of the spread of microfinance, these organizations were mainly non-profit organizations. In the last year, the microcredit industry has seen a shift towards the commercialization of microfinance and business-driven organization, including a number of commercial banks that started to get involved in microfinance activities (CGAP, 2011). Nowadays credit unions, commercial banks, NGOs, sector of government banks and cooperatives can all offer microfinance services (CGAP, 2016)

A prominent model that widespread since the beginning as a form to provide financial services in developing countries is the one of autonomous local collectives, supported by NGOs, governments and/or commercial banks (CGAP, 2007). These collectives are called *self-help groups* (SHGs) and are the dominant form of microfinance in India (CGAP, 2007). Self-Help Groups usually refer to groups of about 10-20 poor people who join in a group for the provision of financial services. The SHGs usually start with a saving activity, where all the members of the group save regularly in order to build a common deposit. After that, the members can start to borrow from the fund created. The loans initially disbursed are usually small and used for consumption or for repaying previous debts borrowed from other sources at high interest rates (such as local lenders). Additionally, some self-help groups provides training for the community, such as literacy training, health care and family planning information (CGAP, 2007).

SHGs are run by their members, which have control on saving amounts, interest rate applied and any other element related to the financial services provided. Literate members of the group or supporting institutions do the accounting and bookkeeping. The promoting and supporting institutions that help forming the SHGs are nongovernmental organizations (NGOs), government agencies, banks, cooperatives, and microfinance institutions.

This form of microfinance is a means to reach especially the rural population, which has less opportunity to reach and contact formal microcredit institutions. (CGAP, 2007).

From the framework just delineated about the characteristics of microfinance, it derives that microfinance institutions adopt different forms, lending methodologies and approaches. Despite these differences, during the 1990s, researchers recognized three main policy objectives that every microfinance institutions should reach: financial sustainability, outreach to the poor and welfare impact (Zeller et al., 2002). The policy objectives are exemplified in the figure below, called “triangle of microfinance” (Zeller et al., 2002).

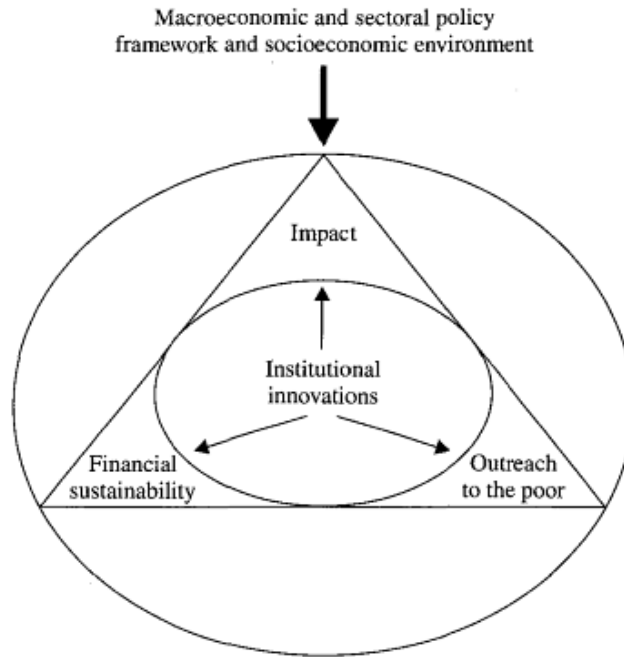


Figure 1. the critical triangle in achieving economic sustainability of microfinance (Zeller et al., 2002)

As can be seen from the figure 1, the institutional innovation is one of the factors that can contribute to improve financial sustainability, impact and outreach to the poor. At the same time, the external macroeconomic policy framework and socioeconomic environment are also seen as factors that could have a positive effect on microfinance institutions.

For many year, practitioners researched and tried to identify the drivers and elements that make a MFI financially sustainable (Armendáriz and Morduch, 2010).

The **interest rate** level has been highly debated in the literature. In fact, this is a big part of the revenue of microcredit institutions and therefore influence their financial sustainability (Rosenberg, 2013). The interest rate amount of a MCI is composed by the cost of funds, loan loss expenses, operating expenses and profit.

The cost of funds is the cost microcredit institutions have to cover to fund their loan portfolio. The funds for the loan portfolio can come either from subsidized government liabilities from development agencies or commercial debts from international market. In both cases, it is a cost that microcredit institutions have to take into account.

The loan loss expenses is an expense set aside for covering possible customers' default.

The operational costs include all the costs necessary for implementing the loan operation, such as personnel compensation, supplies, travel.... They are usually the higher costs for microcredit institutions. Managers are commonly paid a fixed monthly salary and microcredit agents often needs to travel into remote villages to meet with the borrowers for monitoring and for collecting the loan repayment. Therefore, operational costs are usually a big determinant of the interest rate level the borrowers pay (Rosenberg, 2013).

According to CGAP (2004) the amount should be below the ones of informal lenders, which are usually extortionate. Cull, Kunt and Morduch (2007) confirmed that, for attaining financial sustainability, a MFI has to charge sufficiently high interest rate but not exorbitant. They analyse a

MFI granting individual loans. What they find out is that, when the interest rate is higher than 60%, the demand for credit decreases and the institutions is not profitable and sustainable anymore. Therefore, the interest rate charged should be high enough to cover the loan provision's expenses, but at the same time should not be needlessly high because it would lead to a loss of clients and damage its social mission (CGAP, 2004).

In addition, the role of the interest rate has been discussed by Stiglitz and Weiss (1981). They researched that the interest rate charged could work as a screening device between good and bad risks by sorting potential borrowers- *adverse selection*- and affecting the actions of borrowers – *moral hazard*. The borrowers may be willing to pay high interest rates because they perceive that the probability they will repay the loan is low. As the interest rate raises, the riskiness level of borrowers would increase as well, lowering the bank's profit. They show how raising the interest rate induces borrowers to undertake projects with lower probability of success but higher return if successful. The main point of their research is that the expected return of the bank may increase less than the interest rate and may actually decrease beyond a certain point. Therefore, increasing the interest rate more than the "bank-optimal rate" would have the effect to decrease the bank's return (Stiglitz & Weiss, 1981).

A second element that the literature highlighted as influential in the financial sustainability of MFIs is the **loan repayment rate**. Schreiner (2000) underlined as the loan repayment rate and the profit derived from it is the main driver of sustainability of MFIs. Schreiner (2000) also pointed out how effective collection policies leads to higher repayment rates. According to Armendariz and Morduch (2007), delinquency policy, efficiency of loan officers and investment policies affect the rate of loan repayments.

In addition, an element proved recurring relevant in the financial sustainability of microfinance institutions is the **management level**. Bourke (1989), in his study on the determinants of sustainability, shows how management efficiency raises the profitability of microfinance institutions. Armendariz and Morduch (2004) debated and showed how the managing expenses play a key role in the level of financial sustainability. Ayayi and Sene (2010) analysed 217 microfinance institutions in 101 countries over the period 1998-2006 with the aim of understanding what are the factors that drive the MFIs financial sustainability. Their findings shows that a high quality credit portfolio, sufficiently high interest rates and a good institutional management are the necessary instruments to make a MFI financially sustainable. Tehulu (2013) carried on an empirical research on the determinants of the financial sustainability of microfinance institutions in East Africa. A part from the repayment rate, the other indicator that he found to have a significant negative impact on the financial sustainability of these institutions is the management inefficiency. According to the study made by Hudon (2010) on the correlation between management and financial management, there is a positive correlation between management rating and financial self-sufficiency (Figure 2).

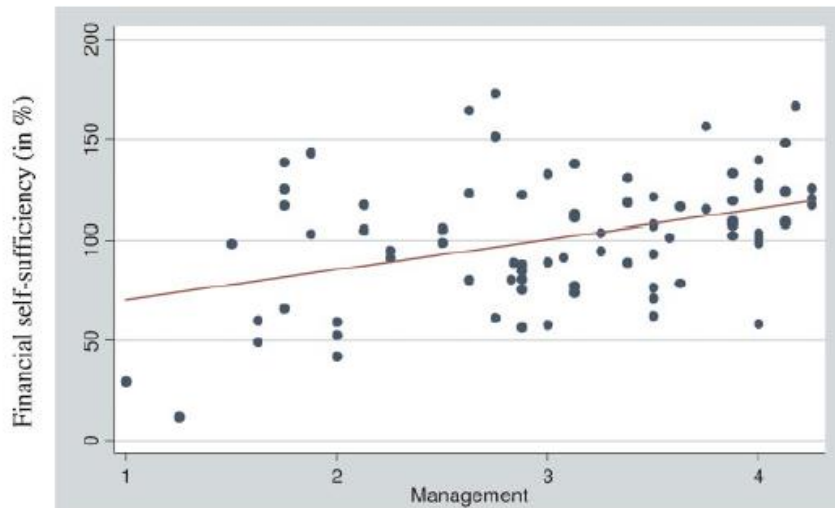


Figure 2. Management and Financial Performance. Correlation Coefficient 0.394

The drivers of financial self-sufficiency just presented are specifically of standard microcredit institutions that give loans with money. My case study analyses micro-credit organizations that gives loans in kg of rice. It means that, when I analyse the quantity of rice harvested and repaid, I need to take into account eventual losses given by various factors closely related to the element of rice in the credit scheme.

In my case study, both *pre-harvest* and *post-harvest losses* need to be considered when quantifying the annual performance of the bank. Pre-harvest losses can deeply affect the quantity of rice available after the harvest, and therefore the capacity of repayment of the farmers and the numbers of loan default. If a farmer has a big loss while the rice is growing, it will struggle in repaying his loan.

As for the post-harvest losses, they are costs that the Bank has to cover, and they can affect the deposit available for the following year. Pre-harvest losses are mainly due to no favourable weather conditions and pests/weeds. As for the post-harvest losses, the definition includes all the losses happening between the harvesting and the consumption of the rice. It includes losses during transportation and storage problems. These losses directly affect the rice deposit to be borrowed the following year and are therefore important to be examined as an element that can influence the financial sustainability of the rice banks.

Both the drivers of financial sustainability of standard microcredit institutions and the rice-related factors identified in this section will be discussed and explained in detail in the Data and Methodology section.

3. The case study: Rice Banks's functions and objectives

The social and economic context where this case study takes place is the one of the rural areas of Siem Reap Province, in Cambodia.

Despite the development of the industry and service sectors that the government planned and started to implement after the end of the Pol-Pot regime, the agricultural sector is still the main activity of Cambodia's economy. In 2007, more than 70% of the population was working as a labour force in the agricultural sector, which accounted for more than the 30% of the GDP (Junning, Luyna, Sununtar, & PingSun, 2008). Rice farming is the major agricultural activity of the country and, according to the Asian Development Bank Report: 'it accounts for nearly one third of the country's total agricultural value added' (Junning, Luyna, Sununtar, & PingSun, 2008). The whole country can rely on favourable natural and weather conditions for the rice farming activity.

However, the natural comparative advantage they have for rice farming is not fully exploited due to the limited market access and underdeveloped agricultural infrastructure faced by rice farmers in Cambodia. (Mak, 2001). The rice market in Cambodia is highly inefficient and fragmented, mainly because of a lack of proper infrastructure that prevents the movement of goods and information (IRRI, 2007). These issues forces the rice farmers to live in condition of poverty and underdevelopment, despite the natural resource they have.

The area of this case study, Siem Reap Province, is embedded in these same economic and infrastructural constraints. Despite the growing inflow of tourists due to the presence of the Angkor Wat Temples in Siem Reap town, which led to a quick infrastructural and economic development of the city itself, the rural agricultural areas account for the biggest part of the provincial territory (National Institute of Statistics, 2012). The farmers living in the province rely heavily on the rice production, which, according to the interviews done with the rice banks' committees during my fieldwork, is the main income in the majority of the communes of the province. A minority of communes can rely on cassava and livestock production as well. However, the Banks of my sample are situated in three of the communes where the agricultural production is not very diversified. During my fieldwork, I observed that big part of the rice farmers in the areas visited, have a small land plot where vegetables are seeded and grown. Women sell the small surplus they have along the streets to the other inhabitants of the villages. Therefore, a small part of their income is derived by food products sale as well. Unfortunately, it was impossible to quantify the exact amount of income they earn through this activity during my fieldwork, seen how variable and occasional it is.

The fact that they rely so heavily on rice production leads to an issue of food-shortage for the farmers in the area, as anticipated in the Introduction. After the harvest, part of the rice is used for consumption, but part is sold for having an availability of cash that permit them to purchase any other needed good and service: other kind of foods, medical expenses, school expenses, and, of course, loan repayment of possible loans stipulated in the previous year. Consequently, majority of the farmers are unable to keep the amount of rice needed to sustain themselves and their families until the next harvest. The interview done with the committees showed that the income the farmers have from other sources (food sale, other agricultural productions, etc....) is marginal compared to the one earned through rice. Therefore, when part of the rice is eaten and part sold

for having cash available to buy other necessities, many farmers lack money for the time left to the next harvest. The problem forced them to incur loans with local lender, which charge them with high interest rate. According to one of the NGOs working in the territory, the interest rate can be up to 200% per year (Lotus, 2011). The high interest rate led the farmers into a situation of debt escalation, worsening their economic situation.

The Rice Banks system arise within this socio-economic context, with the aim to help the farmers to fight food insecurity and its negative consequences and free them from the extortionate interest rate of the indebtedness situation with local lenders. Rice Banks provide loans to poor farmers in rural areas as many microcredit institutions. The borrowers have to repay with an interest rate on a fixed date the year after the loan has been received. The main characteristic that differentiate it from a regular microcredit institution is the product lent. In fact, rice banks give loans in kg of rice instead of money. At the same time, the concepts of lending, repaying and interest rate stays the same as any other microcredit institution.

The scheme of the Rice Banks I analyse involves three main actors: an external donor, a local NGO and the community of borrowers. Specifically, the local NGO that supervise the banks of this case study is called Rural Economic and Agricultural Development Agency (READA) and works in Siem Reap Province.

The capital for creating a new rice Bank is given by the external donor (NGO's, private donors, philanthropic organizations...). They give the initial investment for building the rice storage and having an initial deposit of rice to borrow. The financial investment for creating a new bank is a grant from the donor and does not have to be paid back in the future. The NGO acts as an intermediary agent between the donors and the borrowers. That means that is in charge to select the appropriate areas in need of a Rice Bank system, where the inhabitants are afflicted by food shortage and debt escalation. Once the village is selected, the NGO, READA in this case, supervises the bank building operation. In fact, the villagers create a team for building the storage where the rice will be kept before the lending period and stored after the repayment. As for the management of the bank, it is assigned to three of the inhabitants democratically elected by the village. READA is in charge to supervise the Rice Bank Committee (RBC) formation. Moreover, it gives coaching and training to the RBC members with the aim to let me acquire skills for the good management of the bank. The trainings focuses on tracking, book keeping and recording of the rice borrowed and repaid and on leadership skills.

The duties of the RBC are the followings:

- Call two annual meetings for deciding the date of rice lending and repayment together with the borrowers;
- supervise the lending and repayment operations, which usually last two days each;
- Tracking the amount of rice borrowed and repaid;
- Take care of the storage during the year;
- Controlling if the rice is well-stored and possible problem incurring to the structure.

The borrowers are selected by READA according to their income level. Only the households considered poor and in need are entitled to borrow from the Rice Bank. Therefore, the numbers of

borrower is usually maintained stable, with small increases or decreases. The figure below, developed by READA, shows schematically how the rice bank basic system should work.

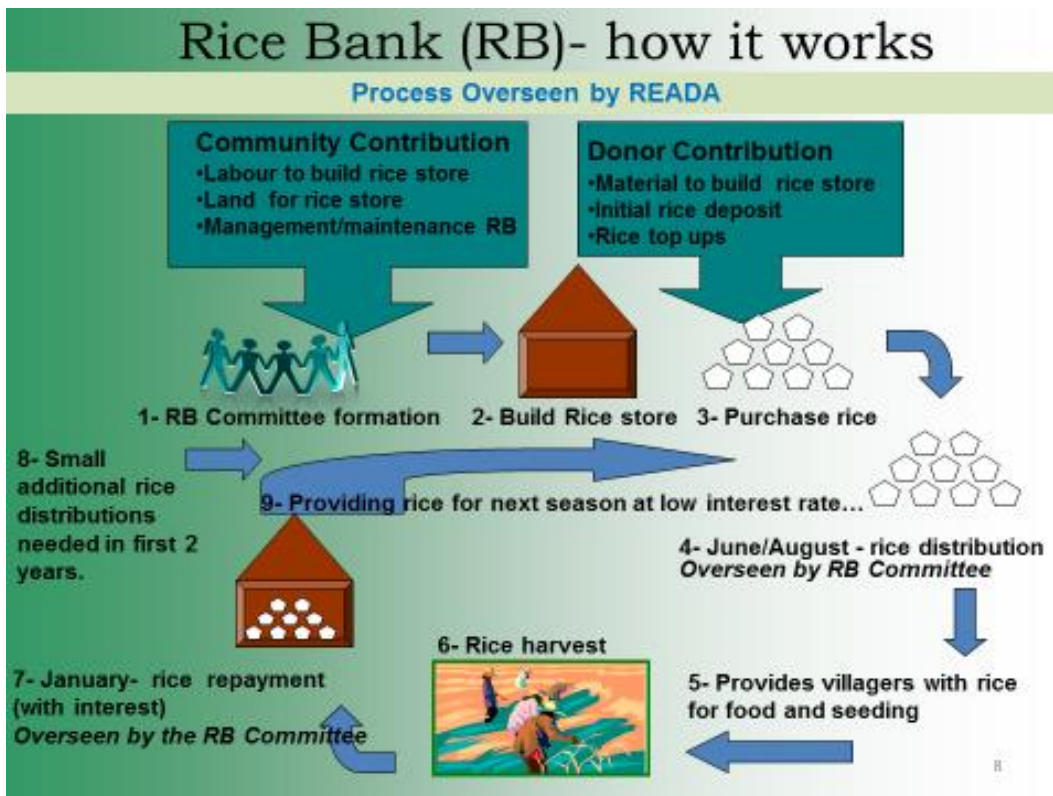


Figura 3. Rice Bank Cycle. Reada

The rice distribution to the households of the village usually happen between June and August. Since the rice is usually harvested between October and December, the distribution happens about nine months after the rice has been harvested and should cover approximately three months before the next harvest. Part of the rice is used for consumption and part is used for seeding.

According to the International Rice Research Institute data, the rice consumption in Cambodia per adult person per year is 160.3 kg of milled rice. That would mean about 40 kg of millet rice per person to cover three months period. In the banks of my sample, the amount of rice borrowed fluctuates between 100 and 200 kg per family unit, with higher and lower exceptions. This amount is generally constant through the years, meaning that the farmers can estimate the amount of rice needed to cover the three months period. Considering the rice consumption average in Cambodia, the amount borrowed is probably not sufficient for seeding and feeding the whole family for the three months period. The family probably compensate the rice with the income coming from the other activities.

After the harvesting cycle, the villagers pay back the rice borrowed with an interest rate, which is at 20%. The 20% interest rate is necessary for permitting to increase the rice deposit for the next year. It is supposed to cover the following costs, in these percentage points:

- 3% to the RB Committee, therefore ensuring a revenue for the Committee members
- 1% for administration costs

- 1% for a social protection scheme for the most vulnerable people in the village
- 15% kept to increase the stock for the following year

Despite the number of borrowers is generally fixed, the bank keeps a percentage of rice to increase the stock for the following year with the aim to have more rice to borrow in the future, in case farmers will need it. As it will be seen in the results and discussions, due to the rice losses the Banks experience, in reality the deposit for the following year does not increase steadily as planned in the project. In most of the banks, it presents increases that are smaller than the 15 percentage points expected.

The interest rate is the variable cost of the loan. In addition, in some Banks the NGO introduced a fixed fee of 10 kg for each borrower. It has been introduced only in the Banks that presented a more stable repayment level. This fixed fee have an interesting role among the scheme. Part of the fee is used as a fund for the community in the village. When community expenses need to be addressed, such as building/restoring a school or leaving donations to the local pagoda, the Rice Bank Committee is in charge to sell the rice and give to the community the money needed for that specific purpose. When necessary, part of them is used as a rice bank deposit for the following year, to compensate possible losses due to a bad harvest and negative weather conditions.

If a member is not able to repay his debt during the repayment operation date, he will not be able to borrow again on the following year. He is not allowed to ask for another loan until the previous debt has not be repaid. When repaid, he can start to borrow again as he was used to do before.

Through the scheme just described, the Banks should be able to cover their costs and to have a deposit for the following year to borrow. READA considered the necessity of an external help in case the Bank would not be able to cover the costs, especially in the first years. This help is called rice top-up and are additional amount rice given to the Bank in need from the NGO. The goal of READA and the donors is that every Rice Bank would run independently after two years from its foundation. During the first two year rice top-up are often requested and the NGO supervises more closely the Bank's operations. After two years, the NGO transfers the main responsibility to the Rice Bank Committee, keeping the external monitoring and supervision. At this point, the Banks should have reached the level to run sustainably, without external subsidies.

From the system described above, it is possible to see preliminary similarities and differences with standard microcredit institutions that lend money.

The Rice Bank system follow the principle of the *poverty lending approach*. It focuses on providing credit to the poorest in need rather than trying to focus on large-scale outreach, providing credit only to small entrepreneurs with high chances to repay.

As for the lending methodology, the loans are given to the household, which is a family unit. Therefore, the system cannot be labelled as group-based lending. The people requesting a loan are not joining a group for borrowing together, but the families selected by the NGO in the village have the right to ask for a loan individually. At the same time, these families have tight social connections due to the small size of the community and the fact that each bank works in one village only. Consequently, despite it is the group-based lending recognized as a methodology that can fight information asymmetries, the tight social connections of the community where the rice banks take place could work as a way to fight information asymmetries as well.

As for the differences with standard microcredit institutions, two elements are immediately recognizable at this stage of the research.

Firstly, the product lent, rice, is a perishable product subjected to external conditions, such as weather and mechanical processing. It needs to be stored for its conservation, which poses challenges such as finding and building an adequate structure, able to preserve big amount for months. Moreover, its value is highly subjected to the price fluctuation on the market. According to IRRI: “Because of the high concentration of exports coming from only a few countries, the international rice market is vulnerable to disruptions in supply from major exporting countries, leading to higher world prices. This means that a sudden change in supply, demand or policy in one or more of these countries could have a major impact on world market flows and prices” (IRRI, 2015). This problem is specifically relevant in Cambodia rice market. The sector experiences large year-to-year fluctuations due to low investments from the government, poor infrastructure and improper land use (Yu & Shenggen, 2009). The graph below shows the price of Paddy Mix in Riel in the Siem Reap rice market- Heu Sen Rice Mill. Prices are collected by the Agricultural Marketing Office three times a week (Agricultural Marketing Office, 2015).

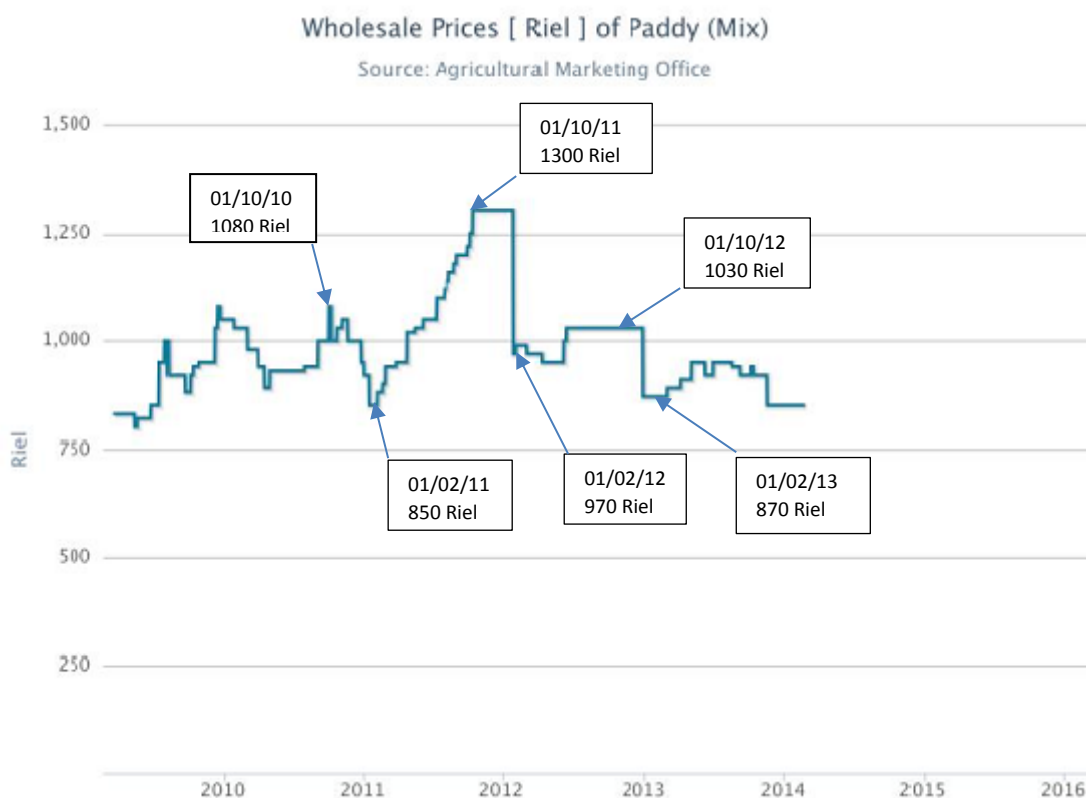


Figure 4. Price of Paddy Mix in Riel in Siem Reap Rice Market Heu Sen Rice Mill. 2010-2015

As can be observed in the graph, the price presents high fluctuations in Siem Reap Market in the years between 2010 and 2015. The fluctuations seem to follow a similar pattern through the year. The prices increase in the period September-December, when the rice is harvested. They start to decrease on January, reaching the lowest price per kilo in the period from February to April.

The rice price fluctuations do not affect directly the financial sustainability of the banks, since the rice is never converted to riel/USD during the operations, but always kept in kg. However, this high price fluctuation gives an idea of the challenges faced by the rice farmers that have to trade a product characterised by high volatility of prices on the market.

The second difference is that the NGO does not act as an intermediation between a Bank providing credit and the community of borrowers, as it often happen in standard microcredit institutions (Raja, 2011). The NGO intermediates between the external donor and the community in the very first step of the Bank's creation. After that, its role is to monitor and supervise the community of borrowers, who organize themselves for the management of the Bank. This system shares some common features with the one of Self-Help Group (SHG), whose characteristics and functioning have been explained in the theoretical framework. Despite the Rice Bank's scheme does not start as a saving group, different elements are in common with this system. In fact, the capital the users borrow after the second year from the creation of the Rice Bank is not a fund from an external bank. It is created through the repayment made by the borrowers on the previous year. In the same way, SHGs borrow their credit from a fund created by the borrowers themselves. Both systems organize and manage themselves without resorting to regular Banks for the financial operations and they can both be supervised and helped by the work of NGOs. The community of borrowers in the Rice Banks is linked by strong social connections and homogeneity in the socio-economic situation, as happens in the SHGs.

Therefore, from a first preliminary comparison of the characteristic of rice banks and microcredit institutions, we can observe differences on two main levels: product lent and structural organization.

The analysis of the results will help defining to which extent the rice banks' system differs from the standard and which factors drive the financial sustainability of a scheme that provide microcredit loans but deviates from the standard system.

4. Data and Methodology

In this section, I will explain the research design and the methodology used for the data collection, with the aim to operationalize the sub-research questions that will help to answer the main question.

4.1 Research Design

The research design chosen is a case study. The case-study methodology aims to deepen the understanding about a certain topic through the analysis of a limited number of events or conditions and their relationship. The researcher Robert Yin defines this methodology as ‘an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used’ (Yin, 1984). Despite different view developed on case studies in the literature, there are some elements commonly agreed on the characteristics a case study should have (Rolf, 2003): The case study should have a “case” which is the object of study. The “case” should:

- be a complex functioning unit;
- be investigated in its natural context with a multitude of methods;
- be contemporary.

The sample taken into account is usually small, for permitting the researchers to investigate the issue more in depth. Moreover, the case-study design is characterized by triangulation, which means the use of multiple data sources in a research in order to produce understanding and elucidate complementary aspects of the same phenomenon (Patton, 1999). Triangulation is used to assure the validity of the case-study research. Quantitative and qualitative data are often combined together in the design, for the full investigation of the case considered (Denzin, 1978). A research design that allows the researcher to go particularly in depth on a specific issue, presents both advantages and limitations, as identified in the literature (Searle 1999, Stake 2005, Flyvberg 2006).

The main advantages are the following:

- The restricted focus of the case-study helps to understand complex inter-relationship;
- Case-studies are grounded in reality, therefore can describe in rich detail a specific phenomenon embedded in a local context;
- They facilitate the exploration of significant issues that were not expected at the beginning of the research;
- The depth of a case study offers insights about the topic that can help structuring future research.

As for the limitations, Yin identified three main points that weakens the strengths of the case study research design (Yin, 1984):

- Case studies can lack of rigour. Yin affirms that : “too many times, the case study investigator has been sloppy, and has allowed equivocal evidence or biased views to influence the direction of the findings and conclusions” (Yin, 1984);
- Case studies are difficult to generalize. Due to the small sample usually considered, it is complicated to derive that the results are representative for a larger population;
- Case study data collection is usually time-consuming for the big amount of information needed to analyse a case in depth. Consequently, they become very expensive if implemented on a large scale.

The case study methodology has been selected because of the specific features the Rice Bank’s project has. Rice Banks are region-specific microcredit system, which can be implemented only when rice is a staple food in the diet of that specific population and it is one of the main products of the agricultural sector of the area. The environmental and social dynamics involved in the system can widely differ from an area to the other. That is the reason why the case study would allow me to have a deep understanding of the factors influencing the financial sustainability of the rice banks in Siem Reap Province.

Moreover, the case study methodology allows me to use for my research both quantitative and qualitative data, which are important to combine to have a deeper understanding of the issue. The data collected during my fieldwork are mainly qualitative, and a small part of it are quantitative and are related to the costs experienced by the Banks in specific years. READA and the Rice Banks Committee had already collected part of the quantitative data that I used. These data are listed in the Banks’ track sheet recorded each year by the Committee.

Since it is a case study, the sample is small in order to have a deeper understanding of the factors involved in the research question. I compared five banks whose operational self-sufficiency ratio shows differences. The research methods used in this case-study is described below. It explains more in details which data have been collected and how they have been collected.

4.2 Research Methods

My research has used primary and secondary data. The primary data are qualitative and partly quantitative and collected through semi-structured interview and observations. The interview format can be consulted in Annex III. The secondary data are quantitative and had already been collected by the NGO READA and the Rice Bank Committee

4.2.1 Quantitative Data

The secondary data are the quantitative data collected by READA and the Rice Bank Committees through the Rice Banks track sheets. They include number of families in the village, number of families borrowing from the bank, total weight of paddy rice distributed, distribution date,

repayment date, the amount of interest rate repaid, and possible fixed fee. They also collected possible rice top-up. Moreover, the revenues given by the interest rate, operational costs and the costs for the social security scheme have been deducted by the data collected in the track-sheets. The Rice Bank Committee of each Bank has first recorded these data. Every committee has a notebook where they record every loan disbursement and repayment made in the bank they manage. At the end of the year, the NGO READA transcribes the data recorded from the paper notebook to excel track-sheets. The data I received are the ones already transcribed by the project manager of READA into the NGO's excel files.

Through the quantitative data, I calculated the operational self-sufficiency, an indicator developed for understanding the pertinence of the interest rate level and the financial viability of the bank. The **Operational Self-Sufficiency (OSS)** indicates whether enough revenue has been earned to cover the MFI's direct costs, excluding the cost of capital but including any actual financing costs. It is therefore calculated:

$$\frac{\text{Operating Income (Loans + Investments)}}{\text{Financing Costs + Loans Loss Provisions + Operating Costs}}$$

This ratio allows determining to which extent the operations are becoming (increasingly) self-sustaining (Sa-Dhan, 2006).

The revenues usually come from the interests and fees paid by borrowers. The denominator of the ratio is are the costs that the institutions needs to pay. The financial costs are the expenses of raising capital, such as interest rates that the institutions pays to commercial banks and investors. Loans loss provision is the amount set aside by the bank to cover the cost of defaulted loan that the MFI cannot recover. Operating costs refers to basic operating expenses, such as staff salary and transportations costs (Armendáriz and Morduch, 2010).

In my case study, the cost of capital does not need to be covered since it is a grant from donors for starting up the rice bank, as well as the money given for building the rice bank storage. Therefore, the OSS indicator is appropriate for my sample.

4.2.2 Qualitative Data: Topics Investigated

The primary data collected during the interview have been used to identify the drivers of the financial sustainability of rice banks.

Due to the particular feature of the rice credit scheme, some of this elements are caused or related specifically to the banking system, while others are specifically rice-related factors, which would not be taken into account in standard microcredit institutions that use money as a currency. Therefore, for a better understanding of the elements driving the financial sustainability of the banks in my sample, I divided these factors in two main groups: banking system factors and rice-related factors.

a) Banking System Factors

Based on the theoretical framework, I considered the *management efficiency* as the banking system factor that can have a relevant impact on the financial sustainability of the rice banks. In order to evaluate the level of the management of the rice banks, I adopted as a framework the governance and management indicators developed by *PlaNet Ratings*, the global microfinance rating agency. The four indicators are the following: Decision-making, accounting and control, top management and human resources. (Planet Rating, 2012) These four indicators have been adapted to my specific research topic. Rice banks have a different management structure than the one of a regular microcredit institution since the managers are selected among the villagers and trained by the NGO.

Decision-making: I researched if there are differences in the decision-making process, analysing the responsibilities (e.g. topics discussed during the meetings) and involvement (frequency of meetings, feeling of responsibility of the Rice Banks's performances) of the rice bank committee.

Accounting and control: this indicator is related to the planning, budgeting and reporting competencies that the Rice Bank Committee has. The aim is to see their level of competencies and if it differs between the Rice Banks. Since the managers are trained by the NGO, I could get information about it also from the project manager of the Rice Banks.

Human Resource: this indicator is related to the recruitment policies, staff incentives, trainings and evaluation procedures. In my case, I focused on the work done by the NGO to understand if there are differences in the way they train and evaluate the rice bank committee in the different Rice Banks. The top management indicator is related to the competencies of the top managers of the MFI, which in my case are not present since the Rice Bank Committee is the only managing body. Therefore, no question have been made in relation to this indicator.

b) Rice-related Factors

In accordance with the theoretical framework, I considered the both pre-harvest and post-harvest losses.

As for the pre-harvest losses, according to IRRI (2012), they are due to no favourable weather conditions (dry weather, flooding, etc....) and/or pest and disease attack to the crops. Questions regarding if they have experienced these losses due to natural causes and in which quantity have been made to the committee and the members present during the interview.

As for the post-harvest losses, they are all the ones that happen between the harvesting period and the loan disbursement. In order to investigate them, I used as a main guideline the Manual of the prevention of post-harvest grain losses developed by the German Agency for International Cooperation (GIZ).

According to the Manual, the sources of post-harvest losses are the following: mechanical damages, heath, moisture, insect pests, rodents, birds. For each source, the manual explains the causes and the effects on the rice.

Since the rice is kept in the rice bank storage for months after the repayment, I focused part of my questions on the possible losses arising during this period. In order to evaluate in detail the storage loss, I developed questions following the Manual of the prevention of post-harvest grain

losses developed by the German Agency for International Cooperation (GIZ). The manual divides the loss happening in the storage in the following categories:

- Unsuitable storage structures (E.g. insufficient shade and ventilation facilities, lack of heat insulation...)
- Damages to the storage (E.g. High relative humidity because of unsealed floor/walls/roof, imbalances in day/night temperature in the storage facility...)
- Infestation of rodents and/or birds.

4.2.3. Qualitative Data: how they have been collected

The research of these factors has been made through semi-structured interview with the members of the rice banks committee -from the selected rice banks- and project manager of READA.

The interview done with the Rice Bank Committee have been arranged through the collaboration with the Rice Banks' project manager working at READA. She is managing the rice banks' project from five year, so she has built a trust relationship with the users of the bank and is knowledgeable about all the aspects of the rice bank scheme. She had the role of translator during the interviews with the Rice Bank Committees. For this reason, we discussed together the interview list in Annex III in the NGO office before starting the data collection on the field. I explained her in details which information I was aiming to collect through the interview questions and we agreed on the interviews' structure. Then, she contacted the Banks part of the sample through telephone and asked to the Committee for their consensus and availability to meet. Once the Committee had agreed, the project manager travelled with me to the rural communes where the bank was situated. The interview questions addressed to READA have been answered by her and another project manager working with the rice banks' project.

a) Interview with Rice Bank Committee

The semi-structured interview with the Rice Banks Committees of the banks in my sample had the aim to investigate on the following topics, part of my sub-questions:

- The cost the rice banks need to cover for the rice bank committee. Questions about the management level of the rice bank in order to understand how it influences its financial sustainability;
- The skills and abilities the rice bank managers learned during the training and the ones they feel necessary for the well-functioning of the banks;
- How the rice bank committee covers administrative and management costs of the bank, including maintenance of rice bank storage and any other eventual cost associated with the management;
- Specific questions of the costs faced due to storage and rice processing losses;

b) Interview with READA

The NGO READA manages and supervise the work of the rice banks I analysed. The interview with the project manager of the Rice Banks project provided me with data in relation to the following topics:

- Training procedure to teach skills to the rice bank committee;
- State of external subsidies and top-up given to the rice banks. The NGO is intermediary with the donors of the rice banks and could therefore provide me information about the quantity and reasons of the subsidies given to the banks so far;
- Overall management of the rice banks. READA has a full picture of the evolution and change of the rice banks because of the supervision it had on them since the beginning.

4.2.4. Observations

During my fieldwork, I had the possibility to visit the rice banks and interact with some of the actors of the banks through the facilitation of READA's project manager. During the visits, I could observe the setting and environment where the rice banks' project takes place. As an observation technique, I used the non-participant method. As defined in the Dictionary of Sociology, it is a "research technique whereby the researcher watches the subjects of his or her study, with their knowledge, but without taking an active part in the situation under scrutiny" (Marshall, 1988). This method was adapt to my type of observation because it allowed me to collect data on the rice storage system. I had the possibility to observe the conditions of the storage where the rice repaid is deposited before the loan disbursement period. The observation of the area and the storage gave me useful insight for understanding how the conditions of the storage are and how the possible damages observed can influence the costs the banks have to cover.

4.3. Research Limitations

As discussed above, the case study approach can encounter some limitations when trying to generalize and apply the findings of the research to another population. Moreover, the researcher choices can bias the data collection and analysis. At the same time, additional limitation specific to my sample could have affected the study. A possible limitation is related to the data collected through the interviews. All the interviews were conducted in Khmer, which means every interview was translated for me by the project manager of the NGO READA. The translation poses two issues. Firstly, information and details can go lost during the translation process. Despite the project manager took care to translate the most accurately possible, I think that being able to understand the local language would have let me immediately recognize remarkable information,

while this role was left to my translator. Secondly, the fact that the translation was made by the project manager of the NGO, could have led the interviewees to avoid some topics or answers because of presence of the NGO's representative.

A second limitation can arise from the quantitative data used. In fact, the collection had been made already by the Committee and transcribed by the NGO. Therefore, I had no possibility to collect the data used on my own, or supervise the collection. The fact that the Rice Bank Committee are not bodies external to the village but are part of the community, could be a bias to the rigour of the loan recording. Unfortunately, it was not possible to compare the data already collected with quantitative primary data collected by myself.

Despite the limitations, the data collected allowed me to identify the answers and issues discussed in this research. Moreover, it is important to identify these limitations in order to overcome it in further researches made on the topic.

5. Results

The results in this section are based on the calculations of the Operational Self Sufficiency Indicator (OSS), calculated through the Rice Banks' track sheets, and the qualitative data collected during the interview. The Rice Bank analysed in my case study are five and are named with the denomination originally given by READA: Rice Bank 1, Rice Bank 2, Rice Bank 5, Rice Bank B, Rice Bank C.

RB 1-2-5 have available data from their creation, in 2011, to 2015. RB B and C have available data from 2013 to 2015, B due to changes in NGO's supervision.

The banks part of my sample are located in the same province. This means that the weather conditions experienced are identical, so the comparison of the financial self-sufficiency between banks is not influenced by relevant differences about the amount of harvest produced because of natural factors. Consequently, the banks can be comparable for management and post-harvest losses factors.

In order to answer my research question, the three aspects identified in the theoretical framework -interest rate, external sources and banking system/rice-related factors- will be analysed in this section. I will start with an overview of the situation of the five banks and I will then zoom in, focusing on the determinants that explains these differences in the results and, consequently, the differences in the financial sustainability of the Banks analysed.

The overall score listed in the table below is based on the amount of years where the bank has not reached self-sufficiency and if the banking and rice related issues are accidental (e.g. milling procedure issues for one year only) or embedded in the bank's structure. It can be High, Medium or Low.

The results of the OSS Indicator for each bank, divided by year, can be found in Annex IV.

I calculated a double OSS indicator for Bank 1, 2 and 5, one without the fixed fees included and one with the fees included in the revenues part of the OSS. That is because when the fees are used as a deposit for the next year, they can be calculated as a revenue of the bank. However, the use of fixed fee is diverse and not always properly recorded in the track sheet. In this way, it will be possible to understand the function of fixed fees in case of low debt repayment.

BANKS	OVERALL SCORE	FIXED FEE	INTERNAL FACTORS	EXTERNAL FACTORS	DEFAULT BORROWERS	RICE TOP-UP ¹
BANK 1	Medium	Yes, from 2013	- small repayment enforcement issue - water infiltration in the storage(2012/2013)	-loss milling procedure ² (2013/2014)	6,25% borrowers in default(2013/2014)	Yes (2014/2015)
BANK 2	High	Yes, from 2013	-very small loss for birds in the storage	-loss milling procedure (2014/2015)	No	No
BANK 5	High	Yes, from 2013	-very small loss for rats and birds in the storage		No	No
BANK B	Low	No	- big repayment enforcement issue -small loss due to rats infestation		-20,16% (2013/2014) -10% (2014/2015)	Yes (2014/2015)
BANK C	Medium	No	-major rats infestation/ storage heavily damaged(2014/2015)		No	No, but requested during interview

Rice Bank 1 shows financial self-sufficiency on the first year, due to a full repayment from all the borrowers and no storage loss. The OSS indicator decreases during the second year due to 450.972 kg of rice lost because of not proper storage conservation (water infiltration). In the third year, the bank does not reach self-sufficiency due to a low quality of the paddy rice, which leads to a 1512 kg loss when processed into milled rice. Even when the OSS is calculated including the fixed fees as a revenue, they are not able to compensate the rice loss. Moreover, four borrowers out of sixty-four defaulted in 2013/2014. Therefore, the NGO had to provide 1190 kg rice top-up to for the year 2014/2015, which gave possibility to the bank to open the distribution period with a sufficient quantity of rice for all its members.

Rice Bank 2 presents financial self-sufficient of the first two years, due to full loan repayment. Despite few kg of rice loss due to minor storage issues, the banks still run self-sufficient. In year 2013-2014, the number of borrowers decreases and the range of kg of rice borrowed increase. The bank that year show a full repayment, which increase its OSS. In 2014-2015, an incorrect milling procedure causes a loss of 2010 kg of rice. Therefore, the bank does not reach self-

¹ Donation of rice given by the NGO in case of need (poor harvest, low repayment rate, big storage loss, ect...).

² Losses while milling the paddy rice can be caused either by poor technical performances of milling machinery or by ineptitude of the machine operator. (FAO, 1998)

sufficiency in theory. In reality, the bank is able to cover its cost anyway, if we include the fixed fees in the calculation. Through the interview, it was confirmed that in year 2014/2015 the fixed fees were fully used as a deposit for the following year. Small rice loss due to birds entering the storage. No defaulters.

Rice Bank 5 shows operational self-sufficiency and full repayment since the creation of the Bank. For this reason, the Bank is able to increase its deposit year by year; the number of borrowers shows a small decrease through the years, which permit to the other members to borrow a bigger quantity of rice, if needed. The bank shows increasing self-sufficiency. Very small loss due to rats and birds through the years, but not influential on the self-sufficiency level. No defaulters.

Rice Bank B is not self-sufficient in year 2013/2014 due a low repayment rate (24 people default). Loss due to rats infestation are present as well. The following year, the OSS increases, but without reaching a self-sufficiency level. The borrowers who have not been able to repay on the previous year repaid on the following year, but other borrowers defaulted, leaving the bank unable to cover its costs. Moreover, in 2014/2015, the bank experienced loss due to rats' infestation again. A top-up from READA was necessary for letting the bank open the rice distribution for the year 2014/2015. Moreover, the number of borrowers decreases of 17 people in 2014/2015, because the bank did not have enough deposit to permit to all the members to borrow the amount of rice they needed.

Rice Bank C runs self-sufficient in 2013, with no borrowers defaulting and minor loss due to rats. In 2014/2015, it loses its self-sufficiency due to a major rats' infestation because of holes in the floor of the storage. Again no defaulters. During the interview, the RB Committee asked a top-up to READA for the storage restoration and for a bigger deposit for the coming year.

5.1. Factors determining the financial sustainability

The OSS indicators shows relevant differences not only between banks but also in the same bank between different years. The factors that can explain these differences have firstly been hypothesized in the sub-questions and then researched through the interview. These factors are the interest rate, banking system and rice-related factors and the independency of the bank from the external sources.

In my sample, the Interest Rate applied and the percentages used for covering the costs and the deposit for the following year have been confirmed to be the same for all the banks analysed. Therefore, it does not explain the differences in the level of financial sustainability between banks. In order to understand the factors driving the financial sustainability of my sample, we need to focus on the two elements bringing variations to the indicator, which are loans default and post-harvest losses, specifically in my sample storage and rice processing losses. Pre-harvest losses have not been revealed in the sample.

5.1.1. Loan Default

Loan default generally stands for the inability of the borrowers to pay their debt back. In my sample, the term inability could be replaced with unwillingness of the borrowers to pay back. In fact, the Banks analysed are situated in districts that rarely experienced weather issues or bad rice harvests. During the interviews, the bank managers said that the harvests have always been good in the years taken into account and the farmers never experienced problems in repaying because of lack of rice. Therefore how to explain the low debt repayment of Bank B and the smaller repayment problems experience by Bank 1? The interviews revealed that the reason behind is **management issues**.

The Rice Bank Committees are trained by READA in the following way: once a committee is elected READA gives them workshops on book recording for the track sheet and leadership skills in order to understand how to structure and lead the meeting with the borrowers. If a member of the Committee changes during the years, the NGO does not train the new member individually, but the other managers teach them the skills they learnt at the beginning with the first training.

In the case of Bank B, it was previously monitored by another NGO, ADDA (Agricultural Development Denmark Asia). In 2013 READA took the supervision on it. Therefore, the managers had to adapt to two supervision methods and training, which weakened the stability of the team. Consequently, Bank B is currently suffering from **enforcement problems** in repayment. The borrowers who defaulted and/or were late in repayment they actually had rice for repaying after the harvest but they did not want to transport it to the storage. That is the reason why twenty-four people did not repay in 2013/2014. The rice bank committee of Bank B declared in the interview: *“Some people were late in repayment despite they had rice to repay. They were lazy to transport it from home to the storage. We (the committee) did not know how to act for enforcing the repayment. At the end, when we realized that the borrowers would have not brought the rice to the storage, we decided to take the paddy rice by ourselves, going to their house and take it”* (RBC B, Personal Interview, October 26, 2015). The words from the Rice Bank Committee is explicative of “active enforcement” for the loan repayment, caused by the unwillingness of the borrowers to bring the rice to the storage. However, this method is costly in term of time and effort for the managers to go and “confiscate” the rice. Therefore, it cannot be considered a standard method of enforcement but a solution is needed to deal with the issue.

Moreover, RB B has a higher number of borrowers compared to the others of the sample and its committee complained **monitoring issues** as well during the lending and repayment operations because of the number of people involved. The committee said: *“It is hard to control the borrowers during the lending and repayment operations, sometimes they want to rush to get the rice and they enter into the storage all together. For us (the committee) is not easy to monitor these operations sometimes”* (RBC B, Personal Interview, October 26, 2015). In addition, the bank has not been able to introduce a fixed fee mechanism yet, due to the enforcement problems and the fact that borrowers still did not understand the possible benefit of it.

Concerning the involvement of the borrowers in the bank and the understanding they have of the system, a member of the rice bank committee said: *“We need to organize meetings to talk to people to make them understand the benefit. Some member wants to borrow more rice but there is not enough rice. People said ‘I tried to repay, why they don’t give me more?!’. But they have to*

repay fully, not just trying. Sometimes they also do not join the meetings where the date of lending and repayment operation are decided all together with the community” (RBC B, Personal Interview, October 26, 2015).

In conclusion, both committee and members of the rice bank B should improve their understanding of their role and duties towards the credit system. It is clear from the data that the committee needs a better training to fulfil their responsibilities and, at the same time, the members need to be educated on the exact functioning of the bank and what are the benefit they can get from it. In this way, they would be motivated to actively participate in meetings and meet their obligations.

As for Bank 1, it has been trained and supervised by READA since its creation. However, it is suffering from small enforcement problems. The number of people who did not repay in Bank 1 is about four out of sixty-four in 2013/2014, but the presence of fixed fees help the bank in increasing its deposit. Concerning the repayment enforcement, the managers interviewed admitted: *“We had a sufficient training for recording and filling in the track sheet, but we don’t know how to deal with people who don’t repay. We need external help from READA for going and talk to these people”* (RBC 1, Personal Interview, October 6, 2015). They also admitted they did not talk about this lack of skills with READA and have not asked for additional trainings before this topic was disclosed during the interview.

On the other side, RB 5, shows operational self-sufficiency during all its working years and its management situations can be used as a comparison. Bank 5 has been trained and supervised by READA since its creation; this helped the bank to build a more stable management team than Bank B and set some rules in the years to improve the work in the committee. RB 5 regularly calls a meeting each year with all the rice bank members to decide the date of rice distribution and repayment, which must be agreed by everyone democratically. Moreover, the repayment is made in smaller groups, in order to avoid monitoring problems experienced by bank B during the lending and repayment operations. Despite the training received is the same as Bank 1, the committee of Bank 5 understood the need to give more structure to the management team and set rules for the members. In fact, when interviewed regards the responsibility they feel as managers of the banks, the three members agreed on this statement said by one of them: *“ We feel very responsible for the way the bank works. We think that the leaders have the role to commit the borrowers. Then, of course, the whole community needs to care for the well-functioning of the bank”* (RBC 5, Personal Interview, October 7, 2015). RB 5 does not have additional measure in terms of enforcement than the other banks. However, according to the NGO and the Committee’s testimony, the managers worked since the beginning to make the borrowers understand the benefit of repaying the debt in order to continue borrowing from the bank. The effort put by the managers to commit the members into the scheme seems to have led to no repayment problems in the last years of work of the Bank.

As for Bank 2 and C, the interviews have not highlighted any consistent problem with the management structure. They pointed out relevant problems with post-harvest losses, analysed in the paragraph below.

5.1.2. Storage and Milling Procedure Losses

The post-harvest losses play a relevant role among the factors determining the financial sustainability of the banks. The loss influences both the repayment rate and the amount of rice available for the following year. The post-harvest losses identified in my sample fall in two main categories: storage loss and milling procedure loss. All the five banks parts of my sample experienced loss due to improper storing. These losses are due to rats and birds infestation or water infiltration caused by unsealed floor and roof. Bank 2, 5, B and C experienced problems with birds and rats, while Bank 1 with water infiltration. For Bank 1 the loss due water infiltration is about 40 kg and has not affected the financial self-sufficiency. Bank 5 lost 45 kg because of rats and birds infestation in 2013, again with no relevant impact on the self-sufficiency of the bank. Bank B repeatedly lost small amount of rice every year due to birds and rats infestation. During the interview, they said: *"We really need to fix the storage but there is no budget for it."* (RBC B, Personal Interview, October 26, 2015).

Rice C had a major loss of rice in 2014 due to a rat infestation because of holes in the floor of the storage. In this case, a restoration of the storage is necessary and the committee asked a top up from READA for this purpose. The fact that the NGO is available to give rice top up when the banks lack of funds to cover their costs is harmful for the financial sustainability of the system, as it will be discussed in the discussion section.

As for the milling procedure losses, Rice Bank 1 experienced a loss due to milling process in 2013. The quality of paddy rice was low before the milling process, which led to a loss of 1512 kg when processed into milled rice. This big loss prevented the bank from reaching self-sufficiency in 2013/2014. In fact, the fixed fees were not sufficient to cover the loss. Rice Bank 2 experienced a loss of 2010 kg of rice due to incorrect milling procedure in 2014/2015, which negatively affected the self-sufficiency level of the bank. The presence of the fixed fees permitted the bank to reach sufficiency, which otherwise would have needed external help in that year.

According to the definition given by the United Nations, milling losses can be caused either by poor technical performances of milling machinery or by ineptitude of the machine operator (FAO, 1998). At the same time, the conditions of how the rice is harvested, threshed, dried and stored before arriving to the mill deeply influence the milling process as well (IRRI, 2015).

Rice farmers make the harvesting, threshing and drying processes before the rice is repaid and collected into the storage. Therefore, rice banks' committees are not responsible for these specific phases. As for the storage of the paddy rice, IRRI highlights how high relative humidity and high temperature in the storage can negatively affect the paddy rice quality and, consequently, the transformation into milled rice. The issue is specific of many tropical countries, where the equilibrium moisture content is often above safe storage moisture levels (IRRI, 2015). Therefore, the rice bank damaged storage system could also be one of the causes why the paddy processed into milled rice lost part of his quality.

The rice bank committee could have a role in avoiding that the paddy rice that enters the storage is a low quality paddy. Since they are responsible to supervise the repayment operations, they could make quality controls on every loan repaid. The International Rice Research institute developed a Rice Quality Assessment Kit, containing all the necessary tools to evaluate the characteristics that make a good paddy rice (IRRI, 2015). The NGO, in charge of giving training to

the Committee for the good management of the bank, could have the role to teach the Committee how to assess properly the quality of the paddy rice that enter the storage, in order to avoid any possibility of loss due to this reason.

However, in the sample I analysed, the rice loss due to milling process happened in two banks during one year only. That leads to think that the storing cannot be considered the main cause of milling loss since the problem is not present in the other years analysed, while the storage system stays the same. However, a rice quality assessment done by the Committee could be a good method to decrease the probability of low paddy and millet rice and, consequently, rice losses.

6. Discussion

The analysis of the results found combining the quantitative and qualitative data collected, highlights that the management efficiency is the main cause of low loan repayment rates and the storage and rice processing losses, which are the two factors that can explain the differences observed in the self-sufficiency level of the banks.

Based on the theoretical framework delineated above, many previous studies on microcredit institutions had already revealed how management efficiency can play a big role in the level of financial self-sufficiency. As for the post-harvest losses, the hypothesis of possible loss due to improper storage conservation and not correct processing procedure, specifically milling procedure, has been confirmed being a relevant driver in the financial sustainability of the bank. These findings open a discussion on how the rice bank scheme actually work, to which extent it follows the characteristics of microcredit institutions and which changes could be made in order to make it more efficient.

6.1. Rice Banks: Scheme and Efficiency

The rice bank scheme is, in theory, a simple scheme. The description of the scheme in section three has highlighted two main differences between a standard microcredit institutions and rice banks, which were the product lent and the structure. The data collected and the analysis of the results provide more insight for identifying clearly the differences between the two systems and how the financial sustainability is affected by these differences.

According to the theoretical framework, the two main elements affecting the financial sustainability of microcredit institutions are a sufficiently high interest rate and a good management.

The *interest rate* in the rice banks' scheme is fixed at 20% and the revenues and costs it covers are the same in all the rice banks of the sample. Through the analysis of the Operational Self Sufficiency Indicator, it was shown how the components determining how high the interest rate will be are different from the ones of standard microcredit institutions. In fact, we observe how

rice banks do not have the type of financing costs defined for standard microcredit institutions, since the initial fund is a grant from donors and the deposit borrowed in the following years is provided by the borrowers' repayment. The scheme does not involve external financial institutions or commercial banks. As described by Ledgerwood (1999) : " some MFIs funds some or all of their loans with grants or concessional loans and do not need to borrow funds –or collect savings- and thus either do not incur any financial costs or incur minimal costs" (Ledgerwood, 1999). However, in my case study the storage cost can be comparable to financing cost incurred by standard microcredit institutions.

As for the loan loss provision, that is covered by the fixed fees, which are used as a deposit for the bank when the borrowers are not able to repay their loans.

At the same time, rice banks has operational costs to cover, which includes all the costs related to the managers' retribution, management expenses, administrations fees. As explained in the theoretical framework, these costs are usually high in standard microcredit institutions. However, the rice banks' scheme is able to keep these costs low due to the internal structure that characterise them. As explained above, the managers' expenses are low because the committee is selected among three inhabitants of the village, which receive as a salary 3 percentage points the annual interest. Moreover, the farmers have to bring their rice to the storage for the repayment, which also eliminate any cost of loan collection the committee could have to cover. For these reasons, rice banks are able to apply a low interest rate at 20% annual.

However, the results showed how these low operational costs are part of the causes of management inefficiency in the rice banks. In fact, the 3 percentage points of the annual interest for the RBC salary and the 1 percentage point of the annual interest for administration costs is supposed to cover all the expenses the banks face. The research, though, showed how the amount of time the committee actually dedicate to work as rice banks' managers is about 7 days per year, which are not sufficient to cover the set of duties they are supposed to fulfil. The Rice Bank committee does not monitor the borrowers and the storage throughout the year, which leads to rice loss and low repayment rates. However, when interviewed about this issue, they said that the amount of time for monitoring the members and the storage would be excessive compared to the salary they receive. We can derive that monitoring costs are not included in the operational costs, which lowers the operational costs itself but causes inefficiencies at the same time.

Moreover, many banks testified how the 1 percentage point of the interest for administration costs is not sufficient for paying possible costs such as storage restoration. The interview showed how the NGO is usually available for rice top-ups when the banks cannot cover certain costs. These top-up can harm the efficiency of the rice banks scheme, because the banks would not be driven to find solutions for their need of funds if the NGO can help them providing external sources. Consequently, the banks would never reach self-sufficiency if the NGO would keep on providing rice top-ups every time the bank is in need.

Therefore, we can affirm that the costs that determine how high the interest rate should be are lower in the rice banks than in standard microcredit institutions. The operational costs should be high and play a big role in rice banks' scheme, as it happens in standard MCIs. Conversely, the research showed how the rice banks scheme keeps these costs low. A closer look at the situation

showed that these costs are too low and not sufficient to cover all the expenses the rice banks have.

The **management level** is the second element that the literature review highlighted as a driver of standard microcredit institutions.

The results confirmed this assumption for the rice banks' scheme of my sample. The management level is the main reason behind the loss caused by loan defaults and the storage and processing system, which have been proved being the elements varying the levels of operational self-sufficiency in the banks of my sample.

Through the interview made, it resulted that the management inefficiency in the rice banks' scheme derives from two main elements: the perception the rice bank committees have of their role of managers and the insufficient training given by the NGO to the committee.

As for the committee's perception of their role, when interviewed about the sense of responsibility they feel as managers of the bank, the committees of all the banks analysed said that they feel responsible for the lending and repayment operations but that, at the same time, the whole community should feel responsible for the way the bank runs. The managers see themselves more as facilitators in the banks' operations rather than completely responsible as in a managerial position.

The inefficiency at the managerial level is confirmed by the enforcement problems some banks are experiencing. This issue is particularly relevant because the rice bank structure would actually have the potential to overcome the information asymmetries discussed in the theoretical framework, such as monitoring and repayment enforcement. In fact, each Bank is working in one village only, and the members selected are from the same restricted community of inhabitants. That means the borrowers have strong social ties and know each other well. Moreover, the fact that the managers of the Bank are inhabitants of the village and members of the community as well enhances the element of "social collateral". Therefore, in this case, the *external ties* between the borrowers and the community could work as a deterrent for adverse selection, moral hazard and enforcement repayment. However, what the results shows is enforcement issues. The fact that the managers have a misperception of their role surely negatively influence the enforcement level.

In addition, the problem could be caused also by another element, which is training they received at the beginning from the NGO, which did not transmit them the proper understanding about their role and duties.

This issue is linked to the **role of the NGO** in the scheme. The data shows as the NGO in charge of the training mainly focuses on skills of book recording, which is the data the organization needs for project's evaluation and for showing to the donors as well. However, the training should make the committee members understand the responsibilities they have as managers and teach them the necessary leadership skills for dealing with repayment enforcement. In this way, the management could acquire organizational features that would make their work more structured. Once the Committee would properly understand their responsibilities, the strong social ties existing among them and the borrowers could help strengthening the repayment capacity of the bank's users.

Moreover, the NGO could have responsibility on the other element influencing the financial

sustainability of the rice banks, which is the storage losses.

The situations where the rice went lost due to problem of bad storage, can work as an example on the improvement that can be made when a new bank need to build their own storage. The NGO, which has the role to supervise the storage-building phase, could set defined guidelines on which requirements the storage has to meet in order to avoid the weather/animal issues already experienced by the other Banks.

In addition, seen the issues faced by the Committee in the management of the bank, the NGO could intervene and strengthen the coordination with the Committee. In fact, when interviewed about the level of collaboration between the project managers and the rice banks managers, the NGO testified to meet the managers only when specifically requested by them, otherwise the regular meeting is once per year only.

Considering the issues caused by lack of communication and coordination, more scheduled monitoring meetings would be a start for a more effective collaboration between the two parts. Moreover, once the NGO analysed the causes of the problems revealed, they could propose to the Committee additional trainings to build the capacities needed for the well- functioning of the Bank. For example, they could provide workshops on budget management, as a way to teach to the managers how to organize the annual budget for covering costs such as the storage issue and additional unexpected expenses. In this way, the NGO would probably have less requests for rice top-up from the Banks.

The findings and the elements just discussed shows how the two main elements driving the financial sustainability of standard microcredit institutions are relevant in the rice scheme as well. At the same time, the analysis of the scheme shows how the characteristics of rice banks differ from the ones of standard microcredit institutions.

The organizational features of the rice banks show shared elements with standard microcredit institutions and self-help groups, a saving and credit scheme discussed in the theoretical framework. More specifically, the system presents similarities with a specific type of self-help group called Accumulating Saving and Credit Associations (ASCRA's).

In ASCRA's, users join in a group to build a common saving found and then borrow from it. As Bouman explains: " pooled savings are kept in custody and accumulated for a specified time, at the end of which the savings are redistributed. The common period is usually one year, during which members may save to pay taxes and school fees or to meet the expenses of a recurring festival or religious ceremony. Participants might also build up a fund to pay for emergencies, insurance, community development expenses or for joint investment" (Bouman, 1994). In the ASCRA's' scheme, the loans are not automatically distributed but subject to a loan decision by a board committee, which recalls the selection made by the NGO in the rice bank scheme of the farmers that have the right to enter into the loan's scheme. Moreover, through the interest rate charged when borrowing from ASCRA's saving funds, the group is able to increase the deposit for future loan disbursement, as it happens in the rice bank scheme. In addition, the members of ASCRA's are strongly interconnected by social linkages and are part of the same community, as the case of rice banks.

The main difference is that Rice Banks are not created as saving groups but as microcredit system, but the methodology of how the deposit for borrowing is accumulated and the organizational structure reflects the self-help group system.

Therefore, the findings confirmed that rice banks cannot be fully labelled as regular microcredit institutions. The issues encountered poses questions on the efficiency of using a hybrid system that shares elements with standard institutions and village self-help groups for providing credit. We just saw how this mixed scheme presents various inefficiencies that affect its financial sustainability. The problems here identified leads to discuss possible more efficient alternatives to this scheme, keeping as a goal the one of helping the farmers to overcome the months of food shortage they face every year.

6.2. Possible Alternatives

A very interesting aspect, which helps addressing the discussion on possible alternatives, comes from the data related to the high capacity of loan repayment the borrowers would have in this scheme. Even in the cases where borrowers defaulted, the Bank Committee admitted that the reason is given by incapacity of enforcement and not actual lack of rice after harvesting. Moreover, some banks have been able to introduce the fixed fee element, which, as explained before, they are a fund for the community and a possible additional deposit for the bank. This element is particularly important in our discussion because open the debate to two options: how to improve the already existing scheme and how to change it in order to adopt a different, more efficient, system.

Considering the monitoring issues highlighted in the findings, building the *monitoring enforcement* capacity of the rice bank committee could be the element playing a key-role in improving the efficiency of the already existing scheme.

In fact, if the rice bank committee would be able to fulfil their monitoring tasks, both to borrowers and to the rice stored in the storage during the year, the repayment level would increase and the losses due to storing issues would decrease. This improvement moves back the discussion to better training that the committee should receive, which has already been debated. However, it could be a remark to take into account in case the scheme should be improved without changing its current characteristics.

A more interesting possibility it is given by building an alternative to the rice bank scheme as it exists now. As anticipated, it is connected to the high repayment capacity the borrowers would have and the fact that the majority of these families obtain their total annual income after the harvesting period.

The fact that farmers receive their annual income after the harvest can lead to the phenomenon widely discussed in behavioural economics of time-inconsistent preferences. Time inconsistency arises when people do not discount their preferences between all future periods in the same way (Goldberg, 2014). In economics, this is captured by hyperbolic time discount functions (Laibson, 1997). In other words, individuals behaving according to the hyperbolic discount model, make choices today that the future self would decide not to make, therefore choices that are inconsistent over time. That means that people value the importance of future consumption but at the same time they are tempted by the availability of sources for present consumption.

Economists described this tension as a conflict between a “patient future self and impatient present self” (Schelling, 1984; Strotz, 1995).

In my case study, the rice loan distribution usually happens on August, while the rice is harvested around November. This means that the loan needs to cover approximately three months consumption. According to my data, the amount of rice each household borrow from the rice banks is constant through the years, meaning that they can estimate the amount they need to cover the months missing to the next harvest. On the following year, the farmers need to repay the loan, which means they have to subtract from their annual income the amount of rice that would be sufficient to survive the three months before the next harvest, plus a 20% interest rate. Given the situation, the farmers are often unable to break the loan cycle and find themselves in need to ask for a loan every year. From this evidence, it follows that a saving mechanism that would help them to overcome time inconsistent preferences that can arise when most of the annual income is received immediately after the harvest could be beneficial for breaking the loan cycle and smooth their consumption.

According to recent literature about saving products in developing countries (Karlan 2003; Ashraf, Karlan 2006; Hofmann 2014) **commitment saving** can be a useful tool in rural developing areas, when it comes to store the post-harvest income and help to implement smooth consumption behaviour over the year. Commitment savings means a saving fund with particular features that allow users to have a restricted access to their funds until a certain sum or date is not reached, with the aim to keep savings for the future and resisting to the temptation given by a free access to funds in the present.

Commitment savings have commitment deposit-side features, for helping users to deposit regularly in the account, and withdrawal-side features, which are a deterrent for withdrawal. In my case study, the deposit would be made once per year after the harvest; therefore, it would be necessary a commitment saving product with effective withdrawal-side features, to help farmers to keep their savings until the food shortage period. The most common withdrawal-side features are: targeted savings for specific purpose, restricted timing of withdrawal, withdrawal fee and peer monitoring (Hofmann, 2014).

In the case I am analysing, the existence of the rice bank scheme can give useful indications on how to establish a successful commitment saving scheme.

First, that fact that rice banks have features in common with self-help groups it is an indication that commitment savings could be a natural transformation of the rice bank scheme into a commitment saving scheme. In fact, self-help group provides loans but start as a commitment saving group, where borrowers save together and monitor each other in order to assure that the savings are deposited and not withdrawn before a pre-determined date.

In addition, the farmers using the rice banks already have an estimation of the quantity of rice to deposit in a commitment saving scheme, which is going to be the same as the loan they were used to take. Moreover, as for the withdrawal side features, both restricted timing of withdrawal and peer monitoring could be applied. In fact, as it happens for the loan distribution, made once per year on a set date for all the bank’s users, the saving account could open once per year on a date decided by the community of savers. In fact, farmers from the same village face food shortage in approximately the same months. That would prevent the savers to use their savings when not

strictly needed.

The saving scheme could create some special rules in case of unexpected events where the savers has to withdraw their funds earlier. Since the community where rice bank are working is small and with strong social ties, the peer monitoring feature could be an option as well.

It would be essential, when switching from a rice bank to a commitment saving scheme, to make the users understand the benefit of it and set specific guidelines on how the saving scheme would work and what are its features. In fact, as discussed in the literature as well, people would give up the possibility of using their income now but storing it for successive consumption only if the beneficial aspects of this scheme are clear (Karlan, 2003). The NGO currently supervising the Banks, thanks to the trust relationship established during the previous years of work, could be a good agent for explaining the benefit of the scheme and its mechanism.

In the transition from Rice Banks to commitment saving schemes there are some issues that need to be considered for the successful implementation of the new system.

Firstly, in the first year the borrowers should repay the rice bank loan and then commit to save a portion of harvest in the saving account. That is costly for the borrowers and this initial difficulty need to be considered in the project design, in order to avoid problem during the implementation. Secondly, if the rice would be stored in the same storage used for the rice banks, it would be essential to make sure that no rice goes loss during the storing period. In fact, the savers needs to be sure that their saving are properly stored and will not go lost during the no-withdrawal period. The savers would not accept to join the commitment saving system in case there is the possibility to lose part of their savings because of improper conservation.

As a possible solution, the people having the role of managers should receive a higher compensation and well defined responsibilities. In this way, the monitoring of the storage could be done efficiently and the losses happening now in the rice bank system could be avoided.

In conclusion, transforming the rice banks from a mixed scheme to a defined scheme such as the one of commitment saving schemes, could have beneficial outcomes for the users of the banks, which could see their situation of indebtedness decreasing or disappearing, in case of the implementation of a fully efficient saving scheme.

7. Conclusion

This worked aimed to explore the determinants driving the financial sustainability of the microcredit system created through the Rice Banks. The study focused on how the rice bank scheme is implemented and what are the factor that can explain the financial self-sufficiency level of the Banks. Moreover, the study discussed also the efficiency of the choices made by the agents creating and managing these institutions.

The results highlighted the factors that influence financial sustainability, which are interest rate level, loan default, management costs and storage and processing costs. Through the analysis of the results, the research identified the two drivers causing the costs mentioned above: the management inefficiency, which influence the loan repayment and the storage loss, and the external factors, such as rice processing loss. The researched showed how both banking-system and rice-related factors influence the financial sustainability of the rice banks, highlighting the management inefficiency as the main cause for negative financial self-sufficiency values. The research identified both positive and negative situations of efficiency among the banks part of the sample, what drives the financial sustainability of these institutions and where their revenues and costs come from.

In addition, the study has underlined to which extent the rice banks' credit scheme deviates from the one structured by standard microcredit institutions. The structure, revenues, costs and organization meets in part the system implemented by microcredit institutions and, in part, the one of self-help groups, such as the Accumulating Saving and Credit Associations (ASCRA). However, the research underlined also weaknesses of the scheme that needs to be addressed to improve the Banks' efficiency. Based on this, a possible alternative has been proposed in the discussion, which is the one of commitment saving scheme. In this way, the rice banks would stop being a system halfway between a microcredit institutions and a self-help group and could acquire a proper organizational structure and help the farmers to stop their loan cycle through a saving scheme.

The theoretical literature on financial sustainability of microcredit institutions lacks of research on the functioning and evaluation of grain banks. Therefore, this research acquires relevance in the discussion on how microcredit system working with grain food can become financial self-sufficient and what are the challenges they could face in the process.

Moreover, the researches is particularly important for the rice banks already existing in the territory. In fact, the strengths and weaknesses revealed through the study can be used by the managers and the NGOs in charge of supervision to improve the structure of the banks and make it more efficient.

7.1. Recommendations for further research

These findings can be used as a starting point for future research on grain bank schemes as a method to fight food shortage in rural areas that rely on a main staple grain. Taking into account the results derived from this study, further research could focus on:

- 1) Deepen the knowledge on grains' banks schemes, analysing sample from different regions/countries implementing this microcredit system and comparing similarities and differences to improve their efficiency;
- 2) How to improve the efficiency of the scheme, seen the challenges encountered by the sample analysed;
- 3) How to implement the seed bank scheme in other territories with a main staple agricultural production but different geographical and development characteristic (e.g. beans banks in African countries);
- 4) Discussing possible alternatives to rice bank microcredit scheme, as proposed in section seven with the commitment saving scheme

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Appendix I: Location of Siem Reap Province.



Appendix II: Location of Rice Banks managed by READA in Siem Reap Province.



Appendix III: Semi-structured Interview Form.

Interview Rice Bank Committee

Rice Bank Name:

Date of creation:

Area:

Number of people part of RBC..... Gender..... Age.....

Aspect 1: Does the Interest Rate covers the Rice Bank's costs?

SRQ1: Committee Costs

- What is the salary earned by the RBC?
- Is the salary yearly fixed? If not, It changes according to what?
- do you think it is a sufficient reward for you role in the rice bank?
- Is the salary earned totally paid through rice?
- do you sell the rice that you get as a salary in order to convert it with money?
- ask what are the percentages taken from the interest rate for every year since the bank opened

SRQ2: Rice Bank Maintenance Costs

- Which kind of costs the Bank needs to cover for its maintenance? (ex: rice bank storage)
- Does the Bank cover all these costs through the interest rate?
- is there a fixed percentage per year? Do you have the possibility to change it?
- if yes, it can be changed only for specific reasons?
- ask what was the percentage for every year since the bank opened
- is there a deposit set aside for emergency costs?

SRQ3: Social Security Scheme

- How do you select the people who benefit from the social security scheme?
- How much percentage of interest rate is used for the social security scheme?
- Is it fixed for the whole year? Do you have the possibility to change it?
- if yes, it can be changed only for specific reasons?
- ask what was the percentage for every year since the bank opened
- Did you give the rice from the social security scheme every year since the opening of the rice bank?

SRQ4: Stock Level

- Do you set a fixed percentage from the interest rate for the stock level for the next year?
- ask what was the percentage for every year since the bank opened
- if it was not fixed for every year, for which reasons was it changed?

Aspect 2: Are the Rice Banks independent from the external sources?

- Did the Rice Bank received rice top-up/external subsidies?
- if yes: From who?
For how many years?
- Which ones are the reasons why top up needed/still needs to be given? (e.g: low debt repayment,

weather issues...)

Aspect 3: Which factors can be held responsible for the differences in levels of financial sustainability of the rice banks?

Internal Factors- Management

SQR1: Decision Making

- Which ones are the competencies and responsibilities of each member of the rice bank committee?
- How frequently is the rice bank committee meeting?
- what are the topics discussed during the meetings?
- How responsible are you feeling for the performance of the Rice Bank?

SQR2: Accounting and Control

- Which competencies you think are necessary for the good management of the rice bank?
- did you receive a training for budgeting and planning competencies?
- can you describe what you learnt in the trainings?
- How do you manage the rice distribution and repayment?

SQR3: Human Resources (for READA)

- Did you train every single member of the rice bank committee personally?
- In case only one member is replaced, the others RBC member train him or you train him?
- Which skills did you teach to the RBC during the trainings? How?
- Do you supervise them in the rice Rice Banks' operations?
- Does the supervision stop after some time? If yes, after how many years?

External Factors- Post-Harvest Losses

SQR1: incorrect harvesting methods

- Did the bank experience any rice loss due to incorrect harvesting methods?
- if yes, could you quantify it? In which year(s)?

SQR2: Storage Issues

- did the bank experience any rice loss due to unsuitable storage structures? (E.g. insufficient shade and ventilation facilities, lack of heat insulation...)
- did the bank experience loss due to damages to the store? (High relative humidity because of unsealed floor/walls/roof, imbalances in day/night temperature in the storage facility...)
- Did the Bank experience losses due to infestation of rodents or birds?

If yes to a question, ask if it is possible to quantify and in which years.

Appendix IV: Rice Banks' OSS divided by year.

RICE BANK 1				
Years	N° borrowers	Loan range in kgs	No Savings	With Savings
2011/2012	62	30<x<150	124%	124%
2012/2013	64	36 <x< 150	121,3%	121,3%
2013/2014	64	36<x<150	50%	85%
2014/2015	52	50<x<470	111%	167%

RICE BANK 2				
Years	N° borrowers	Loan range in kgs	No Savings	With Savings
2011/2012	75	X= 88.88 (equally distributed on the 1 st year)	124%	124%
2012/2013	84	100<x< 194	124%	124%
2013/2014	77	60<x<355	194%	245%
2014/2015	81	100<x<300	71%	103%

RICE BANK 5				
Years	N° borrowers	Loan range in kgs	No Savings	With Savings
2011/2012	56	41.66<x<166	124%	124%
2012/2013	52	50<x< 200	118%	118%
2013/2014	52	50<x<267	137%	312%
2014/2015	44	50<x<550	152%	261%

RICE BANK B			
Years	N° borrowers	Loan range in kgs	No Savings
2013/2014	119	50<x<220	55%
2014/2015	92	100<x< 250	76%

RICE BANK C			
Years	N° borrowers	Loan range in kgs	No Savings
2013/2014	32	100<x<700	150 %
2014/2015	27	20<x< 1000	97 %