CHAPTER 6
DISCUSSION

This study was conducted to analysis the impact of a smartphone application on the livelihood situation of farmers in Thailand and their use of agricultural inputs. Thereby, the research was motivated by the ambitions of Rak Ban Kerd Foundation and dtac, to improve the situation Thai farmers while promoting sustainable and organic agriculture. Furthermore, the work was inspired by the growing importance of information and communication technologies in the agricultural sector, in particular in agricultural extension. In-depth interviews with experts from RBK and dtac as well as farmers in combination with a survey among farmers, who use the application and do not, were conducted for data collection and then analysed. Despite certain limitations of the study, the study revealed first results regarding the impact of a smartphone application on the livelihood situation of Thai farmers and their input use.

This chapter will investigate the previously outlined results following the three research questions proposed in chapter one.

6.1 Impact of Farmer Info Application

The main goal of this research was to analysis if the smartphone application has any impact on the livelihood and input use of farmers in Thailand. During the in-depth interviews officials of Rak Ban Kerd stated several times that the main aim of their services, including the application, is to improve the quality of life for Thai farmers. The positive impact of mobile devices has already been pointed out by several authors, with Aker (2008) and Jensen (2007) among the most commonly cited. Thereby, the underlying intention of distributing market information and agricultural knowledge via mobile devices is to overcome market asymmetries. This idea was also the main assumption of this research as described in chapter three. Thereby ICTs should provide knowledge and information to farmers strengthening their overall position. It is assumed that the use of ICTs in agriculture can significantly contribute to a reduction of transaction costs and as a results will help to solve the Principal-Agent dilemma. Asenso-Okyere and Mekonnen (2012) confirm this point of view by pointing out that

the availability of such information, in particular, information on markets and prices, strengthen the position of the farmers in the value chain. A stronger bargaining position, adjustments to the production plans or new marketing choices are some of the options pointed out by them (Asenso-Okyere & Mekonnen, 2012, p. 8). In general, a well-informed farmer can prevent the occurrence of moral hazard and adverse selection in a principal-agent model.

The findings of this study confirm to some extent the claimed impact by Rak Ban Kerd and dtac. The impact of the application on the livelihood variables of longan farmers is overall significant and shows a positive effect, except for the average monthly income from other activities These results were confirmed when the data was crossed checked for potential selection bias using propensity score matching. However, for rice farmers, only the average agricultural income is higher among app-users. The average, maximum and minimum selling prices are higher among non-app users, while average monthly revenue from other activities shows no significant difference. Once the results were crossed checked with the estimates provided after propensity score matching, the difference for the minimum selling price is not significant anymore, when cases containing missing data are eliminated.

The results for longan farmers suggest that price comparison between markets can lead to higher selling prices and an overall higher income from agriculture as summarised by Lokanathan, De Silva, and Fernando (2011, p. 16). However, this does not apply for the surveyed rice farmers. In this case, no higher selling prices for application users are observed but instead for non-users, although farmers using the application have a significantly higher income. One explanation for the better livelhood situation can thereby be the fact that smartphones, in general, have a positive impact on household's income, as proven by Hartje and Hübler (2015). Another explanation for the higher agricultural income might be the higher yields which are achieved by app-users compared to non-users. However, the yields, in particular for longan farmers, are surprisingly high among app-users with an average farm size of around 10 rai, when compared to the average yield per hectare and year in Thailand and other countries (Crane & Mossler, 2008, p. 1; Food and Agriculture Organization of the United Nations, 2000; Hasachoo & Kalaya, 2013, p. 4). This might be a result of the small sample size or the data collection of dtac and could be corrected with additional

idependent data. Another explanation is, that it was caused by different perceptions of the farmers regarding their yield, as bookkeeping is not an essential part for all farmers and yields can vary significantly between the years. For rice the results seem to be closer to the statistical average considering that more than one harvest is possible per year. The fact that no higher selling price is achieved by rice farmers using the application is in one line with the results from the in-depth interviews. The two interviewed application users stated that the market coverage in the area of Chiang Rai is still poor which makes it useless to compare prices between markets. According to them, it would be unprofitable to transport the produce to the other markets, which are often far away, as the overall production is too small. This statement is confirmed by a study of Fafchamps and Minten (2011) who argue that the service, called Reuter's Market Light, has no significant effect on the price farmers receive, among others, due to a lack of market opportunities (Duncombe, 2012, p. 11). Burrell and Oreglia (2015) even draw the conclusion from their study that the overall impact of market price information has become a panacea which has been promoted over the last years by various actors. Also the World Bank Group raises some doubts regarding the overall impact of ICTs, in their latest report. Although it is not denied that there are positive impacts on farmers' livelihoods and selling prices, there are voices criticising ICTs as the overall solutions. According to them farmers do not always have the possibilities to act consequently on the provided information due to the local market situation (The World Bank Group, 2016b, p. 92). Therefore it is always necessary to understand the local and institutional environment.

In the case of this research it is important to closely analyse the institutional environment and value chains for the chosen agricultural products, as they can provide a better understanding and explanation of the livelihood results. The two agricultural commodities are significantly different regarding their characteristics. Longan as a high value crop is mainly produced in the north and northeast of Thailand with over 40 percent of fresh and around 80 percent of dried produce exported to China. The majority of the longan farmers are engaged in cooperatives which most of the time guarantee good prices, often about market, but at the same time leave farmers with the opportunity to sell to private companies (Hasachoo & Kalaya, 2013, pp. 7–8). As a perishable fruit, it is important for longan farmers to sell as soon as possible once they are cut from the

tree. This makes it more crucial to meet supply and demand accordingly, so all parties benefit.

Rice also has large production areas in the northern and north-eastern parts of Thailand as well as the central plains but is grown in other areas too. The largest share of the available agricultural area is dedicated to rice cultivation as it is the staple food for the majority of the Thai people and an important export good. Most recently Thailand became again the leading rice exporter worldwide after it had lost its position due to an implement policy targeting rice farmer to improve their livelihood situation. This scheme was paying farmers prices significantly higher prices than on the world market which resulted in huge debts and a drop in export and the final collapse of the system (Inoue, Okae, & Akashi, 2015, p. 1). Instead of focusing on increasing the selling price for rice farmers, the current government changed its policy. Thereby the government follows the plan to increase farmers income by reducing input costs and land rents (Inoue et al., 2015, p. 1). Rice has been a political issue for a long time as a large number of the poor is involved in the cultivation. Therefore, well targeted rice policies can help political parties to receive support from farmers, mainly in the northern and north-eastern parts, and as a result influence election outcomes. In general, rice farmers are less organised in cooperatives than longan farmers and are mainly selling their produce to mills or local collectors.

Considering the institutional environment for both agricultural products, they provide an additional explanation for the results highlighted above. The perishable nature of longan requires farmers to sell their produce as quick as possible once it has been harvested. The application, however, allows farmers to track market development and adjust the harvest accordingly. This can explain the overall higher selling prices achieved by longan farmers using the application. Rice farmers on the other hand are highly influenced by political decisions and implemented policies. Although the original tests showed significant higher selling prices for non-users, the results for the lowest price ever received have been weakened after using propensity score matching (see Appendix 14). There is no significant difference between groups regarding the minimum price. This indicates that there might also be no significant differences between the average and maximum selling price for both groups of rice farmers if a larger sample is analysed. The past governmental interference with the selling price

would be a plausible explanation for no or weak differences. Rice farmers are less likely to observe and compare markets once prices are set by the government. Furthermore, rice is not subject to significant price fluctuations in Thailand, as up to three harvest are possible in Thailand. The almost constant supply of rice does not allow for significant price differences throughout markets and months. This also might be a cause for the results regarding the selling price.

Another goal of Rak Ban Kerd and dtac, which was confirmed by the success stories and in-depth interviews with officilas, is the promotion of sustainable and organic agriculture. An additional aspect which is often mentioned when ICT is promoted in the agricultural sector, apart from financial impacts, is the impact on farming activities. Thereby, ICTs are often seen as a replacement or enhancement of existing agricultural extension systems (Dethier & Effenberger, 2012, p. 185; Fiedling & Ninsiima, 2012, p. 1). In the case of the Farmer Info application, the use of pesticides and fertilisers by farmers was analysed as the overuse of chemical inputs is still a major problem in Thailand. The results showed that app users are spending significantly less on both inputs and apply them less frequently which was also confirmed after using propensity score matching to overcome selection bias. This results are in one line with reports from India, where various projects led to a reduction of used inputs and an overall cost saving (Raj, 2013, pp. 125–127; The World Bank Group, 2011, p. 5). Farmers using the application are also more prone to using only organic inputs than other farmers. However, non-users often use a combination of chemicals and organic. The use of organic inputs was also confirmed by the two interviewed app using farmers, who both preferred organic pesticides and fertiliser over synthetic ones. Mainly because of personal health concerns, but for one interviewee also due to higher market prices. The most prominent example, which uses a similar approach than Rak Ban Kerd and dtac, is “Digital Green”. It was named as one of the success cases in the field of ICTs for agriculture using videos to train farmers on new agricultural techniques and extending their overall agricultural knowledge (Food and Agriculture Organization of the United Nations, 2015). According to Raj (2013), following the observations of Gandhi et. al. (2008), the project had a seven times higher adoption of agricultural practices than the traditional extension and was also around ten times more effective per dollar (Raj, 2013, pp. 115–116). The effectiveness of videos in agricultural extension

has been also confirmed by a study in Benin where the impact was compared over a period of five years (Bentley, van Mele, Okry, & Zossou, 2014). The research highlighted that farmers started to experiment with rice farming and new technologies after the videos were shown to them. Also farmers contact extension officers to receive seeds and additional information (Bentley et al., 2014, p. 921). Surprisingly, farmers were able to recall numerous details of the videos even five years after they were shown to them (Bentley et al., 2014, p. 925). This shows the impact videos can have on farmers. Although not all videos provided by the Farmer Info application are related to the farmers field activities, they can significantly raise awareness towards sustainable agriculture and help sharing knowledge between communities. This has been confirmed by the in-depth interviews in which farmers mentioned their interest in the videos, although they are not always applicable. It was pointed out by one farmer that he likes to share the gained knowledge from the application with neighbours and friends. Regarding the results from the study in Benin, videos might be also a good form of agricultural extension, considering that farmers even recall certain details after five years. In the Farmer Info application farmers even have the possibility to watch videos several times which at the end might further increase their awareness towards more sustainable and organic agriculture.

Concluding, it cannot be said that the Farmer Info application helps to overcome information asymmetries and the principal-agent dilemma with its problems of moral hazard and adverse selection. The overall theoretical concept behind the application supports the assumptions, however, the data does not provide conclusive evidence. The impact on the input use shows that farmers are less likely to overuse fertilisers and pesticides and rely more on organic inputs which might suggest a strengthened position towards input markets and an increase of awareness among farmers. This findings are also confirmed by results after propensity score matching. The impact on the selling prices of longan farmers suggests a stronger bargaining power towards other stakeholders in the value chain as production can be adapted according to market demands and oversupply. However, this is not supported by the results for rice farmers, where nonusers achieve higher selling prices and the minimum prices is not significant anymore after propensity score matching. This mainly could be a result of political interference due to the importance of rice for Thai society. Therefore, no final

conclusion can be drawn regarding the impact of the Farmer Info application but further independent studies are necessary to confirm the results of this explorative study.

6.2 Farmer Info Application and Needs of the Farmers

When considering ICT solutions for agricultural problems and development, it is crucial to see the technology as an instrument and not a panacea. An aspect which has continuously been brought up in the literature in this context is information and knowledge on demand for farmers provided by agricultural extension. Over the years the system of agricultural extension has changed from a top-down to a bottom-up approach in which the needs of the farmers determine the information and knowledge transferred (The World Bank, 2010, p. 16). This system is essential to harness best the potential provided by ICTs for farmers and agricultural development.

The interviews conducted with officials from Rak Ban Kerd revealed that initially farmers were consulted to provide a first orientation for the focus of RBK's services. This meeting was scheduled over ten years ago when the SMS-service was established. Since then the services have been developed further, and additional content has been added. Thereby, the needs of the farmers have been sometimes considered, although not always met. Criticism which has been brought up several times is the poor market coverage of the application, which has been already around since the SMS-service. Addressing the needs of the farmers, would require to expand the market coverage for the application and SMS-service. Furthermore, farmers claimed that the agricultural content should be updated more frequently to gain additional knowledge and receive more information.

However, the application already provides a broad variety of information in the form of agricultural news or videos and also takes into account recent events. Most of the information provided by the application is in one line with the results of several studies on the general needs of farmers. Mittal and Mehar (2014) used several studies to identify the overall prioritized needs of farmers, which included weather, plant protection, seed information and market prices (Mittal & Mehar, 2014, pp. 199–200). Similar findings are observed by this study and are covered by the Farmer Info application.

When asked about the future direction of the application, one RBK official stated that the priority at this point is to distribute information referring to water management and consumption. Water scarcity was among the top problems stated by survey participants and interviewees due to a most recent drought in Thailand. Additionally, Rak Ban Kerd has further plans to develop the application to meet the needs of the farmers. This includes an agricultural weather information tool in the application, a geographical separation of the data on the application, the improvement of the e-commerce part to widen farmers marketing channels and also the increase of market coverage.

Although the application so far does not meet all the needs of the peasants, Rak Ban Kerd and dtac take them into account and try to act accordingly. A more elaborated monitoring and evaluation scheme would be helpful to ensure a successful development of the application and a constant evaluation of its impacts on farmers and communities.

6.3 Farmers Info Application and Sustainability

One concern which is also often brought up when ICTs are promoted as a solution for agricultural development and an improvement for farmers' life, is the sustainability of such projects. Kemppainen (2007), as stated by Kemppainen, Tedre, and Sutinen (2014, p. 6), mentioned three issues that are likely to influence the success of an ICT. This includes the lack of resources, the work milieu and the cultural needs. While the lack of resources is mainly referring to financing, labour and equipment, the work milieu considers the infrastructural development in general. The cultural needs finally take into account that not all ICT solutions can be simply transferred from one country to another (Kemppainen et al., 2014, p. 6). There are numerous services which have been implemented so far, but a significant amount of projects also failed, often due to one of the previously mentioned problems.

The Farmer Info application is one of the services Rak Ban Kerd Foundation provides with the support of dtac. The services are thereby managed independently. However, the main financial sponsor is dtac which uses the engagement in the agricultural sector as a part of their overall corporate social responsibility strategy. This strategy aims at providing benefits to the Thai society in general but dtac customers in

particular. When asked about the potential conflict raised by the Farmer Info application between beneficiaries and non-user, the CEO of dtac referred to it as healthy rivalry within the farming community with the hope to attract new customers (Bangkok Post, 2013). The CSR strategy of dtac seems to target a new market of customers within the agricultural sector and in the rural areas. Although the services try have been promoted for several years and most recently were extended, all of the services are free of charge and therefore not financially sustainability. Once dtac's interest in the farming community fades or financial difficulties require some substantial cost reduction, the continuation of the services provided by RBK cannot be guaranteed anymore. Furthermore, the desired extension of the services, such as fully covering all areas of Thailand, requires additional investment in the service and increasing fixed costs.

Brugger (2011) also identifies several factors which are crucial for the long-term sustainability of a mobile applications. The first aspect thereby is the overall business model, which includes the stakeholders involved and how the roles, responsibilities, risks as well as benefits are allocated between them (Brugger, 2011, pp. 12–15). In the case of the Farmer Info application the two main actors are Rak Ban Kerd and dtac. Thereby, RBK has the most important role as the service facilitator with the biggest responsibilities, but also the biggest risk. Dtac on the other hand is the main donor of the program but also has the largest benefit, as it is part of their CSR strategy to attract new customers. The overall business model seems therefore less sustainable. Once dtac reduces its engagement in the project, the funds of Rak Ban Kerd will dry up and consequently the service.

The second and third aspects refer to the costs of maintaining the technology and generating content (Brugger, 2011, pp. 12–15). As highlighted previously, RBK mainly receives money from dtac which has to be used to cover all fixed and variable costs. Although the exact numbers are unknown, it can be expected, that the costs are currently high regarding the various services provided. The plans to further increase the coverage of the application together with the development plans for the application are likely to increase these costs. Consequently Brugger (2011) highlights the aspect of revenue generation. The only service which provides a form of revenue for RBK is the website, where farmers have to pay a small fee to sell their projects. However, this

income is, according to Ms Bencharongkul, small and not sufficient. All other applications are free of charge for all dtac customers, including the data traffic caused by the application. A sustainable mobile application would require to last also without major donations. This, however, does not apply to the Farmer Info application and all other services of RBK.

The last aspect for a long-term sustainable mobile application sees Brugger (2011) in an exit strategy for donors and the commercialization of the product. In case of this research dtac, as the main donor, can exit the program at any time, once there is no more benefit for the company. Rak Ban Kerd on the other hand as the service facilitator cannot easily exit without the complete collapse of the concept. As far as the interviews indicate, there is no plan to commercialise the application but to continuously use it for dtac's corporate social responsibility campaing. Concluding it can be said, that the application, is not likely to be sustainable in the long-term following the indicators by Brugger (2011).

Another crucial factor for the sustainability of such projects and their adoption by the farming community is the trust the people have in the service provider and the generated content. According to Fiedling and Ninsiima (2012) without trust it is not likely that farmers will use the services and information provided. They identify three aspects which are necessary to build up this trust. It is important that given advices are effective, local languages and dialects are used and traditional knowledge is integrated in the service (Fiedling & Ninsiima, 2012, p. 2). Although all three factors are fulfilled by the services provided by Rak Ban Kerd and dtac, survey participants, who were not using the Farmer Info application, indicated that they consider both actors as not trustworthy. When asked about the institutions which should provide agricultural content to the farmers, the Ministry of Agriculture and Cooperatives was mentioned first by the majority.

Several indicators show that the application so far follows an unsustainable approach. A main concern thereby is, among others, the use of RBK's services as a component for dtac's CSR strategy. This does not only exclude a large share of the farming community from benefitting from the service, but also prevents other actors from long-term investments in the project.