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Table of Contents:

Index of Authors:

Agriculture technology adoption in Uttar Pradesh, India

By: Deo Datt Singh

This study narrates technology adoption behaviour of farmers in Eastern part of Uttar Pradesh, India. It is interesting to note that the most expensive technology promoted (hybrid/improved seeds of different vegetable crops or potato) was adopted by all the farmers, irrespective of land size. This reveals that adoption is less about cost, and more about the potential benefit (in terms of increased productivity and income) farmers can derive from it.

There was not a large discrepancy between the adoption rates of technologies by gender. However, the disaggregated data shows that the adoption rate of up to five technologies was higher with small women farmers than with men farming similarly sized plots. The data also suggests a decrease in the adoption rate by women farmers when land holdings are larger than 5 acres. For example, when land holdings are more than 5 acres, the adoption rate for more than 10 technologies is 44.7 and 31.9 respectively for men and women farmers. This may be due to male dominance in decision making when the land holdings are large or the technologies are expensive. In most cases, women had access to the technologies, but were not in a decision making position to be able to purchase them.

Results also indicate that farmers are risk-adverse with regards to adopting anything new, but at the same time they are always in search of information and technology that can enhance their productivity and incomes. They will only adopt practices if they trust the people who are transferring the information and technology. Furthermore, smallholders trusted other smallholders more than they trusted large farmers.

Trust building is more critical for women farmers than men. Women are already marginalized (both socially and economically) in society, and their participation in agri- related decisions at the household level is very low. For a woman to be able to share her learning's with her family and convince family members to adopt what she has learned requires a greater degree of trust in the extension workers. Also, for the extension worker to be able to talk to women farmers and hold trainings and discussions with them requires a lot of credibility, not only with the women but with the entire community.

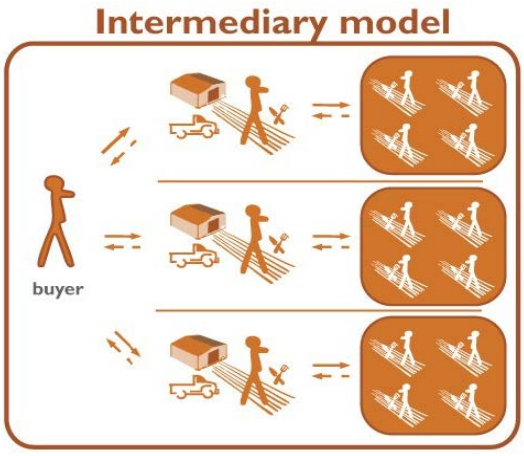
Agriculture technology adoption in Uttar Pradesh, India

By: Deo Datt Singh,

A development project's experience working with smallholder farmers over the last three and a half years, especially in the area of technology adoption, has been both interesting and challenging. Contrary to the general belief that small and poor farmers with land holdings less than an acre and typically earning about INR 50,000 ($840) annually do not adopt new technologies easily due to risk aversion, project realized that small farmers show better adoption than larger farmers if (i) there is appropriate knowledge transfer (ii) accessibility to technology is enhanced and (iii) market risk for this adoption is reduced. Though this may not be universally true, it was evident in the project, which worked with 25,000 small and marginal vegetable producers (including 6,000 women farmers) Uttar Pradesh, India.

The project worked with informal groups, each comprised of 20-25 farmers organized into a lead farmer/outgrower model. The project team realized that the most important part of this entire group formation was the selection of the lead farmer within each group. The lead farmers were democratically chosen by the group members, and members were encouraged to make their selection based on the candidates' ability to be innovative, influential (opinion leaders), proactive and non-political.

> Under an intermediary outgrower scheme, there is semi-formal to formal subcontracting by buyers to partner intermediaries (ie. lead farmers) who manage outgrows and provides services.



The purpose of this document is to disseminate India's lessons learned around technology adoption, particularly around targeting smallholder farmers to act as a catalyst for wider systemic farmer adoption.In the beginning of the project, we were under the assumption that the largest farmer in the group would be the best lead farmer, with a higher rate of self and group adoption of technology. It took almost 1.5 years for the project to organize the targeted 25,000 farmers into such groups. During this process, the project selected the target villages but the farmers joined voluntarily and elected the lead farmers themselves. Over this time we found that a large number of groups elected one of the smallest farmers as their lead farmer or demonstration plot manager. The reasons the group members gave for selecting these farmers were their keen interestand regular attendance in trainings, their willingness to cooperate with project field staff, and their desire to learn improved practices.

Adoption behavior segregated by gender and land holding								
			adopted ≥ 2 technologies		adopted ≥ 5 technologies		adopted ≥ 10 technologies	
Land Holding	**Gender**	**Total Number**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
<1 acre	male	5,398	3,822	70.8	3,825	70.9	1,471	27.3
	female	1,350	1,041	77.1	985	73.0	298	22.1
	total	6,748	4,863	72.1	4,810	71.3	1,769	26.2
1-5 acre	male	9,166	6,728	73.4	4,440	48.4	1,716	18.7
	female	2,285	1,646	72.0	1,191	52.1	463	20.3
	total	11,451	8,374	73.1	5,631	49.2	2,179	19.0
>5 acre	male	304	218	71.7	188	61.8	136	44.7
	female	72	49	68.1	46	63.9	23	31.9
	total	376	267	71.0	234	62.2	159	42.3

(Note that the table above represents information from the 18,575 farmers for whom information on adoption rate and landholding size was available.

It is interesting to note that the most expensive technology promoted by the project (hybrid/improved seeds of different vegetable crops) was adopted by all the farmers, irrespective of size. This reveals that adoption is less about cost, and more about the potential benefit (in terms of increased productivity and income) farmers can derive from it.

There was not a large discrepancy between the adoption rates of technologies by gender. However, the disaggregated data above shows that that the adoption rate of up to five technologies was higher with small women farmers than with men farming similarly sized plots. The data also suggests a decrease in the adoption rate by women farmers when land holdings are larger than 5 acres. For example, when land holdings are more than 5 acres, the adoption rate for more than 10 technologies is 44.7 and 31.9 respectively for men and women farmers.This may be due to male dominance in decision making when the land holdings are large or the technologies are expensive. In most cases, women had access to the technologies, but were not in a decision making position to be able to purchase them.

Types of Technologies/Practices:

Agricultural extension services were implemented through a mix of training provided by project extension staff to lead farmers (who then trained farmers in their small groups); both fee-based and embedded extension services and advice provided by private sector stakeholders – mainly through the franchised rural input-outputcenters piloted by the project (or in some locations, privately-run input-distribution only ‘farmer resource center’or FRC

shops); and demonstration sites, mostly sponsored by private stakeholders, and hosted at farmer plots and at the franchises and FRCs. Specifically, the project collaborated with Dhanya seeds, Chemtura, Nunhems, UPL, Syngenta, Bayer and the horticulture department to deliver training to the farmers. The project promoted the following technologies and practices through these efforts (categorized by its ease and affordability to adopt):

Table 2: Technologies promoted by project

List of Technology	Purpose	Easy to Adopt	Hard to Adopt	Expensive to Adopt	Affordable to Adopt
Soil Testing	Analyse the nutrient status of soil and promote judicious use of fertilizer	X			X
Use of Fertilizer as Per Soil Test	Reduce costs, improve effectiveness, and enhance soil health	X			X
Composting	Use as a low-cost, locally available organic soil enricher	X			X
Use of Improved Seed Varieties		X		X	
Line Sowing	Reduce incidence of weeds, burden of labor, and increase the efficiency of water usage	X			X
Grading and Sorting	Increase price realization	X			X
Field Cooling	Remove field heat and potential crop damage	X			X
Packaging	Reduce post-harvest losses and maximize product marketability	X			X
Record Keeping	Improve farm management	X			X
Seed Treatment	Reduce the incidence of seed/borne diseases and increase germination rates		X		X
Soil Treatment	Disinfect soil and reduce the incidence of soil borne diseases and pests		X		X
Nursery Tray and Use of Low Tunnel	Growing Nursery and crops in the off-season		X	X	
Pest and Disease Management	Reduce crop damage and improve yields		X	X	
Spray Pump Calibration	Increase pesticide application efficiency		X		X
Protective Clothing	Promote field safety		X		X

Dose Calculation of Pesticide	Reduce costs, improve effectiveness, and minimize pesticide residues		X		X

Much of the project's success in using a lead farmer-outgrower model can be attributed to the direct adoption of technologies by lead farmers themselves. This statement is confirmed by outgrowers, who stated that they adopted a technology because they saw its usefulness on a lead farmer's plot or on a demonstration farm. The lead farmer was the first point of contact for the project for trainings, demonstrations and technology transfer, so in most cases the lead farmer adopted the technology or practice first. The data below was collected by the project through customized adoption cards.

Table 3. Lead Farmer Adoption

Lead farmer with land holding more than 5 acre	No of outgrowers	Adopted 2 technologies	Adopted 5 technologies	Adopted 10 technologies
6	152	98(65%)	91(60%)	64(42%)
Lead farmer with land holding between 1 to 5 acre	No of outgrowers	Adopted 2 technologies	Adopted 5 technologies	Adopted 10 technologies
46	1,380	965(70%)	635(46%)	276(20%)
Lead Farmer with land holding less than 1 acre	No of outgrowers	Adopted 2 technologies	Adopted 5 technologies	Adopted 10 technologies
48	1,440	1,008(70%)	980(68%)	330(23%)

The table above suggests that small lead farmers had the highest rates of adoption for between 2-5 technologies. At the 10+ technology adoption level, there were significant declines for smallholder lead farmers, which may be attributed to either increased cost of technologies or lack of available land to utilize all technologies. Anecdotal evidence suggests that the level of influence of lead farmers on their outgrowers differed from group to group, leading to better adoption rates in some groups than in others. However, this was not formally documented or measured.

Adoption Process / Key Drivers for adoption

Based on project's experience working with lead farmers and on our interactions with farmers over the course of 3.5 years, the following factors appear to have played a major role in terms of farmers' adoption of new technologies and practices. Note that these drivers are the same for both lead farmers and outgrowers.

Trust: In the beginning of the project, the project team thought that the large farmers would naturally become the trusted outgrowers, as they had experience adopting more technologies

then smallholders. Contrary to this belief, the project realized thatsmallholders were more trusted by the outgrowers, and therefore more able to communicate information in a convincing manner than larger farmers. One method the project used to facilitate this trust was through creating several points of interaction between the smallholder lead farmer and outgrowers (through extension, aggregation and buying points, etc). Trust made smallholders lead farmers effective change agents because it allowed them to overcome weak relationships that are inherent in other contracting models- often caused by a lack of transparency. The lead farmers then used this trust to convince farmers that adopting a new technology/practice would allow them to increase their household income. Once farmers realized the potential returns of their investment, they adopted more technologies (some even more expensive).

Information on new technology: Prior to the project, it was generally understood that in India, smallholders were not as effective at disseminating information to outgrowers as were large farmers. Partially due to trust (mentioned above), the field team learned through implementing the project, that smallholder are more effective agents in disseminating information and that having information on a technology is a prerequisite to farmers' adoption of it. Even if the farmer has heard about a technology and has a desire to adopt it, in the absence of appropriate and sufficient knowledge, (s) he will hesitate to do so. The project addressed this need for information by equipping extension staff and FRC and franchisee owners with the latest technologies and ensuring that they reached the farmers through regular trainings and follow up. For women farmers, it is important that if she is not the sole decision maker in the family, the other family members who play a role in the decision making process also have enough information about the technology. The project ensured that appropriate information was shared with the family members either through specific trainings or through informal meetings.Smallholder Lead farmers became effective change agents through this key driver, because they were more effectively able to spread information through their kin networks (which are frequently relied on for sources of timely and accurate information).

Value for money: Prior to project's interventions, in was generally understood that both small and large farmers were equally motivated by return on investment after adopting a particular technology or practice. Through implementing the project, the field team realized that smallholders are more motivated by quick, tangible payback than larger (more well-resourced) farmers. The farmer should be able to attribute to a new technology tangible monetary benefit following its adoption. The project addressed this requirement by providing information to the farmers so they could make an informed choice. Record keeping in customized farmer diaries also helped them identify returns realized through adopting a particular technology. For example, soil testing costsINR 50per sample but was widely adopted because it reduced the cost of chemical fertilizers (e.g up to Rs. 2,000 per acre in the case of potato). On the other hand, drip irrigation, though useful, was not widely adopted because the returns were lower, it was more complicated to use then the other technologies. Smallholder lead farmers became effective lead agents because through understanding the priorities that smallholder farmers place on quick returns on investment, lead farmers were

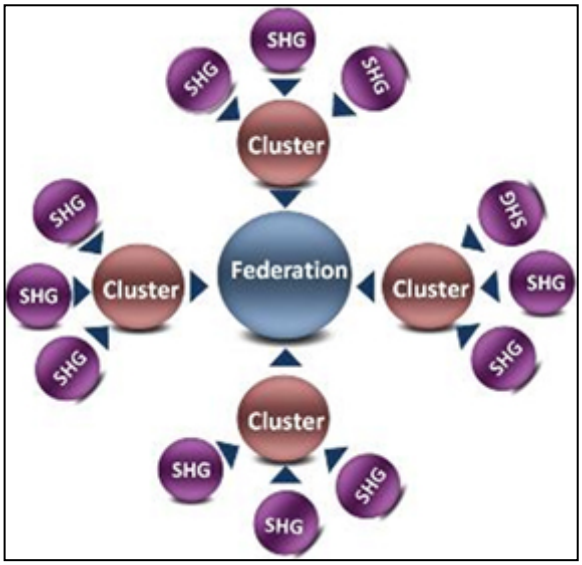
able to introduce were able to introduce a record keeping system that demonstrates the monetary value a smallholder would gain.

Easy to use and practical: Before implementing the project, it was generally understood that complicated technologies and practices were more likely to be adopted by large farmers then by smallholders. Through implementing the project, the field team learned that certain technologies and practices that involved complex processes were not adopted by small or large farmers, even if they brought benefit to the farmer. Therefore, the technologies the project introduced and the way we introduced them were crucial to overall adoption. In project's experience, smallholder lead farmers instilled more confidence in outgrowers then larger lead farmers. This may be partially attributable to lack of confidence (especially among rural women) in terms of their ability to learn how to effectively adopt/use a technology. We learned this through the failure of an early technology intervention the project tried to promote–agri input dosage calculation through a small but mathematically complex tool (a disc). Simple technologies such as soil testing, tray nurseries and raised bed cultivation had the best adoption rates because they were easy to apply.Small farmers, especially women, were particularly enthusiastic about raising seedlingsin plug trays. This was because farmers (both men and women) did not have to wait for the land to be free after another crop has been harvested for nursery raising.Women also had a higher rate of adoption for soil solarisation and line sowing. This was primarily because it led to easier weed management, reducing the back-breaking labor involved in weeding, predominantly undertaken by women. Introducing easy to use and practical technologies made smallholder lead farmer's effective change agents because it resulted in increased incomes for smallholder famers (through both higher productivity and reduced production costs).

Vulnerability &risk– Before implementing project, it was generally perceived that both small and large farmers were prone to the same certain risks that would make adopting a certain technology/practice not viable. Through the project, the field team learned that farmers' incomes are dependent on (and therefore vulnerable to) a lot of external factors such as seasonality and market price fluctuations, which are more significant for smallholder lead farmer than large ones. In project's experience, if these risks can be mitigated, the adoption of new technologies is much higher. For example, once the project helped facilitate market linkages for processing potato, farmers were willing to pay 3-4 times more for the new seed than for local seed.The risk of adoption for many different technologies was mitigated through demonstration sites at franchise and FRC sites, as well as demonstrations directly on lead farmers' own plots. This allowed risk-averse farmers to observe a fellow community member's success or failure with a technology before investing in it themselves. For example, Mentha was cultivated by only 20 women farmers in the first year. In the second and third years, 406 and 746 women farmers adopted it respectively. Smallholder lead farmers became effective change agents through understanding the vulnerability and risk that smallholder farmers face and through relating with them, then introducing a certain technology on their own farm to demonstrate that it works.

Accessibility: Prior to the project, it was generally believed that smallholder could access any technology (even if it not directly available in his/her community).Through the project, the field team learned that many technologies were unavailable to smallholder farmers and therefore, that they would never be adopted, irrespective of its advantages. The high adoption rates are due to the fact that project made the tools and materials necessary to implement these technologies and practices readily accessible, either through the local market or through rural input distribution network (FRC and franchisees). This is particularly important for smallholders, as they are less mobile then large farmers. Recognizing this from the start also allowed the project to prioritize from the very beginning, technologies and practices for which the materials were either already available locally, or rural stores that could easily link into the distribution channels to make the materials available.

In one district, women farmers were organized into Self Help Groups (SHG - a group of 12-15 women that come together to do regular saving and credit) at the basic level. SHGs come together to form a cluster and all SHG clusters fall under the umbrella of a federation.



The structure of the women's federation and its understanding of both women's resources and their needs made it an effective distribution channel for agricultural inputs to women. For example, women federation purchased hybrid seeds for various vegetables and then packaged and sold small quantities of different vegetable seeds (5-6 grams). These packages reached 1,200 women farmers in rural areas through the cluster and SHG network (as given in the figure). Local seed sales through the network also directly addressed the issue of lack of mobility for most women. Smallholder lead farmers became effective lead agents through either referring smallholder farmers to stores where inputs/technologies were available or through directly selling the smallholder farmers the technologies. This in turn, resulted in respect and trust.

Conclusion:

The project succeeded in demonstrating that smallholders (both men and women) can be successful business people and become change agents (via their role as lead farmers) in transferring technologies and encouraging adoption in a village if the right implementation strategy is in place. The fact that women farmers and the smallest/ poorest farmers were the earliest (and highest) adopters of new technologies and practices is interesting. We cannot assume that this will be the case in all situations, but it has been documented within the project. One explanation for high adoption rates is that the project was able to introduce appropriate practices that were easy to adopt and provided quick, tangible benefits. Additionally, very few public or private sector entities have effectively targeted smallholder

farmers. Therefore, when they received an opportunity to access technologies, they were very eager to participate, learn and adopt so they could augment their farm incomes.

Another key lesson is that that future agriculture development projects should encourage smallholders to run for elections as lead farmers. The results of the program indicate that while there was not much difference in adoption rates for up to 2 technologies (e.g., farmers adopted at nearly identical rates for up to 2 technologies, regardless of the 'size' of the lead farmer), a greater percentage of farmers linked to 'small' lead farmers did adopt a greater number of technologies than their counterparts (68 percentversus 46 percent, in a sample of 94 lead farmers and their networks of 2,820 outgrowers).

Results also indicate that farmers are risk-adverse with regards to adopting anything new, but at the same time they are always in search of information and technology that can enhance their productivity and incomes. They will only adopt practices if they trust the people who are transferring the information and technology. Furthermore, smallholders trusted other smallholders more than they trusted large farmers. The project effectively created this trust both in the lead farmers and through FRC's/Franchisees by demonstrating these technologies on farmers' fields, through regular follow ups and training through extension machinery,and finally creating accessible and customer-friendly platforms through franchise and FRC networks.

Lastly, Trust building is more critical for women farmers than men. Women are already marginalized (both socially and economically) in society, and their participation in agri-related decisions at the household level is very low. For a woman to be able to share her learning's with her family and convince family members to adopt what she has learned requires a greater degree of trust in the extension workers.

Note: The name of the project was Sunhara India which was funded by Bill and Melinda Gates Foundation and implemented by Agribusiness Systems International. Author was Programme Manager of the project. Now author is working with People's Action for National Integration – PANI.

Branch Expansion and Institutional Sustainability of MFIs in Bangladesh

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Branch Expansion and Institutional Sustainability of MFIs in Bangladesh

Abstract

Sustainability of microfinance institutions (MFIs) in relation to branch expansion and related decisions has been widely debated in the microfinance sector. The present study explores the factors that are taken into consideration by the MFIs in Bangladesh while opening a new branch. Specifically, the study examines the locational considerations relating to branch expansion and implications relating to service delivery and other MFI operations. The analysis covers both head office and branch level information collected using stratified random sampling approach ensuring proportional representation of small, medium and large MFIs. The study finds locational characteristics and number of borrowers as the most important factors while deciding on opening a new branch.The decision on branch location responds to three main considerations: (i) reducing cost of loan operation; (ii) serving target people in remote areas; and (iii) implementing targeted programmes. It is seen that very large and medium categories of MFIs have greater incentives for branch expansion relative to large and small categories while larger MFIs tend to establish new branches close to growth centres.

Keywords: Branch expansion, MFIs, Sustainability, Location.

1. Introduction

With rapid growth of the microfinance sector and increase in the number of borrowers, the microfinance institutions (MFIs) have adopted branch expansion as an important vehicle of delivering loans to the poor households.It is difficult to provide loan by the MFIs, especially in remote areas, from the head/zonal offices since it involves high transaction costs and information asymmetry. As a consequence, a rapid increase has taken place in the number of MFI branches operating in Bangladesh. The Microcredit Regulatory Authority (MRA) statistics in 2014 show that there are 697 licensed NGO-MFIs in the country. Out of these, 676 MFIs have a total of 16,991 branches. According to Credit and Development Forum (CDF) Statistics 2014, out of 511 MFIs for which information are available, 90 MFIs (with 1,025 branches) have implemented programmes in remote areas, while the rest 421 MFIs do not have any such programme. This shows that, despite a substantial rise in the number of branches in the rural areas, still a large portion of the rural population in remote areas suffers from lack of physical access to MFIs.

Additionally, the MFIs feel increasing pressure to achieve sustainability as the microcredit market becomes more competitive. The MFIs can expand their portfolio and achieve sustainability by increasing the outreach and providing financial services to a larger number of borrower while at the same time fulfilling the social mission. In practice, the MFIs can achieve a significant scale of outreach by using three major pathways: (i) expansion of geographical coverage and widening the range of services; (ii) advocacy and partnerships with organisations working for similar causes enabling leveraging partners' resources; and (iii) restructuring microfinance (MF) operations e.g. through merger and acquisition, franchising, growing existing operations, legal restructuring, strategic alliances and other means.

The location of MFI branches that offer financial services is one of the fundamental determinants of access to financial services by the poor. From the economic point of view, it would be rewarding for MFIs to invest in opening a new branch if the expected revenue from the branch exceeds its expected costs. However, such a strict economic logic may not be tenable in all cases if, for example, MFIs decide to promote social impact and the poor's welfare rather than economic returns alone. Such considerations would encourage MFIs to go to poorer regions or in locations where social impact would be maximised.

On the other hand, some branches may be established near the growth centres based on a different set of considerations.Thus, it is important for MFIs to understand the factors that should be taken into account while opening a new branch so that such decisions are bothrational andcreatepositive impact on the organisation's efficiency and productivity. Thus, although there could be a differing set of determinants, the relevant questions are: what are the main reasons for branch expansion? What important factors MFIs take into consideration while taking decision on opening a new branch? How do they decide on its location? Does the decision to open a new branch and its location have any implications on MFIs' efficiency

and productivity? How an optimal decision can be made by the MFIs in these respects? These are some of the issues that have been examined in this study.

One must also realise that just opening a new branch is not enough, providing access to financial services to the poor residing in the locality requires time-consuming efforts and MFIs must have the capacity (both financial and organisational) to undertake these activities. Otherwise, the efforts towards opening new branches may become counter-productive which would require provision of subsidies/grants for operation or these may have to be merged with other branches or may have to be closed down. It is important, therefore, for the MFIs to take a rational decision regarding when to open a new branch or whether it would be efficient to serve a specific location by extending the coverage of an existing branch. As MFIs seek to reach as many poor people as possible, therefore, it is important to constantly look for possible cost reductions or reallocations in order to operate in an efficient and economically viable manner.

The present study investigates the above issues; in particular, the main thrust of the study is to explore the factors that should be considered while deciding on opening a new branch by the MFIs. Specifically, the study examines the locational considerations (e.g. locating near a growth centre) relating to branch expansion and implications relating to service delivery and other MFI operations. The study analyses the perceptions about branch expansion decisions that can influence organisational structures to facilitate expansion. The impact of branch expansion on MFIs' long term sustainability and performance is also analysed in the study. Further, cost-effective ways of enhancing the outreach in remote areas e.g. alternative options to reach the unbanked low income people is examined. Finally, the study suggests optimal sizes of MFI branch coverage in terms of number of beneficiaries and other characteristics that could ensure greater branch sustainability.

2. Branch Expansion and MFIs: An Overview

Now-a-days, alternative distribution channels such as automated teller machines (ATMs), internet banking and electronic delivery, mobile financial services are widely used in the banking sector. These alternative distribution channels might suggest a lower demand for branch offices. But the operation of the microfinance sector is not similar to that in the banking sector. It has no ATMs, internet banking facilities or other modern technologies but MFIs are the most powerful driver of financial inclusion that leads to greater asset accumulation by the poor. At present, about 30 million poor which is more than half of the total number of the poor in the country, are in the financial folds of the MFIs. No other institution either public or private has been as successful as MFIs to reach the poor with finance that helps them promote income, employment and alleviate poverty.

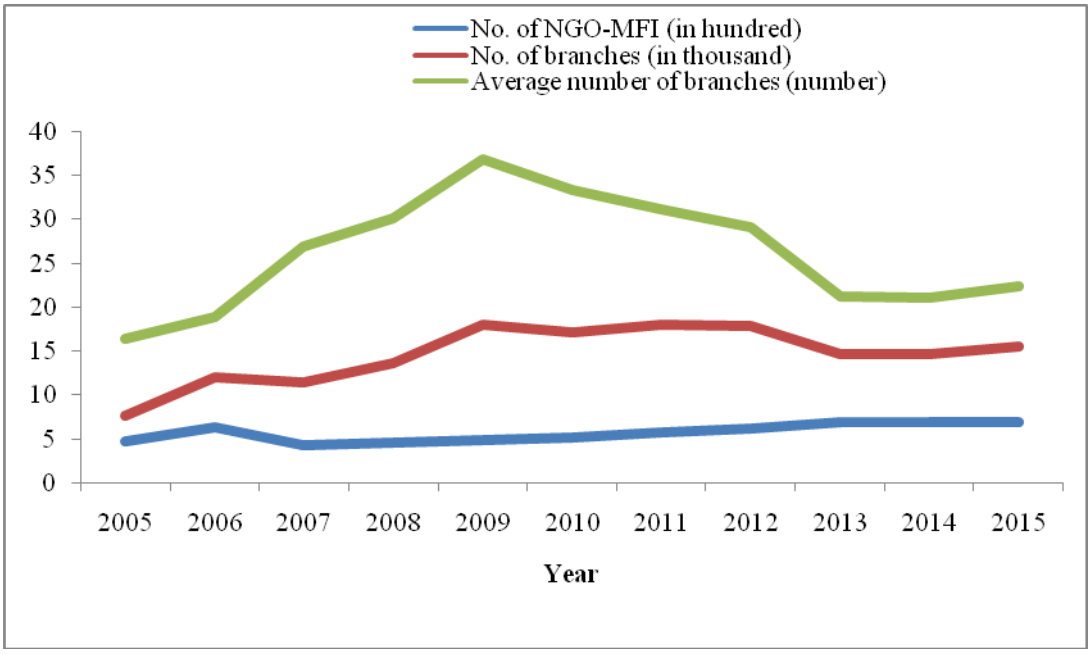
The very large and large MFIs (top 20 MFIs) have 71 percent of the market share among the MRA-licensed MFIs in terms of borrowers and 77 percent market share in terms of loans

outstanding.[4] The market share of two very large MFIs is 50 percent in terms of borrowers and 54 percent in terms of loan outstanding. In FY2016, top five MFIs (Grameen Bank, BRAC, ASA, TMSS, BURO Bangladesh) disbursed a total amount of Taka 662.61 billion and the total loan outstanding was Taka 396.75billion.[5] The equity of seven very large and large sized MFIs has already exceeded BDT 1 billion.[6]

All these numbers indicate that the microfinance sector in Bangladesh has achieved enough maturity and they can expand their branch at any place of choice. By expanding branches, MFIs can offer a greater array of financial products and services (e.g. savings, loans and insurance) to meet various needs of their borrowers who are poor and mostly rural, living outside the purview of the formal banks. Further, these services help the clients to smooth consumption in the face of vulnerabilities or shocks that challenge lowincome informal sector households that are excluded from the social safety net programmes.

The number of branches of MFIs have steadily increased from 7,733 (469 MFIs) in 2005 to 15,609 (697 MFIs) in 2015, whereas the number of institutions has also increased during the same period (Figure 1). However, the concentration of NGO-MFIs in Bangladesh is high in economically advanced regions compared with the backward rural regions. In June 2010, Dhaka district had the highest concentration where more than 60 licensed NGO-MFIs had been operating. The lowest concentrations are observed in four districts i.e. Rajbari, Shariatpur, Bandarban and Rangamati where less than five NGO-MFIs licensed from MRA were operating.

Figure 1: Current Status of NGO-MFIs in Bangladesh



Source: MRA 2015, NGO-MFIs in Bangladesh, June 2015.

[4]MRA 2015, NGO-MFIs in Bangladesh, June 2015.
[5]Bangladesh Bank, Annual Report 2015-2016.
[6]Based on analysis of data of MRA Report 2015, *NGO-MFIs in Bangladesh*, June 2015.

3. Driving Forces of Branch Expansion

Studies on branch expansion related to banks are widely available, but very few such studies exist for the microfinance sector. Burgess and Pande (2005), while examining the effects of bank branch expansion on poverty in India, suggest that branch expansion into rural unbanked locations significantly reduce rural poverty. They show that this effect is, at least partially, mediated through increased deposit mobilisation and credit disbursement by banks in the rural areas.

Zeller et al. (2001) argue that the branch placement of an MFI is dependent on four considerations: level of poorness of a district, potential demand for credit, costs, and risks. They discuss a number of district characteristics that influence these four dimensions. The possible role that district characteristics play and how this may depend on the logic and the goals the MFI wants to maximise are also analysed. Additionally, the effect of competition between different types of financial institutions is also taken into account.

In a rural American study, Nam and Ellinger (2008) focused on the relationship between branch expansion as a means of providing banking services and characteristics of financial institutions and markets. The study uses a nested logit model to analyse the characteristics to affect the expansion decision and location choice of commercial banks due to a two-level nesting structure for branch expansion decision. The decision for branch expansion by a bank has a two level nesting structure: the first decision is on branch expansion; and the second is on location e.g. whether to expand in a rural area or an urban area.

The advancement in communication technology has been a driving force in delivering remote banking services at low-cost. From this point of view, it is argued that branches are relatively expensive channels of delivering retail financial services (Orlow, Radecki and Wenninger 1996). However, Spieker (2004) highlights that bank branches are a highly effective and profitable distribution channel for retail services relative to other methods like the internet or call centres. He also identifies three factors that are mainly responsible for the increase in the number of branches. These are: (1) changes in bank branching laws; (2) branching may improve performance when it is well operated; (3) changes in economic and demographic conditions encourage branching in certain markets.

In a recent study in Peru, Vanroose (2015) shows that MFIs mainly go to regions that are less costly to serve and that have more dynamic markets. Furthermore, the probability of having an MFI is higher in districts with bank presence. This is also true for the presence of other MFI branches.

Carlson and Mitchener (2005) identify that the expansion of statewide branch banking in the US induces greater competition in states where it is permitted and improves the stability of the banking systems by removing weak and inefficient banks. Women's World Banking (2005) identifies some factors that are considered to evaluate the expansion strategies for MFIs. According to the study, when evaluating options, it is important to take into account

market attractiveness; competitive positioning; fit and organization's ability to execute them. To determine which strategy is best for an institution, some key questions should be considered:

- **Market attractiveness:** what is the size of the market and how quickly is it growing? How strong is the understanding of customer's needs and preferences?
- **Competitive positioning:** Are there barriers to entry?
- **Fit:** Does the expansion strategy fit with the mission of the organisation?
- **Executability:** Does the organisation have the capacity to make a substantial change?

In a recent study in Bangladesh, Sadeque (2015) examine the correlation between mushrooming of MFIs with customer dropouts. They find that one branch of DSK (*Dusto Sastho Kendro*) competes with a minimum of three branches, maximum of 22 and on an average 12 branches of other MFIs.

Koskela and Stenbacka (2000) suggest that greater competition decreasesinterest rates and increases the likelihood that borrowers are able to remain solvent and repay their loans. They also suggest that the introduction of competition may improve the stability of banking systems.On the other hand, Matutes and Vives (1998) argue that raising the level of competition causes an increase in failures as lower profits resulting from competition encourage banks to take on more risks.

4. Study Methodology

4.1 Data source

This study uses primary data from institutional level as well as from branch level collected through using a structured questionnaire. A stratified random sampling approach is adopted ensuring proportional representation of small, medium and large MFIs. For branch level analysis, the study collected data from 362 branches of 17 MFIs. A total of 55 MFIs are selected for institutional level analysis. The data collection procedure is shown in Figure 2 and the sample distribution from different categories of MFIs is shown in Table 1. In addition, some case studies are done especially relating to closed branches.

Figure 2: Data Collection Procedure

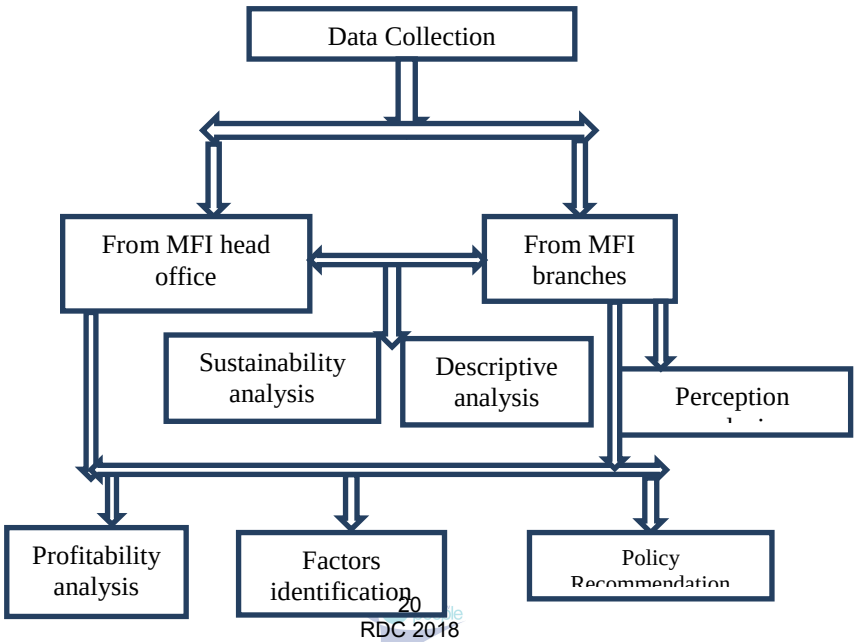


Table 1: Sample Selection of MFIs

Category	Range of borrowers (in lakh)	Head office		Branches	
		Selected number of MFIs	% of respective total MFIs	Number of head office	Number of selected branches
Very large	More than 5	3	60	1	33
Large	1-5	6	30	3	91
Medium	0.1-1	25	20	11	225
Small	0-0.1	21	4	2	13
Total	…	55	…	17	362

Source: Author's calculations

We have collected institutional level information from different categories of MFIs that have already received MRA licence and the data are collected for three financial years (2014 to 2016). The MFIs are categorised based on the number of borrowers (Table 1). We follow the range of borrowers for categorisation as used in MRA statistics. [7]However, in some cases, starting year information are also collected. We have collected financial data (including financial and non-financial income, expenditure including salary and benefits, other operating costs like rent, depreciation along with loan loss provision and also grants and donation). Along with these, we have also collected information on the total amount of loan outstanding and savings and the number of borrowers. However, for the analysis, we concentrate on revenue and expenditure. Besides, we have also collected information on how many branches are newly opened and closed during the survey years. The location of branches and perception related information are collected only for the year 2016.

4.2 Data analysis

The head office and branch level data is the main source of information used for analysis. In the study, three categories of data analysis have been conducted to fulfil the research objectives: descriptive analysis, econometric analysis and composite score analysis. Based on the literature and findings from current statistics, this section gives an overview of the findings.

Descriptive Analysis

Descriptive statistical analysis issued to investigate the status of branches. However, for understanding the trends in selected MFIs, descriptive statistics (e.g. number of branches, speed of MFIs' expansionand so on) analysis has also been used.

Sustainability Analysis

The study explicitly addresses the issue of sustainability of MFIs that expand branches in the rural areas. Most of the MFIs target to reach the poor through financial instruments like

[7]http://www.mra.gov.bd/images/mra_files/Publications/vol2015.pdf

loans, savings, insurance and they expand branches for fulfilling these objectives. It is held that microfinance programmes will effectively work if the branches are sustainable. The cost of delivering the services to ultra-poor households is generally very high. Therefore, for increasing the client outreach it is important to know the sustainability status of branches that will help to design the programme more efficiently for future growth (possibly in other regions with similar conditions). Such information are necessary to take organisational decisions like expanding existing operations, legal restructuring, strategic alliances, merging with other branches and so on. It is argued that 'unsustainable MFIs might help the poor now, but they will not help the poor in the future because the MFIs will be gone' (Schreiner 2000).

Here we attempt to draw some insights from head office and branch level data and assess operational sustainability. For the purpose, several factors have been identified that will affect operational sustainability of the branches as well as the head offices of MFIs.

Operational sustainability of microfinance institutions is probably the key dimension of microfinance sustainability. According to Meyer (2002), operational sustainability refers to the ability of the MFI to cover its operational costs from its operating income regardless of whether it is subsidised or not. Operational sustainability accompanies the concept of operational self sufficiency (OSS) which measures operating revenue as a percentage of operating and financial expenses, including loan loss provision expense and the like. If this ratio is greater than 100 percent, the MFI is covering all of its costs through own operations and is not relying on contributions or subsidies from donors to survive (Churchill and Frankiewicz 2006). The OSS in general includes all the cash costs of running an MFI, depreciation and the loan loss reserve. Sometimes, cash costs of funds are excluded from the analysis because 'those MFIs that begin to access the commercial financial markets and pay the cost of capital would look relatively worse than other institutions with the same costs and outreach, but who have remained reliant on donor capital to fund their portfolio'(UNCDF 2002). This applies due to the fact that some donor fund dependent institutions do not have the same financing cost as commercial MFIs. When an MFI becomes sustainable, it is no longer limited to donor funding. It can draw on commercial funding sources to finance massive expansion of its outreach to the poor people. Experience proves that microfinance can be operated sustainably, even with very poor borrowers. Sustainable MFIs can continue to operate even after grants or soft loans are no longer available.

The operational self sufficiency ratio is estimated in the following way:

$$\text{OSS} = \frac{Operating\ Income}{Operating\ costs + loan\ loss\ provisions + finacial\ cost}$$

Where,

Operating income = Loan service income + income from client+ other financial income

Operating cost = Salary+ administrative expenses+ office rent+ conveyance

Financial cost = Service charge from head office +saving interest expenditure +other financial expenses

As MFIs provide multiple microfinance services, they face various costs and generate revenues and growth. In this study, we calculate operating and net profits of MFIs. Operating profits can be calculated from operating income and operating expenses. While net profit can be calculated from revenue and expenses. For calculating operating income, we exclude grant and for calculating operating expenses we exclude loan loss provision and other related costs. The net profit comes from revenue and expenses. Revenue includes loan service income, income from clients, grants and other financial income, whereas expenses includes service charge from head office, saving interest expenditure, other financial expenditure, salary, administrative expenses, office rent, conveyance, depreciation, other expenses and loan loss provision.

Composite Score Analysis

While assessing the views of branch managers regarding branch expansion, we have collected a set of information. A total of six issues are combined together as scale variables. The issues relate to: branch operating system, cost effectiveness, market research, availability of skilled office staff and competition. If the branch manager has a positive response to the relevant question, we code them as one and similarly, for negative responses, we code them as zero. Considering the responses of the managers on these six items, a composite score is generated. Some previous studies also used this method to generate the composite score.[8] By analysing the composite score of different categories of MFIs, one can analyse the decision regarding opening or closing of a branch or to merge with other branches.

5. Results and Discussion

5.1 Descriptive branch level analysis

One of the main objectives of this study is to analyse the reasons and identify the determinants of branch expansion of MFIs. However, before analysing the reasons we need to know key characteristics of branches related to their years of operation, characteristics of the employees of the branch, area characteristics of the branch and others. Our analysis shows that MFIs tend to appoint young branch managers; mostly around 35-39 years and around 95 percent of them are males. It is expected as one of the main activities of branch managers is to supervise the repayment collection from door to door of the beneficiaries. As it is a laborious job, MFIs tend to hire young male as branch managers. It is also important to note that the branch managers are educated and experienced in their field; they are graduates and have worked in the field of microfinance for an average of around 11 years. There is also a minimum difference in the years of operation of the branch. The branches of large MFIs are operating for about 15 years whereas, for the branches of small MFIs, this figure is about 13 years. One of the important observations about branch location is that majority of the branches tend to be located on plain land and this tendency is higher for the branches of very

[8]Hashemi, S. M., Schuler, S. R., & Riley, A. P. (1996). Rural credit programs and women's empowerment in Bangladesh. *World Development*, *24*(4), 635-653.

large and small MFIs. More than 90 percent of these branches are located in the plain land. On the other hand, for the large and medium MFIs around 80 percent and 86 percent of the branches are located in plain land respectively (Table 2). Also the small MFIs' branches tend to be closer to the upazila headquarters than the giant and medium MFIs and they also have the highest distance from another branch which is around 19 km. In contrast, the branches of very large, large and medium MFIs have more branch density. The nearest distance from another branch in these cases is about 10 km on average. This has also an impact on area coverage.

Table 2: Information on Key Indicators of MFIs' Branches, 2016

Indicator	Very Large	Large	Medium	Small	Total
Branch characteristics (average value per branch)					
Age of branch manager (years)	37.27	35.76	37	39.85	36.89
Gender (male %)	100	95.60	95.11	100	95.84
Schooling of branch manager (years)	15.03	15.14	14.77	14.38	14.87
Branch manager's experience in MFIs operation (years)	11.44	8.98	11.90	9.77	11.05
Number of training received by branch manager	3.12	3.54	5.47	7	4.81
Age of branch (years)	15.59	12.26	12.61	13	12.81
Locational characteristics (land type--plain land %)	93.33	79.75	86.16	91.67	81
Distance from upazila headquarters (km)	7.58	5.96	7.71	5.42	7.22
Distance from nearest MFI branch(km)	9.85	10.82	10.32	18.85	10.71
Branch coverage area (km)	11.19	9.05	9.82	12.84	9.88
No. of growth centres in the upazila	11.28	8.59	14.73	19	13.15
Distance from nearest growth centre (km)	2.85	2.77	2.21	1.43	2.38
Number of other MFIs in branch area (within 5 km)	12.64	13.99	12.93	10.69	13.06
Number of employees	8.44	9.37	7.57	3.61	7.96
Performance indicators					
Number of borrowers	4,449.60	2,170.79	1,271.98	296.76	1,752.58
Number of savers	1,844.93	1,852.25	1,641.23	449.53	1,669.81
Volume of savings (million Taka)	7.60	10.49	8.30	1.47	8.54
Average loan disbursement(million Taka)	197.20	53.85	49.08	10.49	62.40
Average loan outstanding(million Taka)	21.99	8.07	14.61	3.35	13.1

Source: Field Survey

It is seen that each branch of small MFIs cover around 13 km on average, whereas the large and medium MFI branches cover around 9 km. It is expected because smaller MFIs have less branch density and hence they have more coverage area. However, to serve this large area they have lower number of employees. On an average, the branches of small MFIs employ

around 3.6 persons whereas the branches of other three categories of MFIs employ around 8 persons to cover around 8-9 km. For large categories of MFI branches, the average number of borrowers is 14 times higher than small sized MFIs.The small size MFIs' branches disburse lower amount of loans (Table 2).

5.2 Descriptive head office level analysis

For the study, it is important to examine the basic characteristics of the MFIs based on their size. It is observed that the giant MFIs have a high tendency to open more branches compared with other sizes of MFIs. As expected, the larger the MFI the more branches they have opened. It is important to observe that the larger MFIs coverless area but more beneficiaries than the smaller MFIs. The giant and large MFIs cover on an average of 9 km with around 1,900 borrowers whereas medium and small MFIs cover 8 km with around 1,400 borrowers (Table 3). So it may be said that larger MFIs are more efficient in terms of serving more borrowers with less area coverage. The locational preferences of the MFIs are also different based on their size. However, all MFIs irrespective of their size tend to have more branches in plain areas. Though the giant and large MFIs have tried to cover the remote areas too, the numbers are insignificant compared with the number of branches they have established in plain areas. However, the medium and small MFIs have almost negligible numbers of branches in remote areas.

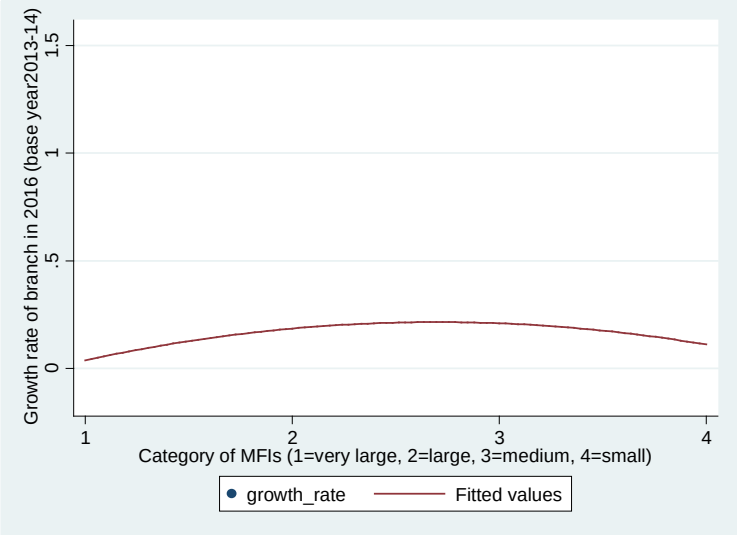
Table 3: Head Office Information about Branches of MFIs, 2016

Indicator	Very large	Large	Medium	Small	Total
Average number of branches	529	137	34.04	4.67	61.05
Average number of closed branches	1.00	12.00	1.50	1.00	3.00
Average number of new branches	32.66	12.00	6.05	2.57	8.82
Average area covered (km)	7.66	10.33	8.2	9.66	8.96
Average distance for branches in urban areas (km)	10.33	10.33	7.24	8.2	8.17
Average distance for branches in rural areas (km)	8.67	10.4	11.30	12.77	11.59
Average borrower coverage (no.)	1,931.33	1,802	1,697.68	1,305.47	1,586.42
Average no. of branches in *char* areas	36	12.67	2.96	0.19	4.76
Average no. of branches in riverine areas	14	5	1.72	0.24	2.18
Average no. of branches in islands	1.66	1.5	0	0	0.25
Average no. of branches in *haor* areas	15	4	.24	.047	1.38
Average no. of branches in hilly areas	13.33	3.5	1.04	.19	1.65
Average no. of branches in plain land	453	107.66	23.84	3.952	48.8

5.2.1 Growth Rate of MFIs

As mentioned earlier, the study categorises MFIs on the basis of number of borrowers. We have also observed that there is a strong positive relationship between the number of branches and number of borrowers. Therefore, it may be hypothesised that the more the number of borrowers, the more will be the growth rate of branch expansion of MFIs. Alternatively, the bigger the branches in terms of borrowers, the higher the growth rate of opening new branches. In reality, the analysis shows that giant MFIs have the lowest growth rate of branch expansion at around 7 percent. It is obvious because giant MFIs in the sample have been operating for an average of 27 years and, during this long span of time, they have opened on an average 530 branches. Therefore, the scope of expansion of giant MFIs is somewhat saturated. On the other hand, the medium MFIs have the highest growth rate, which is around 22 percent. The data in the sample show the medium MFIs have so far opened 131 branches. So it seems that they are still at a high growth stage. The small MFIs have the lowest growth rate of around 10 percent. It is because small MFIs have limited availability of funds which is necessary to set up new branches.

Figure 3: Growth Rate of Branches of Sample MFIs



Source: Field Survey

5.2.2 Reason for Branch Expansion by MFIs' Categories

Although different categories of MFIs have different growth rates but all of them have a tendency to expand the number of branches. As microfinance market becomes more competitive, MFIs feel increasing pressure to achieve and sustain growth. A crucial driver of success and sustainability, growth allows MFIs to expand their portfolio by providing financial services to a larger number of customers while, at the same time, fulfil their social mission. To serve a large number of clients, expanding the number of branches are still one of the effective traditional ways considered in Bangladesh. The crucial issue is: why the MFIs decide to expand branches? Obviously 'one-size-fits-all' strategies do not work as there are differences among MFIs in terms of the revenues, expenses, profits, number of borrowers, operational strategies, area coverage and many other characteristics. We have surveyed the

MFIs about their rationale for branch expansion. Table 4 provides some results. As expected, the results are different for different MFIs depending on their size.

Table 4: Reasons for Branch Expansion by MFIs Categories

Sl. no	Main Reason	Very large MFIs	Large MFIs	Medium MFIs	Small MFIs
1	Economically profitable (%)	46.33	-	-	-
2	Achievement of aim of organisation (%)	33.33	-	-	11
3	Provide financial services for reducing poverty (%)	20.33	-	-	-
4	Expensive to operate from nearest branch (%)	-	40	42	32
5	Provide economic services in remote areas (%)	-	40	-	-
6	For operating new programmes (%)	-	20	8	-
7	Expansion of service area (%)	-	-	21	21
8	Increase organisation value (%)	-	-	17	-
9	Marginal people involved in various programmes (%)	-	-	8	-
10	Increase number of members (%)	-	-	4	-
11	Poverty reduction and employment generation (%)	-	-	-	16
12	High loan demand in the area (%)	-	-	-	16
13	Reducing transportation cost of members for getting loan (%)	-	-	-	5

Source: Field Survey

The giant MFIs report that they perceive economic profitability as the main reason for expanding branch. In other words, if opening a new branch is not profitable they will not go for it. On the other hand, the large, medium and small MFIs expand branches because they think it becomes expensive to continue the operation of the existing branch if they do not open new branch in a new place. May be initially it might not be profitable to operate the new branch for these MFIs but they are still eager to open because they do not want to increase the operating cost of existing branches. Around 40 percent of large and medium MFIs and 32 percent of small MFIs report this as the main reason for branch expansion. It is important to note that large and medium MFIs also expand branch for operating new programmes. Around 20 percent and 8 percent of large and medium MFIs respectively report this reason, whereas small MFIs do not consider such a factor. This is expected because it is not cost effective for small MFIs to open a new branch just to operate a new programme, whereas large MFIs may afford to open a branch for operating a new programme. Another important observation from the results is that around 16 percent of small MFIs point out poverty reduction and employment generation are important reasons for branch expansion whereas other MFIs do not perceive this factor. This may be due to the fact that small MFIs initially want to increase their value and goodwill by serving the poor people. Initially profit generation may not be their prime objective. The giant and large MFIs have already established their goodwill. Hence, they can afford to look for profitability while they intend to open a branch.

5.2.3 Factors Governing Opening of New MFIs' Branches

So far we have observed why the MFIs opt for opening a new branch. It is also important for the study to analyse the factors that the MFIs consider while they decide to open a branch. The giant and large MFIs tend to establish new branches near to the growth centres. All the giant MFIs intend to open the new branch near the growth centre. For the large MFIs, this figure is 83 percent (Table 5). On the other hand, for medium and small MFIs this factor seems not that important. For small MFIs, only 61 percent of new branches are established considering the location of growth centres. Cost effectiveness is important for the giant and large MFIs while establishing a new branch. Almost all MFIs of giant and large category mention this factor to be an important one. On the other hand, 80 percent of small MFIs do cost effective analysis while deciding on opening a new branch. Similar results can be found in the case of market research. For small MFIs, 80 percent of the new branches are opened after conducting demand analysis of the beneficiaries whereas for the MFIs of other categories market research before establishing a branch is a norm. Another important observation from the analysis is that medium and small MFIs have lower tendency to follow any institutional guidelines while opening a new branch. Around 84 percent and 62 percent of the medium and small MFIs respectively have followed specific policies while opening branches. On the contrary, it is a regular practice of the giant and large MFIs to maintain institutional policy guideline for opening a branch.

Table 5: Main Factors Governing Branch Expansion by MFIs

Factor	Very large	Large	Medium	Small	Total
Establishing near to growth centres	100	83.33	76.00	61.90	72.73
Cost effectiveness	100	100.00	96.00	80.95	90.91
Market research	100	100	96.00	80.95	90.91
Follow institutional policy for branch expansion	100	100	84.00	61.90	78.18

Source: Field Survey

5.2.4 Alternative Options for Branch Expansion: Perspective of MFIs

In several countries like India or countries in Latin America, MFIs have been adopting greater use of technological solutions (like mobile phones) to minimise the cost of transactions with customers. The low cost facilitates the MFIs to serve a larger number of poor households who are financially excluded. However, even though there can be significant benefits of operating branches through mobile banking, the present study shows low preference of MFIs to adopt such technological solutions. In the sample, the majority of MFIs never managed lending and borrowing activities with mobile banking. However, around 14 percent of the small MFIs have adopted mobile technology. This may be expected in the case of small MFIs since they have greater operating areas with lower number of employees. However, it is important to note that, although large and medium MFIs have almost no experience in operating the financial activities using mobile services, around 18 percent of these groups think that this may be a profitable option rather than opening a new branch as it can reduce transaction costs and save time. Some MFIs also think that operating branch activities through mobile phones would reduce direct communications with the beneficiaries which may increase the risk of loan default.

5.3 Composite Score Analysis: Perceptions of Branch Managers

The study has collected responses of the branch managers that can be used to analyse the perceptions of branch managers about branch expansion. We report the results in Table 6. To identify the perceptions, six indicators are used and branch managers provided information on present conditions of their branches and shared views regarding branch expansion. The indicators are related to profitability, establishment place, skilled manpower, locational loan demand, loan disbursement capacity and competition. The respondents are classified as 'agreed with expansion' if he/she has a positive score (coded as one) and 'disagreed with expansion' if he/she has a negative score (coded as zero). Finally, we sum up all the scores in Table 7. If a branch manager agrees to all the questions, a score of six is generated and he/she is classified as 'highly agreed with expansion' and vice versa.

Table 6: Perception of Branch Manager on Branch Expansion
(% of branch managers responding positively)

Sl. No.	Indicators	Very large	Large	Medium	Small	Total
1	Do you think that the branch is located at the right place? (Yes %)	96.88	95.24	96.88	91.67	96.31
2	Is it profitable to operate this branch? (Yes %)	100	83.72	84.00	83.33	85.39
3	Do you think that skilled workers are not available due to remote location? (Yes %)	81.25	76.19	90.63	83.33	86.08
4	Do you think that the branch canfulfilpoor people's loan/savings demand? (Yes %)	71.88	82.14	86.16	50	82.67
5	Does your organisation have enough ability to provide adequate loan? (Yes %)	100	98.82	87.95	50	90.34
6	Is the number of customers of your branch low due to presence of other MFIs' branches? (Yes %)	37.50	44.71	52.68	58.33	49.43

*1(Yes) = positive response, 0 (No) = negative response
Source: Field Survey

The analysis shows that MFIs' branch managers of all categories respond positively (around 96 percent) regarding right place of establishment of their branches. The majority (83 percent) of small categories of MFIs operate under profitable conditions at the branch level. In the case of large MFIs, all sampled branches are in profitable conditions. As many of the branches work in remote areas, skilled and efficient workers are not available in these branches; positive responses are relatively high in the case of medium categories of MFIs branches. This shows that availability of skilled workers is not a big constraint for large categories of MFIs branches. Only 50 percent of small categories of MFIs branches respond positively regarding fulfilling the poor people's loan/savings demand. Regarding competition from branches of other MFIs, only 37 percent of the very large MFIs' branches respond positively relative to 58 percent for small MFIs and 53 percent for medium MFIs (Table 6).

From Table 7, it can be said that, although small categories of MFIs branches hold a lower score for branch expansion decision, almost all categories show significant positive attitude towards branch expansion. This suggests that all categories of MFIs branches have a demand for branch expansion. But very large and medium categories of MFIs have higher demand for branch expansion compared with the large and small categories of MFIs branches.

Table 7: Aggregate Score of Branch Expansion for MFIs

	Very large	Large	Medium	Small	Total
Score	4.87	4.79	4.98	4.16	4.90

Source: Field Survey

5.4 Operational Self Sufficiency (OSS)

Sustainability in general means the ability of a programme to continuously carry out services and activities in pursuit of its specific goals. For an MFI, this would mean the ability to continue operating as a development financial institution for the rural poor (Khandker and Khalily 1995). Since MFIs view their financial services as profitable businesses, it is necessary to constantly look for possible cost reductions or reallocations for operating the institutions more profitably and in economically viable manner. For a better understanding of the profitability and sustainability, ratio analyses are often used. For this study, operational self sufficiency ratios of branches as well as head offices are estimated. Unlike many other studies, this study does not consider grants and donations as income of MFIs while estimating the OSS. Table 8 gives the results of OSS of MFIs branches and Table 9 gives similar results of MFIs head offices.

The OSS measures operating revenue as a percentage of operating and financial expenses, including loan loss provision expense and the like, which is mentioned in the discussion on methodology. If this ratio is greater than 100 percent, the MFI is covering all of its costs through own operations and is not relying on contributions or subsidies from donors to survive (Churchill and Frankiewicz 2006).

We find that OSS is higher for very large MFIs branches. In 2016, the OSS for our sampled branches is lower for small categories of MFIs which is less than one (Table 8). If we look at the individual components, the operating income and operating cost are also higher for large sized MFIs' branches and lowest for small sized MFIs' branches. These findings indicate that the very large, large and medium categories of MFIs' branches operate more effectively compared with the small MFIs' branches.

Table 8: Operating Self-Sufficiency of MFIs' Branches, 2016

Branch category	OSS[a]	Operating income (million Tk.) (except grant)	Operating cost (million Tk.)	Financial cost (million Tk.)	LLP[b] (million Tk.)
Very Large	2.51	9.86	2.62	1.09	1.34
Large	1.70	6.95	2.21	2.11	0.10
Medium	1.43	5.34	1.89	1.79	0.54
Small	0.61	0.83	0.82	0.20	0.37
Total	1.57	6.00	2.00	1.75	0.51

Source: Author's calculation from branch level data.
Note: [a]OSS stands for Operational Self Sufficiency; [b] LLP stands for Loan Loss Provision.

In the case of head offices, similar findings are given in Table 9. The large and medium categories of MFIs have lower OSS compared with the very large size of MFIs. Other indicators such as operating income, operating costs and financial costs show similar trends (Table 9).

Table 9: Operating Self-Sufficiency of Head Offices of MFIs

MFI category	OSS[a]	Operating income (million Tk.) (except grant)	Operating cost (million Tk.)	Financial cost (million Tk.)	LLP[b] (millionTk.)
Very large MFIs (3)	1.39	3590	1240	1140	154
Large MFIs (6)	1.21	552	271	198	15.9
Medium MFIs (24)	1.09	120	66.9	36.8	4.43
Small MFIs (21)	0.92	8.83	5.30	2.24	2.68
Total MFIs (54)	1.06	318	131	103	13.5

Source: Author's calculation from branch level data.
Note: [a]OSS stands for Operational Self Sufficiency; [b] LLP stands for Loan Loss Provision. Figures in parentheses in the first column refer to number of MFIs in the sample.

5.5 Determinants of Branch Expansion

One of the objectives of this study is to investigate the important factors that MFIs consider while deciding on opening a new branch. We have conducted an OLS regression to investigate the determinants of branch expansion. We have collected information on whether the sampled MFIs have opened new branches in 2015-16 and how many branches they have opened. The regression gives us the results of variables influencing the intensity of opening new branches by MFIs. The number of new branches in 2015-16 is the dependent variable in the regression. We have set some independent variables based on the literature and the experience we gathered from the field survey. Through this regression, we have also investigated why some MFIs have opened more new branches than others. The regression results are given in Table 10. It is found that number of borrowers is an important factor while deciding on opening a branch. The MFIs that have expended more branches have more borrowers. The positive sign of the coefficient of the number of borrowers variable and the

negative sign of the coefficient of its square together imply that the intensity of branch expansion initially increases with the number of borrowers, but it does so at a decreasing rate and beyond a certain borrower number, the number of new branches may actually decline. Our results show both the coefficients are significant. The regression results also show that location is an important factor while opening a branch. The MFIs that have fewer branches in *haor* areas have expanded more in terms of branches in 2015-16 and the result is significant. On the other hand, having more branches in hilly areas and plain areas may have positive impact on branch expansion although the coefficient is statistically insignificant. Another important factor is costs; and financial cost is inversely related to branch expansion. The MFIs that could open more new branches in 2015-16 have managed to keep their financial cost low.

Table 10: OLS Regression on Determinants of Branch Expansion

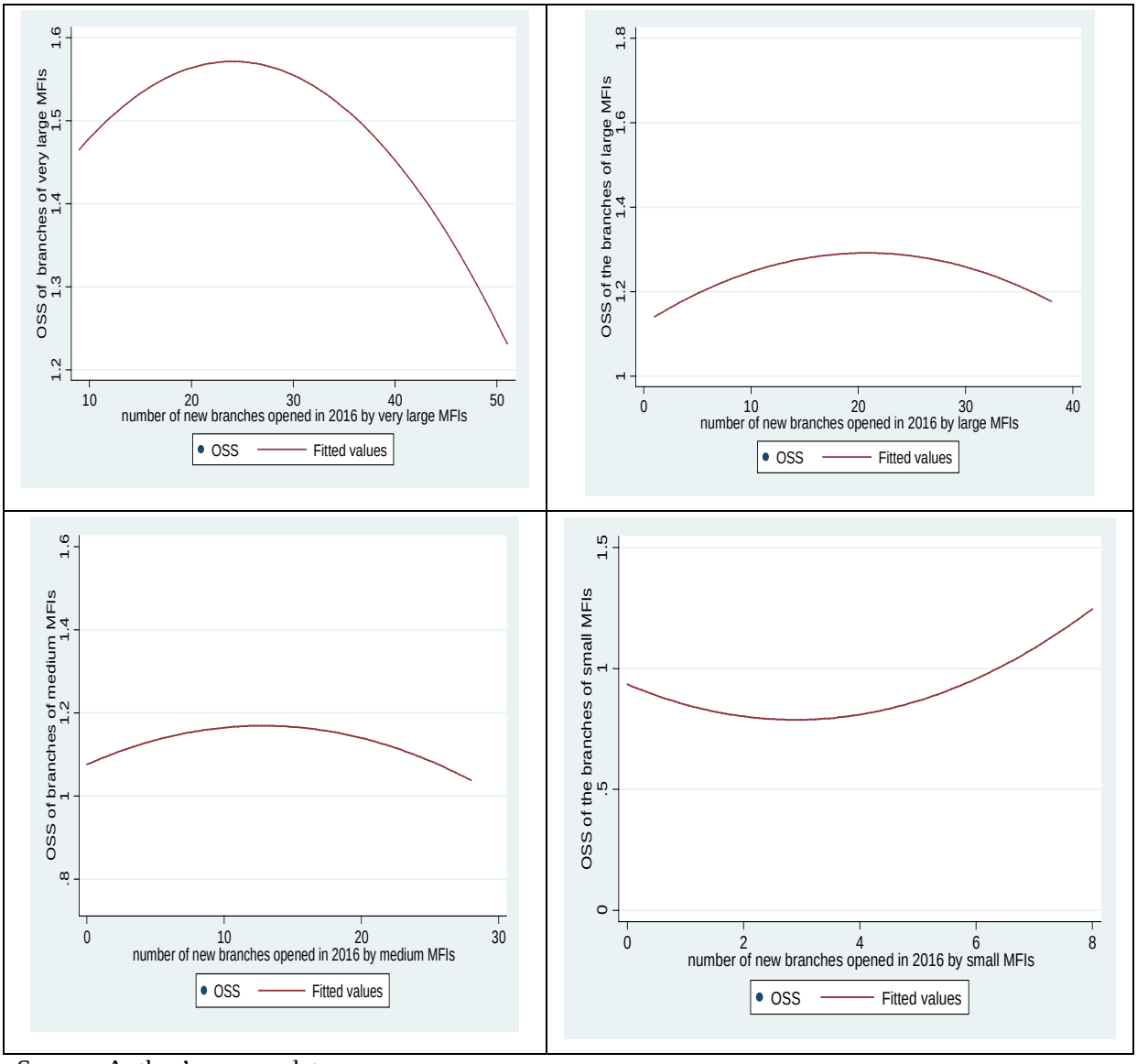
Variables	Estimated coefficient
Number of borrowers	0.0001522 ***
Square of number of borrowers	-5.97e-11**
Number of branches in *haor* areas	-1.398***
Number of branches in hilly areas	0.300
Number of branches in plain areas	0.0142
Financial cost of MFIs	-3.77e-08**
Constant	0.143
Observations	54
R-squared	0.604

We have also analysed whether there is any impact on sustainability if MFIs keep on opening new branches. The graphs below show the number of branches opened by the MFIs in 2016 on the horizontal axis and OSS of the MFIs on the vertical axis. The four graphs represent four different categories of MFIs such as very large, large, medium and small. We find a non-linear relationship. The OSS increases as the number of new branches increases except for the small MFIs. However, it does increase at a decreasing rate for the MFIs of three categories except smaller ones. At the aggregate level, we find that when MFIs have opened about 30 new branches, OSS has started to decline. This somewhat gives an indication that on an average MFIs may open 30 branches per year to keep its operation sustainable. However, this is a combined analysis of all MFIs; hence the implications are not applicable for different categories of MFIs. Hence, it is important to note that the size of MFIs matters while deciding on opening a branch.

Figure 4 shows that for very large and large MFIs, OSS has declined after opening around 25 new branches. However, the result is different for medium sized MFIs. We find that OSS has started declining after opening around 15 branches in 2016. This shows that probably medium sized MFIs can open 15 new branches on average per year if everything remains unchanged to keep its operation sustainable. On the other hand, for small MFIs the figure shows different results. The OSS keeps on declining as the small MFIs keep on increasing the

branch number. It is because small MFIs already suffer from shortage of funds. When it expands the number of branches, financial cost increases and hence OSS declines as it is difficult for small MFIs to generate revenue from the new branch to start with. Moreover, we find that OSS has increased after opening about four branches. This shows that probably after this point the average cost starts declining and the branches start generating profit in the aggregate. Therefore, for small MFIs the number of new branches should be more than four if they want to be sustainable.

Figure 4: Determinants of Sustainability of MFIs



Source: Author's survey data

On the other hand, the very large and large MFIs already have slow growth rate of expansion as they are somewhat saturated operating for more than 25 years in this field. Probably opening more branches beyond 25 per year will hamper the OSS of these MFIs. The small MFIs have still long way to go to achieve that growth level. They need to expand their operation and need to attract more borrowers to be operationally sustainable.

6. Way Forward and Concluding Remarks

The analysis of this study shows that just establishing a new branch is not enough for providing financial services to the poor people.The sustainability of MFIs in the long run is also important in this regard. Otherwise, the efforts towards opening new branches may become counter-productive which would require provision of subsidies/grants for operation or these may have to be merged with other branches or may have to be closed down. It is important, therefore, for MFIs to take a rational decision regarding when to open a new branch or whether it would be efficient to serve a specific location by extending the coverage of an existing branch. As MFIs seek to reach as many poor people as possible, therefore, it is important to constantly look for possible cost reductions or reallocations in order to operate profitably and become economically viable.

The main thrust of the study is to explore the factors that should be considered while deciding on opening a new branch by MFIs so that the expected positive benefits are realised. Specifically, we have analysed MFIs of different sizes (small, medium, largeand giant) in terms of their sustainability parameters in relation to branch expansion and related decisions. When we analysed the main reasons and determinants of branch expansion, it is found that the giant MFIs perceive economic profitability as the main reason for expanding branches. On the other hand, the large, medium and small MFIs expand branches because they think it is expensive to continue the operation of the existing branches if they do not open new branches. Initially, it maynot be profitable to operate new branches for these MFIs but they are eager to open because they do not want to increase the operating cost of existing branches. Around 40 percent of large and medium MFIs and 32 percent of small MFIs report this as the main reason for branch expansion. It is important to note that large and medium MFIs also expand branch for operating new programmes.

To enhance the outreach in remote areas and provide efficient services to existing borrowers, MFIs need cost effective channels. In this case, mobile financial services can be the best options. The MFIs may establish partnerships with mobile phone operators to reach the unbanked low income people. Interestingly, majority of our surveyed MFIs never managed lending and borrowing activities with the help of mobile banking. However, only around 14 percent of the small MFIs have done this and around 18 percent of this group think that this may be a profitable option rather than opening a new branch as it can reduce the transaction costs and save time. However, some also think that operating branch activities through mobile phone will reduce direct communications with the beneficiaries and it may also increase the risk of loan default.

The study also finds that very large and medium categories of MFIs' branches are '*highly receptive to branch expansion*'. In almost five out of six expansion related questions, branch managers show positive responses. The findings of the study indicate that the number of borrowers is positively and significantly related to the decision of branch expansion. The results also show that those MFIs could expand more in terms of branches whose financial costs are relatively low.

The study suggests that OSS has a relationship with branch expansion. For relatively larger MFIs, the expansion needs to be slowed down after a certain point. For example, the analysis of the study shows that for giant and large MFIs after opening 25 branches, OSS starts to decline whereas for small MFIs the scenario is different. The small MFIs are required to open at least four branches per year to be operationally sustainable.

7. Recommendations

The present study brings out the challenge that many developing countries face in providing efficient financial services in rural areas. Overall, in order to increase access to financial services in remote areas, expanding MFIs' branches is one of powerful tools as the poor people prefer physical existence of institutions for money transaction. Based on the findings, several recommendations may be drawn:

- **Regional factor:** The findings of the study reveal that all MFIs irrespective of their size tend to have more branches in plain areas. However, for expanding financial services, it is necessary to establish branches in remote areas rather than convenient areas. This will reduce the transportation cost of borrowers and will increase their self-reliance. However, setting up new branches in remote areas also requires higher costs as it is risky to operate the borrowing activities in remote areas considering the geographical characteristics. In this regard, MFIs can adopt cross-subsidisation policies to make the operation sustainable as a whole.

- **Market research:** The findings suggest that market research is an important factor for consideration by MFIs before opening a new branch. However, the result shows that small MFIs are less interested to conduct market research in this regard compared with larger MFIs.They also have fewer tendencies to follow any institutional guidelines while opening a new branch. The study also finds that small MFIs are less operationally sustainable than larger MFIs. The study suggests that if small MFIs conduct market research and follow appropriate guidelines probably it will help them to increase their OSS.

- **Partnerships with mobile operators:** The analysis shows that majority of MFIs do not prefer operating borrowing activities through mobile phone instead of a physical branch as they think operating branch activities through mobile phone will reduce their communications with the borrowers and it may also increase the risk of loan default. However, in many countries, mobile financial services by the MFIs have proven to bean effective tool of operation. Hence, providing digital and financial literacy to both MFI staff and borrowers and then pilots may be taken up on operating MFI activities digitally.

- **Sustainability and size of MFIs:** The study shows that OSS has a relationship with the expansion of branch and the relationship differs with respect to the size of MFIs. The study recommends that larger MFIs may probably consider restricting the number

of new branches opened during a year to around 25 under existing circumstances; while, for medium MFIs, the number is found to be around 15. However, for the small MFIs the study recommends to expand the branches by at least four per year to keep operations sustainable. One must, however, keep in mind the limitations of the above conclusion which specifically relate to small size of the sample. For getting more reliable results, one needs to conduct deeper analysis with bigger samples.

- **Funding opportunities:** It is observed that branch expansion offers some advantages. For increasing the outreach in remote areas, branches need to sustain themselves in the long term. The study suggests that sometimes there is a need to provide financial support as MFIs often expand branches for operating new programmes. Around 20 percent of large MFIs report this as a major reason. These findings have implications for refinancing institutions (e.g. PKSF) and development agencies for reshaping the support mechanisms for MFIs for poverty alleviation and special programme implementation.

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Improved water management practices as a step towards sustainable agriculture

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Abstract

On-farm adaptation strategies for climate change can constitute effective ways to increase a farm's resilience and inherently ensure its sustainability of production. Across Canada, supplemental water use is essential in agricultural production. Ontario is one of the Canadian provinces, which may experience dwindling water supplies in the future due to climate change. Cost-share programs have been developed to encourage farmers to adopt cultural practices and technologies that make best use of water resources, while at the same time, being economically viable. To understand the degree to which adoption of an improved water management system can lead to a more sustainable production, we focus on a Canadian case study -- a farm growing tomatoes for processing, located in Southern Ontario. Existing technology of surface drip irrigation system was compared against the new technology of a subsurface drip irrigation system, in terms of their financial, social and environmental impacts. By adopting a subsurface drip irrigation system, the tomato grower reduced annual operating costs. In addition to these results, the grower reduced greenhouse gas emissions. While, there were less labor input required with the new technology, there was an increase in time allocated to managerial decision making. Net present value calculations indicate that the new technology is desirable from an economic standpoint. The study concluded that the new technology – use of sub-surface irrigation system, is closer to a sustainable agriculture system. However, further work is needed to develop information on the spill-off costs or benefits for the new technology to the rest of the society, which may assist policy makers develop appropriate policies for sustainable agricultural systems.

Keywords: sustainable agriculture, climate change, multi-criteria analysis, water use, Ontario (Canada)

Background

Climate Change and Ontario's Agriculture: Need for Sustainability: Ever since the introduction of the phrase 'sustainable' by the Bruntland Commission (WCED, 1987), use of the phrase 'sustainability' has become a common practice, even though its meaning is not always clear or appropriate. Many nations and government bodies (including international agencies) have adopted this as part of its objectives and have required of all countries to include it in developing economic development policies.

A major avenue to bring economic development is through improvement of resource use for an industry. Typically this is accomplished through development of new technologies. Agricultural development is no exception to this. In the context of agricultural production, sustainability relies on many factors but more importantly on water availability and quality, together with soil productivity. In addition there is this threat from climate change that can create problems for agricultural production in some parts of the world. The IPCC report (see Romero-Lankao et al., 2014) notes that an increase in the GHG concentrations is associated with reduced soil moisture in the Northern Hemisphere. Soils with a lower water-holding capacity (i.e., sandy soils) will be more sensitive to climate change (Romero-Lankao et al., 2014). This is a potential threat to agricultural production in Southern Ontario, where soil water availability is likely to decrease by 30% in the summer and fall (Chiotti and Lavender, 2008).

The beneficial management practices (BMPs) are single practice or a bundle of practices, which have been scientifically proven to reduce adverse effects of agricultural production systems on the natural resources (air, water, soil, etc.), while ensuring farm's economic viability (Klimas and Weersink, 2006). Others describe such BMPs as means of increasing agricultural production of ecological goods and services (Trautman et al., 2012), or practical and cost-effective methods used for minimizing environmental impacts (CCA, 2013). There are a multitude of BMPs that can be adopted by farmers in order to better manage water resources; these include either practices (irrigation scheduling, improved soil moisture testing techniques, etc.) or technologies (i.e., drip irrigation systems, subsurface irrigation system, controlled drainage, etc.). All these may impact either the water quantity and/or its quality. Although BMPs are generally designed for a particular purpose, for example to increase the quality or quantity of a certain natural resource, more often it is noticed that their adoption impacts other natural resources, providing multiple benefits.

Within Canada the establishment of eligible BMPs for agricultural producers under the cost-share program is left at the discretion of the provincial governments with collaboration from the federal government. In Ontario, the provincial Ministry of Agriculture, Food and Rural Affairs (OMAFRA) implements these programs through Ontario Soil and Crop Improvement Association (OSCIA 2016). In addition to protecting the environment, on-farm adaptation strategies can also increase farmers' resilience. With increased evidence that climatic conditions are changing in various parts of the world, mitigation strategies are no longer sufficient as climate change policy responses. Increasingly, attention has been given to adaptation strategies. In a broad sense, adaptation can be defined as: "responses by individuals, groups and governments to climatic change or other stimuli that are used to reduce their vulnerability or susceptibility to adverse impacts or damage potential" (Bradshaw et al., 2004). While farmers can implement adaptation strategies, their uptake depends on a mirage of factors – economic, environmental and social.

Agricultural producers across Canada, also acknowledge their responsibility in caring for the environment (Environics, 2006). While this could provide intrinsic motivation for the adoption of BMPs, uncompensated on-farm costs and off-farm benefits spillovers could hinder their adoption. Past experiences and historical data on adoption of these BMPs in the context of Canadian agriculture, confirm that while some agri-environmental practices were adopted more rapidly and more widely, showing positive outcomes, others tend to be modestly adopted and with insufficient effects in reducing the degradation of the natural resources (Bradshaw et al., 2004).

Understanding Sustainability: Typically sustainability can be seen through three pillars – economic, environmental, and social. In order for producers to accept a new technology, leading ultimately to their adoption, the new technology must be evaluated in terms of its impacts on the above three pillars. In other words, the new technology must be economically desirable (adds to the pocketbook of the producer), must be environmentally friendly, and does not create any social issues.

Need for Sustainability for Tomato Production in Ontario: Agricultural production in Ontario is primarily localized in the southern region of the province, surrounded by the Great Lakes. With suitable climatic conditions, water availability, and fertile soils, high value horticultural production has thrived in this part of the province. Within the last decade, however, studies have indicated that Southern Ontario has begun facing increasing issues of water availability (CCA, 2013). Already scarce water resources face increased demand from agriculture, municipalities, and industry. This competition and its associated shortage risks are likely to be exacerbated by changing climatic conditions (Chiotti and Lavender, 2008). In addition, increased agricultural intensification in Ontario's horticultural sector has raised increasing concerns in terms of water quality (Filson, 2004), where the risk of water contamination by nitrogen is following an upward trend.

Tomato production takes place mostly on sandy soils, which means that these agricultural production systems can be at risk in the face of upcoming changes related to soil moisture. Tomatoes are an important horticultural crop in Southern Ontario. They are produced predominantly in Essex, Chatham-Kent and Haldimand-Norfolk counties (LeBoeuf et al., 2008). They are either produced for the fresh market or for processing. Generally, field grown tomatoes are grown for processing, unlike greenhouse grown tomatoes, which are destined for fresh market. This study focuses on tomatoes produced for processing.

In the wake of climate change and water availability, any technology / cultural practice that can improve producer's economic position, coupled with reduction in GHG emissions (leading to mitigation objective of various levels of the governments) and at the same time improve water use efficiency would be a welcome choice. Such technologies applicable to tomato production in Ontario may include (but not limited to): surface drip irrigation, sub-surface irrigation, surface irrigation, sub-surface drainage and irrigation.

At present, much of processing tomato production is undertaken using surface drip irrigation (baseline). This involves drip lines over ground near the roots of the plants. A variation of this technology is sub-surface drip irrigation. In this study, this technology is contrasted with the baseline technology.

Objectives and scope of the Study

The major objective of the study is to evaluate desirability of the sub-surface irrigation technology for tomato production on an Ontario farm from a sustainability perspective. The scope of this investigation includes three pillars of sustainability – economic, environmental (greenhouse gas emission, and water and energy uses) and social (labor requirements leading to time to relax). All these indicators were estimated for the surface drip irrigation technology (baseline technology) and the sub-surface drip irrigation technology (study technology), and the results were contrasted.

Study Technology

In Ontario, tomatoes are grown on raised beds, which dimensions are 1.5m x 8m (5 feet by 26 feet). The soil leveling of the section of the farm dedicated to tomato production is half flat and half undulating. Water source for irrigation is mixed, with water coming from one of three sources: (i) an on-farm reservoir, filled by precipitations; (ii) municipal ditches, and (iii) from Lake Eerie, through a private irrigation project called LADII (Leamington Area Drip Irrigation Incorporation).

The surveyed producer installed the surface drip irrigation system (baseline technology) on half of his tomato production area and a subsurface drip irrigation (study technology) system on the other half. There are two factors, which contributed to this decision: one is the spatial variability of the terrain. The surface drip irrigation system was installed in areas with undulating terrain, whereas the subsurface drip irrigation system in areas where the soil was flatter, or more levelled. Two, the texture of the soil was another factor taken into consideration for deciding which one of the two water systems to install. The grower mentioned that it was more likely to have improved effects if the sub-surface drip system is installed on sandier soils as opposed to loamier ones.

The surface drip irrigation system is installed every year in June and taken out from the field in August, whereas the subsurface drip irrigation is installed in early April and removed every three years after harvest. There are some differences in the materials used for the two systems. For the surface drip system, the tape used is the thinner model (4 mm thickness), which costs between $175 - $180 per acre, whereas for the subsurface system a thicker model of the tape is installed (6 – 8 mm thickness), at a higher cost per acre $230 per acre. The cost of installing the tape for both systems is similar, on average labor requirements amount to approximately 2 hours per acre for 2 people. When including machinery usage and fuel (80 hp tractor), the total tape installation cost adds up to $25 - $30 per acre. The subsurface drip irrigation system comprises of several pieces of equipment and materials. Figure 1 shows the layout and components of a typical subsurface drip irrigation system. Depending on the soil type, tillage practices and crop grown, the low-pressure system is usually installed at a depth of 15 – 20 cm.

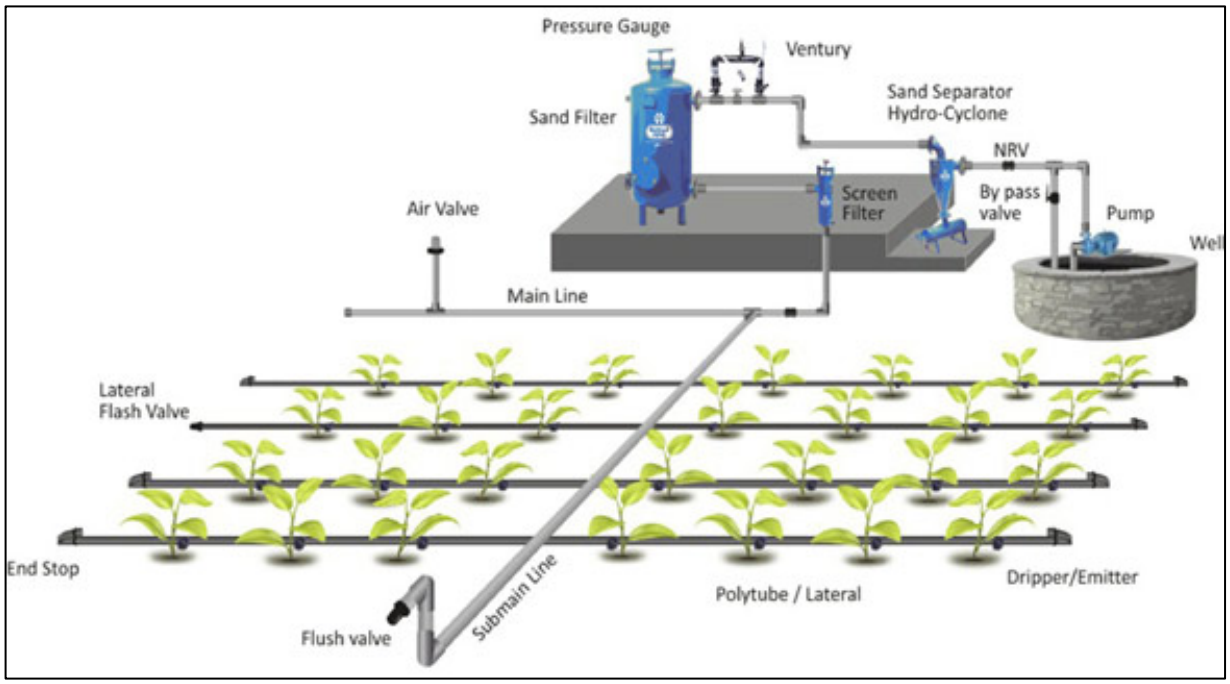


Figure 1. Layout and Components of a Typical Subsurface Irrigation System
Source: Internet, Accessed at: www.gokulplast.com/drip-irrigation-system-layout.html

Study Methodology

In this section methodology adopted to determine sustainability of the study technology is discussed. It included details on the study site and need for the study technology.

Research Site: The research site for this study was located in Leamington, Essex County, Southwestern Ontario (Figure 2). This farm is representative of a large commercial tomato production operations in the Essex County. The size of this farm is approximately 1,000 acres. The farm's land allocation is divided between tomato production, which occupies approximately 10% of the total farm land, seed corn, corn, wheat and soybean (65%). The tomato cultivar grown on this farm is Heinz 9553, used for the processing markets. The crop is in a two-year rotation cycle, with either seed corn or wheat. The soil type is loamy sand. Under the current climate tomato production on loamy sandy soil cannot be maintained without additional irrigation.

Figure 2. Map of Eastern Canada and United States of America showing Research Site

Characteristics of Tomato Production: Tomatoes on the research site are processed into any one of the following: juice, ketchup, sauces, pastes, packed whole, purees, among others, by a local processor. The growing season for these tomatoes varies between 90-150 days, and requires temperature ranging from 18.5 to 25ºC for optimal growth. The plant can be grown in a variety of soils; however, it performs better in light, well-drained soils (i.e., loams) with pH values between 5-7 (slightly acidic to neutral). Requirements for N, P, K range from 100

to 150 kg/ha, 165 to 110 kg/ha, and 160 to 240 kg/ha, respectively (Jaria, 2012 from Jones, 2007).

Total water requirements across the growing season can vary between 200 mm - 700 mm over a 90-120 days growing period, which extends over May to September. Peak water needs of nearly 6 mm/day are reached after the middle of the season (50-70 days). As soil texture can influence water holding capacity, sandy soils have less water holding capacity than clay soils and they require different water management strategies.

Tomato production preparations start in the previous year, after harvest (September to November). At this stage, primary tillage is performed and the beds are created with the use of a bed shaper. Plantation of seedlings takes place in the first week of May, which is accompanied by an application of starter fertilizer. Throughout the growing season, several applications of herbicides and fungicides for pest control, together with additional fertilization, and multiple irrigation events, if required, are provided. Tomatoes are mechanically harvested. Larger farms use a harvester together with two tractors with trailers, involving up to 7 people -- 3 drivers and 4 manual sorters (Miyao et al., 2008). The harvested tomatoes are then transported to the local processing plant.

Water Use for Irrigation in Tomato Production*:* Across the study area, during the growing season, rainfall patterns are irregular, varying between 200 and 700 mm. Throughout the summer months of June, July and August, irrigation is generally required to consistently meet the plants' water requirements (LeBoeuf et al., 2008). In Ontario irrigation is mainly used for high value horticultural produce -- vegetable and fruit production. In Southern Ontario 43% of cultivated land is under irrigation, out of which 36% under vegetable production and 14% is under fruit production (Statistics Canada, 2012).

Irrigation is scheduled according to the plants' water needs, which is crucial for optimal plant growth but also for water conservation purposes. A study by Dolan et al. (2000) has suggested that the majority of farmers schedule irrigation based on water needs, mostly assessed by measuring rainfall and soil moisture levels. However, Bernier (2008) has noted that producers rely predominantly on their own experience to trigger irrigation, using the "feel and appearance" technique. Evidence suggests that this irrigation practice generally leads to an overestimation of water needs.

Indicators for Sustainability: In the context of a new technology it is conventional to measure sustainability through relevant indicators. In this study these indicators were: (i) Economic --profitability indicators expressing economic desirability of the new technology over and above the baseline technology. (ii) Environmental -- Air quality and climate change, measured through greenhouse gas emissions; (iii) Natural resource use, measured as use of water for production. (iv) Social impact, measured through impact on produce's leisure time. Each of these indicators were measured for the baseline and study technology.

Farm Level Economics of Study Technology**:** Agricultural producers manage agricultural systems with the purpose of achieving their goals, which can vary from increasing the farm's profits to increase leisure time (Boehlje and Eidman, 1984). Climate and market factors (i.e., input/output prices) add another layer of uncertainty regarding future development of agricultural systems, making predictions highly uncertain. Nonetheless economic analysis is important and is primarily concerned with the economic viability of the new technology.

Net margin analysis is a simple method of evaluating the profitability of an enterprise for a single time period. It is used to compare a crop enterprise under different beneficial management practices (BMPs). The net profit margin (NPM) for each enterprise can be calculated by subtracting all variable and fixed costs (VFC) from gross income (GI), as shown in equation (1).

$$NPM = GI - VFC \quad (1)$$

In the case of a technology demanding initial investment with a fixed life, single year estimation of gross margin is not appropriate. It is replaced by a financial analysis of the technology. This analysis is done from the standpoint of the producer. Only those costs and benefits that are incurred / received by the producer are included. A technology is evaluated using one or more indicators.

BMP evaluation indicators: Evaluating a BMP's profitability over its lifespan is essential for agricultural producers and thus, represents a milestone in their adoption decision making process. The financial viability of an agricultural project, is obtained by analyzing net cash inflows and outflows over the investment's planned life (Sell, 1991). The main purpose of comparing costs and benefits of the investment is to help the producer decide which projects are worth being further pursued, and which ones to reject.

There are two commonly used indicators used to evaluate an investment's economic worth: Benefit/Cost Ratio (BCR), and Net Present Value (NPV). Both of these are based on discounted values since costs and benefits accrue over different time period. Selecting a discount rate for the financial analysis is an essential step in evaluating an investment's worth, and it can have a large impact on analysis results (Olsen, 2010).

The Net Present Value (NPV) is calculated by discounting and subtracting all periodic outflows (costs), from the inflows (revenues) of a project, at a predetermined rate of discount throughout the life of the investment. The NPV of a project is the difference between the present value of benefits and costs, as shown in equation (2), where B_t are project revenues in period *t*, C_t are project costs in period *t*, *i* is the selected discount rate and n is the number of years denoting the life of the investment (Boardman et al., 2001). The project with the highest NPV is to be preferred to alternative options; however the simple decision rule is to accept projects with a positive NPV (Brown, 1980).

$$NPV = \sum_{t=0}^{n} \frac{B_t}{(1+i)^t} - \sum_{t=0}^{n} \frac{C_t}{(1+i)^t} \quad (2)$$

Benefit-Cost Ratio (BCR) represents another evaluation indicator, which indicates whether a project should be considered for investment. It is calculated by dividing the sum of discounted benefits by the total discounted costs, as shown in equation (3). A BCR of over 1 suggests that the overall benefits outweigh the costs. However, if the BCR's value is close to 1 then further evaluation is advisable, before deciding to invest.

$$NPV = \sum_{t=0}^{n} \frac{B_t}{(1+i)^t} / \sum_{t=0}^{n} \frac{C_t}{(1+i)^t} \quad (3)$$

Source of data for economic analysis: In order to calculate the value of the above two indictors, several pieces of data were required. Gross income data were obtained through interviews with agricultural producers on prices and yields. Variable costs included land preparation costs (i.e. plowing, bed shaping), cultural costs (i.e. pesticide and fertilizer applications), irrigation costs (i.e. start-up of the system, maintenance) and harvesting costs (i.e., harvester use, labor). These costs were provided by producers. Adoption of the study technology affected the cost of operation of the farm and thereby the overall economic position of the farmer. The subsurface drip irrigation included the following costs: more specialized machinery needed for installation, and increased managerial decision making time, among others.

The initial cost of investment involves long-term costs associated with the adoption of the new technology and it is an essential component in determining the profitability of BMPs. These costs included materials, such as headers, connectors, valves, water pump, water reservoir, installation costs, and other costs associated with the BMP adoption (such as a GPS unit).

Environmental Impacts of the Study Technology: Adoption of a new technology can affect the ecological goods and services enjoyed by the society at large. In this study the technology was hypothesized to impact climate change through emissions of greenhouse gases, availability of natural resources (particularly water), and energy use, which has economic impacts for the producer (already captured in the economic analysis) plus implications for energy sustainability, if any.

Social Impacts of the Study Technology: Some technologies are labor saving while other require more labor input form the producer. Therefore, the study technology was investigated for its impact on producer's leisure time.

Results and Discussion

In this section, appraisal of tomatoes grown in a two-year crop rotation with seed corn or wheat are described. Per study methodology, presentation is made for economic, environmental, and social (leisure time).

***Economic benefits and costs – Effect on yield*:** The most important economic change that can be brought about by the study technology was its impact on the yield of tomatoes. While several studies have looked at yield differences between the two irrigation systems, results are mixed. Jaria and Madramootoo (2013) evaluated these differences on the same research site located in Leamington. Their findings indicated that there were no statistically significant yield differences between the two technologies. Tan et al. (2003) evaluated the difference between surface and subsurface drip irrigation on a 16-acre farm, with sandy loam soil and using the same tomato cultivar, located in Harrow a city located approximately 30 km southwest from Leamington. They found that under subsurface drip irrigation, there was a 5.3% increase in marketable tomato yields, when compared to surface drip irrigation. Tan et al. (2008) evaluated the two systems again, in the same location using the same tomato cultivar (Heinz 9478), and found that the on the sandy loam soil, average marketable tomato yields over a 3-year period increased by 35 to 37% under the surface drip-broadcast fertilizer and surface-fertigated treatments relative to the non-irrigated control treatments, while average marketable tomato yields under subsurface-fertigated and subsurface-broadcast

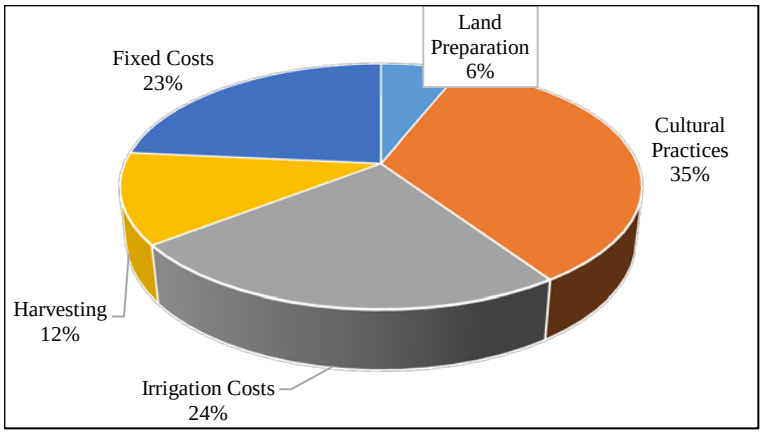
treatments were increased by 43 to 47% relative to non-irrigated treatments (Tan et al. 2008). The same researchers showed that under different soil conditions (i.e. clay loam) the surface drip irrigation had higher yields when compared to subsurface irrigation. Because of the variability in the evidence on yield increases, in this study, the assumption of no yield increase when switching from surface to subsurface drip irrigation was made.

***Economic benefits and costs – Effect on cost of production*:** A related question to the above issue is related to the cost of production under the two technologies. Based on our case study, annual irrigation costs under subsurface drip irrigation are lower when compared to subsurface irrigation. While the subsurface drip irrigation system is in place for three years, the surface drip irrigation gets replaced every year. This reduces the irrigation costs significantly. Our financial analysis of the farm only reflects the differences associated with this replacement pattern. Differences in the major item of cost are shown in Table 1.

Table 1: Difference in cost per acres under the Baseline and Study Technologies, 2015

Particulars	Base Technology (Surface Drip Irrigation)	Study Technology (Sub-surface Drip Irrigation)	Difference (Base minus Study Technology)
Gross Revenue	$4,891.69	$4,891.69	0
Cost of Production			
Land Preparation	$231.32	$231.32	0
Cultural Practices	$1,330.31	$1,330.31	0
Irrigation Costs	$918.43	$436.08	-$482.35
Harvesting	$461.42	$461.42	0
Total Variable Costs	$2,941.4	$2,459.13	-$482.35
Fixed Costs	$904.35	$904.35	0
Total Costs	$3,845.82	$3,363.47	-$482.35
Net Returns (Gross Revenue minus Total Costs)	$1,045.86	$1,528.21	
Net Returns as % of Gross Returns	21.4%	31.2%	
Initial Investment Cost	$1,174.89	$1,269.03	

Both the technologies are similar except for the cost of providing water to the crop. As noted above the yield of tomato crop was assumed to be similar although some higher yields may be realized using the sub-surface drip irrigation. Under the baseline (surface drip irrigation technology) cost of providing water to the crop is the highest item of total cost (Figure 3)



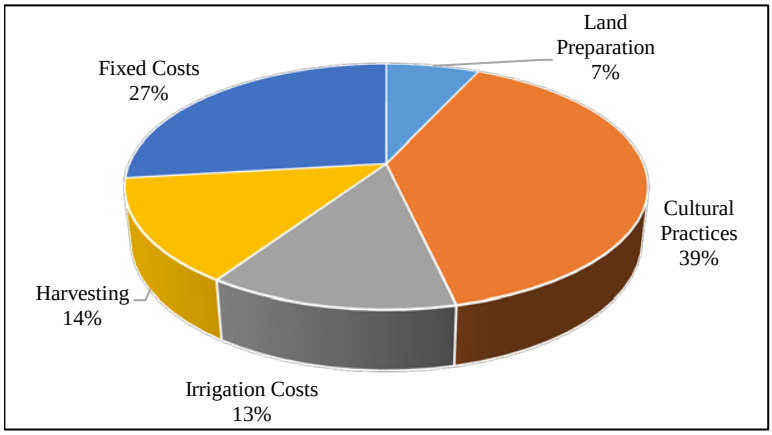


Figure 3. Distribution of total cost by major cost categories, Baseline technology (Top) and Study Technology (Bottom)

Economic Desirability Indicators: As noted above three economic indicators were estimated for the study technology and compared with the baseline technology. Results are shown in Table 2. On both criteria – NPV and BCR the study technology (sub-surface drip irrigation) is a more economic attractive alternative.

Table 2: Measures of Economic Desirability of Study Technology

Particulars	Surface Drip Irrigation	Subsurface Drip Irrigation
Net Present Value @ 5%	$ 6,203.59	$ 6,564.34
Present Value of Benefits	$ 30,218.67	$ 30,305.26
Present Value of Costs	$ 24,015.09	$ 23,740.92
Benefits Costs Ratio	1.26	1.28

Environmental Indicators for the Study Technology: As noted above environmental benefits or damages were measured through change in GHG emissions, as well as through water and energy used. The first question posed was: Does the adoption of a subsurface drip irrigation system lead to a decrease in GHG emissions when compared to surface drip irrigation? Based on Edwards (2014) findings, there were no statistically significant differences between the two irrigation systems. However, anecdotal evidence recorded for

years 2012 and 2013 shows that in both years, fields under subsurface drip irrigation produced 14.47% and 18.32%, respectively, less GHG emissions when compared to surface drip irrigation. In the financial evaluation of the two irrigation systems, differences in GHG emissions were not taken into consideration.

Table 3: Difference in the GHG emissions from Surface Drip Irrigation (Baseline) and Subsurface Drip Irrigation Technology (Study Technology), 2012-13

GHG	2012 Growing Season		2013 Growing Season	
	Subsurface Drip Irrigation	**Surface Drip Irrigation**	**Subsurface Drip Irrigation**	**Surface Drip Irrigation**
N_2O g/m^2	0.17	0.35	0.42	0.40
CH_4 g/m^2	-0.08	-0.08	-0.01	-0.01
CO_2 g/m^2	479.24	517.24	628.61	805.47
$CO_{2\text{-eq}}$ g/m^2	528.38	617.75	754.55	923.80
$CO_{2\text{-eq}}$ kg/ha	52.84	61.77	75.46	92.38
$CO_{2\text{-eq}}$ kg/acre	21.38	25.00	30.54	37.38
Relative Difference		**14.47%**		**18.32%**

The grower in the survey reported that they used the same amount of fertilizer and water, regardless of the irrigation system used. Since other farm operations are not different between the two technologies, no change in energy use was evitable. Previous studies have looked at the relationship between fertilizer use and various irrigation systems. Tan et al. (2003) found that when compared to surface drip irrigation the buried system had higher nutrient N and P use efficiency. Jaria and Madramootoo (2013) evaluated irrigation water use efficiency under the two systems and found no statistically significant differences between the two. European studies have also supported this conclusion (Martinez and Reca, 2014), although in terms of water use efficiency the irrigation water amount was a statistically significant variable in the first two years but not in the third year, although there were clear differences.

Social Impacts of the Study Technology: Major social impact of the technology was measured in terms of labor requirements, leading to leisure time available to the producer. The question raised was: Does subsurface irrigation increase or decrease hired labour, when compared to a surface drip system? When compared to surface drip irrigation, the subsurface irrigation system requires less hired agricultural labour. This is in part due to the increased mechanization of the subsurface drip system, but also due to the fact that the retrieval of the system from the field is done once every three years, as opposed to every year, as it is the case with a surface drip irrigation system.

Related to the farmer's leisure time, the question posed was: Are there any farm owner lifestyle changes involved when moving from surface to subsurface drip irrigation? Based on our anecdotal evidence, from the case study farm, there is an increase in time spent by the farm owner or manager related to decision-making. The producer with the study technology, indicated that the subsurface drip system requires more decision time and more specialized knowledge. The grower spends on average approximately 36 hours per growing season, gathering data, interpreting it and taking decisions regarding water needs.

Future considerations under changing climatic conditions

Climate projections indicate that by 2050 the annual temperatures in Ontario will increase between 2.5°C to 3.7°C from the baseline 1961-1990 (Government of Ontario Ministry of Environment, 2011). Furthermore, in Southern Ontario annual average precipitation has declined by approximately 225 mm in the last 20 years (Tan and Reynolds, 2003). Precipitation projections for the upcoming 45 years do not indicate large variations in the total amount of precipitation, however extreme events are expected to become more intense and more frequent, (Chiotti and Lavender, 2008). These changes would have mixed effects on agricultural production. Tan and Reynolds (2003) indicate that in Southwestern Ontario, an increase in water deficits throughout the growing season, ranging from 80-275 mm, was observed over the last 20 years, with crops already showing yields decreases due to water stress. Water availability, given future climate conditions will be further limited, requiring adoption of water conserving technologies.

Besides water quantity issues, the region is likely to face water quality challenges as well. Increased use of agricultural inputs (i.e. fertilizers, pesticides, etc.) help enhance the productivity of agricultural systems. However, overuse or inefficient use of these chemicals is one of the most common causes of damage to water resources worldwide. Surpluses of nitrogen, phosphorus and pesticides in the soil can pose enhanced environmental risks, due to possible leaching into ground waters or by reaching surface water bodies through runoff (De Jong et al., 2010, pg. 80). Transportation of these surpluses into water resources diminishes water quality. Some of the most common effects associated with water contamination by nitrogen are: eutrophication (affecting aquatic life) and increased human health risks (drinking water issues). In Ontario the risk of water contamination by nitrogen is following an upward trend.

Summary and Conclusions

Results of this study suggest that the tomato production in Ontario using sub-surface irrigation is not only economical but also environmentally friendly and helps leisure time for the producer. These are the major pillars of sustainable practices. Thus, adoption of this technology is a step towards achieving the goals of sustainable agriculture. A summary is shown in Table 4.

On three of five types of indicators, the study technology – sub-surface drip irrigation, had a more desirable change on the producer and / or society. For two indicator types no difference between the two technologies was noted. The overall conclusion is that the study technology is a more sustainable way of growing tomatoes in Ontario. Hopefully this technology would appeal more to the tomato producers.

Table 4: Comparison of Baseline and Study Technologies on Sustainability Indicators

Indicator	Baseline (Surface Drip Irrigation) Technology	Study (Sub-Surface Drip Irrigation) Technology	Difference in two Technologies (Study – Baseline)
Economic (NPV)	$6204	$6564	>0
Economic (BCR)	1.26	1.28	>0
GHG Emissions	37	31	Positive reduction
Water Use	No change due to farm practice		

Energy Use	No change due to farm practice		
Social Impact (Leisure time)	++	-	Positive reduction
Sustainability	Lower	Higher	Positive

Selecting the better technology among the two technologies described above is highly dependent on bio-physical conditions, particularly the levelling and type of soil. The subsurface technology works better for sandy soils. This factor is an important determinant of economic benefits from the adoption of the technology. Furthermore, this surface drip irrigation technology can also create some logistical issues, such as access to the field for heavy machinery when the system is in place.

One of the limitations of this study is related to rotational assumption used for the economic evaluation. It was assumed that the second crop following tomatoes (typically corn) is not irrigated (in spite of the fact that the system is in place). This may have led to underestimation of the economic desirability of the above technologies. However, this may not have affected the marginal difference between the two technologies.

Adoption of new technology by producers is a complex issue. In order to improve the environment's condition, appropriate policy tools need to be used to determine agricultural producers to account for their actions (Weersink, 2002). If economic attributes of a technology are unable to convince a producer to adopt it, appropriate and differentiated policy instruments might be needed for their improved uptake by agricultural producers. Agricultural producers through their production activities can have a positive impact on the environment (i.e., GHG emissions sequestration) or a negative one (i.e., GHG emissions). Costs of GHG emission are external to an individual farmer's agricultural production system and with no incentives to internalize those costs; it is unlikely that the agricultural producer will change cultural practices. Conversely, the benefits of on-farm GHG emissions sequestration cannot be completely internalized by the agricultural producer.

Acknowledgements

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Incentive Farming Resilience and its Limits to Governing the Rural Commons: Rethink the "Golden Corridor Program" in Yunlin, Taiwan [#]

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Abstract

Countryside is a complex human-nature interface representing the multifunctional agri-environment which can be taken as the multi-level/scalar/use rural commons. Governing the commons is a complicated, hybrid, and contested self-organizing network beyond either market mechanism or state intervention. However, market-led rural governance has prevailed among advanced and latecoming countries to reduce the degradation of commons and to improve agricultural sustainability. The neoliberal turn of governing the rural commons should be investigated in a deliberative manner. We argue that the self-organizing network is the premise to prevent the farming resilience from the common tragedy caused by individual self-interests. As a major agricultural area undergoing land subsidence, Yunlin County (Taiwan) is encountering this dilemma owing to the prevalent groundwater overdraft on farmland and the nearby overweighed high-speed railway construction. The County Government is endeavoring to effectively regulate farming water and to seek for alternative irrigation. With the goal of sustainable agriculture, the central government addressed 'Golden Corridor Project' (GCP) as a new alternative in 2013 to promote water-saving agriculture, environment friendly farming, and LOHAS countryside in the area within 1.5km of each side of the high-speed railway. Considering Marxist geography, the paper explores the neoliberal implication of market-led disaster mitigation program. We define GCP as an approach of 'incentive farming resilience' and argue that the neoliberal logic deviates from the principle of governing the commons through self-organizing collective actions. By the policy experiment of market-led management, GCP boosts up risky speculation of privatizing the rural commons whilst exploits the collective interest of farming resilience under the individual commodifying scheme. The resource users are transformed into stakeholders seeking for individual profits but cannot sustain the institutional capacity of cross-boundary coordination in the agri-environment.

Keywords: farming resilience, rural commons, governance, self-organization, neoliberalism.

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LAND VILLAGE INVENTORY FOR OPTIMIZATION THE UTILIZATION OF LAND IN RURAL AREA

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Abstract

Land as an important asset has a high economic value for develop of a rural area. The existence of land village scattered with diverse geographical conditions and uncertificate certainly can cause problems later if not immediately inventoried and mapped. The location of the research was conducted on land village in Selopamioro, Imogiri, Bantul, Daerah Istimewa Yogyakarta, Indonesia. Land village inventory activity is conducted through field survey assisted with high resolution satellite imagery. The result of the research is compilation of spatial data of land village on the basis of the field in which there is information on the location, area, land use and land rights base. The results also indicate that there are several plots of land that have been swapped over, there is a missing land village and the area is reduced due to natural processes (river abrasion). Compilation of spatial data is expected to be the initial data for develop of a village, so that the land use and land utilization is more optimal in order to improve the welfare of the community.

Keywords
Land Village Inventory, Rural Development, Welfare

I. Introduction

Land plays a vital role in the survival of living beings as a primary asset for development. It may become fundamental life support for people who live in a rural area (Ghimire, 1997). However, the growth of population and the increasing demand of land for infrastructure give impact on land-use change. It change agricultural land to non-agricultural land which increasingly limit the space for rural farmers. Disaster and natural liveliness also affect to the morphological shift of an area which occurs in a research location, Selopamioro village. Natural liveliness continuesly causes alluvion, land loss, and land crisis.

This study focuses on rural land condition in some area of Selopamiro village, Imogiri sub-district, Bantul regency, Yogyakarta Special Region. As known as far, land in rural take a fundamental role for society welfare and rural development. Rural land can be an asset which can be managed by the rural community, yet the use and the utilization are for *Pamong Desa* (people who manage the rural administration), for public facilities, for social activity, and for development. Selopamiro is located in different morphology in the hills with steep slopes and in some low land of Opak River. Both conditions can threaten this rural by land slide, water erosion, and flood. Since this area undergoes the process of geomorphology and has geological structure like in the area of thousand hills and Graben Bantul, it can cause active fault which lead to high potency of earthquake.

Various earthquake threats can affect to the alluvion and land loss caused by the activity of Opak River. The movement of river flow and the swift air flow from year to year can cause land erotion along the river. The severe erotion has occured for 8 years because of the construction of water retaining embankments in the upstream. Construction which does not care the river and air flow morphology can cause water erosion, land loss and the decreasing part of road in Selopamiro village. It also causes stress of society. A river usually becomes the boarder of adminitration for a rural, and the morphological river which continuesly happpens can change the boarder and the wide of rural area.

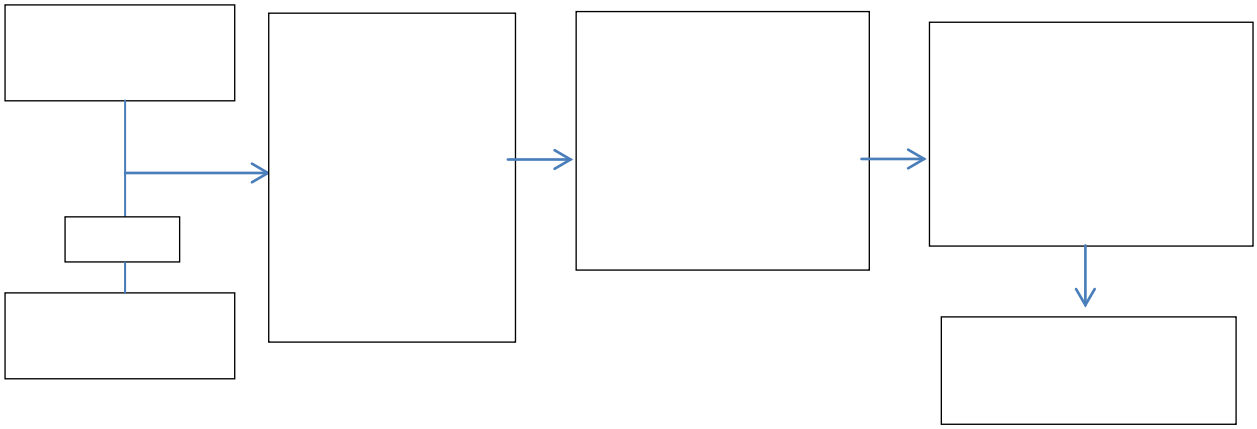
In addition to natural conditions, rural development issues often raise some changes to the communal land condition. It occurs in Selopamioro rural. To build a rural administration office and to provide public facilities in 1950, it conducted *tukar guling tanah* (a system to exchange lands in a certain rural). It exchanged land which belongs to rural with some of land which belong to society, and it was performed by rural administration officer. However, untill this research finished, the process of *tukar guling* and its administration in regional government has not been completed. Unfinished process of inventory and confirmation of communal land can lead to a problem in the future. Therefore, the mapping and inventory of existing rural land condition should be studied and found in this research in order to make well-organized administration. Complete inventory and mapping of rural land may be substances to mapping rural potencies in the future for example as a substance to make policies for rural development and improvement.

II. Material and Method

This research is situated in some parts of communal land in Selopamiro village, Imogiri sub-district, Bantul regency, Yogyakarta Special Region, Indonesia. It uses qualitative method with spatial approach. Communal land inventory is conducted by

utilizing large-scale upright image overlaid[1] with the present communal land sketch (an old version sketch which has not been updated). To find out the change of communal land location, the change of land authorization, and the change of land peripheral, it requires to conduct measurement and checking to every single rent communal land. Checking its existence of the location of communal land can use Carry Map which can be downloaded in Smartphone. Geotangging activity is completed with coordinate position (x,y) with utilizing GPS Map aplication. This research also conduct deliniating land periphery and taking an image of a land. To ensure the validity of communal land data and to fill the table of contents, it requires an interview and a discussion with village administration officer.

Data analysis and process were conducted in spatial using GIS[2] aplication in order to map communal lands which contain several attribute data consisting: land tenure data, land use and utilization, land titling, and land width. A flow chart scheme is presented in the following picture 1:



Picture 1. A flow Chart of Data Organization of Selopamioro

III. Result and Discussion

a. Constructing a Map of Communal land

Rural area where rural community live has wealth and asset managed for improvement of community welfare and livelihood as well as rural income. One of rural assets organized by the rural government is land which belongs to them. Land in Daerah Istimewa Yogyakarta (Yogyakarta Special Region) is a resource and an asset which require to be consolidated, managed, and secured in order to fulfil the functional principle, legal certainty, transparency, efficiency, accountability, and value assurance. This is very vital as most of *Tanah Desa* (Communal land) is a productive land located in strategic accessibility (Harian Jogja, 29 July 2017).

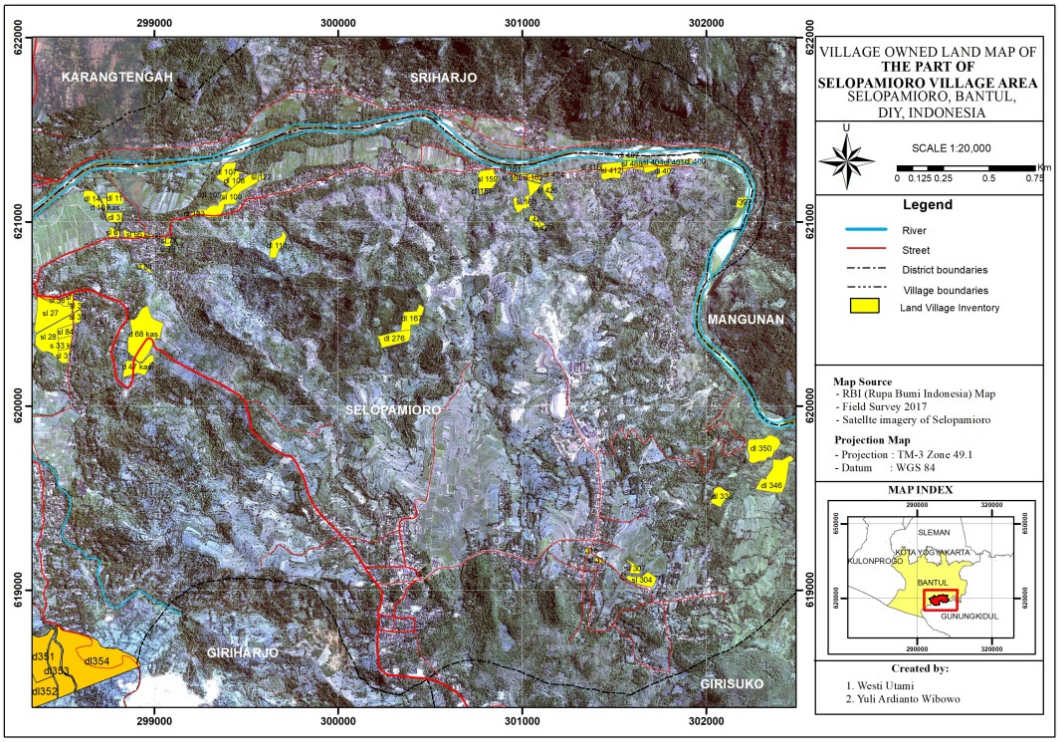
Recently, policy about communal land management is still counterproductive where land use change is uncontrollable, and land utilization is not suitable with its physical land capability. Communal land which is found in The Regulation of Ministry

[1] Overlay is a process to compile digital data with the other data in order to analyze certain purposes; therefore, the data are visualized into the next analysis process. (Vandeveer, 1998)

[2] GIS is a geographic information system which contains software, hardware, and graphic data designed to gather, manage, renew, analyze, and present all forms of information (Environmental System Researc Institute, 1993).

of Home Affairs (Indonesia) No. 4 /2007 about Principles of Rural Wealth is a land which is managed by rural. Communal land cannot be traded without any approval form all the whole community, but it can be leased by authorized person.

Considering the importance of communal land, inventory and mapping should be conducted by checking field data which contain coordinate (x,y) of periphery delineation of this land, authorization inventory, and land use. Map analysis and construction of communal land is conducted by Arc Gis, and the mapping result is presented in picture of map 1.



Picture 1. A map of Partial Communal Land in Selopamioro Village

Picture 1 presents updated location and peripheral of communal land. The use of image in high resolution in this research is quite helpful to recognize the existing land as the result the inventory process of communal land and renewal of peripheral land can be easier. Data about land use and width in Selopamioro Village is presented in the table 1.

Table 1. The Communal Land Use in Selopamioro Village

No	Land Use	Width
1	Agricultural Land	64030
2	Farm/Garden (Agriculture)	243519
3	Public and Social Facilities	9855
4	Settlement	7955
	Width Total	325359

Source: Data Analysis in 2018

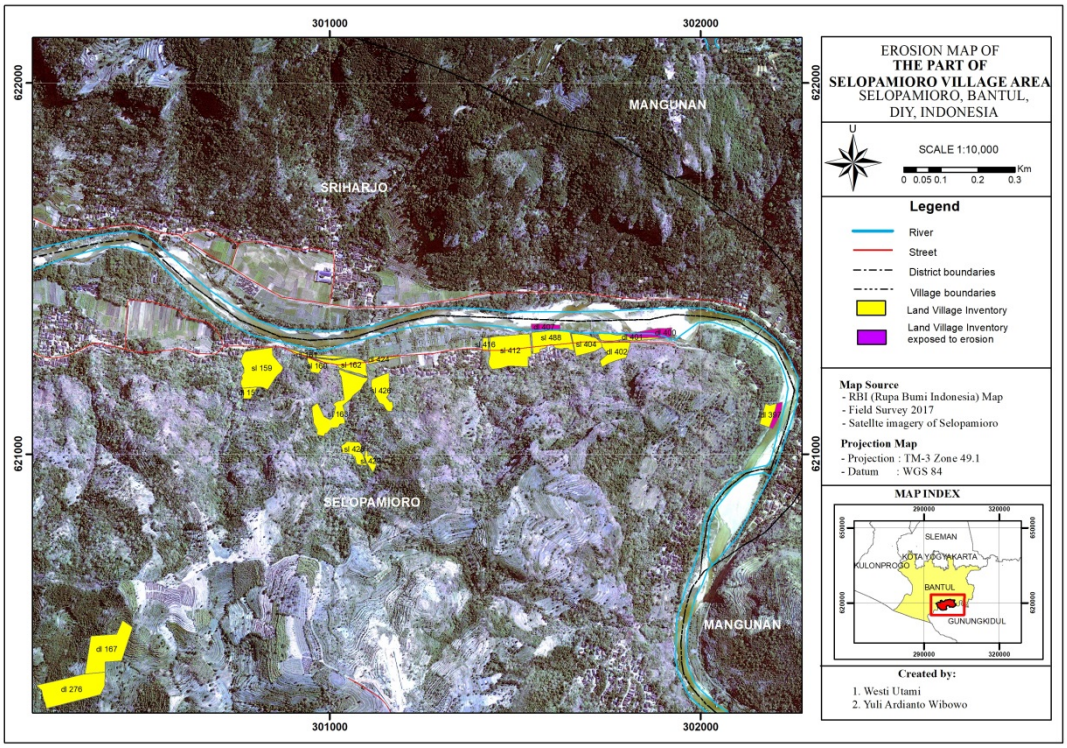
The research result, in picture 1 and table 1 present attribute data and maps of communal land containing spatial distribution, land use information and land width in digital. According to the data analysis and research result, it discovers fifty seven (57) communal lands in Selopamioro, and they are mostly used for agriculture and farm (agricultural land) which are cultivated by the community. The agricultural land use is

purposed to cultivate rice and *palawija* (secondary corps) meanwhile farmland is used to cultivate cassava, yams, coconut, and trees (*sengon*, teak tree, acacia, etc). Small parts of communal lain is utilized for social and public facilities such as kindegarten, pre-school, elementary school, field, mosque, and rural office. Land inventory, updating data and information of location, peripheral land , land use, and land geotagging have been obtained in this research. It uses GPS map which has been installed in smartphone to make geotagging[3] in research field. This installation is very handy and sophisticated.

Spatial information and attribute data have been compiled completely in order to ease rural government to have analysis for rural improvement. It is also beneficial to make up dating data, overlaying data, and analyzing spatial data. The compilation of basic data can be an early start to build system of information for spatial data. This system is completely presented to ease rural development to make some improvements for the rural. The existence of this system and complete basic data is to ease in monitoring and evaluating process of government policy and to determine the rural development.

b. Inventory of Communal Land Change

Natural liveliness and disaster often change morphology of an area. The research result presents that several lands are lost because of water erosion in Opak river. To find out how many land loss, this study uses old image data and old land sketch, and they are compared with new image and direct ground check. Those two data comparison obtain changes towards land loss or land loss in Selopamioro. The mapping result of these issues is presented in the picture 2.



Picture 2. Water erosion Map in Opak River in Selopamioro Village
(Source: Data Analysis in 2018)

[3] Geotagging is is the process of adding geographical identification metadata to various media such as a geotagged photograph or video. In this research, and it is conducted by adding metadata such as photo inserted some information of latitude and longitude coordinates (Wikipedia, 2018)

According to the field survey result and spatial data analysis in Selopamioro village, it finds out three communal land which are lost. Natural conditions such as wather erosion which continually occur in research location is caused by the construction of embankment without considering the environmental condition, and the presence of curvy rivers with hill morphology, rushing river flow as well as natural disaster threat. The power of water erosion which continually occurs can cause the loss of settlement land, yet the river activities can create sediment which affect the emerge of alluvion (Ali, 2018). In addition, it should take preventive ways to protect communal land and community land around the river from erosion. The problem of land loss and destroyed land should be anticipated such as land management, authorization, and utilization as early as possible. The inventory and monitoring activity for land loss and alluvion should be continually processed in order to reduce the possible problems in the future.

c. Land Inventory for Rural Potency Mapping

Communal land mapping in this study is conducted by *Sitem Informasi Geografi*/Arc GIS (Kumar & Moffit, 2018). The primary of Arc GIS can be used to optimization rural resources. The Arc GIS power can ease to process updating data, to have analysis process such as overlaying some maps, and to compute data and other spatial data analysis (Vandeveer & Kennedy, 1998).

Based on the communal land mapping result, some potencies which can be developed in Selopamioro are presented in the following discussions.

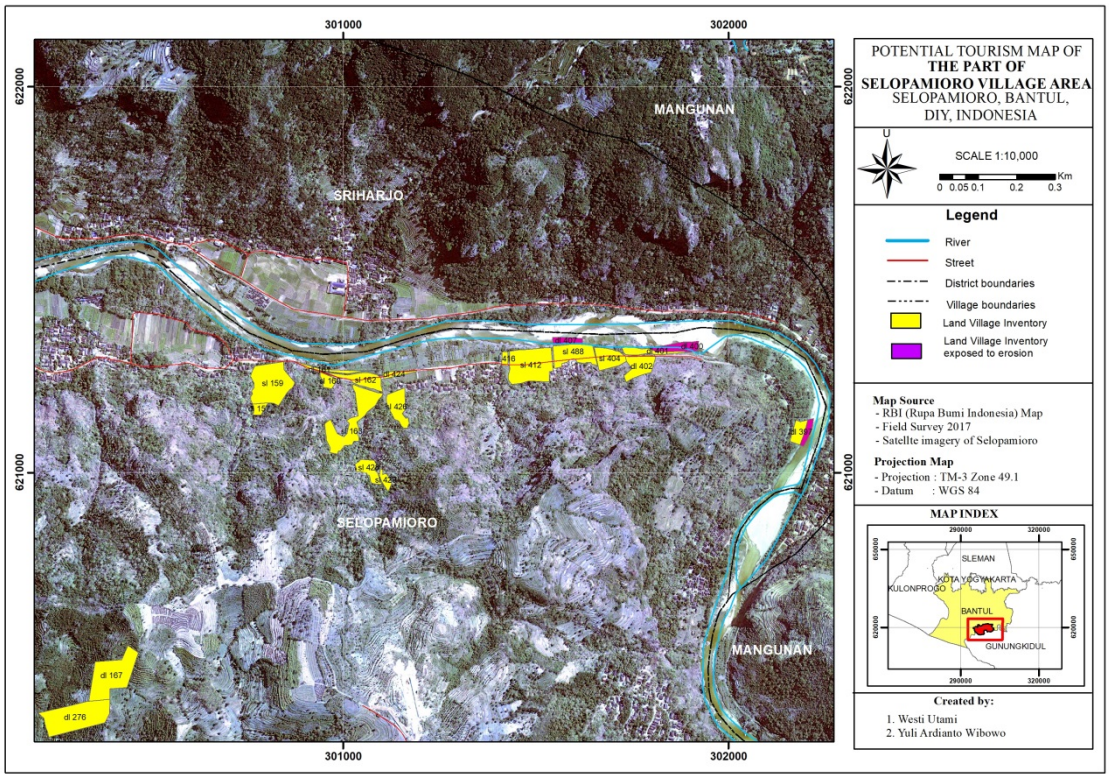
1. Agricultural Land

The social cohesion study described by Takashi Okayo explains that sustainable rural development can be done by optimizing the existing natural resources in the countryside by incorporating the population's ability to process natural products (Bridget Love, 2014).Selopamioro is a fertile rural in Bantul Regency. Its land fertility in the research location is affected by vulcanic sediment carried away in Opak river. The water availability and simplicity to find water for irrigation support the agricultural activity in this rural area. Meanwhile, in several areas which are located in the hills, their land management and utilization should be adjusted. They will damage community livelihood such as landslide if they are not well organized. Community missconception against landslide and limited land autorization cause some lands are still used for residential lands.

The potency of agricultural land in Selopamioro definetely should be protected and maintained considering an increasing number of activity of extensification and land use change from agricultural land to non agricultural land. Rural area as a foodshed and a potential agricultural land should be maintained in order to create sustainable food availability (Davis, 2014). Policy of agricultural land protection in agricultural area particularly field irrigation with fine fertility should be regional and rural government authority. As a foodshed, it has bigger potency to be developed in agricultural aspect. Boncinelly states that rural community can live properly from the agricultural products unless government policy support farmer’s potencies (Boncinelly, 2014). Besides, availability of wide agricultural land which will be cultivated by each household can affect to the farmer’s income. Therefore, policy about protection of agricultural land form industry extensification may be a vital element in order to create rural community welfare with sustainable agricultural land (Moroney, 2018).

2. Tourism Object Area

According to the research result, it discovers that Selopamioro has natural tourism potency which is potentialy to develop. The natural landscape with the view of hills is really fascinating. However, the limit budget and unexposed object cause undeveloped tourism. Several tourism objects which are challenging may be offered and developed such as rock climbing, river exploration, rafting, and the other natural tourism objects.



Picture 3. Tourism Object Mapping in Selopamioro Village
(Source: Data Analysis in 2018)

Optimization of land use and utilization should be performed by rural government during the activity in accordance with the capability and suitability of land use by considering the aspect of disaster threat. The development of rural potency should be performed by government and private sector involving rural community. Their participation is expected to improve social welfare and sustainable livelihood.

IV. Conclusion

1. Communal land takes a vital role for rural development in order to improve rural community welfare and rural improvement.
2. Spatial communal land inventory with complete attribute data is an early step to create well-organized communal land and rural potency mapping.
3. Communal land mapping as a base to determine policy for rural development and to prioritize rural development.
4. Communal land data and attribute data served in digital which can be utilized to construct system information of rural spatial.
5. Fertile communal land in Selopamioro can be used for agricultural land which is sustainably established as a foodshed.

6. The protection of agricultural land in Selopamioro and policy which support farmers can be fruitful to actualize prosperous farmer community in order to maintain agricultural land as life support.

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MGNREGA TRANSFORM RURAL LIVES OF DHALAI DISTRICT OF TRIPURA: IMPACT STUDY

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ABSTRACT

The study was carried out in Dhalai District of Tripura State during 2010-2011 to know the impact of Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) on the standard of living of beneficiaries. The overall mean value of standard of living of beneficiaries before MGNREGA programme was found to be 36.5 as compared to the overall mean value of 60.1 after the implementation of MGNREGA programme. There is an enhancement of mean value in the standard of living of beneficiaries by 65 per cent indicating significant increase due to MGNREGA.

Introduction

The Mahatma Gandhi National Rural Employment Guarantee Programme was notified on 7th September, 2005. The Act came into force on February, 2006 and was implemented in a phased manner. In phase one, it was introduced in 200 most backward districts of the country. It was implemented in an additional 130 districts in phase two during 2007-2008. To bring the whole nation under its safety net and keeping in view of the demand, the Act was extended to the remaining 285 districts of India from April 1st, 2008 in phase three(Anonymous, 2009). MGNREGA marked a paradigm shift from the previous wage employment programmes with its rights-based approach that makes the Government legally accountable for providing employment to those who demand it. The Act aims at enhancing livelihood security of households in rural areas of the country by providing up to one hundred days of guaranteed wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work. The primary objective is augmenting wage employment. Its auxiliary objective is strengthening natural resource management through works that address causes of chronic poverty by

encouraging sustainable development. Against this background, the present study was taken up with the following specific objectives:

- To develop a scale to measure the attitude of beneficiaries towards MGNREGA programme.
- To know the attitude level of beneficiaries towards MGNREGA programme.
- To analyse the standard of living of MGNREGA beneficiaries.
- To understand the association between the selected personal and socio-psychological characteristics of MGNREGA beneficiaries and their attitude towards MGNREGA and standard of living.
- To enlist the problems and suggestions of MGNREGA beneficiaries for effective implementation of the programme.

Methodology

A sample of 50 MGNREGA beneficiaries (who were working in MGNREGA programme since 2006-2007) each from Netajinagar, Ramratan para and Thankurpally villages were randomly selected for the study. Thus, the total sample for the study was 150 MGNREGA beneficiaries from three villages of Kulai gram panchayat in Ambassa Block of Dhalai district in Tripura state.

Based on the mean and standard deviation of annual income, the respondents were classified as follows.

Category	**Criteria**	**Before MGNREGA (Rs.)**	**After MGNREGA (Rs.)**
Low	< Mean-1/2SD	< 4981.70	< 10956.15
Medium	Mean± 1/2SD	4981.70 to 7361.10	10956.15 to 14792.71
High	> Mean + 1/2SD	> 7361.10	> 14792.91

Annual net income (ANI) was measured using the below formula

ANI= Gross income-total cost of expenditure.

Based on the mean and standard deviation of employment generation, the respondents were classified as follows.

Category	**Criteria**	**Before**	**After MGNREGA**

		MGNREGA (man days)	(man days)
Low	< Mean-1/2SD	<38.65	<107.23
Medium	Mean ± 1/2SD	38.65 to 51.39	107.23 to 154.61
High	>Mean + 1/2SD	>51.39	>154.61

Based on the mean and standard deviation of social status, the respondents were classified as follows:

Category	Criteria	Before MGNREGA	After MGNREGA
Low	< Mean –1/2SD	< 1.00	<7.29
Medium	Mean± 1/2SD	1.00 to 4.40	7.29 to 10.35
High	>Mean +1/2 SD	>4.40	>10.35

Social status index (SSI) was calculated by using the following formula.

$$SSI = \frac{\text{Actual score}}{\text{Possible score}} \times 100$$

Based on the total score of the respondent on overall reinvestment pattern of MGNREGA beneficiary respondents were classified into three categories viz., low, medium and high using mean and standard of deviation as measure of check.

Category	Criteria	Before MGNREGA (Score)	After MGNREGA (Score)
Low	< Mean – ½ SD	< 9.71	< 14.79
Medium	Mean± 1/2SD	9.71 to 13.29	14.79 to 18.35
High	>Mean + ½ SD	> 13.29	> 18.35

Computation of Standard of living index

The four components of standard of living (Annual income, employment generation, social status and reinvestment pattern) have been measured and expressed in different units. Hence, all the values were converted into unit values or standard scores by using Thorndike standard score (McCall, 1922) as followed in the case of reinvestment pattern.

Based on the total score of the respondent on overall standard of living of MGNREGA beneficiary respondents were classified into three categories viz., low, medium and high using mean and standard of deviation as measure of check.

Category	Criteria	Before MGNREGA (score)	After MGNREGA (score)
Low	< Mean – ½ SD	< 36.97	< 57.03
Medium	Mean± ½ SD	36.97 to 40.77	57.03 to 61.29
High	>Mean + ½ SD	> 40.77	> 61.29

Results & Discussion

It is observed from Table 1 that 31.3 per cent of the respondents were belonging to low level of standard of living before the implementation of MGNREGA programme. It is interesting to note that only 16.0 per cent of the respondents were falling under low level of standard of living after the implementation of MGNREGA programme.

Table 1 also reveals that 40.6 per cent of the respondents were falling under medium level of standard of living before the implementation of MGNREGA programme, while 44.6 per cent of the respondents belong to medium level of standard of living after the implementation of MGNREGA programme.

It is also seen from Table 1 that 28.0 per cent of the respondents were in the categories of high level of standard of living before the implementation of MGNREGA programme. It is heartening to observe that 39.3 per cent of the respondents belonged to high level of standard of living after the implementation of MGNREGA programme.

The results of chi-square test in Table 1 reveals that there exists a positive and significant difference in the standard of living of beneficiaries before and after the implementation of MGNREGA programme.

Mean values of different dimensions of standard of living during before and after MGNREGA.

It is evident from the finding in Table 2 that employment generation increased (168%) between before and after the implementation of MGNREGA programme. Similar increase is observed in the response between before and after the implementation of MGNREGA programme with respect to dimensions, annual income (149%), food consumption (116%), investment on social functions (96%), investment on savings (91%) investment on assets (81%), social status (28%), value addition in education (20%) and health status (20%). The results also indicate that the overall mean value of before MGNREGA programme found to be 36.55 as compared to 60.16 after the implementation of MGNREGA programme. Hence, the enhancement of mean value was found to be 65 per cent indicating the effectiveness of benefits in MGNREGA programme. The data subjected for statistical test reveals the enhancement in the mean values between before and after the implementation of MGNREGA programme for all dimensions under study was found to be highly significant at one per cent level.

Table1: Distribution of MGNREGA beneficiaries based on their level of standard of living before and after MGNREGA

Level of Standard of Living	Before MGNREGA (n=150)		After MGNREGA (n=150)	
	No	Per cent	No	Per cent
Low	47	31.3	24	16.0
Medium	61	40.6	67	44.6
High	42	28.0	59	39.3
Total	150	100.0	150	100.0
Mean	38.87	-	59.16	-
Standard deviation	3.810	-	4.265	-
Chi-square test value	10.59 **			

**Significant at 1per cent level.

Table 2: Mean values of different dimensions of standard of living before and after MGNREGA

Sl. No.	Dimensions of standard of living	Mean values			't' value
		Before MGNREGA	After MGNREGA	Percentage of Increase	
1.	Annual income (Rs)	6171	15366	149.0	38.61**
2.	Employment generation (Mandays)	45	120.66	168.00	27.05**
3.	Social status (Score)	3.00	3.84	28.00	30.38**
4.	Values addition in education (Score)	5.00	6.00	20.00	18.10**
5.	Food consumption pattern (Rs)	5388	11638.00	116.00	22.44**
6.	Health status (Score)	3.00	3.60	20.00	16.32**
7.	Investment on assets (Rs)	0	810	81.00	10.15**
8.	Investment on savings (Rs)	0	910	91.00	11.18**
9.	Investment on social function (Rs)	410.00	803.60	96.00	98.57**
	Overall(units)	36.55	60.16	65.00	51.80**

**significant at 1 per cent level.

Table 1 revealed that significant improvement of standard of living of the respondents, after joining MGNREGA programme. Before joining MGNREGA programme majority (40.6%) had medium level of standard of living followed by low (31.3%) and High (28.0%) but after joining majority of the respondents nearly 44.6 per cent had medium level of stand of living followed by low (16.0%) and high (36.3%) categories, respectively. It is noticed from the findings that before joining MGNREGA programme low categories of standard of living were 31.3 per cent after joining MGNREGA it was decreased to 16.0 per cent. The main reason behind the increase of annual income, employment generation and it was observed the improvement of standard of living categories.

The data subjected for statistical test indicated significant difference in the standard of living of MGNREGA beneficiaries before and after joining programme. It was found highly significant at one per cent level. The probable reason for the above result are timely need based information supported system,

better mass media exposure, social participation like village panchayat, co-operative society etc., Cosmopoliteness nature of the beneficiaries and better linkage and establishment of need based local institutions that helped in improving their annual income, employment generation, social status, value addition in education, food consumption pattern, health status, investment on assets, investment of savings and investment of social function, further, close follow up and encouragement have together contributed for improved standard of living. The paired 't' test applied for the data, revealed that a highly significant difference at 1 per cent level before and after MGNREGA on different aforesaid dimensions of standard of living of beneficiaries(Table2).

Conclusion

About 31.3 per cent of the respondents were belonging to low level of standard of living before the implementation of MGNREGA programme, while only 16.0 per cent of the respondents were falling under low level of standard of living after the implementation of MGNREGA programme. About 28.0 per cent of the respondents were falling in the category of high level of standard of living before the implementation of MGNREGA programme. Whereas, 39.3 per cent of the respondents belonged to high level of standard of living after the implementation of MGNREGA programme. A positive and significant difference was existing between the standard of living of beneficiaries before and after the implementation of MGNREGA programme.The overall mean value of before MGNREGA programme was found to be 36.55 as compared to 60.16 after the implementation of MGNREGA programme indicating an increase of 65 per cent between before and after the implementation of the MGNREGA programme.The enhancement in the mean values of standard of living between before and after the implementation of MGNREGA programme was found to be highly significant at one per cent level.

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Stewardship of Local Health system – A study in Rural West Bengal, India

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Health for all is a global strategy which gave high priority to community participation (WHO 1978). Participatory health development process involved relevant partners for health at all levels – individuals/community/service providers etc and promotes joint decision-making, implementation and accountability.

Basic Health Care Support (BHCS) Programme traces the development of stewardship through effective engagement and participation of local people/groups, especially in planning/designing and long term stewardship of their community through it's Health Forum movement. They are performing as a watchdog, providing constructive feedback to the health system and can respond to recognized community needs.

The Basic Health Care Support (BHCS) Program implemented by the **West Bengal Voluntary Health Association (WBVHA)** is a process of about 15 years. The program is closely working with the local communities through local partner organizations engaged in the field of health and social development, linking up with each other and with service providers and local authorities. In that way a more enabling environment for the people to access and ensure quality health care services has been created, also in relation with politicians and policymakers. In 2004, WBVHA started it's Health Forum Movement in district South 24 Parganas, the southern-most part of the Ganges-delta in the State of West Bengal, India. Starting from 9 grass root healthcare NGOs active in 5 blocks (i.e. sub-districts) within the district, the forum gradually evolved into a health platform at community, Gram Panchayat (i.e. the local government body) and the Block level (with its health authorities.

The Health Forum provided an opportunity for these grass root NGOs to come together, understand each other's needs, identify gaps in the health services, learn from each other experiences, join forces and improve their institutional capabilities, and engage in a dialogue with both service providers and political decision makers to obtain better quality health services. The fact that these 9 grass root NGOs organised themselves as a platform and engaged in a constructive dialogue with service providers and decision makers, gradually created a relation of trust between these different actors. and led to functional partnerships. This allowed the health platform to become a catalyser for assuring that government schemes and resources related to the 'National Rural Health Mission' (NRHM) policy arrived at the level of local communities, especially in the remote island areas of the Ganges delta in South 24 Parganas. Instead of looking for funding for their individual micro-projects in their villages, the NGOs of the platform bit by bit discovered the benefits of being organised as a platform and work in a more structural way. This means i) strengthening collaboration with the other stakeholders in the local health system, ii) sharing responsibilities towards health

within the local health system (see the notion of 'distributive stewardship'), iii) improving upward but – more important - also downward accountability mechanisms, and iv) engaging in advocacy to tap more effectively potentially available resources in the system and to bring to the attention of decision makers the successes and challenges experienced at grass root level in order to better adapt the policies to the community needs and claim their right to health. Especially that last point proved to be quite a challenge. **The theory of change** underlying this process is to develop the health system and the health services by reinforcing a learning cycle (see figure 2) aiming at i) facilitating the implementation of government schemes, ii) adapt them to local circumstances, iii) share the learnings at grass root level, iv) provide a feedback to the decision making level (mainly at Gram Panchayat and Block levels).

The Health Forum Movement under BHCS programme stared in 2004.

Stewardship stimulates community to participate in decision-making process and is an effective management of resources by all stakeholders involved in their utilization.

This article focuses on the role of shared/distributed stewardship in BHCS programme. The potential success of health promotion in practice is closely associated with a comprehensive approach which relates to problem identification, decision-making, collaboration in planning for health care delivery and active participation in implementation of healthcare programmes – essentially local control of services to improve health of individuals/communities and can demand their health rights.

Participatory process was used for assessing their own knowledge; investigating environmental situation; visualizing a different future; analysing constraints to change; planning for change; implementing change and also to engage and empower local communities in their stewardship.

BHCS team has been actively shaping the evolving policy framework on decentralization of decision-making to local level actors by engaging community leaders and building extensive partnerships at Panchayat/Block levels and able to build a network of CBOs/CSOs champions.

Stewardship requires clear and consistent strategic direction and provides a successful model of health policy making. Consideration is given to the relative strengths and weaknesses of stewardship in health sector and suggestions are made as to how the discussion on stewardship might be moved forward.

Keywords: Community participation, Decision-making, Local Health System, Stewardship, West Bengal

Introduction:

Health systems and polices have a critical role in determining the manner in which health services are delivered, utilized and affect health outcomes. 'Health' is primarily a state subject, but significantly influenced by the national health policy.

India has a mixed health-care system, inclusive of public and private health-care service providers (Sheikh et al 2015). The public health care subsystem is a three-tier structure comprising primary, secondary and tertiary health care which provides preventive and curative health care in rural and urban areas

The Indian health care delivery system is a complex one, riddled with multiple powerful players, lack of a common vision, very low public funding and a host of insufficiencies (Joint Context Analysis Belgian NGO's; India 2015). High absenteeism, poor quality health care, low level of peoples' satisfaction and rampant corruption lead to mistrust of the system. Weak voice and low accountability are yet other constraints to effective health care delivery. Rural health care in India is one of biggest challenges.

The National Health Policy 2017 explicitly addresses the issue of governance of health systems for the very first time, acknowledging the multi-layered local health governance structures in rural India, and the limited public resources available for the health system with unclear mandates and roles for the various players, which of confusion leading to poorly effective health delivery. However, governance in India are a source is complex and poorly understood and effective governance and accountability in the health sector remains a major challenge. Systemic governance failures afflict the healthcare sector across modes of governance (Bali & Ramesh 2015).

Basic Health Care and Support (BHCS) program:

The BHCS program is implemented by the West Bengal Voluntary Health Association (WBVHA) - a Non-Governmental Organization (NGO) Federation, to strengthen the local health system (LHS). The program works closely with the local communities through local health and social welfare NGOs, thus creating a network among NGOs, service providers and local authorities. This has evolved an enabling environment for the people to access and afford the pro-people quality healthcare services, also in relation with politicians and policymakers. In 2003-2004, WBVHA organised the demand side actors and created a HF Movement in district South 24 Parganas, the southern-most part of the Ganges-delta in the State of West Bengal, India. Starting from 9 grass root healthcare NGOs active in 5 blocks (i.e. sub-districts) within the district, the forum gradually evolved into a health platform at community, Gram Panchayat (i.e. the local government body) and the Block level (with its health authorities).

HF Movement:

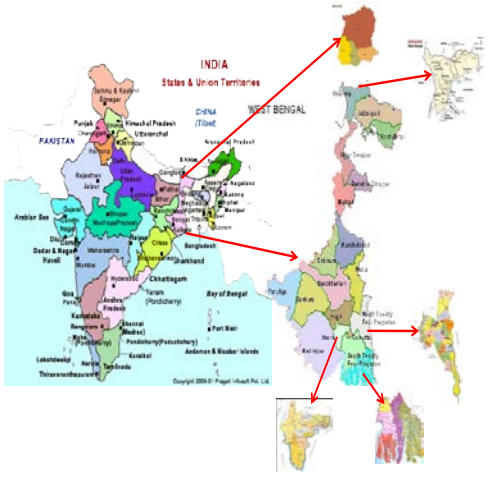
WBVHA, organised the demand-side actors and created a HF (HF) movement in the district of South 24 Parganas, the southern-most part of the Ganges-delta in the State of West Bengal, India in 2003-2004. Starting with 9 grassroots healthcare NGOs active in 5 blocks within the district, the forum gradually evolved into a health platforms at community, Gram Panchayat (GP - the local government body) and block/district level (with its health authorities).

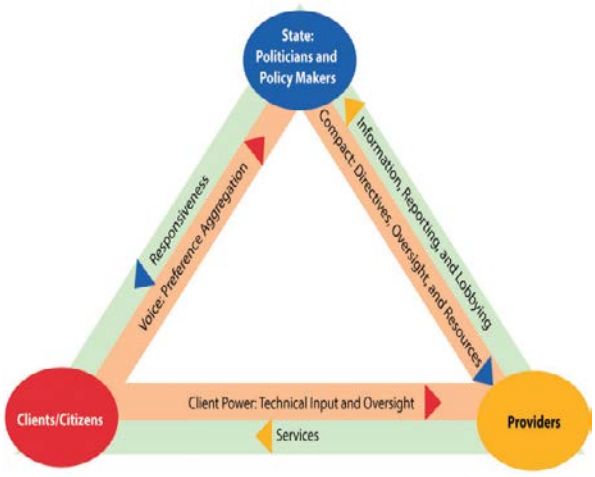
The HF provided an opportunity for these grassroot NGOs to come together and understand each other's needs, demand and experiences; identifying gaps in the health services; improving their institutional capabilities; engaging in dialoguing with service providers; interface meeting and political decision makers to obtain better quality health services. This allowed the health platform to become a catalyser for assuring that government schemes and resources related to the National Rural Health Mission/National Health Mission (NRHM?NHM) have successfully arrived and utilized at local community level, especially in the remote island areas of the Ganges-delta in South 24 Parganas.

Instead of looking for funding for their individual micro-projects, the NGOs of the platform bit by bit discovered the benefits of being organised as a platform and work in more structural way. This means i) strengthening collaboration with various stakeholders in LHS, ii) sharing responsibilities towards health within the LHS (distributive stewardship), iii) improving upward but-more important-also downward accountability mechanisms, and iv) engaging in advocacy to tap more effectively and potentially available resources in the system and to bring to the attention of decision makers about the successes and challenges experienced at grass root level, in order to better adapt the policies to the community needs and claim their right to health. Examples of involvement of civil societies/communities are Creation of a Community Health Fund in health emergencies; Community Monitoring of the Sub Centre (SC), Primary Health Centre (PHC), Block Primary Health Centre (BPHC) and other local initiatives (installation of incinerators, repairing of SC etc).

The success of this dynamic was picked up by NGOs of other districts. This has led to the establishment of **five Health Platforms** in 4 districts (Darjeeling/ Howrah, North & South 24 Parganas) in West Bengal and in 1 district ((West Sikkim) in Sikkim that bring together 40 NGOs and cover 1.5 million people in remote rural areas

All these platforms developed their own dynamic, emerging from the local context: i) some are primarily concentrating on facilitating service delivery, while others engage more in advocacy; ii) some are focusing on health, while others have a wider scope and concentrate on welfare. In that way, different types of health platforms have emerged, each with





their own typology, and each with their proper relations displayed in the Brinkerhoff & Bossert framework (2014).

trict Health

Fig: 2: The Health Governance Framework (source: Brinkerhoff and Bossert 2008)

HF strengthens local leadership and cooperation at all levels: communities/civil societies/management teams at local and intermediate level; document changes introduced to capitalize the experience and influence the decision making level.

Method

Participatory process was used for assessing their own knowledge; investigating environmental situation; visualizing a different future; analysing constraints to change; planning/implementing for change by engaging/empowering local communities. Community-based action is an approach that is driven by guiding principles, such as being community-driven and action-oriented, are also guided by specific research methodologies or "*methods"* that represent the strategies used to collect, analyze and convey data. They mainly generate qualitative data. The most important ones are:

- Quarterly coaching workshops which systematically reflect on the activities and aims at broadening and deepening the perspective. The Most Significant Changes (MSC) since the beginning, in this program called 'mind-shifts' at the level of the key actors, have been systematically monitored and documented.
- Inter-vision: visits based on comprehensive, supportive coaching which create a different dynamic compared to administrative control visits. They contribute to developing the role model of supportive leadership.
- Funding of joint activities (Block or District Forum activities) instead of funding activities of individual NGOs contributed to strengthening the Forum dynamic and shifting from the micro-level to the more strategic level.
- Outcome Mapping provided a set of tools to design and gather information on the outcomes-behavioural changes, among the 'boundary' partners of the programme and also the process of focusing on how change happened.
- RICH Pictures contribute to visualise the vision, achievements & challenges of the program. It allows community to explore their subconscious, their occult sentiments and conflicted understandings and also allow them to quickly convey not only the fact of situation, but their feelings about that situation.
- Village Information Boards is tool for communication between health providers and the local communities. It also reinforces downward accountability.
- The case-building exercises is used to map the needs, existing services & actors and gaps . It is useful in advocacy (gaps identification) and visualises the great diversity of

community actors as well as public and private actors and their potential complementarily.

- Story telling has been done in a systematic way and refers to the concrete daily reality. Some stories were recorded on video. These are a powerful tool in advocacy.
- Peer-to-peer education contributes to scaling up of the program beyond the initial selected areas.
- Action-research: contributes to better reflect decision-making, puts the focus on conceptualisation and strategic lessons, (potentially) generates evidence for policy and reinforces advocacy.
- Appreciative Inquiry has helped the program to focus first on the positive things already existing. This is valorising and generates a dynamic to tackle the gaps.
- Interface meeting facilitated by Peoples Forum with the Local Government officials over the Government Service Delivery Score Card Report. The meeting served as a platform for presenting the block and district authorities with the Score-Card report.

Theory of change:

The theory of change underlying this process is to develop the health system and the health services by reinforcing a learning cycle (Action-Reflection-Action) aiming at i) facilitating the implementation of government schemes, ii) adapt them to local circumstances, iii) share the learning's at grassroot level, iv) provide a feedback to the decision makers at GP and Block levels. This process has organically grown, starting from GP level, mapping and linking up with all types of health service providers at primary level and with the GP leaders. It has led to a more prominent place of health within the GP Development Plan, as well as a regular dialogue and monitoring between grassroot NGOs, service providers and GP members at the monthly "Fourth Saturday Meeting" at the GP office. In a next phase, a link with the block level and to some extent at the district level was established with more attention for first line referral health services, as well as on specific themes and advocacy issues.

The conceptual framework covers 3 dimensions i.e., Action-Reflection-Action.

1. ***Action*** **(Supporting the government role)**

Lots of State/Central Govt. Schemes are there in India, of which NRHM/NHM is the most important. The problem with these schemes is to connect the services with the communities. The program could help the implementation of Govt. schemes, especially the NHM, by assuring that 1) the schemes are known to the people and their awareness about the right to health is increased, 2) there is a proper operational planning, implementation and monitoring of the schemes, 3) the gaps identification in services.

The **challenges** are as follows:

- not to create a parallel system of service delivery but to help the government services to fulfil their tasks. How are the partners in the program aligning with these services? This requires a mindshift from doing (providing the services) to facilitating (the provision of services by government services). Are we having a coaching approach in our program?

- to assure a people (patient) centred approach: this requires a mindshift from customer adapting to service to service adapting to customers based on their needs.
- to strengthen polyvalent services would yield a more comprehensive approach towards health and health care. The schemes are tackling priority problems largely decided upon by policymakers and this in a fragmented, vertical way, not considering the other needs of the person and not considering him/her as a whole.

2. ***Reflexion*** **(Supporting the civil society role)**

It reflects upon our actions in order to continuously improve the quality of our work, and to influence the policy/program/other stakeholders which includes several components:

- Systematically analyze and monitor the actions. The analysis was done based on guiding principles of the program.
- Identify priority issues together with the community and actors close to the community, through story telling and case-building and the issues were properly documented. Well-documented and well-argumented issues were raised evidence for policy influence and effective advocacy/ Apart from a technical role, reflection has an empowering function. It helps the communities to formulate their needs and claim their right to health in a clear and organised way.
- Develop innovative, operational strategies in order to implement government schemes more effectively, or to fill up the gaps in service delivery (f.e. Nutrimix strategy, Weight for Height monitoring, polyvalent PHC centre,….) or gaps linking up actors within the local health system (HF dynamic, VHSNC, 4th Saturday meetings, Interface meetings)
- Communicate effectively documented experiences, operational strategies, tools, concepts…. so that these can influence policies and/or can be shared with other actors (upwards, downwards, horizontally) and scaled up. In that way we can take the program to other areas (GP, blocks, districts) without having a specific field level program in these areas.

It also supports the civil society to give a constructive but critical feedback from the field to the policy level.

The **challenge** here is to move from concentrating exclusively on schemes to focusing on issues, which are of prior concern of the population which is not necessarily the same. It requires a mindshift from providing to community to involving the community, from ngo activities to community problem oriented strategies.

3. **Change facilitation (Engaging in strategic partnerships)**

This learning cycle however is not a spontaneous process. It requires a motor. You need channels of communication between various stakeholders (horizontal links), and between the field level and the strategic level(s) (vertical links). As the definition of a system is ‘actors and their interrelations’, linking up actors is system strengthening. This is the specificity of this program. Rather than to concentrate exclusively on ‘what to do’ it concentrates on ‘how to do things’. The hypothesis is that by influencing the environment, meaning influencing policies and other stakeholders, you have a more effective way of assuring access to quality

services and advocacy regarding health related issues which are a priority for the local communities.

Linking up actors requires a number of paradigm shifts. These mindshifts have gradually been made by the HF partners through a process of regular coaching (regular workshops, intervision visits by WBVHA, peer-review….). The entry point to do this has initially been the creation of a HF of ngos. From there linkages between various stakeholders at different various levels (GP, block, district, interdistrict/state) gradually are established. These linkages allow us to take the concepts of the program to other GP, blocks, districts which are not directly covered. Depending on the local context and dynamic, these linkages may take various forms. There are some variables:

- the level at which the partnership is organised: at GP, block, district level, and interdistrict/state level
- the members of the forum: it ranges from being a pure civil society HF interacting with other stakeholders who themselves are not directly part of the Forum, to a people's Block (or District) HF incorporating all actors related to Health in the large sense (so including other sectors)..
- the mode of organisation: it can be a rather institutionalised forum or an open movement and platform of exchange.
- the focus: apart from the forum, there may be thematic groups on specific issues. These groups are composed of interested operational actors and resource persons (coming from government, other ngos, academic institutions…) with a specific expertise regarding the issue.

The **challenges** regarding this dimension of strategic partnerships are:

- to make the partnerships functional: arriving at concrete outputs through a proper dynamic of preparation/way of conducting forum meetings/decision-making and follow-up.
- to move towards partnerships at more strategic levels for instance district and state-level.

HEALTH FORUM (HF) Vs. Local Health System Strengthening:

Despite India's impressive economic performance, slow progress in improving access to health care, large inequities in health and access to health services continue to persist and have even widened across states.

This program is explicitly in line with the NHP and LHS, which contributes to the objectives of National Rural Health Mission/National Health Mission (NRHM/NHM) by bridging gaps in access to services by vulnerable populations in unserved/underserved areas.

The forum activities focused not only on raising community awareness (demand-side) but also on empowering providers (supply-side) by co-hosting values-clarification workshops on health system strengthening. HFs runs cooperatively with government health services to maximize the opportunity to provide for better access to healthcare and for the realization of health rights.

HF along with Civil Society Organisations (CSOs) and Community Based Organisation (CBOs) understands that an effective and strong LHS requires local ownership, networking, flexibility and adaptability to the local context.

The involvement and cooperation of the community promotes successful governance for health. Working directly with the public can strengthen transparency and accountability, which become engines for innovation in the complex relations between govt. and society. Communities are at the centre of concerns for sustainable development.

HF strengthens local leadership and cooperation at all levels: communities/civil societies/management teams at local and intermediate level; document changes introduced to capitalize the experience and influence the decision making level.

Synergic and collaborative actions were undertaken with PRI, public/private and civil society actors to implement and influence various State/National health programmes at GP/block/ district levels.

Various gaps were identified and prioritized at SCs/PHCs/BPHCs by HF Partners and were shared at various levels. In many areas, the inactive Village Health Sanitation and Nutrition Committees (VHSNC) – a community–based monitoring team created by government, became effective after the intervention of HF partners. Health plans prepared by VHSNCs, were sent to block level for consolidation and submission at higher level.

HF network promotes linkage, both within and among communities/organizations/societies. It also focuses on the multiplicity of societal actors in LHS at various levels, the distribution of roles and responsibilities among them, their ability, power and willingness to fulfil their roles and responsibilities, leading towards distributed stewardship and ensures that all *health system* actors including *stewards* are held accountable to their actions. The mechanisms and dynamics promoted by the BHCS program, promotes GPs and service providers to greatly engage in health concerns of their citizens, by way of identification/analysing the local health situation, need assessment, prioritization and plan of action.

The resources are available in theory but still inaccessible for unreachable population. HFs helped the service providers to reach services to people and integrated all stakeholders at various levels. In that way a multi-stakeholder dynamic is developed to strengthen LHS. Presently HFs are interacting with the existing decision makers at community to district level.

This HF assists government in fulfilling its commitments to people by identifying gaps (operational & policy) and providing services in un-served/under-served areas. Forum can also support the Ministry of Health and Family Welfare by identifying the operational gaps at various levels, in joint movement on various health related issues, training, facilitating health plan (involving stakeholders) at GP level. Forum members are representing in various patient welfare committees at GP/Block/District/State by raising voices on behalf of community, and also advocate for policies that promote and support the public sector.

The NGO partners engaged in health program want to access the funds available through NRHM/NHM to improve the accessibility of healthcare services to their target population. On the other hand they are engaged in advocacy to improve the policies and strategies, based on their experiences. This role of advocacy may indeed create tension with the aim to access

the funds. The dilemma is managed by building trust between HF and service providers in the first place: by engaging in dialogue, by helping public health providers to implement the goals of the NRHM and to reach the vulnerable population, by offering complementary expertise to the providers. A balance between service delivery and advocacy work should be sought for better involvement of target group and increased ownership at community level.

The demand-side actors also gain credibility and become strong partners of the health providers and decision-makers. This facilitates access as implementers of the health schemes launched by government and the related resources. The relation of trust allows the Forum to provide advice and to make proposals which defend the health rights of the population.

Their credibility as operational actors also attracts partners other than government, such as international groups./NGOs/agencies and corporates. HF builds strong, trusting relationships with their communities by breaking barriers and optimising the use of diversed and valuable resources embedded in local community settings and on the strengths of social interaction and local ownership as drivers of change processes. This integrated approach is also participatory, empowering, context-sensitive and knowledge-based. Integrated efforts and long-lasting partnerships promote an effectiveness of strengthening of LHS involving a diverse range of actors in public/private institutions, NGOs, CSOs and CBOS.

Budget analysis of allocated funds to various patient welfare committees at GP/block/district levels was done for monitoring gaps between policies and action at SC/PHC/BPHC/District hospitals, followed by advocacy at State level. Another way is by scaling down expenditures on unproductive activities and increase social spending on activities those benefit the poor and vulnerable groups.

HF felt the need for the security of the distressed and vulnerable people and link with concern departments to avail the benefits of various social security/health schemes of State/National Government. Initiatives are taken for awareness generation, facilitating the process of enrolment and disbursement of National/State level insurance schemes.

HF can further contribute at fostering the relevance and effectiveness of the research, priority setting, and translating knowledge to action. It can play a key role in stewardship (promoting health evidences and advocating on issues which are relevant for national health policies and system research; resource mobilization; generation, utilization and management of knowledge, capacity development). HFs can initiate partnership with academic institutions or dedicated research agencies with their knowledge/innovative ideas, expertise, community mobilisation and empowering skills, social legitimacy, implementation capacity and ability to attract external donors to address diverse health needs in under-served or un-served geographical areas or communities, which government did not provide or least prioritised in its public health agenda.

HF provide supports to the local governments, who are facing barriers like insufficient capacity and confidence in health promotion activity, lack of guidance and resources in evidence –informed health planning.

HFs are facing difficulties in finding sufficient, appropriate and continuous funding for Forum activities.

The major challenges faced by the HFs are: recognition from government departments, visibility, ensuring community ownership, participation in health system, facilitating in developing health plan, advocacy for improving health utilization, ensuring political will for health system development; expansion of Forum in broader area with financial stability.

Discussion:

The intervention is focusing on how to minimize inequity in society. There is an opportunity to evidence that peoples' awareness on their right to health can help them identifying what exists and what doesn't, but should. This is a bottom-up approach that can influence policy. Consequently this will lead to expansion of the role of HF in social, community and sustainable development.

The scope of stewardship is broad, which includes all actors (i.e. private health actors) involved in the health system and the links of the health system with society. It's a management model.

As per the modern concepts of governance, there is not a requirement that Ministries themselves undertake all the activities required for improved evidence use. They can serve as the Steward of health evidence by over seeing and maintaining ultimate responsibility for the institutional structures and arrangements in place to improve evidence use. A wide variety of systems and structures that can be established which serve improve the use of evidence in health policy and planning.

Capacities for health system stewardship needs to be build on both individual and organisational levels. More research need to be done in the area of stewardship.

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Voicing both sides of the Mekong river: how the people are adapting to a changing natural environment between local identity and NGO development projects

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Abstract
This study wants to fill the gap in the literature on the recent transformations in the livelihoods of the populations of the Mekong river in China and Vietnam through the collection of people's narratives. Underlying this methodological choice there is an ontological position that attaches great importance to how people make sense of their lives through stories. The analysis will try to shed light on the relevance of cultural, institutional and social variables in explaining the change in the livelihoods of local populations in the selected areas. In simpler terms, this study will assess how much the ongoing transformation in these two countries is filtered by the three variables, analyzing the typologies of families present in the areas, the kinds of job, the division of gender roles, the attitude of the local government, the typologies of NGOs, etc.
The researcher will carry out a twelve-month fieldwork, the first six-month fieldwork in Vietnam and the second in China. In each country, the researcher will identify one NGO that carries out projects aimed at helping the people to adapt to the changing natural environment and she will spend six months living with one community where these programmes are being implemented.

Key words: rural development; climate change; biodiversity; livelihoods; family; water resources management; NGOs; Mekong river.

1. Research Significance

This study wants to fill the gap in the available literature on the recent transformations in the livelihoods of the populations of the Mekong in China and Vietnam. Specifically, the researcher wants to understand how institutions and culture are influencing the livelihoods of the people that live along the river in the context of rapid economic development of the two Communist regimes. A third, social, variable appears to have a significant role in this moment of change and it consists of the NGOs that operate in the areas object of this study To sum up, the analysis will try to shed light on the relevance of cultural, institutional and social variables in explaining the change in the livelihoods of local populations in the selected areas. This study will assess how much the ongoing transformation in these two countries is filtered by the three variables analyzing the typologies of families present in the areas, the kinds of job, the division of gender roles, the role and attitude of the local government, the presence and typologies of NGOs, etc.

The following paragraph will describe the three variables in more details. The cultural variable consists of the analysis of the structure, the features, the changes of family in China and Vietnam. Some space will be devoted to reflections on the impact of Communism and recent historical developments on the regions, as well as on the possible changes that these events caused in family structure and in the economic model (division of labor, etc.). The institutional variable has to do with governance and policy and it focuses on how the Mekong river is organized and regulated in the two countries, which are the organs in charge of decisions and which bodies supervise the activities of non-governmental organizations and grassroots associations. Finally, the social variable includes the NGOs that can be found in the two Communist countries and it will assess the typologies present, the differences and similarities in their structure, scope of action and connections with the government. To make the comparison more consistent, two different NGOs belonging to the same typology (fox example two foundations) will be selected for the study, in particular NGOs that aims at supporting local livelihoods through the creation of new economic models and alternatives. During her six-month fieldworks, the researcher will pay attention to the differences and similarities of these two NGOs in China and Vietnam in terms of their modus operandi, their structure, their relation with the local government, their engagement with the project participants, etc.

Following the three variables, three main research questions can be identified for this study:

1. If and how a socio-economic and cultural change is interesting the populations living along the Mekong river in China and Vietnam.
-If there has been a change, how deep is it from a socio-economic and cultural point of view? The following dimensions will be taken into considerations: family, job market, migration, leisure time activities, social participation.

2. How have NGO development projects impacted upon the livelihoods of the populations living along the river?

3. If there has been a change, how do culture and institutions affect the contexts in the two countries (do they have different roles)? How similar are the two countries in terms of the institutional and cultural rules in place on their respective territories? How was this change influenced by NGO projects, if that is the case?

Additionally, this research aims at adding the Chinese side to the story commonly told in academia about the living conditions of the local populations of the Mekong. Furthermore, by comparing the two countries, this study not only wants to address the disparity in representation, but it also aims at assessing how accurate the mainstream image conveyed by the literature really is, providing more updated data about the current living conditions of the locals. In fact, as suggested by preliminary findings, factors like climate change and dam construction are altering the living and working conditions of the people along the river very rapidly. Consequently, the images of fishermen and floating markets that are usually correlated to the collective imagination that has been constructed by the dominant literature on the issue of the Mekong river might change dramatically in the near future, as draught and rural to urban migration become more and more serious threats.

In this analysis the researcher will reflect on the reasons why a comparison of the populations of the Upper and the Lower basins has never been done, investigating whether the presence of a small number of villages by the river banks in China is a consequence of relocation plans resulting from dam construction or if people have never settled down in those areas for other reasons. In any scenario, the absences of villages and people can still say something relevant to the analysis and does not constitute a good reason to cut the Upper countries out of research studies. In fact, relocation and displacement are often necessary when building dams and, if that is the case, the river people of the Lower riparians are exposed to the same risks.

Lastly, another contribution of this research lies in the fact that an ethnographic account of the Mekong people's livelihoods might inform the analysis at the macro level. In fact, the literature that focuses on China and the Mekong tackles extensively the country's investments in hydropower plants. A study of how Chinese people experience and relate to the river object of this research, today and in the past, might provide useful insights to understand better the attitude and the agenda of the Chinese government in implementing hydropower plants in its territory as well as in the Lower riparians. In simple terms, if China perceives the Mekong as a resource to be exploited rather than an entity strictly related to the identity of a region and its people, it will be more inclined to optimize its potential for energy production disregarding other aspects that in China are not present or have ceased to be important, as people's relationship with the river has already changed dramatically. Whether this change has occurred at all and if it was a consequence of dam construction, together with many other questions, are part of the questionnaire that will be used as a loose guidance when conducting interviews (see Appendix A).

2. METHODOLOGY AND RESEARCH DESIGN

The researcher will conduct a twelve-month ethnographic fieldwork in the two countries object of the study. During the first six-month fieldwork, which will take place from September 2018 to February 2019, the researcher will live together with a community of the Mekong river Delta, in Vietnam. This site will be indentified during the preliminary fieldtrip to Can Tho city and the surrounding provinces that the researcher will conduct in late June 2018. The second six-month fieldwork, from March to August 2019, will be carried out in Yunnan Province of China.

Before a general introduction of the ethnographic method in section 2.2, section 2.1 will introduce the theoretic framework that will guide the research. Section 2.3 will go more into the details of the two fieldworks in the countries object of this study.

2.1 The Actor-Network Theory (ANT)

Since this analysis focuses greatly also on non-human actors, the theoretical approach chosen for this study is the Actor-Network Theory (ANT). Before engaging in a detailed discussion of the theory and its founders, an introduction is necessary to understand this new way to look at the world and society.

The ANT aims at redefining the 'social' remaining faithful to the original meaning of the term. Latour (2005, p.1) denounces that the usage of this notion becomes problematic when 'social' is used as an adjective like 'wooden' or 'economical.' In doing so, social scientists imply that social is some sort of ingredient which differs from other materials, and not "what is already assembled together, without making any superfluous assumption about the nature of what is assembled" (2005, p.1). Bruno Latour stresses the need to go back to the old duties of sociology, the 'science of the social,' with the awareness that the terms 'science' and 'social' have undergone a deep transformation and that the meanings that we attach to them today differ greatly from what their inventors had in mind when they forged their disciplines. However, despite social scientists agree on this metamorphosis, the object and the methodology of the social sciences have not been adjusted to these changes. In fact, "they still hope to reach one day the promised land of a true science of a real social world" (2005, p.2).

The biggest breakthrough of the ANT is exactly the rediscovery of the meanings of 'social' and 'society' through an approach which does not posit the existence of these phenomena and treat them as one among many other different domains, such as geography or politics. This new perspective breaks with this common view of society where the adjective 'socio-' is added in front of the name of various disciplines, leading us to believe that there is a social context in which activities that are not social take place. The Actor-Network Theory denies this belief which has become common sense and brings about a new way to look at the world, where society is not a context but only one of the many connecting elements, where social is not a material but a type of connection between elements that are not social. In other words, social is not the glue that holds non social things together but it is "what is held together by many other kinds of connectors" (2005, p.5). To conclude this brief introduction, sociology is now redefined as the tracing of associations and social is not a thing or a specific domain among others but a movement of reassembling and re-association. This innovative perspective allows a new assembling of the elements that were considered heterogeneous by the common approach to the discipline.

Latour's approach starts from the assumption that when associations between non social elements happen they leave some sort of trail, and those traces that are left behind are the only things that make the social visible. The arduous and innovative task of the Actor-Network Theory is that of reassembling the social by tracing the associations made between non social elements. The acronym of this theory is A.N.T. and, as pointed out by Latour, it "was perfectly fit for a workaholic, trail-sniffing, and collective traveler. An ant writing for other ants […]" (2005, p.9). The difference between the first approach, the standard sociology of the social form, and the one advocated here is that the former perceives society as the beginning of the process while the latter considers it as its end, something to be reassembled tracing associations and not a specific domain (2005, p.8).

After this general but necessary clarification of the starting point of critical sociology, we can now focus on the innovations brought about by the ANT.

The main difference that emerges from a comparison of ANT with other theories is the possibility for non-human elements to be considered as actors capable of influencing and changing situations and events. In this perspective, ideas, natural elements, objects and so on are regarded as important or influential as people or animated creatures. This role goes beyond the natural causality traditionally attached to non-human elements, and all the studies that grant them this more active agency can be considered part of the ANT corpus.

After its refusal of the naturalistic or symbolic causality, a second trait of the ANT is its rejection of the idea of the social as something stable. In fact, a study which adds social forces to explain the state of affairs cannot pertain to ANT. As stated above, the social is a movement of reassembling and not a thing or a specific domain.

Lastly, Latour warns us not to confuse ANT with Postmodernism: this approach is all about reassembling the social, not deconstructing it. Indeed, the destruction attitude of the latter theory is what ANT tries to overcome. Studies that attempt to deconstruct the social cannot be part of ANT (2005, p.11). What is to be assembled needs to go through defragmentation and inspection in order to be reassembled again. Sociologists failed to understand this and used the shortcuts of 'social' and 'society' to define the common world. The reason behind this choice was to have a say in politics and provide solutions to social issues; however, in rushing to the solutions, sociologists have neglected the non-social elements that the social is made of (2005: 250).

We can now turn to the ANT's instructions for social scientists, who should "follow the actors themselves" in the attempt of learning from them, as suggested by Callon (1986). Latour explains how, in tracing the social as associations, we can freely decide to stop or carry on with our movements from an association to another. If we decide to resume this movement towards collection, the associations' traces might lead to a shared definition of a collective (common world). However, our tracing of association might fail to assemble the social as there are no common procedures to follow. In Latour's words, "to be social is no longer a safe and unproblematic property, it is a movement that may fail to trace any new connection and may fail to redesign any well-formed assemblage" (2005, p.8).

We can still use terms like 'social' and 'science' but with the awareness that they are only shortcuts for many different connections of many different actors. They are 'blackboxes' that social scientists should open and look at who is doing what to whom and for what reasons. Researchers can achieve this following the actors and not settling for shortcuts. This last remark is exactly the problem of this approach, since people are content with creating blackboxes and taking shortcuts. We are tempted to stick to the repertoire suggested by social explanations instead of restudying what we are made of and discovering new connections (2005: p.248).

2.1.1 My Conceptual Framework

The ANT proves to be a valuable theoretical approach for this study as the researcher will consider the Mekong river as an actor capable of influencing and shaping the lives of the people living on its banks. Furthermore, the NGO projects part of this research and their ideas and programmes will also be recognized the same power. The other actors that will be observed in their relations with the river and the NGO project will be the local people, the NGO staff, local government officials, Mekong river specialists and professors related to the research sites.

It is worth noting that the overall framework will be subject to change constantly as the relations between the actors will evolve during the six-month fieldwork. As a consequence, the framework presented initially will be only a loose draft and it is expected to differ greatly from the 'final' picture. Relatedly, the two conceptual frameworks resulting from the two six-month fieldworks, one in Vietnam and one in China, are expected to show significant differences in the actors involved and in the relations established among those.

2.2 Ethnography

The approach chosen for this study is ethnography, a research method which borrows from symbolic interactionism and ethnomethodology in defining itself as a way to describe and understand social worlds, which are interpreted worlds constantly rebuilt and created through

interaction with others. Ethnographic participation is, therefore, strictly linked to interaction and interpretation, and it focuses its analysis on how meanings are constructed and understood in different situations and among different groups (Emerson et. al, 2011).

Ethnographic research is characterized by two main activities that usually take place simultaneously when the researcher sets foot in the field site. First, s/he enters an initially unfamiliar social setting and, getting to know the people, s/he establishes relations, shares their daily routine and, most importantly, observes. Second, the researcher takes notes of what s/he observes, recording systematically what happens in a written form. As pointed out by Emerson et. al, first-hand participation in an unfamiliar setting and the production of written accounts on the basis of such experience are the core of ethnographic research; however, ethnographers hold very different opinions on how to conduct these two activities. In fact, there are many ways to conduct participant observation and no fixed procedure for writing descriptive fieldnotes (Emerson et. al, 2011).

For what concerns the first activity, the immersion in the fieldsite enables the researcher to access people's lives and experience the dynamics that they go through every day. While getting close to the everyday life of others, the researcher observes how people respond to certain events and, at the same time, s/he has the chance of experiencing firsthand the same situation.

This deep involvement which characterizes the ethnographic immersion precludes the researcher from adopting a passive role in the observation and in conducting fieldwork. In fact, not only this scenario is not conceivable nor realistic, but it should also be avoided. The researcher inevitably develops personal opinions and perspectives while engaging in the people's everyday activities and building relationships; however, as pointed out by Emerson et. al, "the task of the ethnographer is not to determine 'the truth' but to reveal the multiple truths apparent in others' lives" (Emerson et. al, 2011, p.4).

The ethnographer's presence in the fieldsite alters the way people behave and talk and these so-called reactive effects do not contaminate the observation in a negative way; on the contrary, the people's reactivity to the observer constitutes a precious opportunity for learning about how they relate to the world. In simpler terms, the ethnographer should pay attention to how the people treat her/him (Emerson et. al, 2011).

The second activity at the core of ethnographic research is turning passing events, that exist only in their moment of occurrence, into written accounts, that exist in their inscriptions and that can be reconsulted in the future. This process of transformation of experiences into fieldnotes involves a selection: it is up to the researcher to decide what to include, what to leave out, how to present a specific situation or person and, every time a choice is made, many other possible interpretations are "missed" (Emerson et. al, 2011).

2.3 Presentation of Sample and Sites

The interview schedule that will be used to guide semi-structured interviews is attached in appendix A and includes questions that are strictly related to the life on the river banks. For example, to explore how the relation between households and the Mekong has changed over time, the researcher will ask the participants to describe the activities that they used to carry out in those places when they were kids and how they differ from the ones they carry out today. Correspondingly, to assess how the space has changed, she will ask the villagers to describe how some specific streets or places of the village today are different from the past. In order to help the respondents to elaborate their answers, the researcher will ask them to recall memories or tell stories of other people. The attached questionnaire has already been approved by Can Tho University and will be used in occasion of the preliminary fieldtrip that the researcher will conduct in Can Tho city in late June 2018.

A part from the local inhabitants of the village, other groups of interest will be the staff of the NGO operating in the sites and the local officials in charge of those areas. In identifying interviewees, purposive sampling will make sure that the respondents are deeply rooted in the research site. Snowballing will also be used to reach out to other possible participants.

2.3.1 Vietnam

The site of the first six-month fieldwork in Vietnam is the Mekong Delta region, where many NGO and government projects are being implemented. The researcher will officially start collecting data in September 2018 and will leave the site in February 2019, after having lived continuously with a local community.

The NGO selected for this study is Heifer International Vietnam, a foundation established by an American farmer and whose main office for the Mekong region in Vietnam is in Can Tho city. This NGO is particularly suited to be the object of this research since it focuses on the livelihoods of the people by the river, In particular, its aim is to help the local communities to overcome the challenges posed by the changing climate of the region. The organization tries to help the households involved in their projects by giving them cows and teaching them to braid and raise animals. In this way, they hope to give farmers another source of income to sustain themselves, since rice farming and fisheries are not enough anymore. In fact, after the construction of dams, the water flow is not enough anymore to harvest rice three times a year and the fish population has also diminished greatly. The researcher has already met the NGO in Can Tho and the possibility of carrying out a six-month fieldwork in one of their project sites has been welcomed with enthusiasm by the NGO country leader.

At the beginning of the fieldwork in Vietnam, the researcher will reside in a township nearby the NGO project site and will visit the village every day. This solution has been suggested by the NGO itself, after having dissuaded the researcher from living together with the locals. According to the NGO leader, in fact, it will not be possible for the researcher to live by the river; however, after having made some friends in the village and in the local government, she will try to move closer to her participants.

Before the start of the official fieldwork, as previously mentioned, the researcher carry out a preliminary trip to the Mekong Delta region from June 26 to July 8. In this occasion, she will visit two different fieldsites. Firstly, the researcher will meet some NGO workers of Heifer International Vietnam in Can Tho, from where they will leave for their project site in Soc Trang, a southern Vietnamese province in the Mekong Delta. According to the schedule sent out by the NGO, in the morning she will meet a community group that specializes in dairy production and, in the afternoon, she will visit some farmers' households and the milk collecting center where the farmers sell their milk every day. Secondly, a few days later, she will meet some Mekong river specialists from Can Tho University and will visit with them a few households whose livelihoods have been affected by shortage of water, flooding and other natural disasters in the past.

In both cases, the researcher has trusted the local experts -the NGO staff and the university professors- in selecting the most suitable sites to visit and collect the first interviews. Additionally, this time both teams will provide translators that will help the researcher to communicate with local people and collect interviews.

These initial visits will be a good occasion to pilot the questionnaire, gain a better understanding of the reality faced by the populations of the Mekong Delta and get to know the NGO staff and the professors of Can Tho University. During her six-month fieldwork, however, the researcher will find her own translators and set up a research team which, in order to be recruited, will need to be external to the NGO to guarantee impartiality and avoid any conflict of interests.

2.3.2 China

The six-month fieldwork in China will follow the one in Vietnam and will probably start around March 2018. However, being this second fieldwork still so far away in time, the researcher has been reluctant to discuss the details of the collaboration with Chinese NGOs. In fact, she cannot anticipate with absolute certainty when the fieldwork in Vietnam will finish and she wants to reserve the possibility to extend it, if deemed necessary. Certainly, in order to be eligible to participate in the study, the Chinese NGO will have to belong to the same typology of the one selected in Vietnam (Heifer Foundation Vietnam).

3. BACKGROUND: Upcoming Challenges in the Mekong River Basin

Covering an area of 795,000 km^2, the Mekong river is the twenty-first largest river basin in the world. It stretches from China, where it is called Lancang river, and it is distributed in six countries: 21% in China, 3% in Myanmar, 25% in Lao People's Democratic Republic, 20% in Cambodia, 23% in Thailand and 8% in Vietnam (FAO, 2011). The population density of the basin is around 88 inhabitants/ km^2, varying from 50 inhabitants/ km^2 in the Upper basin and almost 100 inhabitants/ km^2 in the Lower one (FAO, 2011).

A number of factors signal how an increased cooperation of the two river basins is becoming more and more urgent. In fact, a host of challenges in many areas awaits the population of the Mekong region in the coming decades, such as planned hydropower developments, dam constructions, waterway transport and expansion of irrigation add to the already evident effects of climate change (MRC, 2010). The impact of climate change in the region is hard to predict with absolute certainty. According to scientists, from now to 2050 we will witness temperature rise and changes in the alternation of dry and wet seasons. More evident consequences will be visible after 2050, when sea levels are expected to reach one meter above the current one and the rise of temperature will speed up (IWMI, 2010). In their study, Belay et al. mentioned also the issues of food shortage, biodiversity loss, high population pressure and natural disasters and droughts (Belay et al., 2010).

All these issues are interrelated and already have major implications for the environment and for the livelihoods of the indigenous people that rely on the river's aquatic system and biodiversity. The governments of the Lower basin are well aware of the need to develop a jointed approach that will take into account the river resources and the people's livelihoods (MRC, 2010).

The scenario becomes even more worrisome if we consider that in the next 30 years it is estimated that the demand for agricultural goods will increase from 20 to 50 percent (MRC, 2010). In fact, the increasing population growth is putting pressure on food security and agriculture, the current most dominant water-related sector, is essential in poverty alleviation in the area. The 70% of the population of the basin is employed in agriculture and their revenues are exposed to an increasing number of hazards and risks.

The demand for food is not the only thing that is estimated to be growing in the near future. In fact, as a result of political stability and economic growth, the countries of the Mekong region are asking for more electricity. According to the MRC, the demand for electricity will increase between two and even times the 2005 level by 2020 (MRC, 2010) and this may trigger competition and intra-national water conflicts.

Furthermore, private companies are now investing in hydropower projects in the Mekong basin without consulting with the traditional aid agencies such as the World Bank, the ADB and the MRC. Especially in Lao PDR and Cambodia, the pressure on natural resources is increasing as foreign investors concentrate on mining industry and tree plantations for biofuel production (Molle et al., 2009).

A micro analysis of the livelihoods of the local inhabitants of the Mekong river cannot be separated from its socio-political and economic context. This is why macro issues such as dam construction and a switch to more attainable agricultural and economic models are involved to some extent in this research. The following sections try to inform a macro analysis of the region, providing a background to the research questions introduced in section 1.

3.1 The Relationship Between Human Beings and Natural Environment

The first research question of this study tackles the relation between local people and the Mekong, a natural element that has undergone significant changes in the recent decades. These alterations of the river have not only impacted the flora and the fauna but has had major effects on the local people who used to rely heavily on these products for their own survival and sustenance. This section starts presenting some data on the changes in autochthon fish species and ecosystems, and then it introduces some studies of how people react to the threats to the natural environment they depend upon.

The available data depict a bleak picture for the water reservoirs interested by dam constructions: decline in water discharge during the flood season, annual sediment flux in China and degradation of water quality are seriously compromising fish assemblages and the aquatic biological communities. Given the urgency of these issues, Fan, He and Wang have been calling for a long-term and basin-wide terrestrial/aquatic monitoring program to track the potential risks of the Lancang cascade dams (Fan, He & Wang, 2015). In this regard, it must be noted that human activities can have a huge impact over the biological integrity of an ecosystem and fish assemblages can be used as an indicator for environmental degradation, given their sensitivity to the alterations of their natural habitat (Schmutz et al. 2000). A study carried out by Li et al. provided some alarming data concerning the homogenization of fish communities after the construction of the Xiaowan hydropower dam. As a consequence of this hydropower plan, the river was divided into a reservoir impoundment region and a downstream area, triggering a series of changes at many levels. In fact, water temperature, transparency, velocity etc. are greatly influenced by dam constructions and also the bottom substrate shifted to finer sediment materials (McCartney et al, 2000). As a result, the natural habitat of the native fish species of the river has been irrevocably altered and that is why non-native species were introduced. These new fishes, more suitable to the new water condition, found it easier to adapt and reproduce in the reservoir region where the native species were struggling to survive. The downstream area did not undergo massive changes in water degradation and there native species were able to survive. However, the elimination of local fishes from their original habitat and the arrival of new exotic fish species as a consequence of dam operations have altered fish assemblages in the region, diminishing biodiversity and therefore causing fish homogenization. The countries that are situated along the river will be affected greatly by these changes in fish assemblages because large part of their populations rely on fishing for a living (Li et al, 2013).

For what concerns the villages on the river banks, one of the most serious consequences of dams construction and large water projects is the displacement of local people. In fact, when big projects are implemented, local inhabitants are forced to abandon their homes and villages to make space for the new development plan. Very often, they are not adequately reimbursed for the economic loss and, more importantly, they are not relocated in suitable locations and facilities (Shiva, 2002). Another disadvantage strictly linked to displacement regards social capital. Tilt and Gerkey found an association between resettlement and diminished social capital. In their study, they used two indicators: inter-household exchange of financial resources and inter-household exchange of agricultural labor. The two authors have stressed how, in the context of developing countries that rely heavily on those transfers, social support

can be seriously harmed by resettlement plans. As a consequence of the loss of agricultural and financial exchanges deriving from the displacement, social-ecology diminishes too because peasants rely on social support for their agricultural production and income (Tilt & Gerkey, 2016).

All the issues mentioned above prove the strong relation between human beings and the natural environment in which they live. However, the discourse becomes even more complex if we consider Lora-Wainwright's assumption on the correlation between anxiety and pollution. The scholar denounces how people can become so used to poor air quality and a changing environment that they accept the presence of these harmful elements as part of their 'normal' life. One of the consequences of such a stance could be a resignation to change and the cease to fight to protect the environment, which would then not be due to ignorance or a lack of information but to this new resigned attitude rooted recently in the consciousness of the locals (Lora-Wainwright et al., 2012).

To conclude, the first research question of this study will investigate how people cope with environmental threats and fear about disasters by exploring the ways in which they are responding to living in a changing environment.

3.2 Dams Proliferation along the Mekong River: Advantages and Disadvantages

In a landmark study of 2000, the World Commission on Dams (WCD) has estimated that the 50,000 large dams existing in the world have negatively impacted the people's livelihoods and the environment. One of the most staggering data supporting this statement is that 40-80 million people have been displaced as a consequence of dam construction, which has increased worldwide in the second half of the 20th Century (WCD, 2000). Half of these large dams are situated in China, a country that is actively building and planning further infrastructure developments throughout South East Asia. Specifically, 5 out of the 28 total dams present along the Mekong river are situated in China and are part of a comprehensive plan of 8 cascade dams. Other reservoirs and dam operations are already planned in tributaries of other Mekong riparians like Laos, Cambodia, Vietnam and Thailand (MRC, 2008). According to the China's Ministry of Water Resources, dam construction in the country has caused the displacement of more than 15 million people in the last decades only (Yao, 2004).

River damming is believed to be a viable strategy in addressing some of today's major concerns, in particular the world energy crisis and global climate change. Today, hydropower accounts for around 3.8% of the world's energy use and the 16.5% of electricity supply (REN21, 2014). Hydropower development is on the rise globally but Latin America, Africa and Asia seem to be the places in which it could get its largest development potentials (REN21, 2014).

China's heavy energy consumption rate has accelerated the hydropower development in the country, which now stands out globally in installed hydropower capacity and generation (Huang & Yan, 2009). However, despite the high number of dams, the share of energy deriving from hydropower in China represents only the 17.2% of the total electricity production of the country. In this respect, China seems to be still behind countries like Canada, Brazil and Norway, where hydropower developments produce the 57.9%, 83.7% and 96.6% respectively. Furthermore, China is pursuing the goal of cutting its carbon dioxide emissions by 40-45% before 2020 and this translates into an increase in hydropower development. The Twelfth Five-Year period alone, from 2011 to 2015, has seen the construction of 8 out of the 13 planned hydropower bases. This trend will only increase until 2020 and will also involve the Lancang river, where 13 projects out of the 60 included in the comprehensive plan will be built (CNEA, CNREC, 2012).

According to the Mekong River Commission (MRC), this transboundary watercourse is one of the few basins that has not been irreversibly modified by large dams (MRC, 2003);

however, Lu et al. have examined the impact of the dams in Chiang Saen, Thailand, and challenged the MRC's statement. The Lower Mekong basin relies on the productivity of its ecosystems and that is why maintaining a natural hydrological pattern in the water flow, especially during the dry seasons, is of utmost importance. Studying the impact of the hydrological alterations caused by dam operations could help the development of a more sustainable scheme of water resources usage (Lu et al. 2014).

The question of the effective impact of Chinese dams over the river basin has been debated and there are different positions. Some believe that those are responsible for the lower levels of water in the downstream of the dams (Lu et al, 2014); other have pointed out that a combination of forest clearing and dry weather have contributed to the drought of the Mekong (MRC, 2010). Anyway, the debate helps us understand the complexity of the issue and include other factors in the general picture. In fact, population growth and rapid economic development have triggered new phenomena like deforestation, expansion of cultivated land and irrigation. These factors, combined with the changes brought about by dam operations, have altered the river biodiversity and hydrological pattern. Furthermore, the transboundary nature of the river implies that the single riparians act upon these issues independently, often without policy harmonization or intra-governmental consultation (Cronin, 2010).

3.3 Priorities and Possible Solutions

Numerous factors determine how local populations adapt to change, for example their wealth, the education they received, their access to technology and infrastructures and so on. According to the International Water Management Institute, the way to help the deprived communities living in rural areas should start with the promotion of a broad-based agricultural development, which must take into account today's environmental challenges (IWMI, 2010). In fact, an efficient plan of water management is of utmost importance to assure food security in the future (IWMI, 2010).

In the Great Mekong Subregion (GMS), water is a central element as most of its agricultural land is affected by natural disasters such as droughts or floods. Due to the threat posed by climate change, water availability is at risk and the competition between agriculture, industry and urban areas is increasing. The 75% of the crops cultivated in the region are rain-fed and, in many areas, irrigation is not a feasible solution, both technically and economically. As a result, a well functioning water management system is the only real and applicable adaptation strategy available in the GMS (IWMI, 2010).

Apart from water, other major priorities in the area are the improvement of irrigation designs and maintenance, an assessment of the groundwater of the region, etc. (IWMI, 2010). The desirable approach must give priority to the restoration and conservation of the natural ecosystems of the area. Only in this way, in fact, the poor communities which rely on forests, wetlands and fisheries for their sustenance will be able to meet the raising food demands.

The GMS is another proof of the need to rethink the model of agricultural production. In fact, not only the increase in food production caused harm to the environment, but it did not benefit the rural communities of the area, which are still struggling with poverty.

Currently, there is a strong need of innovative farming technologies and practices that respect the environment and contribute to the restoration of ecosystem services such as flood protection, clean water, etc. In view of the urgency of the matter, a number of sustainable agricultural projects have been implemented in the GMS at various institutional levels (local, national and transnational) (IWMI, 2010).

Appendix A

Interview Schedule

1. Can you describe the typical kind of family that lives on the Mekong Delta? (How is family usually organized in your village? How many people are in the same household? Do children live together with their parents until they get married? How is life after marriage? Do grandparents stay with their sons/daughters?)

2. Can you think of any unusual families that you know of? How are they different from the traditional family?

3. How strong is the relation between people and the river in the Mekong Delta region? (I've been told that people used to be born on boats and feel a strong tie with the Mekong, is this still the case?)

4. How important are traditions and local culture in your village? Can you tell me more about the stories and the traditions related to the river?

5. Living in this village today is very different from what it used to be a few decades ago. Can you tell me about this change in your hometown?

6. How has the river changed from when you were born (in terms of size, pollution, fish, etc.)?

7. Can you describe the activities that took place on the Mekong when you were little? How are they different from now?

8. What do you take from the river today for your job? And for your personal life?

9. Can you tell me about the activities you carry out every day? How will they change in the near future?

10. How is living by the river different from living in urban area? Which one do you prefer and why?

11. Would you ever consider moving to the urban area to work? Why?

12. Do you know anybody who left the river to work somewhere else? Can you tell me about them?

13. Does migration interest men more than women or the opposite? Why?

14. Can you tell me how roles and tasks are organized in your family with respect to gender and age?

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