

Water Credit Management System for Urban Smart City Planning

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Abstract— The world is facing improper distribution of water and one of the major barriers to safe water and sanitation is affordable financing. There are millions of families spending more than 20% of their income on water. The truth is that many of these families can get a water or sanitation solution in their home for a fraction of their annual water costs. All they need is access to affordable financing to make this a reality. An attempt has been made through this paper to offer financial services to low income population through water credit system. Many financial systems in developing countries weren't offering loans for water and sanitation to the poor. This paper focuses on water credit system as an exclusive solution to work in microfinance. Water credit system has been proved to be very effective solution for water management in rural area. This research highlights that the water credit is recognized as a proven, powerful smart solution to slum and rural areas and it has reached more than nine million people through more than 2.2 million loans. As every urban area is facing challenge of merging the connected rural areas as a part of smart city initiative. This research paper primarily aims at putting forth an optimal solution for dynamic parameters of rural and urban areas.

Index Terms: - Water credit, microfinance, rural areas, smart solution.

I. INTRODUCTION

Poverty is a complex phenomenon and its effects are more complex processes. In every developing nation, the ongoing crucial issue is socio-economic development and poverty alleviation. One of the major barriers to safe water and sanitation is affordable financing. Water is an indispensable natural resource for the survival and well-being of human kind. There are millions of families spending more than 20% of their income on water. They are caught in a cycle of poverty, unable to afford permanent access to water in their homes and beholden to water merchants who charged exorbitant fees. All they need is access to affordable financing to make this a reality. Many financial systems in developing countries weren't offering loans for water and sanitation to the poor. It is very difficult for the poor to get small working capital from formal banking system for various reasons. "Money makes money and when you got a little, it is often easy to get more. The great hardship is to get the little." (Adam Smith) Millions of people around the world could get access to safe water in their homes with the help of small, affordable loans. The truth is that

many of these families can get a water or sanitation solution in their home for a fraction of their annual water costs. Hence, water credit is new system which offers financial services to low income population. There is both a need and demand for these loans, because when people have access to safe water, they get time back to go to school, earn an income and take care of their family. It changes their world.

II. LITERATURE REVIEW

Literature review includes case studies of Bangladesh and Tiruchirapalli in which concept of microfinance is used. Microfinance is bringing credit, savings and other essential financial services within the reach of. Millions of people who are too poor to be served by regular banks, in most cases because they are unable to offer sufficient collateral. This literature overviews about access to micro-finance in rural and slum areas and use of that principle in water supply and sanitation.

A. FUNDAMENTALS OF WATER CREDIT

Water credit leverages philanthropy to allow people to tap into their potential as customers. For example, it

provides subsidies and technical assistance to microfinance institutions to help them launch loan portfolios. The loans enable the world's poor to pay for a connection to a water source or install a toilet in their homes. Water credit accelerates progress toward ending the global water crisis. But for this initiative to reach its full potential, we need to unlock more, affordable social investment capital to help microfinance institutions and other enterprises scale their water and sanitation efforts to meet market demand.

1. BANGLADESH CASE STUDY

Bangladesh is a pioneer and home of conceptualizing micro-finance program. It has undertaken a number of such programs to reduce poverty and bring about socio-economic changes in the rural community. The main purpose of this case study is to give an overview about access to micro-finance for rural poor and its impact on their poverty situation and relevant factors related to income of the micro-finance recipients. The principal method employed for this case study was a field survey using a semi-structured interview schedule. The study was conducted in six villages of three unions of Gangachhara Upazila of Rangpur district in the northwest region of Bangladesh. The study villages and unions were selected based on availability of credit recipient people. Only the micro-credit recipients of the study area were considered as population for the study. All micro-credit respondents were female according to credit distribution criteria. The whole set of individuals i.e. microcredit recipients under the study were estimated to be around 940. Among them, 360 respondents were chosen as sampling. Credit respondents were randomly selected using proportionate random sampling procedure considering each of the village population. Additionally, 60 non-credit respondents taking 10 from each village were also selected and interviewed as a control group for comparative analysis. Standard of living includes sources of drinking water, toilet condition, medicare, number of clothing per year and electricity consumption level. Change in sources of drinking water was considered by number of users before and after joining the credit program. It indicates that all respondents (100%) used tube-well to meet their daily water requirement after their involvement in credit program whereas before joining it was 93.4% and the rest 6.6% used either river or pond water as shown in Fig.no.1

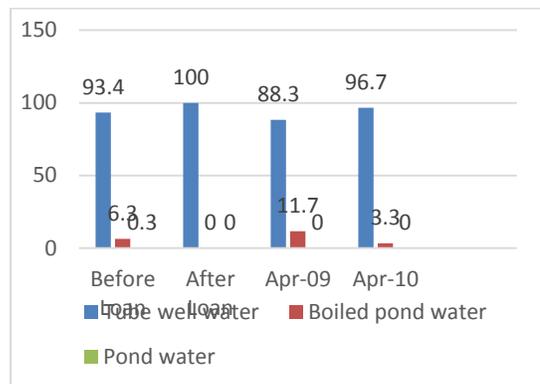


Fig.no.1: Comparison of credit system

A significant change followed within the members in respect of their using drinking water between the study periods (from April 2009 to April 2010). Financial solvency of the credit respondents influenced to fix and use tube-wells in the study area. The increasing trend of fixing and using tube-well also influenced the members since they could consume it from other owner's tube-well without spending money. This indicates that credit respondents' health consciousness has substantially improved. Change in use of latrine was considered by number of different types of latrine users before and after joining the credit program. It shows that after involvement with credit activities, percentage of pucca (metaled latrine) and ring slab (pit) users increased from 44.5 to 82.3%. It also indicates that after involvement in credit program, percentage of kutcha (without ring slab and only earthen) and open space users decreased from 55.5 to 17.7%. Sanitation behaviour has changed within the credit respondents. This may be due to their involvement with credit program. It also enhanced respondents' financial ability and became more aware of health and sanitation practices by taking lesson from NGO workers. In short, it is generally perceived that micro-credit program helps to improve socio-economic status of the rural women in Bangladesh the involvement in credit program had a positive impact on different dimensions of the participants' standard of living. Majority of the respondents appear to upscale their poverty situation by properly utilizing the credit received.

2. CASE-STUDY: TIRUCHIRAPPALLI, INDIA

According to the study of Andrew Barenberg, a network of women's self-help groups in Southern India are responsible for the development of a water and sanitation loan fund. The success of the loan fund reduced barriers to credit from formal lending institutions and increased investment in water and sanitation facilities the objectives of his case study are to summarize this loan program and explore the possibilities and limitations of this new financing model for the water and sanitation sector. Gramalaya, founded in 1987, works within three regional areas of Tamil Nadu. Access to improved sanitation in these areas is severely limited. Only 36% of the population had access to a basic toilet (Geetha, 2008). Those household without toilets use public facilities or defecate in open areas. Public toilets in urban areas were generally not well maintained, overburdened, and often required a fee. Due to privacy and cultural concerns, women and girls were often unable to defecate during the day, which subjected them to serious health problems and dangerous situations at night. While 90% of the target population was officially listed as having access to water facilities, many of the water systems in the area were overloaded, poorly maintained, or broken. In urban areas, women waited for hours, for water available only during certain period, on certain days. In most poor neighbourhood's locations, this process took two to three hours. So, in 2004, Gramalaya began its micro-loan program for water and sanitation improvements. This program was executed through its Women's Action for Village Empowerment (WAVE) Federation network. Gramalaya provided loans directly to SHG (Self-help group) and SHG members distributed the loans among borrowers with all members sharing joint liability. The women directly paid for the construction work while Gramalaya monitored the construction. SHG members were key program planners and community organizers that helped to stir community demand for safe water and toilets. As of December 2007, Gramalaya had disbursed nearly \$200,000 in loans directly, with an average loan size of \$91 per borrower. Loans were for 24 months with 12% or 18% percent interest rate and were used to construct latrines, toilets, bathing facilities, water connections, and stand posts. Many borrowers constructing latrines also accessed a subsidy from the state of Tamil Nadu of a 1500 rupees reimbursement.

Before the program, loans for water and sanitation were not available in the formal market and could only be accessed at interest rates often over 120%. Hence, Results of this case study suggest that when tied to participatory community groups, a viable market can be made for credit for water and sanitation improvements.

B. GROWTH OF MICROFINANCE

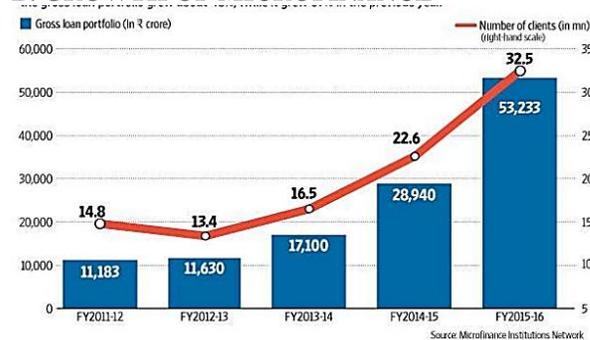


Fig.no.2: Comparison of growth of microfinance

This bar chart shows that increase of microfinance over the last 5 years in India by private firms. This means there is a demand of concepts like microfinance in India.

C. CHALLENGES AHEAD

Microfinance helps to cater to the needs of poor but there are also certain challenges. Loan default rate is high. Also, as micro finance loans are offered without any collateral, the extent of default is more. The other major challenge is to have a strict supervision on the business happenings. This helps to keep a proper check on the activities. However, MFI (Microfinance institution) combat these risk through field visits and surprise visits to their branches. MFI about 31 of them, still follow traditional way of doing business. Use of technology can help to lower operational cost. Automation is anytime better as compared to use of traditional ways of doing business. High-performing microfinance institutions have developed methodologies to extend credit, saving and other services to the poor clients. Many banks and other institutions with nationwide distribution system are beginning to take keen interest in reaching poorer clients. Advances in information technology have the opportunity to lower the cost and risk of providing

microfinance to the poor. The challenge is to mobilize this knowledge and apply it on a much vaster scale, creating financial systems that work for the poor and boost their contribution to economic growth.

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D.INTERPRETATIONS AND RECOMMENDATIONS

- Standardization of policies for staff (so that there is a less chance of fraud),
- Effective internal control on any human error,
- Recording of fraudulent staff,
- Background verification of staff before recruiting.
- Technology driven processes also helps to reduce human errors.

III. CONCLUSION

Due to urbanisation, unplanned slum areas are growing drastically which is a major problem in smart city planning. This leads to water distribution and sanitation problem. In first case study of Bangladesh they had a problem of poverty and over the time they improved the condition of people by microfinancing whereas in second case study of Thiruchirapalli indicate that micro-finance principles can be successfully applied to the water and sanitation sector. So, initiatives like water credit should be taken by the government to connect slum and rural area which are going to be part of urban smart cities. A Nationwide drive promoted by our Prime Minister for involving smart zones and connecting to rural areas, water credit system can be promising solution for distribution of water work department. In this dynamic era, there is a need to connect rural area on all fronts with the urban planning of smart cities. Distribution of water has been very challenging aspect for any state public work department in our country. For the further generation there is a need to broaden the perspective and applying water credit system as one of the innovative solution.

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