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FEASIBILITY STUDY FOR THE DIGITALIZATION OF A MICROCREDIT PROCESS IN INDIA

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ABSTRACT

The objective of this thesis is to do a feasibility study for digitalization of a microcredit program in South India. The work is conducted through a field research in Khammam (Telangana State, India) in collaboration with the non-profit organization Arbor India: direct observation permits to gain deep experience about the microcredit principles, the organization workflow, the current problems, and the local environment.

Digitalization of microcredit process is the proposed solution to possibly fix problems such as cash deficiency and errors occurring in the traditional manually maintained books for accounting. However, the solution is not as straightforward as it might appear, because the presence of several constraints: technical limitations, organizational needs, technology acceptance obstacles and preservation of local social values ought to be carefully analyzed to formulate a successful solution and avoid failures.

After the analysis of the current situation, the thesis work includes a survey of the ICT technologies already available which have been adopted by other no-profit organizations across the country and are successfully working. The analysis covers large variety of characteristics of the possible ICT solutions compared with formulated criterias that model the specific needs of the context. Such analysis will help the NGO in driving the digitalization of micro-credit process, preserving the needs of the beneficiaries.

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Acronyms

ICT	Information and Communication Technology
MFI	Micro Finance Institution
SRC	State Reorganization Committee
KCR	Kavalakuntala Chandrashekhar Rao
TSR	Telangana Rashtra Samithi
JAC/TJAC	Telangana Joint Action Committee
SDGs	Sustainable Development Goals
NAC	National Academy of Construction
TASK	Telangana Academy for Skill and Knowledge
MEPMA	Mission for Elimination of Poverty in Municipal Areas
MSME	Micro, Small and Medium Enterprises
TS-iPASS	Telangana State Industrial Project Approval and Self-Certification System
IT	Information Technology
LED	Light Emitting Diode
NABARD	National Bank for Agriculture and Rural Development
SHG	Self Help Groups
NBFCs	for-profit nonbank finance companies
SIDBI	Small Industries Development Bank in India
SERP	Society to Eliminate Rural Poverty
DWCRA	Development of Women and Children in Rural Areas

PoS	Point of Service
USSD	Unstructured Supplementary Service Data
MMID	Mobile Money Identifier
AEPS	Aadhaar Enabled Payment System
BC	Business Correspondents
UPI	Unified Payments Interface
NEFT	National Electron Fund Transfer
RTGS	Real Time Gross Settlement
ECS	Electronic Clearing System
IMPS	Immediate Payment Service
CII	Confederation of Indian Industry
IAESB	International Accounting Education Standard Board
XBRL	Extensible Business language
ERP	Enterprise Resource Planning
MIS	Management Information System
PDA	Personal Digital Assistants
IVR	Interactive Voice Response

INTRODUCTION

The objective of this research was primarily to analyze the present scenario of Arbor's micro-finance program in Telangana. The actual micro-credit process of distribution, collection and accounting of money is completely done manually with the help of several accounting books. Until the end of 2016, the manual approach though tedious and time consuming was the best due to the cultural and sociological context and to practical impediments such as scarce Internet access, interrupted electric power, lack of education, under-developed rural environment etc.

When country had least expected, the main break point occurred on 8th November 2016. The Prime Minister of India announced "Demonetization" of all 500₹ and 1000₹ banknotes as a measure to terminate black money and counterfeit cash to fund illegal activities and terrorism. This led to prolonged shortage of cash in the following months. People of the country were affected severely, as the main mode of transaction in India was done by cash. This suddenly forced people's attitude to change towards alternatives like digitalization to which otherwise were not preferred. Currently, digital-applications on mobile phones, online-internet banking have indeed limited the use the traditional 'cash only' method.

Focusing on the current accounting system, maintained manually by making data entry onto books. These books are often prone to errors which in turn decreases the accuracy of the accounting history. This act demands constant monitoring, inspection and repeated verification with the office accounts. Apart from the errors caused during an entry, filling these books practically is time consuming, seeks undivided attention and requires large storage space too. Due to all these factors the overall efficiency of the system is dearly affected.

With all the commotion in the background, the end goal of the research is to evaluate all the possible feasible ideas for digitalization of the micro-finance process in India. Observing the functioning of Arbor program, two possible ways of digitalization was evaluated to be:

- Digital cash or cashless systems
- Digital accounting system

Major challenge encountered during the research period was to answer the core questions like 'how the accounting systems can be quickened and improved using the ICT's? and Was there a way to limit/remove cash transactions?'. Most importantly keeping in mind the staff and

beneficiaries of the program who were women from rural villages. To formulate ideas which had to be uniform and at the same time had to have an easy operation was the most challenging part.

The first chapter of this report 'context description', has the general overview of the locality. Starting off with a brief history of the newly formed state Telangana. The progress of the state is overwhelming and indeed has taken big strides towards development of the state in terms of infrastructure, education & welfare of its people and administration. Hoping to see the betterment of lives in the rural parts in the future 'Bangaru Telangana' but by the way, it has already begun. The next section of this chapter contains a brief description about the Arbor foundation, its activities and the emphasis on micro-finance programs which is currently lending loans across 137 villages, to 571 groups in total.

'Digitalizing of micro-credit process' is the next chapter which is the heart of the research activity. The focus is to draw light on the field work conducted in Khammam for a period of 3 months. The As-is analysis describes the current working scenario of the organization. This helps to analyze the weak links and further formulate ways to bridge gaps in the organization. It also deals with the analysis of the problems that are arising mainly in the accounting and cash transactions systems which is affecting the overall performance of the organization. The second half of the section gives a brief overview of all the current trends of digital payment modes supported by the government. It also describes the various ICT's or existing technologies adopted for accounting globally and locally by MFI's. Some of the successfully adopted ICT solutions by various local MFI's are discussed under the Should-be analysis sections which can provide a few standard solutions acting as a base to compare with Arbor's demands. The chapter also covers the social and cultural aspects that are affecting the adoption of ICT solutions. Lastly, with the feedback of Arbor staff towards the technology advancements and to consider their point of view on the possible solutions is graphically represented at the end.

Confrontation with past thesis in collaboration with Arbor has helped to gain perspectives in the field of microfinance and its principles. The statistical survey of these reports has qualitatively analyzed various aspects of the beneficiaries of the micro-credit program. The field research conducted by previous students specially Gemma Cavaliere and Lodovica Appendino has served as a base in understanding the women, locality and organization better. It is a medium of reference for drawing conclusions relating to the life of rural people in Telangana.

CHAPTER 1 – CONTEXT DESCRIPTION

1.1 The Andhra Pradesh and Telangana States in India

Telangana, located in the southern region of India was formed on 2 June 2014 is the newest state among the 29 states of India. In the past, before 1948, Telangana was part of 'Hyderabad state' which was governed by many rulers, including

- Maurya Empire (320 BC to 180 BC)
- Satavahana dynasty (180 BC to 220 AD)
- Vakataka dynasty (250 – 500AD)
- Chalukya dynasty (543 – 753AD)
- Rashtrakuta dynasty (753AD – 982AD)
- Kakatiya Dynasty (1083AD –1323AD)
- Musunuri Nayaks (1326–1356AD)
- Delhi Sultanate & Bahmani Sultanate (1347–1512)
- Qutb Shahi dynasty (1512–1687)
- Mughal Empire (1687–1724)
- Asaf Jahi Dynasty popularly called the "NIZAM's of Hyderabad" (1724–1948).
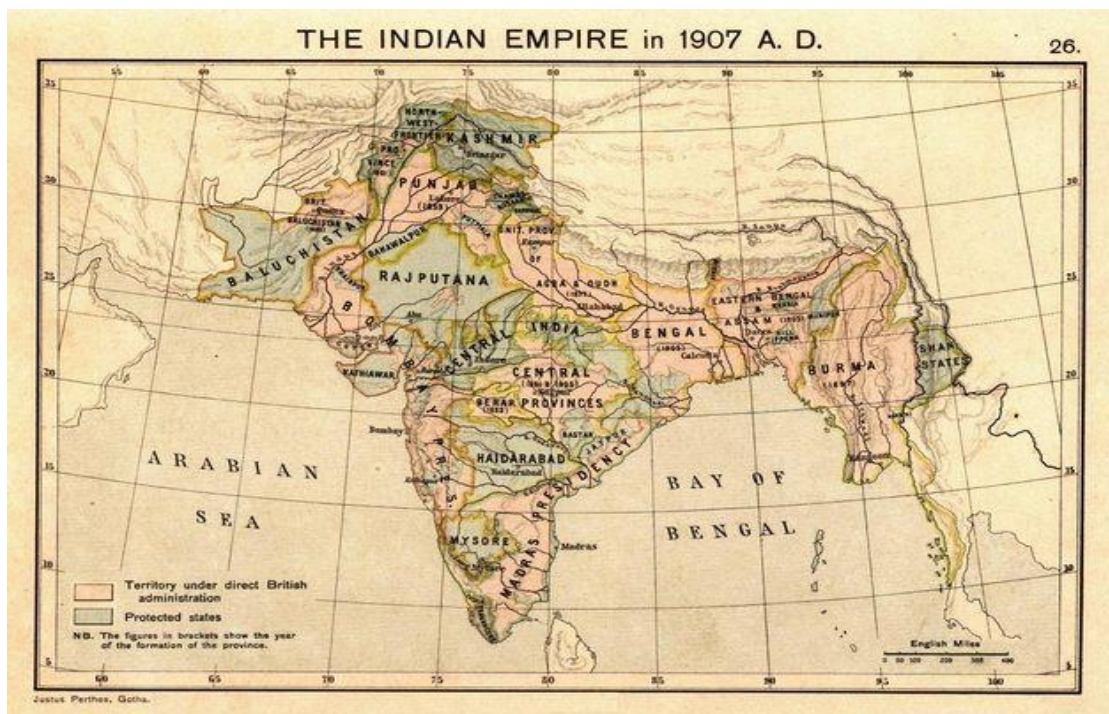
Figure 1: The Indian empire before Independence.

The region of the deccan saw the rise of the Maratha Empire after the decline of the Mughals. The Figure 1 shows the extent of the Indian empire before independence. In 1720's the Nizams encountered many invasions by the Marathas, major battles were fought to which the Nizams lost and remained a tributary of the Marathas by paying Chauth (tax). After the Nizam got defeated by the British East India company in the second Anglo-Maratha war (1805), Hyderabad was under the protection of British. The Nizam's play a main role in the development of the city, be it the roads, railways, airways, introduction of electricity, irrigation and reservoirs. All major buildings used by the public were built during the reign of Nizam under British Raj The rulers were great patrons of art, literature, architecture, culture, and rich food. They promoted the Turco-Mongol Mughal which was the aspects of the Persianate society.

During the period of Indian independence in 1947, the princely states were offered to accede either to India or Pakistan or remained independent. The Nizam owned a large portion of the developed and prosperous state of Hyderabad. Unlike other princely states either acceding India or Pakistan the Nizam decided to keep Hyderabad independent. When India became independent from the British in 1947, the leaders of the new Government of India did not approve of an independent state in the heart of the new country. The Indian military force annexed Hyderabad into the Indian Union by deposing the Nizam (Operation Polo) in the year 1948.

Post-Independence

The appointment of the State Reorganization Committee(SRC) to form states in India based on linguistics gave rise to Andhra Pradesh, which was formed on 1st November 1956. This happened through the unification of Telangana state and Andhra state with the Telugu-speaking area of the Hyderabad state. Also, dividing the Telugu-speaking region from Tamil Nadu. The city of Hyderabad being the capital of the newly formed state 'Andhra Pradesh'. The figure 2 below depicts India and the newly formed states post-Independence based on the linguistic division.
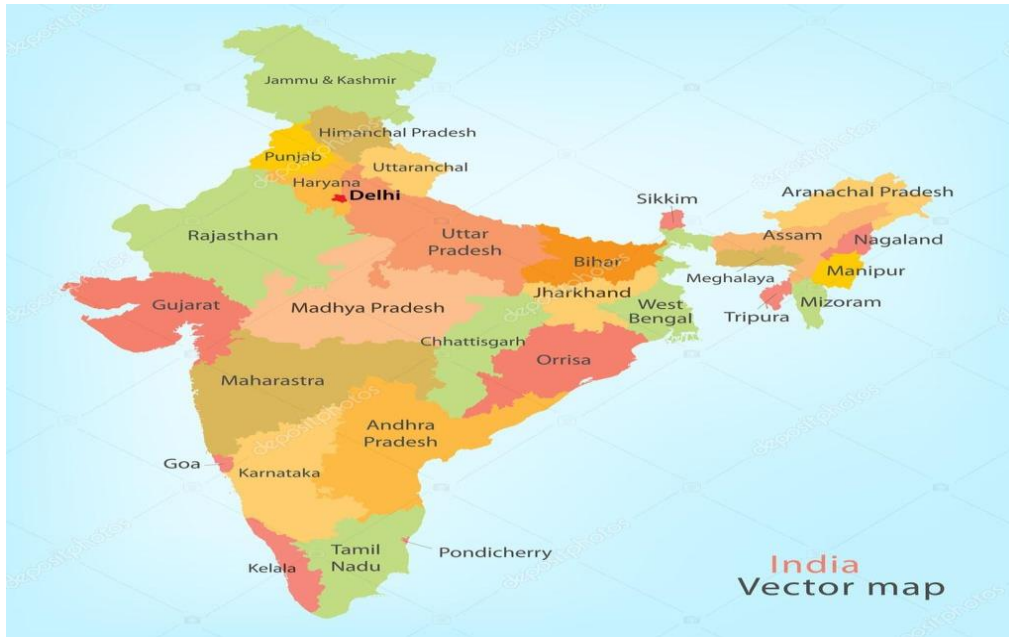
Figure 2: State map of India post-Independence.

Despite having the same Telugu language, the two regions were culturally different. History of the Coastal and Rayalaseema i.e., Seemandhra[1] district is very different to the district located within the region. Also, Telangana was governed by the Nizams i.e., Muslim kingdom whereas, the districts of Andhra were under the direct control of the British raj. Another reason being, economical divisions of the state of Andhra Pradesh. Telangana had a less developed economy than Andhra but had a large revenue base[2] and were insecure about the income of their region being diverted for use in Andhra. The insecurity of losing out on employment or opportunities was the primary concern when the irrigation projects that were planned on the rivers Krishna and Godavari would not proportionately benefit Telangana region. They further feared that people of Andhra who had access to higher standards of education would have an added advantage in seeking government and educational jobs.

Telangana state perceived injustices in the distribution of water, budget allocations, and jobs which ignited the spark for two political agitations from the period 1969 to 1972 namely 'Jai Telangana' for a separate Telangana state and 'Jai Andhra' movement for separate Andhra state. There was a lot of social tension as the protests grew wilder in the state as well as politically as the Prime

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[1]   Costal Andhra and Rayalaseema regions together is called Seemandhra
[2]   tax

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Minister of India did not favor this separation. In the year 1997 the BJP[3] passed a resolution to separate Telangana. Kavalakuntala Chandrashekhar Rao (KCR) launched Telangana Rashtra Samithi (TSR) for the separate Telangana in the year 2001. After eight years the Union Minister of Indian Government announced the initiation of separation. This announcement gave rise to protests of costal Andhra and Rayalseema to keep the states united and launched the movement of 'Samaikyandhra Movement'. On the other hand, Telangana Joint Action Committee (JAC/TJAC comprising of political and non-political) was formed to support Telangana's separation by the other region. The process was put to hold seeing mass resignation and withdrawal of political ministers in the manner of protest to keep the state united or separated supporting their respective their region.

The government then appointed a five-member committee 'SriKrishna committee' headed by the Chief Justice in 2010. The committee travelled across the state taking opinions of the issue from all sections of people. According to the reports submitted to the government by the SriKrishna committee, most regions of Telangana were a shade lower than Costal Andhra when Hyderabad was excluded and the most backward among the regions was Rayalseema. They found most of the violation in the field of health and education due to the insufficient qualified locals. Comparatively the funds released for education institutions in Telangana was much lower. The committee also noted that emotions of the public was due to the neglected assurances given to the region and concluded with the statement that Telangana had some merit and was not entirely unjustified. The committee proposed six solutions to the issue but the most preferred option being keeping the State united by providing definite constitutional and statutory measures for socio-economic development and political empowerment of Telangana. The second-best option was to bifurcate the States into Telangana and Seemandhra.

After a lot of chaos and more protesting, the congress[4] working committee passed the resolution for the formation of the Telangana state to the Union Cabinet where it got its approval to bifurcate Andhra Pradesh. The Andhra Pradesh Reorganization Bill was approved in 2013. The legislature on the other hand rejected the bill when asked for its views, but the Union cleared the Bill when

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[3]   Bharatiya Janata Party is one of the two major political parties in India after the congress.
[4]   Indian National Congress was the first modern nationalist movement to emerge during the British rule in India.

Lok Sabha[5] approved it. The President of India assented to the bill and the 29th state of India was born on 2nd June,2014. With city of Hyderabad serving as the joint capital of both states for a period of 10 years. Figure 3 is an illustration of the two newly formed Telangana and Andhra states.

Figure 3: Splitting of Telangana and Andhra states extent.

In the past three years, the state has experienced tremendous changes such as no other state has witnessed. The credit goes to the TSR[6] and the current chief minister KCR's vision 2024 for 'Bangaru Telangana' or Golden Telangana to strive towards the betterment of the state in the fields of administration, welfare and infrastructural sections. Referring to the detailed report [2] of the progress from the official website of the state, is an attempt to support the statements on the brief overview in the following section.

1. Administration
    a. Re-organization of districts: in the erstwhile state Andhra Pradesh, the revenues allotted to Telangana region was not completely utilized, instead it was re-allocated to Andhra regions which resulted in poor development in Telangana. The

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5   Lok Sabha is Lower house of the Parliament (House of People) of India. The members are direct representatives chosen by an electorate of adult citizens of India. Constitution provides it maximum size to be 550 members.
6   State Government

government reorganized the districts of the state after consolidating the state's revenue, resources and taking into consideration of suggestions of their people through a dedicated website. Reorganization has in turn increased the opportunities in the field of employment. With smaller districts all the government activities are monitored and administrated efficiently. There was homogenous distribution of resources which helped the poor or marginal areas to improve in the quality of infrastructure for social-economic activities. Also, there has been consistent focused approach on- irrigation, industry, education, health, wealth and infrastructure which has begun to show progress towards urbanization. Strengthening the military force would result in drastically reduced anti-social activities and increase the quality of security services.

b. Planning District: To fulfill the dreams of the people a 'bottom up model' or decentralized planning was adopted. People could participate in the planning process under "Mana Vooru-Mana Pranalika" (our village- our plan) with the motto 'know your district-plan your district' in a democratic way. This was the beginning of micro-level planning which allowed the district administrator to identify and map all the resources within the specified area in order to build comprehensive plans to cater to the requirements of the people, village and district.

Figure 4: classification of all Sustainable Development Goals(SDGs)[7] into four focus areas.

2. Social-Economic Welfare

a. Health: To combat the problem of malnutrition in children the government has set

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[7]   India is committed to 'Transforming our world: the 2030 Agenda for Sustainable Development' called SDGs.

up nine "Nutrition Rehabilitation Centers". Anemia is another condition affecting the women and children of the state. Arogya Lakshmi-Nutritional care for children, pregnant women and lactating mother was started in 2015 to improve nutritional status. 'ANMOL' a mobile based application was launched for tracking women and children. Vehicles called "Amma Vodi" (mother's lap) for dropping women home after a surgery are arranged. There are many schemes to support the people, some of them are: - Public distribution systems, Asara pension scheme to feed rice to the needy at Rs.1/kg, 'Kalyana Lakshmi and Shaadhi Mubarak' provides financial assistance for the women getting married from the poor or scheduled castes and tribes' families.

b. Education: Five agencies are involved in the development of skills in Telangana. They are National Academy of Construction(NAC), Telangana Academy for Skill and Knowledge(TASK), Employment generation, Marketing Mission, Society for Elimination of Rural Poverty and Mission for Elimination of Poverty in Municipal Areas(MEPMA). Emphasis is laid on residential schools, government funded courses, training programs and technological education. The government provides student scholarship schemes to eligible students for higher education. 'MANA TV' is a television channel that telecasts programs related to educational, academic related programs and awareness of career prospects.

c. Irrigation: schemes like 'Mission Kakatiya' was launched with the motive of rejuvenating the ground water to enhance yield in the livestock from the farm lands and in turn increase the overall rural economy. 'Mission Bhagirata' on the other hand is an initiative to provide safe, adequate and sustainable drinking water to the people of the entire state.

d. Agriculture: main crops cultivated in this region are cotton and chili. Sheep-rearing and fish cultivation is widely practiced and encouraged.

3. Infrastructure

a. Expansions: of the metro, betterment of the road and highways, uplifting rural developments.

b. Industrialization: The Micro, Small and Medium Enterprises(MSME) sector provides direct employment opportunities to people for import or export of raw

materials or other services.

The new initiative, Telangana State Industrial Project Approval and Self-Certification System(TS-iPASS) Act has enabled to skip lengthy time-consuming procedures that had to be followed before setting up an industry. This online based system has increased the entrepreneur, start-up companies and ease at doing business.

Power generation by Telangana state 'GENCO' is the largest power generating company. It is now looking forward to expanding energy by integrating non-convectional energies with solar power, with the motto of providing uninterrupted power supply to the entire state.

Handloom sector is the largest cottage industry in the country and provides massive rural employment.

4. Information technology (IT) & IT-enabled Services: promoting expansion of the IT companies. Currently the state is setting up two electronic manufacturing clusters, an LED park is under construction for LED assembly and manufacturing. Promoting innovation and entrepreneurship through T-Hub was successful and the government has plans on expansion of it to the next phase. Upcoming new initiatives plans where the government as identified as potential sectors and shifts its focus upon Photonics Valley Corporation, GAME city, Smart Technology, Data Analytics, Data centers, Open Data, Internet of things, Cyber Security, Digital Telangana, T-Fiber, E-Government and M-government are service delivery services through online portal called "mee seva".

1.2 Micro Finance crisis in Andhra Pradesh

According to the World Bank [9], less than 25% of the population in India had access to financial service. Laws were passed by the Indian government to create co-operative financial institutions at the beginning of the 20th century to serve people in the rural areas. In 1970, financial sector in India was nationalized and established regional rural banks to maximize the access to finance in rural areas. Social entrepreneurs created the self-help group linkage with bank program and lent money to groups of women in the year 1980s. Initially these SHGs offered training and nonfinancial services but with bank linkage larger credit was lent. This SHG movement was supported by the National Bank for Agriculture and Rural Development (NABARD) which was

widely adopted and outgrew when economic reforms incorporated the role of private sectors in banking system. Microfinance institutions which operated as non-profit organizations had transferred into for-profit nonbank finance companies (NBFCs). There were 30 NBFCs by 2010 with significant annual growth rate of 80% when these NBFC MFI received governments support in the form of policies and direct investments. In addition, the state-owned Small Industries Development Bank in India (SIDBI) whose mission was to support small enterprise started lending to MFIs.

Andhra Pradesh, housed maximum number of MFIs and had widespread like no other state in India with a total of 1.47 million SHGs serving 17.1 million clients across the state. The government had invested in policies that were keen on developing information technology industry around Hyderabad. So, series of large scale projects to eradicate poverty were undertaken, one of them was the Society to Eliminate Rural Poverty (SERP). SERP was a rural development program that provided promotional programs like generation of employment, vocational training and saving-credit access through SHGs. Initially these SHGs had a limit of the credit based on their savings [limiting to Rs.100000] but the new program has increased the limit by five times [Rs.500000]. Additionally, there was flexibility in the repayment time and 3% reimbursement for non-defaulted repayments as a reward by the government. This encouraged people to borrow money from various sources or multiple loans. Multiple loans were a serious problem as the borrowers were not aware of their debts overall. Being the headquarters to many MFIs, the state attracted investment from MIVs and private equity that had created high growth and profit. This created a wrong perception of MFIs as profit-oriented organizations.

Crisis emerged during 2005-2006, when 50 branches of MFIs were closed for not abiding by the code of conduct that included unethical collection methods, high interest rates, profiteering and illegal operations of taking savings. The chief minister passed an ordinance to protect women SHGs from getting exploited which set new conditions on operation of the MFIs. This led to low repayments, making it difficult for the MFI to refinance loans and hence gradually closed its operation removing financial access to the poor. Because of this, the press reported large number of suicides in October 2010. The Ministry of Finance still encouraged the presence of MFIs due to its importance while requesting stricter regulations, lower interest rates and improvement in operations. After negotiations some MFI have resumed operation but are still not able to carry out loan repayment activities smoothly. A third party was appointed to record and maintain the

transparency of the interest rates charged by these MFIs before the crisis in 2009. Today microfinance industries have progressed hugely not only in India but globally, the sector has proved to financially strengthen the poor by providing credit access.

1.3 Arbor Charitable Trust

1.3.1   Formation & Motive

Arbor foundation is a non-profit organization (NGO) based in Lugano, Switzerland. Indo-Spanish philosopher Raimon Panikkar collaborated with a group of businessmen, economists and philanthropists and 'Arbor India' was founded in the year 2005 with a motive of promoting practices of dialogue between cultures, people and communities. The tree, or "Arbor" symbolizes the basis of life.

Since 2007, Arbor Foundation in Telangana, (India) was registered under the Ministry of Home Affairs and later came under the Foreign Contribution Regulation Act (FCRA) making it possible for receiving foreign donations.

Following the principles laid down by the founder, the end goal of the Foundation is to promote local development in the rural and urban area of Khammam district of Telangana, with more emphasis on women development, humanitarian activities, cultural and interfaith activities.

1.3.2   Structure of the organization

The working staff of Arbor are hierarchically organized as shown in figure 5 below:
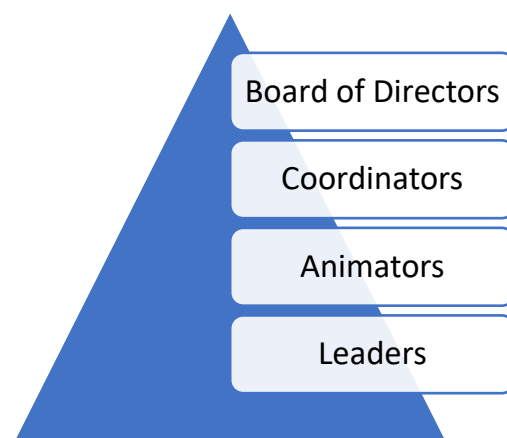
Figure 5: Structure of the organization

<u>Board of Directors:</u> [comprising of the president, vice-president, treasurer and secretary] They are the main authorities managing the program. Members are elected and are responsible for administration of the foundation and its activities.

<u>The Coordinators:</u> [are religious figures, sisters, from different congregations and there exists an agreement between the Diocese of Khammam, his Bishop and the religious congregation rule to discipline the engagement of the Coordinators.] They are responsible for the financial management of an area or a group of villages in the ring of 15 km. Every Coordinator select one or more Animators from that area, according to the needs and to the number of groups followed. The accounts are kept track by the office assistant using the TallyERP9 software which is operated by a single user at the office. Currently there are 14 coordinators, 1 office coordinators and 1 office assistant.

<u>Animators:</u> [are simple laywomen from the villages, who have very little or basic education capable of writing and doing basic math] The role of the Animator is motivating the women of the village to cope with the program. They monitor the creation of groups, assisting in selecting leaders, support coordinator in keeping account of money, manage and regularly conduct meetings to educate the people on developing strategies. Totally there are 25 animators and 2 external trainers to skill the animators.

Figure 6: Coordinator and animator distributing advances

<u>Leaders:</u> Two persons among the group are selected as leaders in a democratic way. Giving them the authority to represent the group and to support it. The first leader and the second leader work together in every occasion, for the growth of the group and both are equally important. Leaders

should be trustworthy, accountable and sincere, their role is central in the life of the group. Leaders accept this role as a volunteer service to the community.

During meetings, leaders are responsible for the punctuality of the group members and gather the people. During the meeting sessions they contribute to maintain order, silence and attention of their group members. Together with animators and coordinators, they act to facilitate the comprehension of the topics discussed during the meeting and help the members in difficulty to understand and to participate. Leaders assisted by the local coordinator open the bank account for the groups with joints signatures i.e., joint account. They are responsible for the regular deposit of the group funds incoming from the saving schemes. Every bank transaction made should avail the bank receipt or bill that leaders are requested to present to the group as a proof.

1.3.3   Activities

All programs implemented by Arbor Charitable Foundation India are programs focus on field experience, following the Gandhian approach of self-development through community-based organizations.

There are different programs that shape Arbor India apart from Micro-finance like: medical programs, water management and sanitation, structural program for the shelter less, professional training programs and in partnership with SEMI[8]- an Italian non-profit based in Turin, Arbor supports children education. These activities have made changes to the many life and has indeed changed the lifestyles of many innocent people of the rural, who now are learning and progressing putting their foot towards making their life meaningfully beautiful.

1.3.4   Introduction to micro-credit principles

Arbor's microfinance involves programs for rural populations that include micro-saving, microinsurance and microcredit. The financial program follows the step of grassroots community organization and empowerment. This is possible through steps taken by setting up of micro-saving through self-help groups(SHG) and then subsequently opening of bank accounts for these groups (usually with the Indian Overseas Bank). Access to microcredit follows a training program and micro-saving that continuously takes place throughout the year prior to provision of advances for

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[8]   SEMI is an organization working at local level to provide financial resources to create structures (construction of schools, hostels and hospitals) and organize its management. Guarantees sponsorship and scholarship for poor students, orphans and backward community children.

all members of the Arbor groups. Through Micro-saving groups learn the value of money and the significance of transforming it to empowerment, not only for the individual but for the whole community. Microinsurance can offer with a small amount within the reach of the poorest protection from natural disasters, serious illness, death, loss of livestock and the destruction of the house. Microcredit is a tool aimed at the creation of micro activities to rebuild the social existence. The microcredit program allows for the permanent reuse of funds in the form of continuous advances fed in a constant and rotating fashion from the repayments.

The structured approach strengthens the program. Norms, procedures and rules are well explained during every meeting. Not only does each woman receive a little book with all the rules also there is a constant recall to procedures and acts every year.

Rules and Regulations of the group to be a part of the micro-credit program are:

1. Each group consists of 10 to 15 members (minimum 5 after dropouts)
2. The age of the members is limited to 18 to 50 years at the entry date (according to age in the ration card[9]).
3. No unmarried members[10] are allowed.
4. The group members are selected from the same village
5. More than two group members of the same family cannot join the same group (family is intended to live in the same house and with the same parents)
6. Each group shall pay ₹100 (1,2 €) as membership fees before opening the bank account, this amount is not refundable.
7. Monthly meetings and empowerment activities are part of the Arbor program (action plan)
8. In case of grave reasons staff provide extra individually empowerment by personal visits (H in the attendance book)
9. Every group appoints two leaders.

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[9]   Ration cards are official document entitled to provide ration of food, fuel, subsidized food stuff (wheat, rice, sugar) and kerosene issued by the government of India. Also, serves as a proof of identity. India's public distribution system is based on ration card.
[10]   In India when a woman gets married it is customary ritual that she starts living with her husband in his village/town. This affects the program as group members in a group have to reside in the same village to make it possible for meetings, repayment collection and loan distribution.

10. In the name of the group leaders one joint bank account is to be operated. Savings from the members are considered as a group program and all must pay the same amount. Savings collected from the group members are deposited in the joined account. The coordinator holds the bank pass book for the savings.

11. Under the guidance of Arbor staff, the venue of meetings shall be fixed in the presence of the group. They decide the date of repayment, date of applying for advances. No more than 5 groups can join the same "advance day" at sub-centre level. Bank transfers are provided for big amounts.

12. Advances can be applied by the group members. Each member applies for the advance to Arbor Foundation in the prescribed form regularly.

13. Groups savings and advances repayments are collected properly on time and all on the same day i.e., during the meeting.

14. After three years of regular savings with Arbor the members are free to leave the program indefinitely.

15. In case of cancellation, members are welcomed to join the program again by following the rules of Arbor from the beginning.

16. Interest accumulated from the savings of the groups, deposited in the bank belongs to the group will be withdrawn to the account of each group after three years.

17. In case of absence or not bringing savings of any member for the monthly meeting she shall be charged ₹10 (0,13 €) as fine. This amount shall be kept for common purpose of the group (i.e., other contributions).

As a registered institution 'Arbor Charitable Foundation' is subject to the control of the Government of India and Ministry of Home Affairs. To maintain transparency, every operation conducted in the Arbor program is recorded in pre-printed Arbor books. There are four types of books:

1. Individual Passbook: It is the book every group member holds. Contains all data of the member with a recent picture. Every month the Arbor staff updates the records with the details of individual savings and withdrawals.

2. Bank Passbook of the Group: Bank provides passbook to the account holder i.e.; the group is represented by two leaders and the passbook remains in the hands of the Coordinator.

This book records the history of transactions of every deposit or withdrawal of funds made by the delegate leaders, as well as interests and expenses.

3. Group Book in Telugu: This book is held by the Coordinator and contains the details of a single group. Listing all its members and their activities like meeting attendance, savings, advances, repayments, penalties and expenses.

4. Area Consolidation Book: This book is filled by the Coordinator and contains all the consolidated data from all the groups of an area.

There are also "central level meeting" every three months with the board of directors, coordinators and animators to strengthen the relationship and more importantly to obtain feedback about the program. Figure 7 below was captured during the central level meeting. They also discuss about the action plan, every year few topics are chosen for each month for creating awareness during the monthly village meetings.

Figure 7: Arbor staff during central level training and meeting

- January: community programs (cooperative work, people collaboration for the community, government plans)
- February: women's day celebration (motivating of the people, prepare banners and programs for the women's day celebration)
- March: women empowerment (women's day + evaluation. Women as agents of

change, role in the family/society)

- April: leaders training (role of leaders, guidelines for the groups, motivation)
- May: children education (admissions to schools, boarding, tuition centres.
- June: community programs (group activities, water survey, community involvement, government plans)
- July: advances, new groups seminaries and orientation (preparation for "advance days" - training for new groups recently joining Arbor – boards fix / repaint)
- August: house visits/field visits (rapports and reinforcing relationships with husbands)
- September: environment (kitchen gardens, tree plantations)
- October: health month (prevention of illness, tuberculosis, dengue, malaria, infections
- November: leaders training (role of leaders, guidelines for the groups, motivation)
- December: spiritual awareness (praying and sharing love among people, religions and castes. Christmas celebrations).

It is undeniable that being a microcredit program the most important part is the advance. The advance is the amount of money that Arbor gives annually to the group members following a clear procedure. Eligibility criteria to avail this loan are:

1. Minimum 10 months participation in Arbor Program
2. Not more than 3 absences in the last 10 months
3. In case of grave reasons staff can provide extra loans for individual empowerment by personal visits
4. Regular savings and entry in the passbook for the previous 10 months is necessary. All penalties must be paid regularly.
5. The applicant should not have any other previous known advance from other programs/NGOs except DWACRA[11] program. Multiple loans are discouraged.
6. The applicant shall follow the instruction given by the staff and maintain individual passbook with the clear photo and signature.

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[11]   Development of Women And Children in Rural Areas (DWCRA) is a government scheme with a motto of improving socio-economic status of the poor women in rural areas by creating income-generating activities. The program facilitates employment, skill upgrade, credit, vocational training to encourage group activities which are more sustainable.

7. Signature on application form and promissory note. No thumb impression shall be accepted for applying the advance and issue the advance.

8. See that the advance amount is utilized for the same purpose approved in the application.

9. To Sign an agreement on promissory note, to pay regularly in 12 monthly instalments beginning from the following month after receiving the advance.

10. In case of failure to pay the advance amount, according to the agreement the beneficiary shall pay a monthly fine until the whole amount is cleared. Fine is ₹10 (0,13 €) every single month of delay (penalty record). This amount is to be collected by the coordinator and used for common purposes.

11. Office expenses shall be contributed 2.5% prior to the advance. Corpus fund is requested.

12. While applying for the advance the group shall contribute a minimum of 80% of their savings to Arbor as a guarantee

13. There must a be a minimum one-year gap between one advance to the next

14. There must be a minimum two months for the proceedings of the advance

15. In special cases the group can take decision: on the advance to be obtained or to keep a member in the group etc.

16. Only regular repayments admit in an increase of the next advance amount.

Year	Amount (₹)
1	0
2	4000
3	6000
4	8000
5	8000
6	10000
7	10000
8	12000
9	12000
10	14000
11	14000

Table 1: Advances for subsequent number of years the member participates in the program

Arbor Foundation does not apply any interest rate on the advance. They simply collect the same amount given the year before, without considering inflation (in India is around 2.49%[12]).

1.4 Micro-credit in Telangana

In India, this region of Andhra Pradesh and Telangana are known for the high penetration rate of microfinance than in any other states. The region houses some of the largest leading MFI such as SKS, Spandana, BASIX and Share being run successful even today. The Velugu program is the largest state-led microfinance initiative. The SHG movement gained momentum in the late nineties and the state began to see the rise of private microfinance institutions. Since the micro-finance crisis, the state has experienced a downfall and has shut down several MFIs. Details of some MFI are discussed in depth the upcoming chapter.

1.4.1 Introduction to micro-credit process

Professor Muhammad Yunus, a Bangladeshi economist was the first to define "microcredit" in the seventies. Microcredit or microfinance or micro-banking is a medium for providing credit access to the 'unbanked' the poor in the under developed areas, this money is utilized for the income generating activities to help people in sustaining life. His motivation for eradicating poverty through credit access occurred during a field trip to a poor village where he interviewed bamboo weaving women who made marginal profit after paying all the middle men. He then decided to lend loans and founded the Grameen Bank meaning 'village banks' in 1983 on the principles of trust and solidarity. Yunus famously claimed that "Poverty will be eradicated in a generation". For the developing world the Grameen Bank forms the basis, a reference model of modern microfinance in promoting self-help entrepreneurship. Yunus 'the banker to the poor' has been awarded Nobel Peace prize in 2006. Today the Grameen methods have be adopted worldwide and serves more than 8.5 million people in Bangladesh. The table 2 below shows the penetration of microfinance country wise in 2008.

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[12]   For the year 2017, http://www.inflation.eu/inflation-rates/india/historic-inflation/cpi-inflation-india-2017.aspx

Global Ranking	Country	Borrower accounts/population
1	Bangladesh	25%
	(Andhra Pradesh State, India)	17%*
2	Bosnia and Herzegovina	15%
3	Mongolia	15%
4	Cambodia	13%
5	Nicaragua	11%
6	Sri Lanka	10%
7	Montenegro	10%
8	Vietnam	10%
9	Peru	10%
10	Armenia	9%
11	Bolivia	9%
12	Thailand	8%
13	India	7%
14	Paraguay	6%
15	El Salvador	6%
16	Burkina Faso	5%
17	Kyrgyzstan	5%
18	Ecuador	5%
19	Guatemala	5%
20	Mexico	5%
21	Colombia	5%
22	Morocco	4%

Source: Gonzalez, 2010. *Rozas and Sinha, 2010.

Table 2: Microfinance penetration by country

To avail the loan from Grameen bank, the member must form of group of five, own less than half acre land and should be able to put their signature. The loan must be paid back in 50 weekly installments with interest. Center meetings are arranged to collect and record repayments. These meetings gave scope for activities and to gain information about the social life from the external world to educate the rural women. After repaying the loan, the woman can obtain larger loan and these credits are used for income generating activities.

Grameen bank now has savings account, pension schemes, insurances, other loans- housing, education, business etc. The bank has a 97% loan recovery rate and 96% of women participants and has been the only successful bank in one of the poorest countries of the world. The table above shows the penetration of microfinance in different regions. The basic features of the program being:

1. Promotes credit as human right.
2. With a mission of targeting the poor and to help them overcome poverty.
3. It is based on 'trust' and not on mortgages and no collateral or legal contracts are required.

4. Group based lending and it is supposed to be utilized for income generating activities.

5. Weekly installments for loan repayment. Once the loan is repaid the member can avail new loan.

6. Door to door service, where the bank goes to the people.

7. Generally, loans are given through non-profit organization, if it is done for profit the interest rate of interest is kept close to the market value.

8. There is saving programs along with credit access.

9. The Center meetings help develop social agenda and follows "sixteen decisions" strictly. These activities help gain information about the outer world and educates them towards leading a better life.

10. The four principles of Grameen bank are discipline, unity, courage and hard work.

1.4.2   Micro-credit projects of Arbor in Telangana

Presently (2016-2017), Arbor covers 137 villages of Khammam district in Telangana state of India lending micro-credit to about 571 women SHGs in rural areas for a total number of approx. 6,500 women.

CHAPTER 2 – DIGITALIZATION OF MICRO-CREDIT PROCESS

2.1 AS-IS Analysis

After familiarizing with the organization hierarchy, activities and rules of the micro-credit program from the previous chapter let us focus on the area of interest i.e., the micro-credit program from the research point of view. The organization today functions with the help of religious missionaries as 'coordinators' and 'animators'. The beneficiaries comprise of women from the rural villages.

The journey to avail the benefit of loans begins with formation of groups and choosing their respective leaders. A bank account is opened for the group with joint signatures of their leaders with the assistance of the area coordinator. For the next 10 months the members start 'saving' procedure and attend the regularly conducted group meetings. Idea behind the meetings is not just collection of money alone but the fundamental principle is to strengthen and spread awareness that would help the people to build a better tomorrow. The topics related to these meetings are chosen from the already existing action plan.

Before the members avail advances[13] the group members must comply with the eligibility criteria of having punctual payment record and attendance. The eligible members request for loan by stating the purpose and submit an application along with agreement on promissory note towards regular payment to Arbor office. While applying for the advance, the group contributes 80% of its savings as a security or caution amount to Arbor. Other expenses like office expenses, dues and fines are to be cleared before re-applying for next advance. The loan takes about 1 month for processing before the advances are distributed.

To have a simplified and organized environment in terms of banking and finance, according to the areas the organization is sub-divided into 4 main sub-centers each holding a regional bank account as illustrated in figure 8. The sub-centers are Naidupeta sub-centre, Manuguru sub-centre, Madhira sub-centre and Enkuru sub-centre (respective area coordinators are responsible for operating and maintaining these accounts). Additionally, the organization is registered under the FCRI Act and to make foreign donations possible, an FCRI account is maintained where the contributions made are usually in euros. These contribution in euro must be converted to local currency for which a

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[13]   Loan or credit

sub-account or local account in central bank is required for ease of operation. This local account is maintained and accessed by the director. This money in the local account is transferred to their respective sub-centre's accounts for accessing cash during advances.
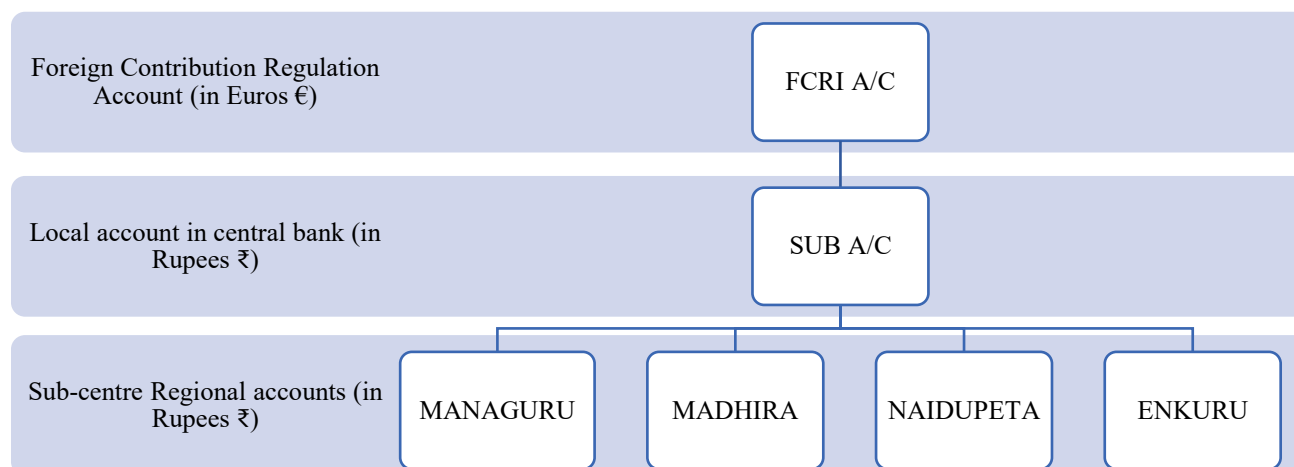

Figure 8: Arbors sub-center division

On the day of advance all the group members are present and advance in the form of cash is distributed to each group. The group then distributes the money among its individual members. The registers and passbooks are now updated. The repayments and savings are collected on monthly basis for the next 10 months by the coordinators with the help of animators. The repayments are deposited in their respective regional sub-center bank accounts and the savings are deposited into their personal group bank account.

Furthermore, apart from the cash flow i.e., the money distribution and collection. Arbor does not charge interest on the advances but collects small contribution of money towards Corpus fund and office expenses. Understanding this is crucial and very often misinterpret as interest.

1. Corpus fund: Rs.20 (0,25€) is collected from each beneficiary approximately 8000 women. The money collected is being utilized for recovery of debts and to help fund the women if they suffer from serious conditions such as sickness, death, natural calamities. For arbor program to function smoothly and to support the affected when in need this is very essential. The amount to be contributed is decided by the resolution through the directors.

2. Office expense: This includes expenses mainly for the stationery, printing, book, etc., about

maximum Rs. 250 (3.1€)

3. Maintenance: Comprises the internal expenses like salaries of the coordinators and animators, travel and food. These expenses are taken from the part of the sub-account or local account which amounts to around 4 lakhs rupees i.e., 5,000 €.

Rotation of money is done to keep the program running hassle free with an approximate turnover of 25 MLN Rupees (2.5crore), equivalent to 300.000 €. The UML diagram depicted in the figure 9 below is the diagrammatic representation of the cash flow within the organization of the whole micro-credit process. The actors of the program are represented in the swimlane (vertical columns). Action block are described in green rectangles and decision block is represented by blue diamond blocks. The initial and final circular nodes denote the start and end of the process flow. The main processes are:

- Processing application and availing advance: The advance application forms are submitted to the office after verification of all credentials and criteria through the coordinators and animators initiated from the group leaders. The director approves the loan application and withdraws money from the central bank or subcentral bank (the subcentral bank accounts are usually maintained by the coordinators and they withdraw money from the bank) to give advances to the groups in the villages. The passbooks are updated while the advance is received by the group leaders and is distributed among the beneficiaries.

- Savings: Monthly savings of all members are collected by the group leaders. During the monthly meetings the animator collects, checks savings and updates the passbooks and group books furthermore the savings is handed over to the coordinator for depositing it into the subcentral bank and updating the area books and the bank passbook.

- Repayments: Monthly repayments of all members are collected by the group leaders. During monthly meetings the animator collects repayments from group leaders and updates the passbooks and group books. The received repayments are deposited into the subcentral bank by the coordinator or handed over to the director in case of depositing into central bank. The bank passbooks are updated in both cases. The cycle continues for the next 10 months till the advance is repaid.

Figure 9: Cash flow process model of Arbor
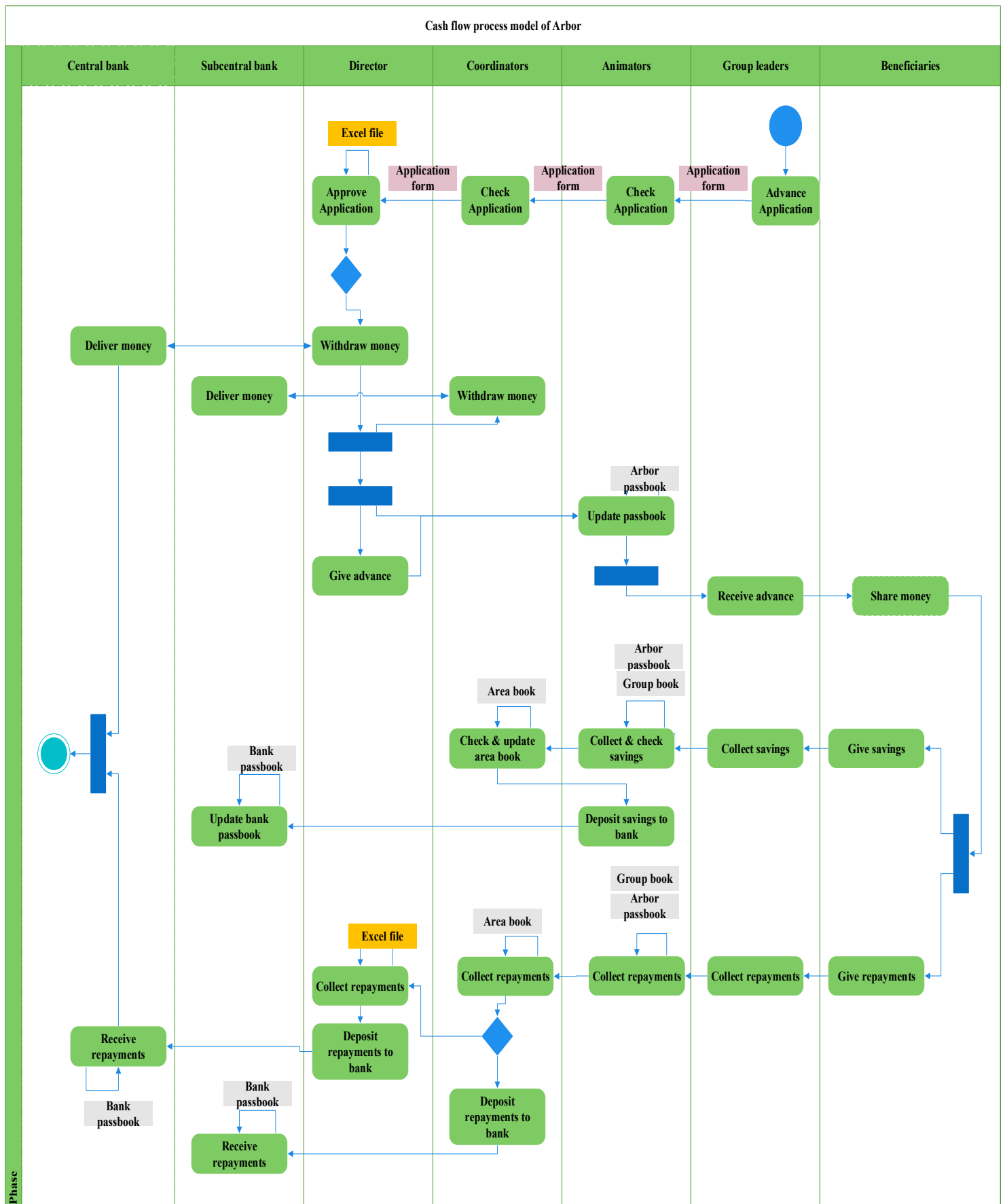
On field research during the three months gave me an opportunity to closely observe the insights of the current working model. The whole process seems to be simple and efficient but there are weaknesses in this system too. During the village visit phase of my research activity I noticed the environment of the villages, live preceding of the activities, beneficiaries etc. For clear understanding I would classify these many challenges mainly into two categories of accounting system and the cash transaction system. Apart from these the proximity and availability of resources such as the banks, shops, mobile re-charge shops, internet facilities, education etc. is very scarcely available.

2.1.1 Accounting system

Arbors accounting system is maintained with the help of books. These pre-printed books (passbook, group book, area book) are filled by the animators and coordinators to monitor the savings, repayments and attendance of the meetings. These handwritten books were prone to errors and had to be constantly checked and verified to maintain accuracy. Filling these books consumed a lot of time too as the coordinators sometimes maintained a fair and rough copy of the same data. Other disadvantages would be in the situation when the books get misplaced, damaged and tampered. Though the office stores its data bases using the Tally software this would not solve all the problems permanently.

In some instances, (on the advance day) spot decisions of whether to issue advances to a faulty member (who does not comply with the eligibility criteria) creates a tense atmosphere and unpleasant situations within the committee members. These situations occur frequently and it can be blamed on the accounting system on the whole. Instead if there would be a software to filter the defaulters and ineligible candidates (Tally does not hint such operations) so that the decision could be taken collectively as a united organization putting an end to such uncomfortable situations.

Tally is the software used at the office level by the office assistant. The data bases regarding all the groups (saving, repayment), bank transaction details of the organization, every detail regarding the cash-in and cash-out is stored. The books are brought in regularly to the office by the coordinators and are fed into the data base every month. The passbooks, group books, and area books are cross verified with the details of the data bases stored in Tally. This software can be easily operated, flexible (no code) and is widely used to tally audits across India by small and big companies for it secured operations. There are some limitations such as it is a single window

software restricting opening the same screen from multiple computers, software is expensive and must be purchased annually, high risk of data loss as the data is stored on the hard disk (system crash and virus attacks can erase data), since it is offline there is no backup to retrieve lost data.

The book keeping principles are more prone to error, time consuming, uncertain thus affecting and bringing down the accuracy of the overall accounting system. Tally software on the other hand is the best suitable software for the organization at present because advanced software's are even more complex to learn which would require hiring skilled operators.

2.1.2 Cash transaction system

In India, about 98% of transactions[14] were done by the readily available cash. Bank operations were preferred mainly when dealing with higher denominations. For everyday common errands cash was the sole means of transaction. Until demonetization happened the organization did not face cash deficit issues and advances were carried out successfully. Cash was withdrawn from the central/local bank account, transported physically to the villages and distributed to each group. Though this mode of transaction is a sure payment option and benefit the people, there is a high risk involved in compromising the security while transporting the cash.

From the other end, most of the beneficiaries in arbor comprises the farmers, daily waged workers (cooly-work), small kirana shops (provisional stores), tailors etc. whose livelihood entirely depends only on 'cash'. It is difficult and highly impossible for them to adopt other transaction methods due to various factors- non-availability of resources (bank, mobile, electricity etc.), lack of awareness, little or no education, fear of acceptance towards new changes, etc. Traditional method of cash is very convenient from the beneficiaries' point of view. This had a great impact on the repayments history and life was tough in rural parts during and after demonetization. The organization too did not receive repayments nor were able to provide advances for a long period of time. This problem is not completely solved even now, the bank has new regulations of limiting cash withdrawal and Arbor is struggling to find ways to obtain cash (a week prior to advance, everyday visits to the bank are made to accomplish the desired amount and at the same time complying with the rules of the bank withdrawal limit).

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14   https://www.americanexpress.com/us/content/foreign-exchange/articles/india-demonetization-digital-payment-services-growth/

2.2 Should be Analysis

After analyzing the current scenario of Arbor organization, work flow (cash-in and cash-out) and weak links affecting the process that is the cash-transaction systems and accounting systems and its overall impact on the organization. This section deals with all the possible solutions that could be adopted by the organization to overcome these drawbacks by implementing changes mainly in the current transaction system and accounting system.

2.2.1 ICT Solutions

The Government is promoting the 'Digital India' initiative and motivating its people to use digital modes of payment with a motive of 'Cashless India'. These changes are already implemented and massively used in the large cities of India.

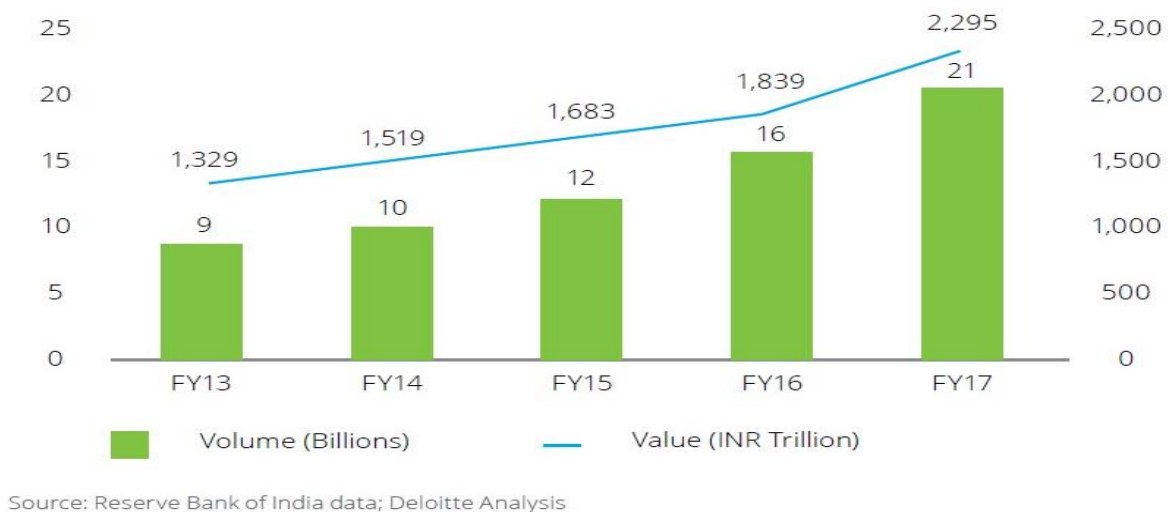Source: Reserve Bank of India data; Deloitte Analysis

Figure 10: Digital payment transactions over the years.

The figure 10 above depicts the digital payment transactions over the years from 2013-2017 and gives the details of how it has increased massively. The governments area of interest is not majorly cities but in targeting the development of rural economy. So, lack of digital financial literacy among rural population is the major challenge so a project "Digital Finance for Rural India: Creating Awareness and Access" is launched under the 'Digi Dhan Abhiyan' initiative to target 10 Million rural citizens[15]. Apart from these free educational television channel 'DigiShala' which

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15   http://digitaljagriti.in/

is available on Doordarshan's DTH platform is launched with an objective to impart all information related to digital payment ecosystem. Akodara, was the first digital village of 1200 people was adopted by the ICICI bank. The most important transactions of the villagers have been digitalized and made cashless. Also, their accounts are linked with Aadhaar cards, which means that government funds and grants are being directly transferred into their saving account.

Some of the digital payments methods[16] supported by the government as seen in figure 11, which are already available and in use are:
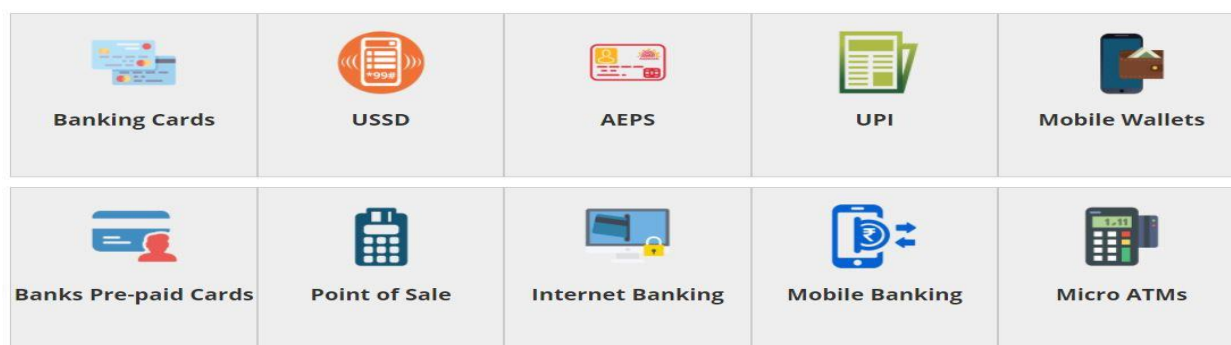
Figure 11: Government supported digital payment modes.

- Banking cards: Wide variety of card includes debit, credit, cash, travel, others that is issued by the bank to its customers. This mode is most secure and convenient. There is a 2-step authentication (PIN and OTP) for secure payments. These cards can be used at PoS, ATMs, microATMs, wallets, shops, online and e-commerce websites. Examples RuPay, Visa, MasterCard

- Unstructured Supplementary Service Data (USSD): the *99# works on the USSD channel. This allows mobile banking transactions using basic mobile phone (internet/smart phone is not required) so it can be used by every common man to avail banking services by dialing the common number *99# across the telecom service provider and transact using the interactive menu displayed on the mobile screen. Services that can be availed are interbank account fund transfer, balance enquiry, mini statement by remembering the Mobile Money Identifier MMID and Mobile PIN MPIN. This facility is offered by 51 banks and can be accessed in 12 different languages. Limit of fund transfer is Rs. 5,000 per day. Figure 12

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16   http://cashlessindia.gov.in/index.html

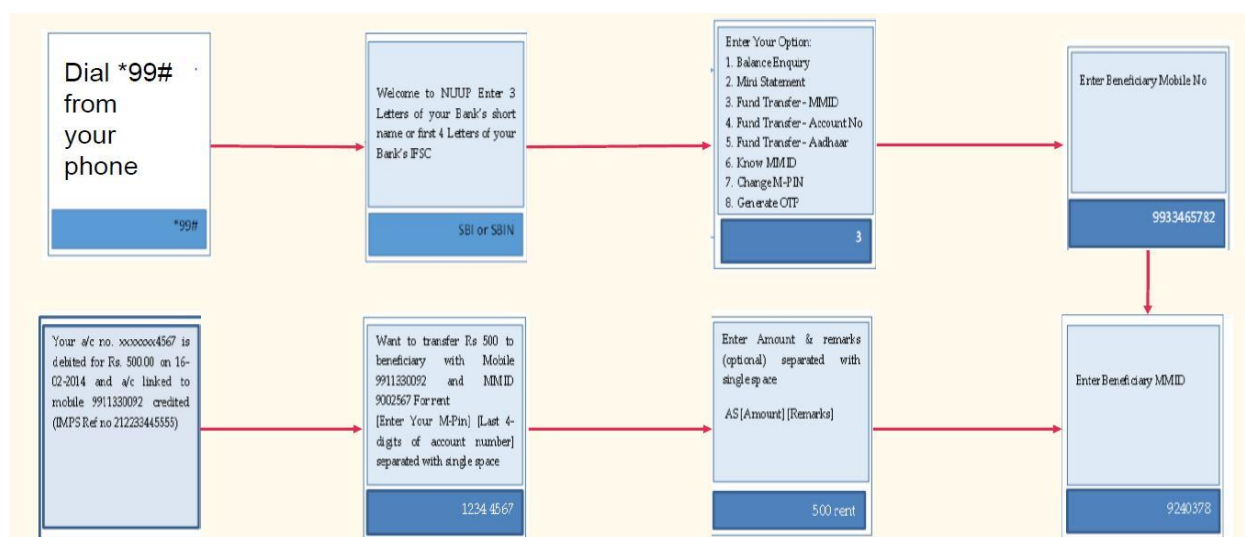details the step-by-step procedure to avail services as shown below.

Figure 12: Step-by-step procedure to avail *99# USSD services.

- Aadhaar Enabled Payment System (AEPS): it is a bank led model allowing online financial transaction at PoS/microATM through Business Correspondents BC or bank mitra using Aadhaar[17] authentication (biometrics) without the need to remember any pin or password. Figure 13 is an illustration explaining the procedure for AEPS.
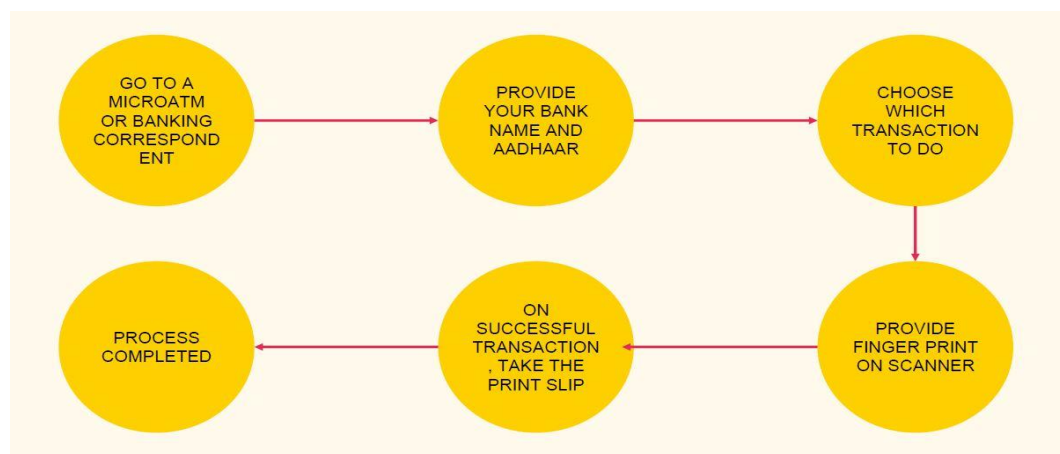
Figure 13: Process of AEPS using microATM

- Unified Payments Interface (UPI): this system powers multiple bank accounts into a single mobile application. Each bank has its own window. Allows merchant payments, fun

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[17] Aadhaar is a 12-digit random number issued by the Unique Identification Authority of India (UDAI) to the residents of India. Aadhaar identification cards contain a unique identification number that would capture all the details, including demographic [name, date of birth(verified), age(declared), gender, address, mobile number and e-mail id] and biometric information [10 fingerprints, 2 iris scans, facial photograph] of every individual resident of India.

routing and several bank features are merged together and peer to peer collection requests. Requires prior registration, activation, smartphone linkage and internet facility. Limit on funds transferred Rs.1lakh per transaction. Example: BHIM application.

Figure 14: Registration procedure to use UPI payment mode
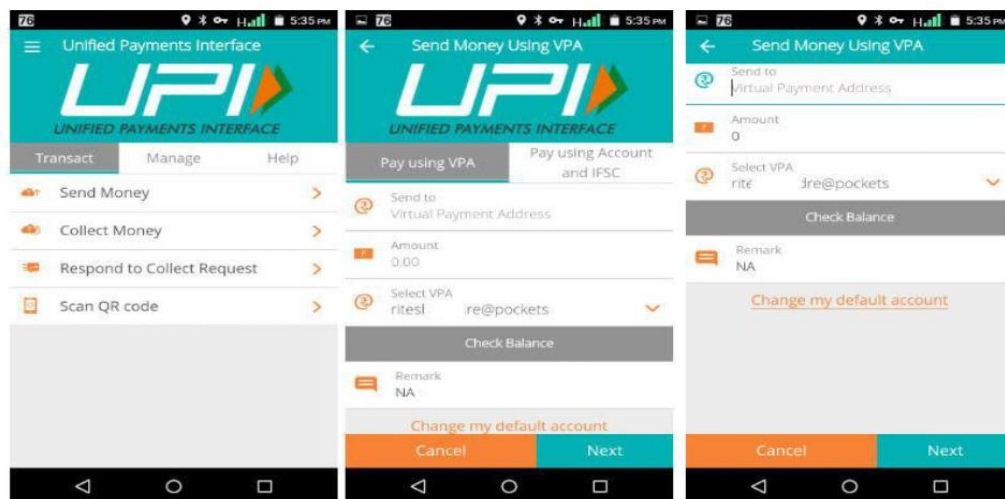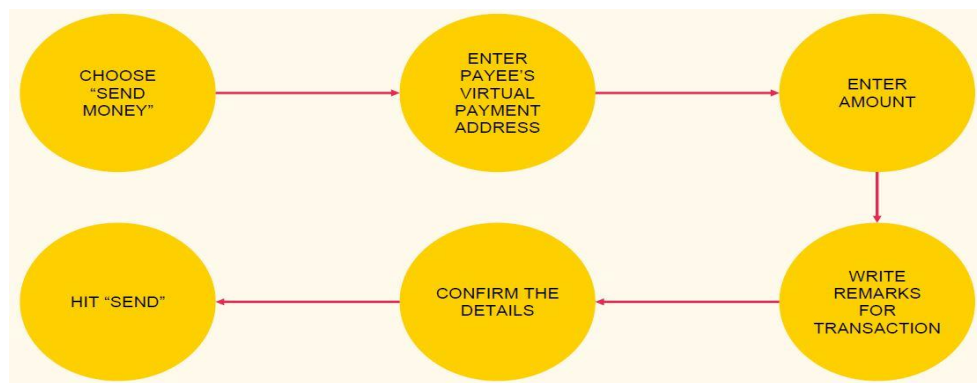
Figure 15: Procedure to send money using UPI payment mode.
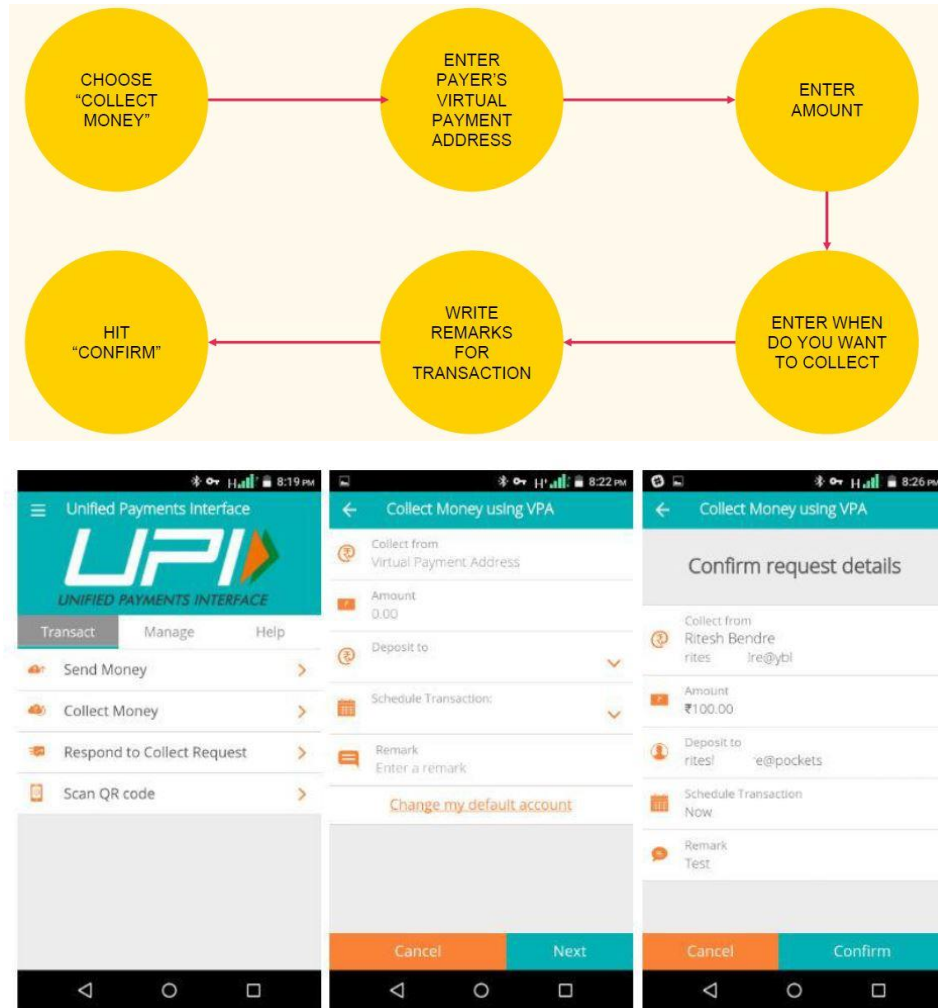
Figure 16: Procedure to collect money which is sent using UPI payment mode.

The figures 14 explains the registration steps for UPI, the figures 15 and 16 details the steps to be followed while sending and receiving money using UPI along with the screen shots of the mobile application for practicality.

- Mobile wallets: it is a digital format of carrying cash. All the cards (credit, debit) can be linked to the mobile wallet application. Payment is made using the smartphone instead of the plastic cards and can read barcodes. It requires to link the individuals bank account to load money into the digital wallet. These transactions may be subjective of some fee. Figure 17 steps followed by the consumer and merchant while carrying out operations using mobile wallets. Examples Paytm, Freecharge, Mobiwik, Oxygen, mRuppee, Airtel Money, Jio Money, SBI Buddy, itz Cash, Citrus Pay, Vodafone M-Pesa, Axis Bank Lime,

ICICI Pockets, SpeedPay, Juspay etc.

Consumer Wallet Limits: Rs.20,000/month for all. Rs.1 lakh/month with KYC
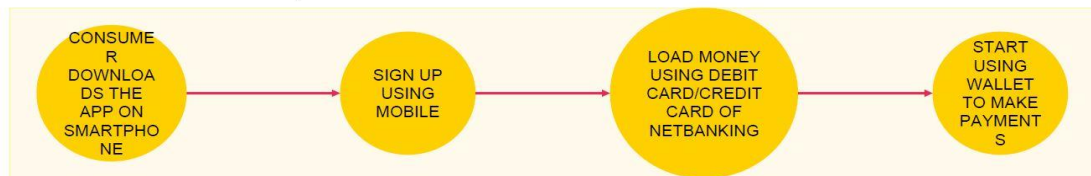
Merchant Wallet Limits: Rs.50,000/month with Self Declaration. Rs.1 lakh/month with KYC
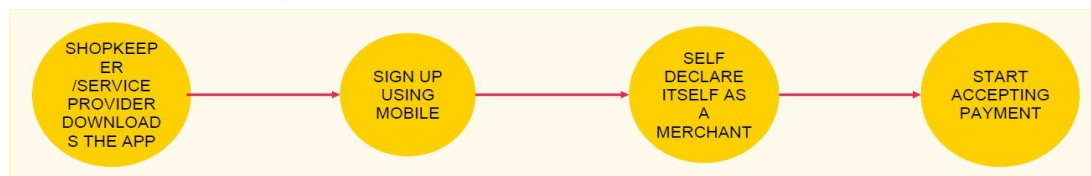
Basic Requirements to Start Using a Wallet: Bank Account, Smartphone, 2G/3G Connection & A Free Wallet App

Figure 17: Procedural steps in using mobile wallet payment option by customer and merchant.

- Bank pre-paid cards: provided by the bank on request. Takes about 1-2 days for availing the card. Authentication by MPIN/PIN. Customers may pay service charges based upon the bank for each card reload or each transaction.

- Point of Sale (PoS): it is a handheld device with a card or biometric reader. It is used in the places where sale is possible, can be a mall, market or a city where the customer completes a transaction such as a checkout counter where the purchase is made. Requires internet and merchant bank account.

- Internet Banking: provides the customer to make a range of financial transactions through the financial institute's website. Different types of online banking are-National Electron Fund Transfer (NEFT), Real Time Gross Settlement (RTGS), Electronic Clearing System(ECS) and Immediate Payment Service (IMPS).

- Mobile Banking: Allows the customers of the bank to conduct different financial transactions through a mobile application developed exclusively by their respective banks.

- Micro ATMs: is a micro platform device connected to the banks across the country. This device enables the individual to instantly deposit or withdraw money regardless with the bank associated with the bank correspondent. On providing valid identity authentication the bank correspondent acts as a bank and money can be deposited or withdrawn from his
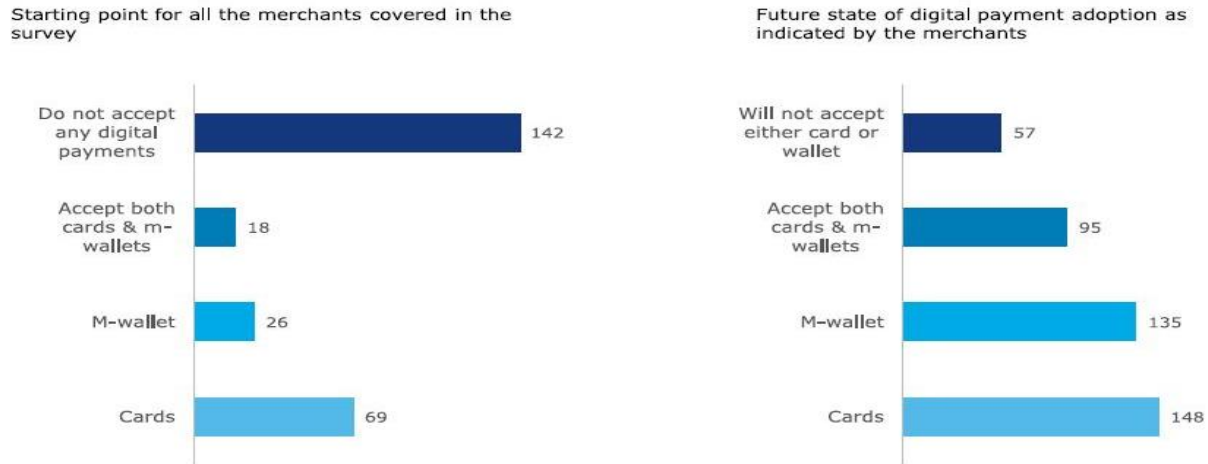
cash drawer.

Starting point for all the merchants covered in the survey

- Do not accept any digital payments: 142
- Accept both cards & m-wallets: 18
- M-wallet: 26
- Cards: 69

Future state of digital payment adoption as indicated by the merchants

- Will not accept either card or wallet: 57
- Accept both cards & m-wallets: 95
- M-wallet: 135
- Cards: 148

Figure 18: Adoption of digital payments trends pre and post demonetization[18]

In the recent report published in collaboration by CII (Confederation of Indian Industry) and Deloitte [31] the figure18 above shows the study of pre and post demonetization trends for digital payments and how it has gained momentum in the current times.

Globally the face of accounting is advancing to the next level referring to the International Accounting Education Standard Board IAESB article [22] where changes in technology occurring in the business fields are influencing the ICT skills required by the accountants. So, the standard is examining the mega trends to steer accounting into the digital era.

- FinTech industry: they cover broad area of finance sectors for example borrowing money, foreign currency, international money transfer, multi-factor authentication and payment security solutions for mobile applications, e-commerce and financial advice. These FinTech companies have influenced the accounting sectors by reformulating the design, advancements in technical developments and software development. They are providing services in asset management, fraud protection and retail banking. Accounting software provides direct link between credit and beneficiaries, thus providing value-added services to clients. It creates scope for the accounting by managing regulatory, financial aspects and tax of the industry.

- Big data and data analytics: Big data describes large volume and complex data that deals

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18   Source: Reserve bank of India, Deloitte analysis

with day to day business. Data analytics involves qualitative and quantitative techniques and processes such as extracting data, categorizing, analyze hidden patterns, customers preferences and market trends. Data analytics creates opportunity in accounting by identifying debts, responding to fraud risks, increasing audit effectiveness and efficiency. This kind of accounting system will change the perception of looking at the past to forecasting the future.

- Bitcoin and Blockchain: Bitcoin is one of the first decentralized digital currency, allowing to make online payments without going through financial institution. The advantages of using this system are faster transaction speed, security and reduced cost. The blockchain technology supports bitcoin. The distributed data base allows the partitioned blocks to be added continuously forming a new sequence. These blocks are linked using cryptographic signatures so that the transactions are time-stamped and tamper-proof. This will enhance the scope of accounting profession where the verification of transactions will not be required.

- Cloud computing: it is a technique to store, manage and process data using a network of remote servers over the internet rather than the computer. This system provides cloud computing without the need of desktops, software, infrastructure costs and local area networks. Cloud computing is transforming business and widely rebuilding the accounting sector when information is required to be accessed from anywhere and at any time.

- XBRL Extensible Business language: the reports in the XBRL are easily accessible and readable by the computer for analysis. It allows electronic exchange of financial data between entities i.e., from viewing to analyzing data. The unique tags defining the labels, provides information about each line item in the financial report which is allowing its users to make better decisions and compare the performance time. To understand the impact on accounting the accountant require the knowledge of XBRL filing process.

- Mobile phone technology and websites: this technology has taken over the desktop computers. Mobile phones are not just limited to communication but are used in day-to-day activities such as paying bills, accessing exchange rates, invoicing clients etc. many small businesses are solely dependent on mobile phone technology.

- Artificial intelligence and drone technologies: Automation through machine learning has a great impact on the finance and accounting sector. Robots and bot-technologies are being

employed to perform calculations and data analysis in many businesses. Drones are another technology that can be incorporated into auditing. Mining and agriculture are using drones to enhance routine audits. This technique is used to carry out activities in dangerous areas.

- New software: To enhance productivity software companies are offering to simplify tasks. Many applications such as MYOB, QuickBooks, NetSuite, Xero, Wave, Sage 50, Arthmo etc. being developed specifically for accounting which saves time for accountants and makes more time for value-added client services.

- E-Business: the team members of the business process are responsible for coordinating the activities for internal management. They combine client's information with financial data using the digital network medium. The exchange of information is possible with internal and external networks called Intranets and Extranets. The distribution of data through a single point access or Web interface with encrypted is attained with this technology.

- Enterprise Resource Planning (ERP): they are mainly composed of software programs that unite different departments of an organization to work in the same environment (i.e., central data base) by making information about the groups and its activities available to be accessed from multiple locations.

Apart from the globally developing trends it is better to adopt to the already available trend in the local market. The most common accounting systems are the ERP software's that either uses the web or cloud platform to access their data base. Choosing the right software is critical and depends on several factors such as required features, organization size, usability, cost etc. Many organizations are using the web or cloud computing ERP software's for accounting at present.

On web researching, there are many micro-finance programs successfully using ICT's to digitize microfinance system in India. Some of them are:

1. NABARD[19] is National Bank for Agriculture and Rural Development has established a pilot project 'E-Shakti' for digitalization of SHGs to improve the quality of book keeping by allowing the bank to take informed credit decisions through a Management Information System (MIS). This project employs a customized mobile phone application for e-book keeping involving regular updates of transaction data, reports, monitoring attendance, auto generation of loan applications, history of savings and repayments etc. and all the data is

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[19]   https://eshakti.nabard.org/

hosted onto the dedicated website "www.eshakti.nabard.org" through a central server enabling real time tracking. This organization too has employed animators whose roles are similar to the Arbor staff, they are using this mobile application instead of books and have managed to promote transparency and real-time tacking of the accounts. The application is accessed through authentication of user id and password for securing data and avoiding tampering. Animators are finding this user-friendly because of flexible language options available. The first phase of the project has been implemented in two districts and has been successful. Results have proved that technology customization using local language has been accepted and adopted by the rural poor.

2. Ujjivan[20]: this small financial bank has adopted a mobile and cloud-based technology to manage all interactions with its customers on a single platform. Front end, the handheld devices i.e., mobile/tablet allows fulfilment of field task- customer enrollment, repayments, applications etc. At the backend the staff can process the data collected on field (in the form of images, forms, documents) in real-time through a web interface. These features have accelerated the loan processing time and has indeed eliminated data errors.

3. SHARE Microfin Limited[21]: This MFI has employed integrated technology platform which allows data from all its branches to be sent online to a centralized server for analysis and data consolidation. This has helped the organization to monitor the repayments and accounts of the beneficiaries. Thus, increasing the efficiency and productivity, minimizing time and cost.

4. SKS Microfinance: this microfinance institution uses Personal Digital Assistants (PDA) who use portable devices platform to run software programs to standardize lending methodologies and help in collecting information.

5. Sa-Dhan[22]: is an association of community development financial institution working on the Interactive Voice Response (IVR) system in collaboration with Gram Vaani to address the complaints and as a helpline to provide financial literacy to its clients. The organization is at the verge of setting up a web-based platform to help monitor the activities of the organization and its branches. Many initiatives of promoting digital literacy are currently

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[20]   http://ujjivan.com/
[21]   http://www.sharemicrofin.com/index.html
[22]   http://www.sa-dhan.net/

being undertaken to make the new digital payment systems adaptable in the rural areas. This ICT tool is expected to give real-time and analytical evaluation of overheated areas.

6. Development of Women and Children in Rural Area (DWCRA): it is a government aided anti-poverty program established to promote microcredit program through SHGs. Every woman in the rural in India can be eligible to take part. The credit obtained initially by each member of the group are quite high as Rs.10000 and this scheme supports capital infusion to DWCRA SHGs. This program has partnered with the banks has reduced transaction cost and increased the credit efficiency. The SHG bank-linkage is widely used in the rural areas where the people are visiting the banks to obtain the credit by withdrawing money through cheques/vouchers from their respective group account and for monthly repayments through a voucher payment scheme available at the bank. The program is known to charge interest rates for missed repayments during the loan period. Many beneficiaries at Arbor are a part of DWCRA and avail loans here too. It is revealed that repayment was usually done once in a year with high interest rates and unlike Arbor they do provide adequate awareness of the effect of over indebtedness and assistance to women. There have been cases of fraud reported where the members are forced to pay interests and sometimes do not obtain the entitled credit amount assigned by subtracting additional charges such as form filling fee obtained by the animator/grama-deepika.

Considering all the above-mentioned trends in both the fields of cashless transaction and digital accounting systems is crucial to choose the solutions complying with Arbor. This could possibly be overcome by defining a few comparative criteria and making a comparison of these solutions using a comparative scale (as shown in figure 19) to test all solutions for understanding the features required to meet Arbor needs clearly in the comparative tables 3 and 4. The effective solution can be chosen seeing the color representation.
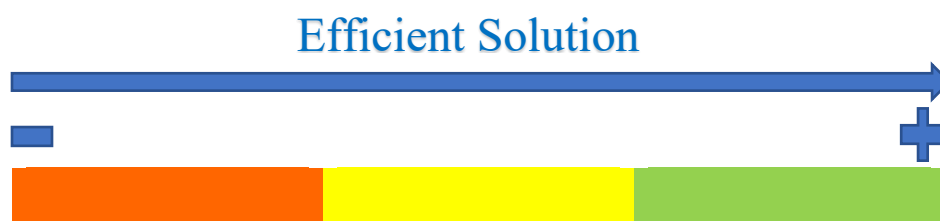
Comparative scale:

Figure 19: Comparative Scale

Definition of Comparative Criteria's

1. **Complexity:** *Level of difficulty in terms of operation (hardware and software) of the proposed solutions.*

   Scale:

simple	moderate	complex

2. **Availability:** *Resources & Technology already present/available in the locality(villages) with stakeholders.*

   Scale:

yes	sometimes	no

3. **Customization:** *How flexibly the solutions proposed can be personalization i.e. if there can be changes or can adopt the features suitable for the changing requirements and environments.*

   Scale:

yes	sometimes	no

4. **Training Intensity:** *Degree of teaching skills required to understand and practically operate the new technology going to be adopted (hardware/software).*

   Scale:

low	moderate	high

5. **Maintenance:** *Effort/process of preserving the correct functioning of the device/process. [using facilities of servicing, repair, replacement-<u>for digital cash</u>.*
   Working with ease about history of accounts, transparency, efficiency -<u>for accounting</u>].

   Scale:

low	moderate	high

6. **Connectivity:** *here, related to internet, electricity supply in the area(villages) for real-time money transaction, data updating and back-end monitoring.*

   Scale:

requires internet	-	requires no internet

7. **Cost:** *Overall expenditure from the initial set-up, maintenance and all miscellaneous expenses included.*

   Scale:

low	medium	high

Comparative table for transaction:

Criteria's	CASHLESS OR DIGITAL PAYMENT MODES				
	Cheque/Voucher	**USSD**	**Mobile wallets & UPI**	**Internet/Mobile Banking**	**PoS, AEPS & microATM**
Complexity	Simple	Simple	Complex	Complex	Moderate
Availability	Yes	Yes	No	No	Sometimes
Customization	Yes	Yes	Yes	No	Sometimes
Training Intensity	Low	Low	High	High	Moderate
Maintenance	Low	Low	Low	Low	High
Connectivity	No internet	No internet	Requires Internet	Requires Internet	Requires Internet
Cost	Low	Low	High	Medium	High

Table 3: Comparative table for digital or cashless transaction.

Comparative table for accounting:

Criteria's	DIGITAL ACCOUNTING METHODS		
	Mobile application with website	**Barcode scanners with website**	**Mobile application with cloud computing**
Complexity	Simple	Moderate	simple
Availability	Yes	Yes	Yes
Customization	Yes	No	Yes
Training Intensity	High	Moderate	High
Maintenance	Yes	Sometimes	Yes
Connectivity	Requires internet	Requires internet	Requires internet
Cost	Medium	Low	High

Table 4: Comparative table for digital accounting.

2.2.2 Social and cultural aspects affecting the adoption of ICT solution

There are numerous advantages of digitalizing the microfinance sector such as increased transparency and security, improvement in operational efficiency, real-time and reduce costs etc. But the main challenges encountered while adopting ICT's for digitalization are to be considered:

- Education: Digital literacy is an integral aspect affecting the beneficiaries from adopting digitalization. Arbor's women are mostly people from the rural or semi-urban areas who are often illiterate or educationally deficient. It is extremely difficult for them to understand and learn to interact with technology which is essential for the progress of the organization. Before adopting changes, it is necessary for the organization to understand the local community. The people must be provided with awareness, adequate training and personal support services to enhance the comfort level of using the technology.

- Infrastructure/ environment: Many villages do not have adequate communication wiring or electricity. In some villages there are no banks and hence people must travel long distances to avail bank services with limited transportation options. When adopting a technology, the organization has to keep in mind the level of knowledge possessed by an average number of customers towards that method. Otherwise even the most promising technologies (PoS, ATM) can lead to failure when the customer does not know how to use it. Even if there are infrastructure people are subjected to bear additional transaction costs as the people in the rural areas are not concentrated in one area and are often spread out.

- Affordability and sustainability: Most of the software's available are developed for the use of large organizations and these are not suitable for small MFI's. Furthermore, these high-end software's are expensive due to the subscription of the license, amount of customization and costs associated with training. Among arbor's staff there are just two people who are operating the computer for accounting and there are limited number of people operating phones usually basic handsets without internet are used by all animators and percentage of phone users in the village areas like Bonakal- 20%, Enkoor- 5%, Manuguru- 20%. Hence lack of skilled staff, high need for localization (language, iconography etc.) and high budget can act as obstacles in adopting digital channels by small MFI.

- Cultural value: Hard cash is not just cash but is a store of value by itself as a farmer or laborer sees these notes as their seasons crop or a day work for a bag of grains for their

family. Cash has a visual meaning even if it lies without safety below the mattress or a cupboard. Visual impact of money is a part of cultural upfront (gifting odd number denominations during events and wedding ceremonies is a wide spread culture across the country). Money is recognized as auspicious and it is worshipped at festivals among some communities of people. The number in the e-wallet or digital payments does not have the same significant value as cash (just like how an e-book cannot completely replace traditional books). Cultural linkage and rootedness to cash lies in the speed of transaction that cannot be replaced by any other means. Cash in hand gives people satisfaction, trust and guaranteed payment means which no technological alternative can gain (one failed ATM operation is enough to lose the trust of the entire village and refrain from using the services). For generations cash is a significance of wealth, prosperity and social status. Except for the current generation no one has experimented an alternative payment method. Transition from cash to cashless economy demands to change the entire mindset of people. The feeling of intense dislike towards technology is due to the lack of trust, comfort and digital literacy. Apart from these there are additional restrictions for women in a man dominated society such as less access to mobile phones, less confidence in using technological services, lower literacy, forbidden to travel and restricted social interaction. People will adopt to new technology if they gain confidence by seeing the advantages of using digital services over time and cannot be rushed.

2.2.3 Feasibility check with local stakeholders

To introduce staff of Arbor to the new ways of doing tasks by adopting technology it is important to consider their point of view on digitalizing. This was possible through a presentation which including videos, demonstrations, explaining commercials of the digitalized payment systems (M-Pesa and Paytm) and digitalized accounting system(E-Shakti). The presentation was very effective, and the response was overwhelming, everyone understood clearly the working of these systems. Having said the feedbacks were very important to the research it was decided to be a one-on-one session with the staff to voice their opinion without getting influenced by others. The feedbacks comprised of simple questions where they simply had to answer with 'yes', 'no' and 'maybe' but, some of them voluntarily stated statements to support their answer. The total number of feedbacks collected were 42 and the details are as follows:

1. Writing books is taking lot of time and effort, if this could be made easier like shown in the video will you use it after proper training?
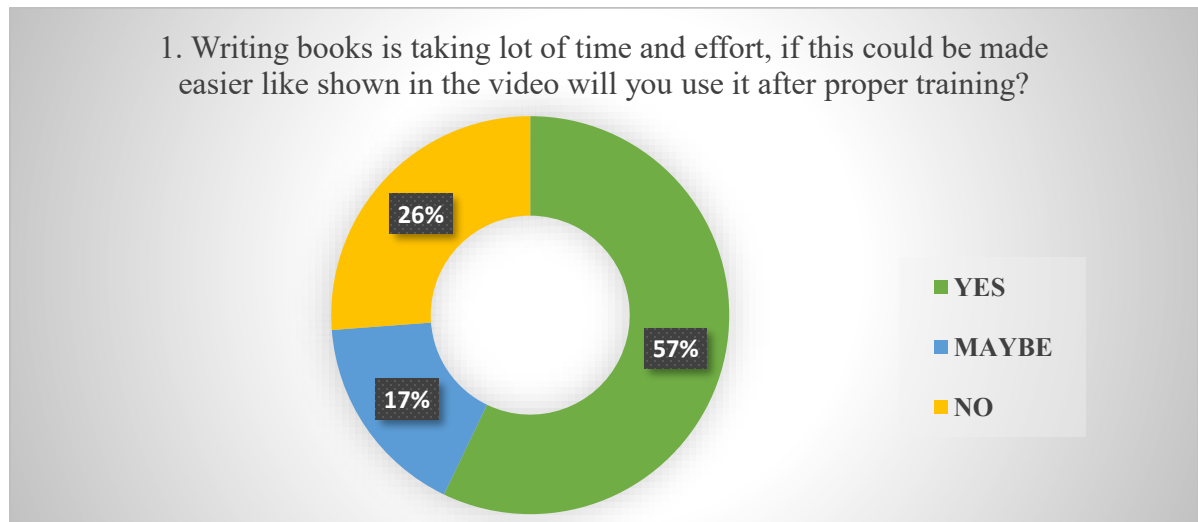

Figure 20: Graphical representation of staff's opinion on book keeping.

➢ Yes-24/42

- o Already obtained training in 2012 & ready to use it
- o Easier, reduces burden of carrying books
- o Transparency and faster data transfer of submission of data

➢ Maybe-7/42

- o Depends on the after-training outcome.
- o Better to draft at least some important documents.

➢ No-11/42

- o Because system becomes transparent and real time, money paid cannot be compensated for missed repayments.
- o Very new, understanding takes time.
- o Books at hand are more reliable for verification of the history of accounting
- o Virus attack can destroy and corrupt data making it in accessible.
- o No permission to use.
- o Websites, cloud, computer can get infected with virus and data can be lost

Comment: The reasons stated by the staff clearly show that the majority agree that there are effective alternative way of doing the same task by using technology and are willing to use it. The 'may be' category of the staff are very practical and have analyzed the situation well. The after

training outcome and drafting some important documents are very valuable suggestions to be considered. 26% of the staff are ignorant having limited or no digital literacy and hence lack confidence in using technology. Their mindset in adopting technology can change with time when they experience the simplicity and benefits of these services.

Some of the drawbacks of book keeping stated by the staff during the feedback conversation:

- Going around to villages (carrying books) makes travel difficult with the load of books.
- Faster rate of submission of data without having to coming to office multiple times.
- Since all data is readily available, data entry is simpler, frequency of errors is reduced which in turn increases time between women-animator relationship.

2. Would you like Arbor to implement the use of such technology? If passbooks and a rough book can be used along with mobile application?
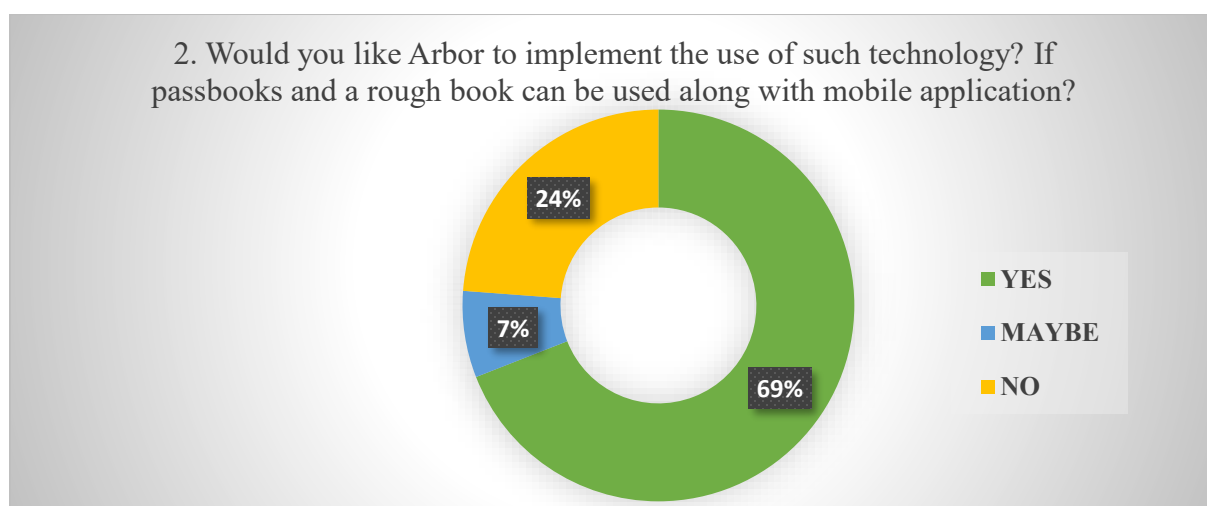

Figure 21: Graphical representation of staff's opinion on implementing the use of technology.

➢ Yes-29/42
➢ Maybe-3/42   Depends on the after-training outcome.
➢ No-10/42   Never! Not ready for change.

Comment: Without eliminating the book keeping principles completely about 76% of the staff are ready to accept the change after obtaining adequate training. The usage of books will slowly decline automatically once they start gaining confidence in the mobile application. While the 24% are never ready for change and prefer to stick to traditional methods.

3. What do you think of the systems shown? Have you seen it/ heard about similar technology (m-pesa/paytm) before? Any suggestions/comments?
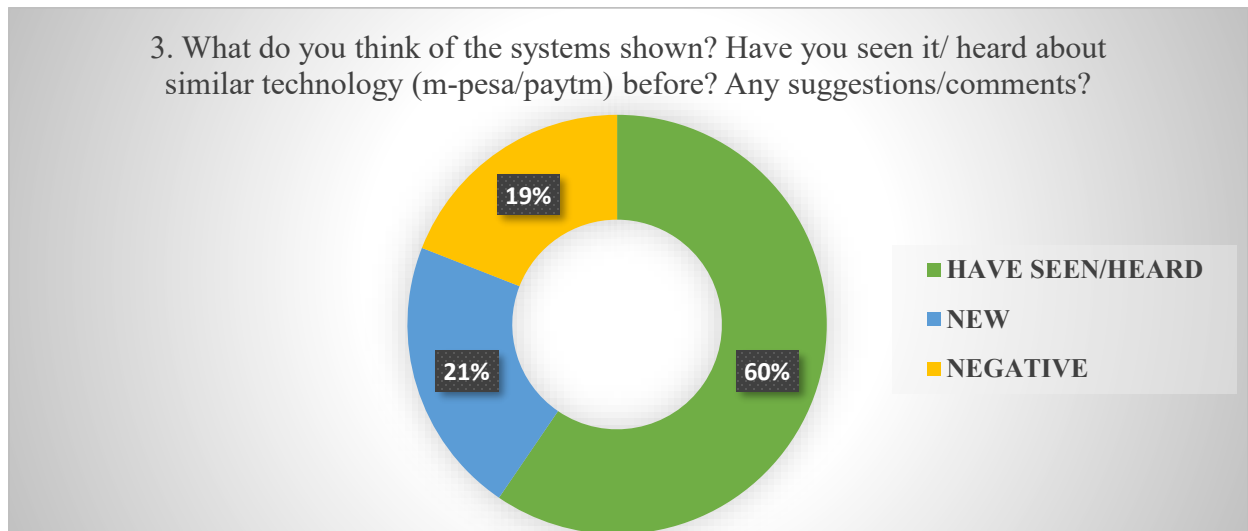

Figure 22: Graphical representation of staff's opinion on the new advancements in society.

➢ New-9/42

➢ Yes, have seen/ heard-25/42

  o Need more information, interested in encouraging such awareness programs and training activities, It's the future, very practical makes life simpler, looking forward towards implementation.
  o Green card from SBI using paytm (mobile application for money payments)
  o Srinidhi cell-cell transfer through government
  o Mobile system in DWCRA
  o Family members are already using

➢ Never-8/42

  o Good for educated and employees in big cities but not in rural villages, Impossible as no permission to have a bank account (coordinator)

Comment: 21% of the staff were never exposed to technology and were first timers. 60% have had a chance to experience technology that is after having used, seen or heard about such technology in the past. Other schemes of payment and accounting systems were stated by them. The rest of the staff do not see it as a possibility of success and lack confidence of the technological systems

shown in the video. On the whole most of the staff were enthusiastic in quest of knowledge and requested to conduct more awareness programs in the fields of technology.

Some questions from the (staff) audience after the presentation:

Q1   How can m-pesa work if implemented?

A   Sending money through m-pesa can work as simple as making telephone call.

   Steps:
   1. Enter the phone number (of recipient)
   2. Enter the amount to transfer
   3. Verify by entering the PIN number
   4. Press 1 to confirm

   But it cannot be used practically as new technology has swept off the old one, unfortunately m-pesa is no more in use and the m-pesa kiosks are disappearing in Khammam.

Q2   How can you access history of group records saved on the phone?

A   Data is saved on the website/cloud so accessing history of group members will not be a problem.

Q3   What happens when the phone is lost?

A   As each animator is given a unique user id & password, after the data entry, one can easily LOGOUT to avoid tampering of data when phone is lost.

Q4   Are error corrections possible when using mobile application for accounting?

A   Yes, unless it is not uploaded to the website/cloud and if you have not clicked on 'submit' at the end.

Q5   Phones are not affordable for all, as they are expensive

A   Phones now are a necessity as there is so much one can do with a simple phone apart from calling, there are chances to buy electronics (fridge, washing machine, etc.) by paying for it in equated monthly installments (EMI) with 0% interest rates.

Q6   What happens when the phones are damaged or do not work effectively?

A   Servicing and replacing of phones if they fail to function (or) replace with new technology after few years once this system too gets outdated.

CONCLUSION

The feasibility study analyses the current scenario of the organization and it is summarized in table 5 below covering all the features and problems of the current trends of accounting and transaction systems.

	Advantage	**Disadvantage**
Accounting using books	Easily available	Frequent occurrence of errors and takes up space for storage.
	Simple operation (basic knowledge is sufficient)	Demands constant monitoring and verification
	Low intensity of training	Time consuming process
	Serves as a visual proof	Not real time
	Cost efficient and affordable	High chances of books getting misplaced, damaged or tampered.
Accounting with Tally software	Well suited for small sized organization as advanced software's are complex and requires hiring skilled operators	It is an offline software hence there is no backup. High chances of data loss occur when the system crashes or with virus attacks.
	Simple accounting software used across India for auditing	Single operating window
	Flexible has no complex programs or codes	Purchase of software and renewal of license periodically is expensive
Cash transaction	Most widely used form of transaction (98% of Indians use cash)	High risk and low security in manual distribution and logistics of cash.
	Sure payment option as most beneficiaries are farmers, daily waged workers etc. entirely depend on cash and cash has a visual impact on cultural front all over the country.	Cash scarcity after demonetization and government progressing towards cashless economy with banks limitations on cash withdrawal.

Other payment options	Solves cash deficient problems	Non-availability of resources at rural areas.
	Secure payment reducing risks	Lack of awareness and low confidence in the technological systems.
	Real time updates	Fear of acceptance towards new trends in the market
	Operational efficient	Expensive for the rural people and they cannot afford it.

Table 5: summary of features and problems of the current scenario

Digitalization is a sure solution to overcome all the obstacles faced by the organization. According to the aim of the thesis early and rapid transition is not possible as it depends on various factors governing the environment, sustainability, Arbor staff's and beneficiary's acceptance for using ICT's.

Transaction system: Complete removal of cash and making the system cashless is impossible. Though the government is taking steps to eradicate cash, making India a cashless economy remains only a dream come true especially considering the life and resources in the rural areas. Alternative payment schemes cannot replace cash transactions permanently. Simple and universal method of payment by cheques can be adopted to distribute advances to solve cash scarcity problems temporarily. The Director has agreed to adopt issuing of cheques in two villages (Enkoor & Naidupeta).

Accounting system: Adoption of ICT's for accounting is already implemented by some of the microfinance institutions in the same locality and have been successful. Implementing change and adoption of the ICT's for the accounting can be adopted. The feedbacks show that about 70% of the staff are ready for the change and are willing to adopt technology for improved operational efficiency in accounting after obtaining adequate training. Awareness of upcoming technologies and its operation will be a good platform for them and they should benefit from such vocational training activities [operating computers, smart phones, etc.]

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