

Digital Financial Needs of Micro-entrepreneur Women in Pakistan: Is Mobile Money the Answer?

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ABSTRACT

This paper studies the use of Digital Financial Services (DFS) as a solution to women's financial inclusion in deeply patriarchal, resource constrained communities. Through a qualitative, empirical study we map the financial life cycles of 20 women micro-entrepreneurs in different cities in Pakistan and the challenges they face. We explore how technology is currently influencing these women's businesses and personal lives and reveal how mobile money is not tuned to the problems they face and their financial needs. We present alternate design directions for meeting the technological and financial needs of these women, circumnavigating the patriarchal structures that constrain them.

CCS CONCEPTS

- Human-centered computing → Human computer interaction (HCI); HCI design and evaluation methods; Interaction design;

KEYWORDS

low-resource, women, DFS, financial inclusion, gender

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1 INTRODUCTION

The size of the financially excluded population in the world stands at 2 billion [10]. Financial inclusion refers to a process that ensures *ease of access* and *affordability* of formal financial services for all people of a given population and is an important means to tackle poverty and inequality.

In recent years there has been a concentrated effort to design technologies to combat financial exclusion for low-resource communities in developing countries like India, Kenya and Bangladesh [2, 24, 31, 44]. Digital financial services (DFS) are presented as a viable alternate to formal banking structures for low-resource populations by providing tools for accessing savings, spending and utilization of money digitally through use of mobile money platforms and mobile-phone based services [26, 28]. The benefits of using mobile money services are thought to be particularly well suited to developing countries where using a formal bank involves travelling a significant distance (to physical bank branches), requires literacy, extensive documentation, high transaction costs and the services offered are not suited to low-income segments which are characterized by unpredictable earnings.

However, the barriers to financial inclusion are many and diverse and solutions that work for one population may be redundant for another [29, 35, 38]. One concern is that the local specifications of developing countries are less understood in the West and this is exacerbated for highly religious and patriarchal communities like Pakistan [33, 40]. Inherent attitudes of a patriarchal society, that men are superior to women combined with a religious mindset where women are to be monitored and controlled create daunting challenges for women in Pakistan [39].

Pakistan is on the list of seven countries that, in economic terms, constitute half of the unbanked population around the world [10]. By itself, Pakistan constitutes about 5% of the total global population with no access to financial services. What is even more worrying is that less than 5% of women in Pakistan are included in the formal financial sector, compared to South Asia's average of 37%[18]. Pakistan, along with Syria also scores last in the gender gap for Economic Participation and Opportunity (out of 144 countries) and places second to last in the gender gap index. According to the 2017 gender gap report, at the current rate of improvement, it will take 217 years to close the economic gender gap [14]. Financial inclusion is key to closing this gap where lack of access to financial services reduces a woman's ability to engage in productive economic activity and increases their likelihood of living in poverty.

It is imperative for the HCI community to play an active role in not only understanding the reasons behind populations that score the worst on the gender gap and financial inclusion index but also in pursuing designs for reducing this gap. Any viable solution that looks to tackle these issues would need to be based on technology design that is grounded in the local context and an understanding of the current use of and access to technology in low-resource communities.

We conduct a qualitative, empirical study to explore the financial lifecycles of low-income micro-entrepreneur women in Pakistan and map the landscape against which any technology design could happen. Women in Pakistan present a unique challenge in terms of access and availability for research and given the deeply religious nature of Pakistani society there is little existing research mapping the financial and technology lives of women in Pakistan [23].

We identify key issues faced by women in Pakistan and reveal constraints within which any meaningful design for financial inclusion must be placed. Our study reveals that digital financial services (DFS) as it stands currently, is unsuited to the financial needs of Pakistani women and we make alternate design guidelines for technology interventions that would cater better to their financial life-cycles and might lead to increased financial inclusion.

Our work makes four unique contributions. First, we reveal the daily challenges that Pakistani micro-entrepreneur women face in their businesses and personal lives, that constrain any future technology design. Second, we map out the current role of technology, access to it and the impact it has on their business and personal lives. Third, in light of the data obtained, we analyse the applicability of DFS to women micro-entrepreneurs in Pakistan and explain why DFS may be a poor fit to meet their financial needs. Fourth, we present alternate technology guidelines to design for the

financial inclusion of women in Pakistan in order to reduce the existing gender gap.

2 BACKGROUND

Due to the sheer scope of research on gender and technology, we limit our related work to gender and financial inclusion and existing digital financial services.

Financial inclusion is the accessibility of basic financial services at an affordable cost to the all groups within a population. It includes access to formal financial systems like loans, savings and insurance services.

Digital Financial Services and Financial Inclusion

Currently in Pakistan there exist two primary mobile money models; over the counter cash transactions and mobile wallets. Over the counter cash transactions (OTC) occur when senders/receivers instead of using their own accounts, transact in cash with an agent who executes the electronic payment on their behalf. The main services provided under mobile wallets are bill payments and top-ups (for mobile phone cards), disbursements and collections, cash deposits and withdrawals, savings, fund transfers, and agent liquidity management [37]. Providers are also working towards offering life insurance and digitizing payment use cases such as school fees and government payments [11, 22].

Recent studies have shown that the factors that influence the adoption and use of digital financial services are diverse and varied [2, 26]. Medhi et al. [30] in an analysis of five different mobile banking services, Globe Telecom's GCash in the Philippines, Safaricom's M-PESA and Equity Bank's Eazzy 24x7 in Kenya, WIZZIT in South Africa and Eko in India, reveal that the adoption by low-literate users depends on factors like household type, services adopted and frequency and ease of use. According to their study, geographic splitting of family members played an important part in the adoption and use of mobile banking services. Similarly, trust and perceived usefulness contribute towards adoption of mobile money services [9]. Interestingly Chauhan et al. [9] showed that perceived ease of use does not influence perceived usefulness or attitude towards usage.

One of the most commonly cited examples of DFS success is M-Pesa in Kenya with 27 million registered users in 2017 [41]. M-Pesa allows for the safe storage and transfer of money, payment of utility bills and purchase of services over mobile phone accounts. M-Pesa has also had the effect of empowering women who traditionally have had less bargaining power in the household by allowing them control over remittances received [19].

However, most mobile money services deployed have had limited impact, where even replicating successes like M-Pesa in a different geographic and cultural context like South Africa have failed [12, 27]. This is because one size does not

fit all for mobile money systems and a deeper understanding of the sociocultural, and technological context is important for the success of a mobile money deployment [29, 35, 38]. In comparison to Kenya where there is negligible difference in phone ownership between men and women, in Pakistan only 27% of women own mobile phones as compared with 86% of men [8].

A recent study by Ibtasam et al. [17] presents results from a broad examination of 51 participants (10 men, 41 women) in Pakistan from a wide range of backgrounds to understand the barriers to financial inclusion. Their study concludes with the hypothesis that entrepreneurial women (9 out of 41 women were micro-entrepreneurs) are the most ready to adopt digital financial services (DFS) because they have overcome a number of barriers like limitations on financial transactions and restrictions on travel. In our work we examine this hypothesis by conducting a focused study of a group of low-income women micro-entrepreneurs - and draw a negative conclusion to the hypothesis. We do not look at a broad section of women or at barriers to financial inclusion like mobility, social access etc. but instead focus only on micro-entrepreneur women to determine if, once the quoted barriers [17] are removed is DFS adopted? This question of whether DFS is a good fit for women in developing countries like Pakistan is particularly important given the push to implement digital financial services as a solution to the financial inclusion problem.

In another study conducted in Afghanistan, Blumenstock et al. [7] investigate the potential for mobile money to impact the lives of low-income users. Their results show that although mobile salary payments benefited employers, increasing the efficiency and lowering costs for their traditional systems, mobile money had no immediate or significant impact on individual wealth or well-being of the low-income salaried employees. In a similar study, Aker et al. [2] investigate the effect of moving a cash transfer program in Niger from cash to mobile money. They also found that the switch to mobile money might not lead to improved financial inclusions for all households in all contexts.

One common strategy for deploying mobile money in low-literate populations is to use intermediary agents. Mehra et al. [34] describe a mobile phone-based loan management application for auto-rickshaw drivers in India. Their work, Prayana, enhances collaborative loan management between the drivers and the collectors of these loans. In contrast we focus on designing for women as sole managers of their finances.

Technology Design within a Patriarchal Context

A recent study by Sultana et al. [45] discusses the impact and use of technology by rural women in Bangladesh. Their work highlights the need for designing within the local context and

the existing patriarchal structures. Their study is seminal in pointing out that for meaningful change to take place technological interventions have to work around existing limitations and support mechanisms women already employ to navigate their lives.

One such issue prevalent in Pakistan that factors heavily into the financial burden on most households is that of dowry. Within Pakistan's context dowry typically means transfer of paternal property, when a daughter is married, to her husband and his family [16]. This usually takes the form of furniture, electronic items, linen, money, household items and sometimes land, gold and cars. The amount paid in dowry depends to a large extent on how desirable the groom and his family are [3]. In societies like Pakistan, India and Bangladesh where dowry is prevalent [32] this places an immense financial burden on families with daughters. In our study we explore the existing mechanisms in place for the financial management of dowry payments for families and discuss guidelines for design of meaningful digital financial interventions.

Another restriction women in countries like Pakistan face is lack of privacy. The prevalent use of mobile phones as shared devices in the developing world has been discussed by Jeffery who argues that as compared to subscriptions, phone usage is a better measure of phone access [20, 21]. Similarly, Sambasivan et al. [42] in a recent study looked at how women in Pakistan, India and Bangladesh manage privacy on their phones. They reveal that women's devices in these countries is monitored by their social relations, particularly husbands, brothers and parents and that this is a cultural expectation for women as opposed to a socially undesirable behaviour. All the women in this study owned their own personal mobile phone and their general devices use was analysed. In contrast, we look at women micro-entrepreneurs where device ownership was not a pre-requisite and we focus on their usage of technology for financial management.

3 STUDY DESIGN

Twenty unstructured, in-depth interviews and participant observations of low-income microentrepreneur women were carried out in rural and peri-urban areas in Lahore (7 interviews), Faisalabad (6 interviews) and Gujranwala (7 interviews). Women between the age group of 25-50 are interviewed, with an average age of 35 years (Table 1). Respondents with an income bracket ranging from PKR 15,000-50,000 (USD 121 - 405) are chosen given that ninety percent female owners of micro, medium and small enterprises lie within this bracket [4]. This range is indicative of the revenue and not profit, which may vary significantly across the sample size. We focus on women with varied education levels where no respondent who has more than 12 years of

Age Groups (years)	18-24 = 0 25-34 = 3 35-44 = 14 45-54 = 3 54-Above = 0
Martial Status	Single = 0 Married = 17 Divorced = 1 Widow = 2
No of children	Min: 1 Median: 4.5 Max: 8
Family Set-up	Nuclear: 12 Joint: 8
Education Level	No formal schooling = 11 Less than 5th grade = 3 Less than 10th grade = 2 Completed 10th grade = 2 Completed 12th grade = 2
Household income (USD per month)	Min: 146 Median: 170 Max: 285
Home Ownership	Own: 14 Rent: 6
Business	Beauty Salon = 6 General Store = 4 Dairy = 1 Spinning = 2 Tailor = 4 Garments = 3
Phone Type	Smartphone = 9 Feature phone = 11
Phone Ownership	Personal = 13 Shared = 7
Texting	Can not text = 12 Can text = 8 Can read text = 8 Can not read text = 12
Calling	Can call = 11 Can not call = 9

Table 1: Demographics of the 20 Participants.

education to allow us to understand the design needs of low literate populations (Table 1).

The data collection tool was piloted and continuously improved to ensure high quality data collection. These interviews were recorded (after obtaining informed, recorded oral consent from the participants), anonymized and transcribed. Field note summaries from participant observations were prepared for data triangulation and additional insights.

Choice of Participants

Previous work by Ibtasam et al. [17] present an initial exploratory study in mapping the DFS readiness of women across different cities of Pakistan. Their findings reveal that women micro-entrepreneurs who run small businesses like beauty parlours, embroidery shops and in-home tailoring

businesses fulfilled the pre-requisites for mobile money adoption; they have agency, greater access to phones and mobility. Based on this, we limit our participants to micro-entrepreneur women in order to determine if, once these barriers are overcome, they adopt digital financial services. Participants were approached through micro-finance institutions (10 women, MFI) and through snowball sampling (10 women, SS) to eliminate plausible bias of approaching participants through a micro-finance institution only.

Interviews

The interviews were conducted by women who are fluent in English, Urdu and Punjabi. The language of each interview was based on the preferred language of the participants. These interviews were carried out either in the homes or in the workplaces of the respondents (which were most often the same) to ensure the participants comfort and allow our team to observe the participants work settings. We also conducted two rounds of interviews. The first round was to gather initial data and get a sense of the financial set up of these women. The second round consisted of observations and follow up questions.

Data Collection and Analysis

Over the two rounds of data collection we approximate 20 hours of audio recordings and copious field notes. The audio recordings were transcribed and a thematic analysis was performed on the data. The thematic analysis was conducted by three researchers separately and then the codes combined. Examples of codes include, "dowry", "financial hardship", "borrowing", "Mobile Phone", "ROSCA" and "gold". The codes from the three researchers were iteratively refined and combined under related themes. In the following sections quotes from women recruited through micro-finance institutes are labelled MFI's and those through snowball sampling, SS.

4 FINANCIAL ECOSYSTEMS OF PAKISTANI WOMEN MICRO-ENTREPRENEURS

The main goal of our study is to understand technology and financial readiness for financial inclusion. In order to design meaningful digital interventions for financial inclusion we need to get a broader understanding of the financial life cycles of women micro-entrepreneurs in Pakistan: how do they finance their enterprises? how much autonomy do they have to manage their own money? who pays the household bills? how is money saved? where is it spent? who decides where to spend it? how much independence do they have in running their own businesses? This understanding is essential for designing any digital interventions for financial inclusion targeted at women.

Financing Micro-enterprises

This section looks at how our participants navigated formal and informal mechanisms to raise seed money for setting up their businesses.

Formal Loans. Of the ten women we approached through a micro-finance (MFI) organization, nine have taken loans through the MFI to initiate their businesses and all of them have made the repayments themselves and have not sought their family's support for it. Only for one woman, who was not the primary earner of the family and had a seasonal business, the monthly instalments were paid by her sons. However, four other women have had to take out formal loans for family emergencies and for events like marriages, funerals and illnesses

Our data shows that typically loans have been used for expansion of business and not initiation of the micro-enterprise because micro-finance institutions are often wary of giving loans to new businesses and field staff prefer providing loans to individuals who already have established businesses. One of our participant explains:

They first look at the size of your business and then give you a loan. How will you have a business if you don't have the money for it? – SS1

Additionally, our data reveals that women who have taken loans from micro-finance institutions pay their own loan instalments, with no help from other family members and they only take loans once they can repay them.

Assets. Two of the respondents had assets that they could sell to initiate their venture. Both of them report that the value of their assets was more than what they received. Due to their circumstances and the lack of access to a better market for the sale of their assets, they know that they got exploited.

Informal Loans. Only two women took loans from family members for starting their businesses. As one participant describes:

My husband worked double shifts on the power loom and bought me a salon chair, mirror and facial set. On my first Eid after I started my business, I earned Rupees 1200 (USD 9.50) in one night. I used that money to buy more equipment, and now look, I have almost everything. – MFI3

Similarly, another participant says:

I took Rupees 5000 (USD 40.5) from my mother to buy facial sets etc. Then I kept investing the profit from the business to buy more products. I took the loan from a micro-finance institution only recently because the business is doing well. – MFI7

Savings. The ten women we approached outside of micro-finance institutes used their own savings accumulated through

rotating savings and credit associations (ROSCAs) and otherwise to use as the seed amount for their businesses. Rotating savings and credit associations (ROSCAs) are a form of peer-to-peer lending and borrowing where a group of individuals agree to meet for a certain period of time in order to save and borrow together. Each member contributes the same amount at each meeting and one member takes the whole amount. This process is repeated until everyone in the group gets one pooled payment. This allows each member to access a large sum of money once during the life of the ROSCA [6]. For the start-up capital, the ROSCAs are mostly funded through savings from the husband's salary, while the few participants who were previously working invested their own savings in ROSCAs to build their start-up capital. One of the women, who saved through ROSCAs to set up a general store tells us:

I had to buy a counter and grocery when I set up the general store. I saved Rupees 25000 (USD 202) through a ROSCA and used that money to buy some groceries to sell. Then I saved Rupees 60,000 (USD 486) and Rupees 10,000 (USD 81) through ROSCAs and invested that too in the business. Whatever I then saved from my earnings, I reinvested in the business. – SS2

Household Saving Mechanisms

Outside of the seed money needed for start-ups and business expansion, 18 of the women use ROSCAs as a means to save and most participate in more than one ROSCA at a time. The number of ROSCAs participated in range between one to seven, two being the average number of ROSCAs with contributions towards individual ROSCAs ranging from Rs. 500 to Rs. 6,000 (USD 4 to 48). The participants refer to them as either a 'small' or 'big' ROSCAs and total monthly contributions towards ROSCAs ranged from Rs.500 to Rs. 10,500 (USD 4 to 85).

One main appeal of ROSCA as a saving mechanism for our participants is the control they have in determining the amount of instalment to be paid. They choose when they start saving, for how long they save, how many ROSCAs they contribute in and how much they contribute every month towards their individual ROSCAs. This flexibility is vital for micro-entrepreneurs with seasonal businesses who reported only saving during periods of increased demand.

Once they commit to pay into a ROSCA our participants make the payments on time and religiously with the same priority as for the formal loan instalments. In cases where a micro-entrepreneur thought she was unable to make timely payments, she would not participate in ROSCAs.

Hidden Savings. When saving small amounts of money for shorter durations, women tend to request other women to

act as money guards in order to hide money from their husbands. We asked women if they knew any other women in their family or neighbourhood who would have to hide their money from husbands. They revealed various reasons and instances of women in the neighbourhood asking the micro-entrepreneurs to act as money guards and keep their money safe. We see other examples too where women sometimes hide ROSCA participation from their husbands because the husbands do not believe the women capable of fulfilling their commitments. We found these concerns to be untrue because all the micro-entrepreneurs when committed to ROSCA contributions, always fulfilled it and did so mostly independently.

Dowry Savings. One main reason for secretive ROSCA savings is dowry. Women prioritize the creation of a dowry while their husbands do not, which leads them to engage in hidden ROSCAs. One such participant shared that her husband had sold her gold but now that she is making gold jewellery for her daughters dowry without her husbands knowledge, he would not be able to sell it. Her mother and mother-in-law were actively helping her in hiding the gold. One beauty saloon owner purchased gold earrings but chose to tell her husband they were borrowed. Another, a tailor, having no avenue for private savings, immediately bought items like cloth, pots and pans for her own dowry with any small savings.

Household Expenses

The major domains of spending for our participants are expenses incurred for children's education (tuition fee, books etc.), clothes and shoes for themselves and their children, ROSCA payments and loan instalments. The women prioritize monthly household payments with loan repayments and ROSCA payments having the highest priority. They separate funds for high priority payments or periodic expenditures such as utility bills etc. at home in different boxes, sometimes under locks, to prevent spending them.

They also put a portion of their own money back into their businesses. Some of our participants also contribute towards grocery, utility bills and rent, however, for the majority, their husbands pay for the aforementioned. One of our respondent says:

My husband pays for the 'daal roti' (kitchen expense). I used my income for constructing this house, paying my loan instalments and for educating the one child who wasn't going to school then. – MFI5

Similarly, another woman explains:

My husband pays the bills and for the grocery. I use my income to buy things for my children and fabric etc. to increase my business. – MFI6, MFI3

Except one, all our respondents who have taken loans from micro-finance institutions, except one, are responsible for repaying their own loan instalments, and prioritize paying the loan instalment before undertaking any other expenditure.

5 EMPOWERMENT THROUGH MICRO-ENTERPRISES

Contrary to previous work on women in patriarchal societies [5, 25], our participants actively engage in making decisions at the household level for instance the purchase of durable goods, building a house etc. This is surprising given earlier studies that have shown that a woman's participation in a credit program reinforces her dominated role in the household, and in some cases, the loan ends up under the control of her husband [15, 36]. One reason for this disparity from earlier studies, is the shift in household power once a woman has financial stability and earning power. It may lead to more autonomy and control over household decisions.

One woman explains:

I make all the decisions myself; marrying my daughter, buying her dowry, getting the house repaired- everything is my responsibility. I am the head of the household. My husband gives Rupees 500-1000 (USD 4 - 8) occasionally and for him this involvement is enough. – SS1

It is interesting to note that some of the participants who do not consult with their husbands in decision making do not get along with their husbands; one is in a polygamous marriage and the other's husband was negligent, and they recently separated. However, most of the married respondents stressed on the importance of compromising and making decisions with their husbands. One of our participant tells us:

When we were building the house, my husband had a very ordinary plan in mind and said only this plan is possible according to the space. I didn't like it, so I said no. I drew another plan and then got it constructed according to my plan. Everybody liked it a lot. – MFI5

When asked about decision making, the above respondent narrates the anecdote of buying a refrigerator:

I went alone to buy a refrigerator from the electronics shop here which sells goods on instalments. They said, 'We don't sell good to women without two male guarantors.' I said to them, 'If I don't pay you after taking the refrigerator, why would the guarantors pay when they have not even taken anything from you?' Then they let me take the refrigerator without providing guarantors.

Our data shows that our participants have autonomy while making household decisions, and in most cases, these decisions are made by them and their husbands both.

Autonomy in Enterprises

All our respondents manage and run their businesses independently. This is counter to the narrative often put forward regarding women in low resource and patriarchal communities ([15]). All of these women manage complicated businesses lives interfacing not only with clients but also suppliers. Owners of general stores have a more informal relationship with their suppliers, who provide them goods on credit, visit them weekly for stock taking, and allow them to pay according to a flexible schedule, acknowledging their personal and financial needs.

One of our participants explains her interaction with the suppliers:

I have set suppliers for all six days of the week. For instance, the candies supplier will come on Monday, another on Tuesday and so on. I pay them on a weekly basis and they deliver whatever needs a refill. For instance, if I need to give them Rupees 1500 (USD 12), I can give Rupees 1000 (USD 8), and pay the remaining Rupees 500 (USD 4) the next time. If my children's school fee is due, I will not pay any suppliers for 2-3 days and pay the fee instead. – MFI4

Similarly, another respondent explains:

I have spent 16 years in this business and 16 years are enough to understand any business I don't need to consult with anyone now i have enough knowledge about everything related to it. – MFI9

6 TECHNOLOGY ACCESS AND USE

All of our participants have access to mobile phones and internet (Table 1). Thirteen of the twenty participants own mobile phones and though not all our respondents own personal mobile phones, all the participants have access to mobile phones which they share with husbands or sons (Table 1). Out of the seven respondents who do not own a mobile phone, two plan to buy a phone soon, four do not feel the need to own a mobile phone, and one feels uncomfortable owning a mobile phone. This lack of mobile phone ownership in our sample corresponds to the overall mobile phone ownership gender gap in Pakistan. The gap in access to a mobile phone is 13 percentage points: 84% of men versus 71% of women have access [18].

Of the five women who own smart phones, all five use WhatsApp and three use Imo (video chat application) to stay in touch with siblings abroad. One of our respondent, who does not have a smart phone of her own says:

Sometimes I scroll through my husband's WhatsApp to watch video clips. – MFI2

All our respondents prefer using phone calls over text messages and most of our respondents find it difficult to type text messages. Most of our participants whose business is based on parlour services delivered at clients residence or who cook for clients from home rely entirely on their mobile phones and availability of data packages for their businesses to function. As one participant explains it:

I use mobile for my parlour business or when I am outside. Because my eye sight is weak so i prefer to send voice messages rather than text using whatsapp. – SS3

Three of our participants are also familiar with the use of YouTube. One of them tells us:

Sometimes at night my daughters put television dramas on YouTube and then we watch them together. – MFI1

In repeat interviews with this participant, we discovered that her daughter had refused to help her find videos and had instead taught her to use the phone's voice search function to manage video searching independently.

The other two respondents who are familiar with the use of YouTube use it for their enterprises, for instance one of our respondents uses YouTube to learn new hairstyles. Another participant, who is a tailor, tells us she asks her husband to find her images of latest designs from the internet, so she can stay up-to-date with the latest trends.

All of our participants who have access to mobile phones use data packages to connect to the internet to be able to use WhatsApp and Imo. One of our respondent tells us:

I have the Rupees 180(USD 1.7) package which gives me on-net minutes, off-net minutes, text messages, and WhatsApp. – SS3

Other participants also reported having data packages ranging from USD 1.29 to USD 1.7 which give them on-net minutes, off-net minutes, text messages, and WhatsApp.

Fifteen of the twenty women were familiar with over-the-counter cash (OTC) transactions and were able to identify specific providers. All fifteen participants had a positive perception of OTC services and explained that because the OTC shops (agents) were everywhere, and open at all hours they preferred them to traditional banking set ups for money transfers.

All our participants showed a willingness of uptake and usage of technology as and when they perceive a significant need being fulfilled.

Familiarity with Mobile Wallets. Only three of our twenty participants were familiar with the concept of mobile wallets,

however did not use these currently. One of the participants explains:

I have heard that you can also pay utility bills from your mobile phone now. It will make things very easy, who likes to stand in long lines to pay the bill?—MFI9

Similarly, another woman whose husband was moving to another city says:

We will have to send and receive money frequently when my husband moves. I will get a phone and start using this; what is better than being able to do this from home?—SS3

Demographic analysis of the respondents aware of mobile wallets show that they are all literate and reside in urban areas. However, the majority respondents did not grasp the concept of mobile wallets and chose to evade the question:

I don't understand this. How can I say anything about what I don't understand?—MFI8, MFI5

7 DESIGNING FOR FINANCIAL INCLUSION: THE CASE AGAINST DFS

Previous work by Ibtasam et al. theorizes [17], that if certain socio-cultural limitations like mobility, agency and access to technology are removed, women in low resource communities would be more inclined to adopt mobile money services. They hypothesize that there is scope for using digital financial services as a solution to financial inclusion in countries like Pakistan. To investigate this we looked at a specific group of women for whom these barriers are lower; they have financial autonomy, are mobile, and have access to technology. They are, however not using mobile wallets and the extent of their DFS use is through over the counter cash transactions.

Our analysis reveals the existing ways for women micro-entrepreneurs to navigate their finances, to take out formal and informal loans and to run small businesses. The women have set up a division of finances between themselves and their husbands income and use different sources of income for specific purposes. So for example, the ROSCA savings are typically used either for the business or for dowry savings and not for running household expenses. This differentiation of how money is used depending on its source is also discussed by Zilner, who explains that people assign different meaning and uses to particular monies [47]. The existing ecosystem reveals no inherent need for mobile money applications in their current form. These women operate in a cash based environment and all the vendors, suppliers, MFIs, utilities bills, school bills etc that need to be navigated are cash based. Their savings are also cash based and for these women the proximity and tangibility of hard cash is an important factor. They rely on these savings for any emergent

situations like health care or funerals, and the proximity of their physical savings provides them with a sense of security. Cash is also easier to hide, affords more privacy and entails no trust issues. As one woman explained it:

Having cash is better than money in the bank because it is in your hand; you can use it any time.—MFI5

Another participants explained her use of cash as:

I use cash by my own self. I give money myself to the other person, ask her/him to make sure the amount is exact neither less nor more and make sure that the money is real and not fake. Otherwise, it creates problems and I have to do everything/entire process again. —SS1

Similarly, from our study we discovered that although a few of the women are familiar with the specific products for mobile money they have no interest in further learning about them or their uses. We are not entirely convinced that this is due to a gap in technology adoption; when it is of value to them, our participants are willing and able to adopt new technologies like Imo for video chatting, voice mail to leave messages in wattsapp instead of writing and voice search for youtube videos. We were particularly interested in understanding the women's attitudes to digital financial technologies that might work for them. Participants did not see the need or inherent added value of such services. One woman explains in detail while discussing the possibility of using mobile money for savings:

My child, the business (mobile money) would run this way that if I have extra money, I deposit it. But then I take it back if any need arises. Bank also does this. If I have Rupees 3000 (USD 24.27) so I deposit Rupees 3000 (24.27 USD), if I have Rupees 5000 (USD 40.45) so I deposit that. God forbid, if any need arises then what would I do? This is beneficial for those who don't need money back soon, it doesn't work for us. Our advantage is concerned with the things we have at our home for example, if I have Rupees 10,000 (USD 80.90) or Rupees 20,000 (USD 161.80) in my home and I can buy a soap, cooking oil or milk or something that can give me benefit.—MFI1

They also explained how new technologies and learning a different way of managing their complicated personal and financial lives would incur additional costs in terms of time and effort. Some of our findings reflect previous work by Sultana et al. who argue that any technology design should be embedded within the existing patriarchal context and that for technology design to be meaningful and have value it has to be situated in the context as it is and not how we would

wish it to be [45]. Our participants have complicated lives, where they have to manage their homes, children, businesses and social obligations. Their personal and business finances are intertwined and there is little separation between them. This creates a complicated financial set up where they have no written records or book-keeping, because of issues of literacy and time management. They instinctively know if they are making a profit or a loss based on how many of their personal and household needs are being met. Current implementations of DFS add little benefit to their lives, do not provide services they need like insurance for dowry, or medical emergencies, do not cater to privacy and secrecy concerns and are not designed for phones as shared resources. Our findings differ from previous work [17] because to the best of our knowledge this is the first study of its kind that looks in-depth at this particular segment of women for whom barriers like mobility, autonomy, agency etc. are lowered. Our analysis of these women's lives reveals little benefit to the use of DFS as an alternate to formal banking systems to provide access to financial products like insurance and savings and lending mechanisms.

Women Centered Design For Financial Inclusion

Given our understanding of the ground realities we have identified multiple reasons why current implementations of DFS, we believe, have been a bad fit for women in countries like Pakistan. In what follows we outline specific guidelines that any technological financial intervention aimed at women in patriarchal societies should consider:

- Designing for Phones as shared resources
- Designing for hidden financial transactions
- Designing for flexible and self-determined saving and loan mechanisms
- Designing for Dowry dynamics

Designing for Phones as shared resources. One of the key understandings that has resulted from our study is the need to design for shared phones. Current DFS implementations are not based on an understanding of a mobile phone as a shared commodity in low resource, patriarchal populations. However, based on our data and previous studies [1, 42] women in South Asian countries like Pakistan only have access to mobile phones and to the internet as shared resources. However, current financial interventions require phone ownership and are modelled on the "one account, one user" paradigm. For any digital financial intervention to be viable and to be adopted, it needs to be designed for shared phone access and can not assume phone ownership. What is also important is to design for an understanding of what lack of privacy in a patriarchal society entails. It is not enough to simply use App locks for content protection. In environments where male relatives have power over women

any visible indication of hidden content can have serious consequences [42].

Designing for hidden financial transactions. Women in our study have expressed the need for saving secretly for specific needs that their husbands do not support, like dowry. These women employ two mechanisms for hidden savings: ROSCAs and money guards.

Other than ROSCAs women seek out in their neighbourhoods or family to act as money guards for savings. But women do not always find a way to hide their money especially if the money guard is not in agreement with the underlying intent for hiding money, she is likely to not facilitate it. One of the micro entrepreneurs in our sample was strongly opposed to women hiding money from husbands and refused such requests. This micro entrepreneur shared that there were women in the neighbourhood who would often ask her to hide their money which they would collect before visiting their maternal families. These women would then purchase clothes and crockery with this money and take to their maternal relatives. Previous work on micro-finance has also revealed that anonymity for women is an important aspect that banking systems need to support especially because hidden assets strengthen a woman's position in the household and allow for a stronger bargaining position [46].

A digital intervention that allowed them to save secretly on a shared phone would solve the need for searching for reliable money guards or secret ROSCAs. All the women in our sample (those who owned phones and those who did not) had their phones accessed by other family members and so it is imperative for any digital financial intervention to account for the need to make confidential and hidden financial transactions on shared phones. Current DFS implementations do not support and are not sensitive to the ground realities of how money is managed by low-income women in complicated marriages.

Designing for Flexible and self-determined saving and loan mechanisms. We identify key aspects of the informal saving and loan behaviours and regimes of micro-entrepreneur women in Pakistan which are vital in understanding the case against DFS as a viable solution. Despite economic hardships and a tightly budgeted financial life cycle, the one payment that all women in our sample prioritize are formal loan repayments and ROSCA payments. The informal nature of ROSCAs does not change their payment behaviour.

One main determinant of this behaviour is the control the women exert over the amount that needs to be paid, the frequency with which it is paid and the duration of their ROSCA contributions. Our data shows that women have an intrinsic understanding of their monthly finances and their disposable income. They prove to be a good risk but must

have control over how much they pay and the schedule of payment.

The second key element to understand for designing financial interventions for women in Pakistan that would allow them to have access to formal loans is flexibility in loan repayment. All women in our sample paid back loans on time and independent of their male family members. However, the unstable nature of their financial ecosystems where a single unplanned event like a funeral can force them into debt, requires financial services that can accommodate not only loans in emergent situations but with a repayment schedule determined by the women themselves. One of the most interesting enterprises in our sample was entirely based on this inherent understanding of women being a good risk as long as they are determinants of their payment schedules. One micro-entrepreneur had built a successful business on buying cloth from the market and selling it to other women at a mark-up. These clients have access to the same markets to buy the same cloth at a lower price. The only difference is, shopkeepers do not allow for flexible payments. This micro-entrepreneur uses an understanding of women's financial life-cycles to provide them with goods at a mark-up and accept flexible payments in return. Clients pay at a schedule determined by them.

Any financial intervention designed for women in low-resource communities needs to give them control over determining their loan and savings payments.

Designing for Dowry Mechanisms. Preparing dowry for daughters is an active and serious concern among all women in our study. Our respondents fall in two categories with respect to dowry savings.

The first category is currently and actively saving. These include both women whose daughters are either engaged or of marriageable age and those with very young daughters. The second category, though small in number, consists of women who are unable to save for their daughters' weddings because they are currently paying their educational expenses and find it difficult to be able to save for dowry simultaneously. However, saving for dowry is a priority and they trust that they will be able to save up for dowry once the education expense is over.

It is clear that saving for dowry is an essential part of the financial lives of not just Pakistani women but families in South Asia [32]. In our study women rely on their maternal families to save money, purchase and store dowry items secretly for daughters (sometimes as young as 4 years old) because they fear that the husbands would object to it and insist on spending the money elsewhere. These fears are sometimes based on past experiences of the husband selling the woman's gold.

In an ideal world we would eliminate the concept of dowry. However, given the ground realities of societies like Pakistan and the immense pressure these women face, it is not productive or realistic to expect to change deeply rooted cultural norms that over centuries have become a cornerstone of these societies. Studies reveal that the amount of dowry per marriage can be up to four to six times the annual household income [3]. This is a significant amount for most low-income families.

Any meaningful digital intervention for financial inclusion would have to tackle the insurmountable burden of dowry. Apart from creating saving mechanisms crowdsourced funding for dowry items would alleviate some of the burden from these households. A recent study by the Pakistan Center for Philanthropy reveals that in 2014 the total estimated magnitude of household level giving is Rs. 239.7 billion (more than 1% of its GPD and approx. \$2 billion) and the main reason was religious giving [13]. Amjad et al. [43] also report that most donations go directly to individuals where 67% of their survey respondents said they give to individuals while 33% percent gave to organizations. However, currently there exist no digital ways to connect the needy with those donating. Any digital financial intervention aiming to tackle the issue of dowry as it currently stands needs to create ways for those donating to connect with households which are burdened under the requirements of dowry.

8 LIMITATIONS

This paper presents findings from a study we conducted on a specific segment of Pakistani women who had the basic prerequisites for DFS adoption, as identified by previous work. Future studies may examine a broader segment of women, particularly the adoption of mobile money by well-educated, salaried women in Pakistan who are literate and fall within a higher socio-economic class.

9 CONCLUSION

Based on initial literature review and before going into the field, we expected female micro-entrepreneurs to have very little autonomy in their personal and professional lives. The field activity however proved otherwise, illustrating a constant negotiation and renegotiation of space in an attempt to climb out of poverty. Despite low education, limited mobility and overwhelming domestic responsibilities, our participants have set up successful businesses capitalising on whatever economic and personal opportunities they were presented within their limited means.

The women proactively engage in making decisions at the household and enterprise level and engage with technology to varying degrees. They have set up complex businesses, extend credit to customers, make multiple fixed payments and tap into informal and formal sources of credit despite

their unpredictable schedules of receiving payments. Their use of WhatsApp and YouTube, as well as their comfort with over the counter transaction services suggest that our target demographic has adopted technology where it caters to their distinct financial and non-financial needs.

Our study reveals that the conventional banking system and the current infrastructure of digital financial services do not cater to the needs of low-income, low literate women in patriarchal and religious societies like Pakistan. We propose specific guidelines to design meaningful digital financial interventions for women, working within their specific limitations and tapping into their current mechanisms for survival.

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REFERENCES

- [1] Syed Ishtiaque Ahmed, Md Romael Haque, Jay Chen, and Nicola Dell. 2017. Digital Privacy Challenges with Shared Mobile Phone Use in Bangladesh. *Proceedings of the ACM on Human-Computer Interaction* 1, CSCW (2017), 17.
- [2] Jenny Aker, Rachid Boumnijel, Amanda McClelland, and Niall Tierney. 2013. How do electronic transfers compare? Evidence from a mobile money cash transfer experiment in Niger. *Tufts University* (2013).
- [3] Siwan Anderson. 2007. The economics of dowry and brideprice. *Journal of Economic Perspectives* 21, 4 (2007), 151–174.
- [4] A Aslam. 2013. Moving Towards Micro and Small Enterprise Lending Opportunities and Challenges. *Pakistan Microfinance Network. Islamabad: Pakistan Microfinance Network* (2013).
- [5] Jyotish Prakash Basu. 2013. *Microfinance and Women Empowerment An Empirical Study with special reference to West Bengal*. Technical Report.
- [6] Timothy Besley, Stephen Coate, and Glenn Loury. 1993. The economics of rotating savings and credit associations. *The American Economic Review* (1993), 792–810.
- [7] Joshua E Blumenstock, Michael Callen, Tarek Ghani, and Lucas Koepke. 2015. Promises and pitfalls of mobile money in Afghanistan: evidence from a randomized control trial. In *Proceedings of the Seventh International Conference on Information and Communication Technologies and Development*. ACM, 15.
- [8] Deena M. Burjorjee and Yasmin Bin-Humam. 2018. *New Insights on Women's Mobile Phone Ownership*. Technical Report. <http://www.cgap.org/publications/new-insights-women%2080%99s-mobile-phone-ownership>
- [9] Sumedha Chauhan. 2015. Acceptance of mobile money by poor citizens of India: Integrating trust into the technology acceptance model. *info* 17, 3 (2015), 58–68.
- [10] Asli Demirguc-Kunt, Leora Klapper, Dorothe Singer, Saniya Ansar, and Jake Hess. 2018. *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. The World Bank.
- [11] Easypaisa 2018. Easy Paisa Mobile Wallets. <https://www.easypaisa.com.pk/consumer/mobile-account>
- [12] David S Evans and Alexis Pirchio. 2014. An empirical examination of why mobile money schemes ignite in some developing countries but flounder in most. *Review of Network Economics* 13, 4 (2014), 397–451.
- [13] Pakistan Centre for Philanthropy. 2016. *The State of Individual Philanthropy in Pakistan*. Technical Report.
- [14] World Economic Forum. 2017. *The Global Gender Gap Report 2017*. Technical Report. <https://www.weforum.org/reports/the-global-gender-gap-report-2017>
- [15] Anne Marie Goetz and Rina Sen Gupta. 1996. Who takes the credit? Gender, power, and control over loan use in rural credit programs in Bangladesh. *World development* 24, 1 (1996), 45–63.
- [16] Jack Goody and Stanley Jeyaraja Tambiah. 1973. *Bridewealth and dowry*. Number 7. CUP Archive.
- [17] Samia Ibtasam, Lubna Razaq, Haider W Anwar, Hamid Mehmood, Kushal Shah, Jennifer Webster, Neha Kumar, and Richard Anderson. 2018. Knowledge, Access, and Decision-Making: Women's Financial Inclusion In Pakistan. In *Proceedings of the 1st ACM SIGCAS Conference on Computing and Sustainable Societies*. ACM, 22.
- [18] Financial Inclusion Insights. 2018. *PAKISTAN WAVE 5 REPORT FIFTH ANNUAL FII TRACKER SURVEY*. Technical Report. http://finclusion.org/uploads/file/pakistan-wave-5-quicksites_final.pdf
- [19] William Jack and Tavneet Suri. 2011. *Mobile money: The economics of M-PESA*. Technical Report. National Bureau of Economic Research.
- [20] Jeffrey James. 2011. Sharing mobile phones in developing countries: Implications for the digital divide. *Technological Forecasting and Social Change* 78, 4 (2011), 729–735.
- [21] Jeffrey James. 2016. Mobile phone use in Africa: Implications for inequality and the digital divide. In *The Impact of Mobile Phones on Poverty and Inequality in Developing Countries*. Springer, 89–93.
- [22] Jazzcash 2018. Jazz Cash Mobile Wallets. <https://www.jazzcash.com.pk/mobile-account/>
- [23] Shireen J Jejeebhoy and Zeba A Sathar. 2001. Women's autonomy in India and Pakistan: the influence of religion and region. *Population and development review* 27, 4 (2001), 687–712.
- [24] Susan Johnson and Max Nino-Zarazua. 2011. Financial access and exclusion in Kenya and Uganda. *The Journal of Development Studies* 47, 3 (2011), 475–496.
- [25] KG Karmakar, GD Banerjee, and NP Mohapatra. 2011. *Towards Financial Inclusion in India*. SAGE Publications India.
- [26] Deepti Kumar, David Martin, and Jacki O'Neill. 2011. The times they are a-changin': mobile payments in india. In *Proceedings of the SIGCHI conference on human factors in computing systems*. ACM, 1413–1422.
- [27] Rajiv Lal and Ishan Sachdev. 2015. *Mobile Money Services: Design and Development for Financial Inclusion*. Citeseer.
- [28] Kate Lauer and Timothy Lyman. 2015. Digital financial inclusion: Implications for customers, regulators, supervisors, and standard-setting bodies. *Note. Washington, DC: CGAP, février* (2015).
- [29] Scott Mainwaring, Wendy March, and Bill Maurer. 2008. From meiwaku to tokushita!: lessons for digital money design from japan. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 21–24.
- [30] Indrani Medhi, Aishwarya Ratan, and Kentaro Toyama. 2009. Mobile-banking adoption and usage by low-literate, low-income users in the developing world. In *International conference on internationalization, design and global development*. Springer, 485–494.
- [31] Apurv Mehra, Sambhav Satija, and Jacki O'Neill. 2017. Prayana: A Journey Towards Financial Inclusion. In *Proceedings of the Ninth International Conference on Information and Communication Technologies and Development*. ACM, 26.
- [32] Werner F Menski. 1998. South Asians and the dowry problem. (1998).
- [33] Valentine M Moghadam. 1992. Patriarchy and the politics of gender in modernising societies: Iran, Pakistan and Afghanistan. *International Sociology* 7, 1 (1992), 35–53.

- [34] Jacki O'Neill, Srihari Hulikal Muralidhar, Apurv Mehra, Anupama Dhareshwar, and Sambhav Satija. 2018. Prayana: Intermediated Financial Management in Resource-Constrained Settings. In *AcM Chi Conference on Human Factors in Computing Systems*.
- [35] Joyojeet Pal, Priyank Chandra, Vaishnav Kameswaran, Aakanksha Parameshwar, Sneha Joshi, and Aditya Johri. 2018. Digital Payment and Its Discontents: Street Shops and the Indian Government's Push for Cashless Transactions. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, 229.
- [36] Aminur Rahman. 1999. Micro-credit initiatives for equitable and sustainable development: Who pays? *World development* 27, 1 (1999), 67–82.
- [37] Hasaan Anwar Raza. 2017. *TECHNOLOGIES FOR DIGITAL FINANCIAL SERVICES*. Technical Report. Karandaaz.
- [38] Stephen C Rea and Taylor C Nelms. 2017. *Mobile Money: The First Decade*. Technical Report. Working Paper 2017/1, Institute for Money, Technology and Financial Inclusion, University of California.
- [39] Sumaira Rehman and Muhammad Azam Roomi. 2012. Gender and work-life balance: a phenomenological study of women entrepreneurs in Pakistan. *Journal of Small Business and Enterprise Development* 19, 2 (2012), 209–228.
- [40] Muhammad Azam Roomi and Guy Parrott. 2008. Barriers to development and progression of women entrepreneurs in Pakistan. *The Journal of Entrepreneurship* 17, 1 (2008), 59–72.
- [41] Saaricom. 2017. *SAFARICOM ANNUAL REPORT AND FINANCIAL STATEMENTS 2017*. Technical Report. https://www.marketscreener.com/SAFARICOM-LIMITED-6500172/pdf/754987/Safaricom%20Limited_Annual-Report.pdf
- [42] Nithya Sambasivan, Garen Checkley, Amna Batool, Laura Sanely Gaytán-Lugo, Tara Matthews, Sunny Consolvo, and Elizabeth Churchill. 2018. "Privacy is not for me, it's for those rich women": Performative Privacy Practices on Mobile Phones by Women in South Asia. In *Fourteenth Symposium on Usable Privacy and Security (SOUPS) 2018*.
- [43] Muhammad Ali Shazia M. Amjad. 2018. Philanthropy in Pakistan. *Stanford Social Innovation Review* (2018). https://ssir.org/articles/entry/philanthropy_in_pakistan
- [44] Md Nur Alam Siddik, Gang Sun, CUI Yanjuan, and Sajal Kabiraj. 2014. Financial Inclusion through Mobile Banking: A Case of Bangladesh. *Journal of Applied Finance and Banking* 4, 6 (2014), 109.
- [45] Sharifa Sultana, François Guimbretière, Phoebe Sengers, and Nicola Dell. 2018. Design Within a Patriarchal Society: Opportunities and Challenges in Designing for Rural Women in Bangladesh. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, 536.
- [46] Rebecca M Vonderlack and Mark Schreiner. 2002. Women, microfinance, and savings: Lessons and proposals. *Development in Practice* 12, 5 (2002), 602–612.
- [47] Viviana A Rotman Zelizer. 1997. *The social meaning of money*. Princeton University Press.