

# Microbanking: Bringing Credit to Underrepresented Communities by Enhancing Local Financial Practices With AI

Heloisa Candello, Andrea Britto Mattos, Claudio Pinhanez,  
Rogerio de Paula, Marcelo Carpinete Grave

IBM Research  
Rua Tutóia, 1157,  
Paraíso São Paulo, 04007-005.

## Abstract

This paper focuses on how small business owners' local financial practices in underrepresented communities can support economic independence, growth, and resilience for these businesses and, at the same time, for the community to which they belong. We propose here a model based on microbanking, that is, the transformation of small business owners into managers of very small banks which provide microcredit to their communities. The idea is based on findings and learnings from a past project with Brazil's largest micro-credit institution. Our proposal looks, in particular, into how AI technology can ethically mine the knowledge some people in those communities (e.g., small shop owners) have about the financial life and status of other members and leverage it to enable micro-loans to the whole community, supporting at the same time the small-business owners on credit and cash flow provisions.

## Introduction

During a project done by the IBM Research Brazil laboratory in 2015 with the largest micro-credit provider in Brazil, we observed that small business owners (SBOs) of poor communities often allowed some members of their community to pay later for goods and services, a practice known locally as “fiado” (e.g., a kind of store credit; “put on my tab”) (Candello et al. 2018, 2016; Bianchi et al. 2017).

By doing so, they were the *de facto* local micro-loan providers, and at the same time, they generated more revenue for their own business. However, as the SBOs had cash-flow problems, their capacity to exercise credit providers' role was limited. Moreover, since both the SBOs and their clients were often part of the informal economy and often had issues with their credit scores, their access to traditional credit lines from banks was virtually nonexistent.

“Fiado”, is, in fact, a common practice of many communities, especially ones where racial and ethnic constraints the ability of their members to get access even to simple forms of credit provision such as credit cards. A common impediment for getting credit cards and similar financial instruments is a lack of or bad credit history. Financial institutions are often at loss to provide credit to people without those instruments, which often do not exist in informal economies.

However, in our study we observed that, in deciding who should get “fiado” or not, the SBOs displayed a remarkable level of knowledge of the financial situation and ability to repay of their community members. What if, with the help of AI technology, that knowledge could be mined and formalized in some form, allowing banks and other financial institutions to provide loans to people marginalized from traditional credit systems using the SBOs knowledge?

To materialize that particular scenario, we envisioned an electronic ledger for the SBOs, modified to include the “fiado” transactions, which could become a platform for providing credit to customers and, at the same time, solve some of the cash-flow problems of the SBOs (borrowing from delayed income). In many ways anticipating the “sharing economy”, we proposed the transformation of the SBOs into micro-bankers, bringing credit to highly under-served communities and to themselves.

Unfortunately, both the technological limitations of the SBOs and the novelty of sharing mechanisms prevented that idea to be tested at that time. Fast-forwarding 5 years, providing credit to people with limited or problematic credit historical data is still a practical challenge, in particular for poor and minority communities. In such a way, similar cash-flow difficulties for SBOs in such underrepresented communities are still common and recently much aggravated by the COVID pandemic and associated recession (Dua et al. 2020). However, advances in AI technology, Internet access, and electronic payment have progressed to a point where many of the project's original technical challenges no longer stand out. Also, sharing and gig economy platforms are now mainstream and part of the daily life of most people, including ones from those poor and minority communities.

## The Time for Microbanking

We see this moment of difficulties and need for advancement of discriminated communities and groups as an opportunity to explore some of the ideas from the initial project and revisit them in the current temporal context and low-income communities in different parts of the globe. We are exploring the current financial context of credit access of SBOs and their clients in two geographical contexts (US and Brazil) and we envision proposing solutions based or adapted from the previous ideas to such contexts. We aim to develop technologies and tools that would enable testing the proposed

solutions in the context of the studied communities. If successful, the solution could be scaled up with the support of partner banks.

To do so, we are addressing this issue by combining the inherent community-based and community-oriented nature of SBs and an emerging discovery-driven approach to enable minority-owned SBs to better manage their financial situations at the community scale. By discovery-driven approach, we mean creating mechanisms whereby SBOs could explore various financial and decision scenarios testing hypotheses via what-if scenarios. We postulate that these scenarios would be drawn from behavioral-economic models (Dhami 2016) that would consider the financial risks and outcomes of certain decisions and the social values and costs of a community-based business. Thus, we anticipate being able to simulate possible financial outcomes based not only on financial and economic factors but on social and cultural ones.

Helping small business owners better manage their finance through a discovery-driven approach while providing store credit for their clients are critical possibilities our project shall create. Community-based finance is a well-known practice in local communities that are based on trust and social relationship (e.g., put on a tab, “fiado” store-credit in Brazil). Through those financial mechanisms, they can not only plan their cash flow, but also become eligible for credit loans with lower-interest-rate and administrative costs. The advantage for their customers is secure access to store credit locally. These all help to promote sustainable practices supported by community-based technology and practices. On the other hand, banks value the creation of more affordable forms of credit loans (with lower delinquencies) using tapping into those local social practices and values, as those engendered by store credit (e.g., “fiado”), as informational “collateral” for microloans.

At the core of those ideas is the SBOs financial knowledge about people in their communities. We want to create mechanisms in which that knowledge is used in the benefit of the SBOs and their clients and doing so, enact positive social change. At the same time, we are trying to avoid designing mechanisms which extract such knowledge and provide them to other players almost at free cost, as often social media companies do. This is a fundamental ethical question which we want our solutions to address, that is, to give back to the SBOs the actual value of their knowledge.

### Insights from Our Previous Research

In our previous research (Candello et al. 2018), our understanding of informal credit’s social and cultural practices was informed by interviews, work observations, and analysis of the documentation about the microfinance program that is publicly available. We conducted semi-structured interviews and work observations in two cities in the Northeast of Brazil. The first city was Fortaleza a capital city and an urban environment. The second city was Icapuí, located in the semi-arid region in the Northeast seafrent. We interviewed SBOs and credit agents from the micro-finance institution (MFI). All the interviews took place at the local business establishments in September 2014.

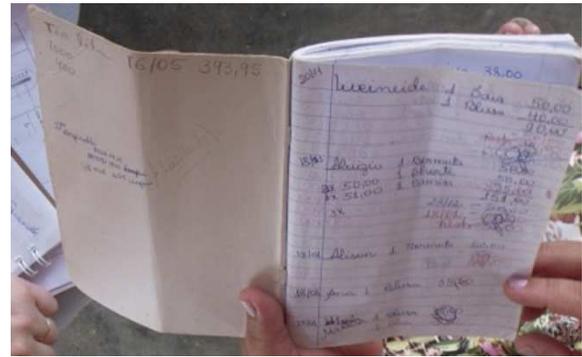


Figure 1: Photo of an SBO ledger with recorded “fiado” loans: SBOs sell products to customers based on trust that the customer will pay for it in the future and knowledge of their financial situation.

We understood that quite naturally, the merchants and their customers form an important social network. Usually, the small business is in the same neighborhood where the merchant and customers live. They meet very often, and depending on the business (e.g., groceries), the customers may pass by the small business every day. They may even ‘hang out’ in the spot, as described in (Guimarães 2007). The “fiado” transactions are ordinary in Brazil (Gonzalez et al. 2013; Guimarães 2007; Magalhães and Abramovay 2008). It is an informal credit practice in which merchants sell products to a customer based on trust that they will pay for them in the future. The date for repayment of the loan is variable and informal, e.g. “next week”, “next month”, or simply “I will pay it later”. The use of “fiado” is a source of reciprocal tension. It relies on personal trust and good faith. Moreover, at the same time, it generates a mutual obligation where the customer is obligated to repay the loan and continue to shop at the establishment, and the store-owner is obligated to keep offering store credit. The duality of informal store credit thus rests on the fact that, on the one hand, store-owners are compelled to allow customers to use “fiado” to maintain their customers. On the other, the extent to which store-owners’ trust that their customers will pay back their debts creates uneven relationships. In the extreme, the lack of payment will become a moral barrier and prevent customers from returning to the shop.

Typically, SBOs take notes in a notebook to remember their clients’ purchases using “fiado” store credit (see Figure 1). They also use the notebook to record transactions where the SBOs had no change available and therefore owe the customer a small amount of money. Each of our participants had their own way of taking notes. One, a cake baker, only documents the delivery day and value of the purchase and says she always remembers the customer’s name by heart. Others take notes of customer names, purchase amounts, and compute summary totals for new purchases made in the month. As some customers do not pay the full amount at once, merchants deduct the amount paid by crossing out the current value and writing down the new

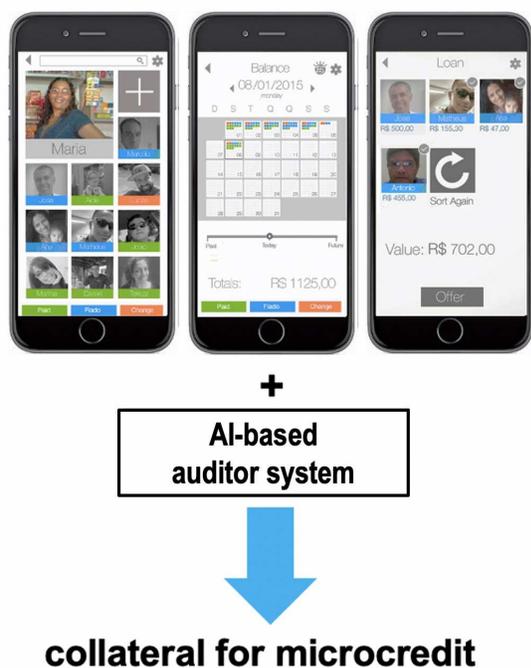


Figure 2: Basic architecture of our prototype of a microbanking system, focused on the use of “fiado” (audited by an AI-based system) as a collateral for microcredit for the SBO.

amount owed by them. In general, SBOs are not very organized with their notebooks, and many times they cannot find recorded transactions in the current notes. Other times they only record the customers’ names and do not record the purchase value. Consequently, the business owners are often not aware of exactly how much people owe them by week or month, which impacts their inventory management and limits their ability to predict future income.

Our observations of the prevalence of informal lending among small business owners have encouraged us to envision the possibility of new financial management tools. We designed a new service that may help business owners manage, plan, and predict their financial lives (Candello et al. 2016). The system learns from historical payment trends and can estimate future transactions. A digital trace of purchase and “fiado” transactions will be preserved and made available in a secure way for the merchant to use, e.g., as evidence of cash flows for future formal loan applications. We have created a mock-up for a smartphone app based on this design for consequently planning field tests with SBOs in Brazil. The system would help the SBOs to act as micro bankers that would also give small loans (e.g. “fiado” ) to their final clients. In our future research, we aim to adapt it to the current context (see Figure 2).

### Reflections on the Financial Practices of SBOs

Our findings generated several insights and design opportunities for the workshop discussions, and to shape our future research activities:

1. There is an opportunity for digitization of financial information to help with account and inventory management. Observing how the SBOs take notes, which notes they claim to be more important, and researching client habits and account management may inspire designers to mimic those sequences of actions in digital environments. Financial modelling, if part of the design problem, needs to be done in a way that is easily understood and financial assumptions made transparent to the SBOs.

The SBO in our study were often not happy selling their products using “fiado” as their customers do not always pay their debts back. In those cases, the merchants should contact the customers to demand repayment or in some cases even cease doing business with them. These impose great financial as well as social hardships to their businesses. For one, merchants face difficulties both in managing the portfolio of small loans and in anticipating future cash flows from “fiado” repayments. Merchants who we interviewed asserted that they carry out such loans to please their customers, to build up loyalty, and friendship. It is always a difficult social situation when a customer is unable to fully pay for the all the products she wants. Thus they may allow “fiado” as a store credit. But, on the other hand, store owners have troubles when their customers fail to pay back. In some stores, owners in fact select carefully which of their customers with whom they carry out this form of transaction.

2. Informal credit repayments constitute a potential future cash flow to the small business. The SBOs usually do not see “fiado” as a positive practice; they would prefer to receive the money on the same day rather than an uncertain day of payment. But providing credit to good customers is a sound financial practice for business since it grows the clientele and guarantees future cash flow. Therefore, design technologies which might help the SBOs interpret “fiado” in a positive way as future cash flow may support business growth. Additionally, SBOs know their clients better than the banks and this source of information can be valuable to banks (e.g. evaluating new and current customers for new loans).
3. Informal credit (“fiado”) is important to retain customer although constituting a repayment risk for the SBO. The close trusted relationships in those communities are what enable certain kinds of financial practices to exist. Great care must be taken in designing new technologically assisted products and services so that the sense of community remains intact. The design challenge is to support the development and maintenance of trusted relationships and generalized reciprocity.

### Current Research

We are setting our current research in two contexts, the US and Brazil, and possibly working with financial institutions and representatives of those communities as partners. First, we will carry out deep-dive fieldwork to better understand pre-selected communities’ financial practices in both regions. To this end, we aim to work with local community-based organizations or institutions and academic partners to

facilitate access to the field and local SBOs and carry out the actual fieldwork. It will allow us to gain a more nuanced understanding of how SBOs actually manage their finances and the relationship between their business and local clients and other local businesses currently. Moreover, we aim to identify critical data sources and key determining factors that can better represent and model the SB and local communities' intrinsic financial dynamics.

This brief description of the business and social milieu in which small business practices unfold and business owners and their clients establish and maintain (professional and often personal) relationships reveals the complex and often problematic relationship people have with their personal and business finances. Micro and small businesses' financial practices lie in a complex web of local and personal relationships, hardship and turn-around experiences, finance and business education, money availability, and the like. Unwittingly, those business owners should deal with not only complex sets of finance concepts and practices (such as future cash-flows, store-credits, or interest rates) but complicated and often conflicting decisions (e.g., to allow "fiado" credit, to ask for repayment, or to cross out a client).

To design technology to support such practices is by no means merely a question of financial management – it is not just about a point of sales or another ease-of-use personal and business finance management system. It also has to be about relationship management. It should consider that business transactions are forms of social and cultural exchanges and shaped by local moral and cultural norms. For one, the decision of disallowing a client from purchasing a product because of bad credit history should be situated in the context of the social relationships established between the store owner and its client. It should not be merely unmediated or just attributed to financial factors (a purely financial decision). It should be made considering the interplay of all those factors.

On the other hand, what does it mean to make such social practices manifest business practices and become accounted for? More should be investigated about the complex relationships between financial practices and local social norms and morals. They are interdependent.

Those social practices are the other side of the coin when discussing the relationships between SBO and their clients and between SBOs and MFIs. Often, people get trapped in negative credit spirals as they find themselves borrowing more money (payday or fiado loans, to be paid back when one's paycheck arrives) to cover the existing debt. In such situations, they tend to lack the mental "surplus" to make decisions, which will result in more positive long-term benefits rather than just short-term fixes. In such circumstances, anticipating such scenarios and attempting to remediate them early enough might be the best ways to enable individuals to manage their financial life.

### Final Remarks

The unfortunate events of 2020 seem to have pushed the opportunities to deploy and test the idea of microbanking in many ways. The pandemic forced many people, including from poor communities, to scramble for forms of Internet

access. At the same time, high levels of unemployment and their impact on small business owners, particular from the service sector, have strengthened the need for credit.

Microbanking can become the way out of this scenario for many communities, but first we need to address the complex questions and issues discussed before to guide better the design of the solutions. In particular, there are difficult ethical issues, particularly of an adequate reward for the use of knowledge, which need to be well understood and dealt with before deployment of actual and scaled solutions.

In this spirit, we aim to have insightful discussions with workshop participants and learn more about how AI technologies can include underrepresented communities and empower them; and how our ideas, particularly microbanking, can be safely and ethnically brought to poor and minority communities.

### References

- Bianchi, S. C. S.; Candello, H. C. D. S. P.; Millen, D. R.; and Pinhanez, C. S. 2017. System and Method for Credit Score Based on Informal Financial Transactions Information. US Patent App. 14/863,470.
- Candello, H.; Millen, D.; Pinhanez, C.; and Bianchi, S. 2018. Design Insights and Opportunities from a Field Study to Digitally Enhance Microcredit Practices in Brazil. *DRS2018*.
- Candello, H.; Pinhanez, C.; Millen, D.; and Bianchi, S. 2016. Service design tools to explore financial services for poor microbusiness owners. In *Service Design Geographies. Proceedings of the ServDes. 2016 Conference*, 125, 192–204. Linköping University Electronic Press.
- Dhami, S. 2016. *The foundations of behavioral economic analysis*. Oxford University Press.
- Dua, A.; Mahajan, D.; Millan, I.; and Stewart, S. 2020. COVID-19's effect on minority-owned small businesses in the United States.
- Gonzalez, L.; Diniz, E. H.; Nascimento, E.; and Kasmirski, P. 2013. Inclusão financeira e correspondentes bancários no Brasil. *Bankable Frontier Associates Fundação Bill & Melinda Gates, Fundação Getulio Vargas*.
- Guimarães, A. C. R. 2007. Comerciantes de bairro: seus discursos, suas práticas. *Reunión de Antropología Del Mercosur (RAM)-Desafíos Antropológicos* 7.
- Magalhães, R. S.; and Abramovay, R. 2008. The emergence of a micro-finance market in the sertão back lands of Bahia. *Revista Brasileira de Ciências Sociais* 4(SE): 0–0.