Organizing Money

The process of implementing a complementary currency in a context of scarcity

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LUND UNIVERSITY
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JUAN OCAMPO | DEPARTMENT OF BUSINESS ADMINISTRATION | AGENDA 2030 GRADUATE SCHOOL

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The process of implementing a complementary currency in a context of scarcity

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LUND UNIVERSITY

Agenda 2030
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DOCTORAL DISSERTATION

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Juan Ocampo

Malmö, September 2024.

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Abbreviations

CBO	Community-Based Organizations
CT	Credit Tokens
GFI	Grassroots Financial Innovation
HAO	Humanitarian Aid Organization
KES	Kenyan Shillings
MFI	Microfinance Institutions
MTCr	Maendeleo Trading Credits
NGO	Non-Governmental Organization
ROSCA	Rotating Saving and Credit Association
SCANDEV	Scandinavian Development Organization
SDG	Sustainable Development Goals
SCI	Strategic Community Investment
STS	Science and Technology Studies
BPO	Blockchain Protocol Organization
UN	United Nations
UNSGSA	United Nations Special Advocate for Inclusive Finance for Development

List of actors that feature in the empirical chapters

In alphabetical order, rather than order of importance to the project or research.

Blockchain Inc. (BPO): A company that fostered cryptocurrency trading and supported Inclusion Coin's development.

Charles: The co-founder of Inclusion Economics, and originally responsible for the quantitative research of the project.

Circuits: Software used to host digital complementary currencies.

COVID-19: An infectious disease affecting a large number of people worldwide. It caused significant societal disruption, and enormous efforts were made to control its spread (e.g. curfews).

Ellen: An action researcher, and at the time of this research a Professor of Management and Social innovation in Denmark.

Grassroots Financial Innovation (GFI) project: The objective of the GFI project was to study existing complementary currencies in Kenya, and introduce new ones.

Howard: A contractor for Circuits, and consultant with experience of the implementation of complementary currencies.

Human Aid Organization (HAO): The organization that funded the cash-transfer programs managed by Inclusion Economics.

Inclusion Coin: A blockchain-based digital token developed by Inclusion Economics.

Inclusion Economics: A non-profit organization co-founded by Charles with the vision of improving the lives of people with low incomes.

Josephine: A Professor of Organization Studies in Sweden who had been working in Kenya for more than 15 years.

Laila: A local trader who used MTCr.

Mama Alva: An entrepreneur, trader, and leader of the local merchants in the Kibuye Market who claimed to be a co-founder of the market. President of the Progress Warriors.

Margarethe: A local trader, and leader of the merchants. Treasurer of the Progress Warriors.

Mary: The field administrator for the GFI project in Kisumu.

Moses: A Professor of Engineering at a university in Kenya, who had previously collaborated with Josephine.

Maendeleo Trading Credits (MTCr): The name the Progress Warriors gave to their complementary currency.

Payment technology: A physical or digital medium that is used for the accounting of transactions.

Peter: A local trader who used MTCr.

Progress Warriors: The name the group of Kenyan merchants who started the complementary-currency project in Kisumu, Kenya gave to themselves.

Robert: A Kenyan post-doctoral researcher who supported the project.

Scandinavian Research and Development Organization (SCANDEV): An organization that awards research grants to projects that work to prevent and combat poverty and inequality.

Steven: A local trader, and leader of the merchants. Secretary of the Progress Warriors.

Strategic Community Investment (SCI): A strategy to repurpose a share of the funds to be given as aid to the Progress Warriors.

Sylvester: A Kenyan community leader who helped to mobilize the locals so that the researchers could speak to and interview them. Josephine and Moses worked with Sylvester in a waste-management project.

Xavier: A young community leader who worked as a communications officer for the GFI project.

The truth is, however, that the oppressed are not "marginals," are not living "outside" society. They have always been "inside" the structure which made them "beings for others." The solution is not to 'integrate" them into the structure of oppression, but to transform that structure so that they can become "beings for themselves." - Freire, P. (2002:75).

1. Scarcity of money?

A. Financial inclusion as a solution to the scarcity of money in poor populations

1. The financial-inclusion agenda

The poverty line is US$6.85 per day (Jolliffe et al., 2022); based on this, 3 billion people live in poverty. Scarcity of money, or lack of access to money in order to attain a minimum standard of wellbeing (Morduch, 2006), is a significant problem that must be addressed if we want to solve world poverty. The financial system is said to contribute to solving the problem of the scarcity of conventional money by giving access to money to people who need it (Levine, 1997; Beck et al., 2007; Cull et al., 2014; Demirgüç-Kunt & Singer, 2017). Hence, policymakers and country leaders have mobilized efforts to include poor populations in the financial system.

Efforts to include people in the conventional financial system are known as the financial-inclusion agenda. The United Nations (UN) defines financial inclusion as the "universal access, at a reasonable cost, to a wide range of financial services, provided by a variety of sound and sustainable institutions" (UN, n.d.). As part of the financial-inclusion agenda, people in poverty can pay for services such as owning a bank account or having insurance.

Two concepts have been particularly important for the financial-inclusion agenda: microcredits and mobile money. Microcredits received international recognition when Muhammad Yunus received the Nobel Peace Prize for his work on banking for the poor (1998). The original idea consisted of giving poor people access to small loans on easy terms, and using the local knowledge of communities and peer monitoring to ensure the repayment of the loans

(Stiglitz, 1990; Morduch, 1999). Development funders (e.g. The World Bank, The International Monetary Fund, IMF) picked up on the idea of microcredits, and Microfinance Institutions (MFIs) were soon offering loans and shaping access to conventional money for people living in poverty (Roy, 2010; Schwittay, 2011a; Maurer, 2015a).

Over the years, the not-for-profit mission of MFIs that offer microcredits has been replaced by a requirement of profitability (Woller, 2002; Cull et al., 2009; Armendáriz & Szafarz, 2011). A profit-oriented mentality has meant that the success of MFIs is assessed based on the profits received by creditors, rather than the benefits received by the loan takers. There have been cases of microcredit interest rates reaching 240% a year (Sandberg, 2012), and people with low financial literacy and uncertain repaying capacity being targeted. Moreover, studies have found that microcredits often have only modest positive impacts (Buckley, 1997; Banerjee et al. 2015a; Banerjee et al., 2015b; Smits & Günther, 2017), and in many cases exploit the loan takers (Sherratt, 2015). In other words, because of their profit-driven mission, MFIs seldom meet the needs and capabilities of lower-income populations.

Financial technologies have also influenced the financial-inclusion agenda (Langley & Rodima-Taylor, 2022). Driven by technological developments, mobile money started to gather interest among financial-inclusion actors since early 2000's (Demirguc-Kunt et al., 2022). The IMF defines mobile money as "a pay-as-you-go digital medium of exchange and store of value using mobile money accounts, facilitated by a network of mobile money agents" (n.d.).

A well-studied example of mobile money is M-pesa. M-pesa was developed by Safaricom, the largest mobile network operator and telecommunications provider in Kenya. In exchange for deposits in conventional money, Safaricom issues a digital currency that can be transferred quickly and securely between mobile-phone users (Jack & Suri; 2011). M-pesa was designed to decrease the transaction costs of sending remittances to and within Kenya (Hughes & Lonie, 2007; Jack & Suri, 2014), and facilitates the safe storage and transfer of money (Jack & Suri, 2014; Suri & Jack, 2016). Mobile money has become popular in Africa, and in Kenya in particular, where around 82% of the population uses mobile money to make transactions (FinAccess, 2021).

While the uptake of mobile money has increased, its effects on poverty are inconclusive. The effects of the use of mobile money on savings and poverty reduction have not been proven (Batista & Vicente, 2021; Wieser et al., 2019), access to the telecommunications infrastructures required by mobile money is still limited (Singh, 2019; Langley & Leyshon, 2017), and the exploitation of

poor populations through the sale of data for mobile app technologies has been criticized (Schwittay, 2011a; Aitken, 2017; O'Dwyer, 2019).

As an anti-poverty framework, the financial-inclusion agenda has been utilized by actors such as governments, multilateral agencies, and for- and non-profit companies (Schwittay, 2011; Lavinas, 2015). A group of actors who promote this agenda came together at the UN General Assembly's Financial Inclusion event in 2019 where, in the presence of presidents, banking moguls, financial technology companies (FinTech) CEOs, and a Queen, Melinda Gates stated: "Money is power. If we want to empower people, we have to ensure that they have means for saving". The context of this quote makes it evident that financial inclusion is more than a concept, and that development organizations, FinTech companies, and regulators must work together to ensure the inclusion of poor populations in the financial system. In other words, the underlying assumption is that money can only be externally made and accessed via the current financial service system; this, as I will explain, has several shortcomings in relation to populations in the context of scarcity.

2. The shortcomings of the financial system in the context of scarcity

In the modern economy, ≈ 97% of conventional money is created by the financial system,[1] specifically by commercial banks (McLeay et al. 2014a; 2014b). Theoretically, banks should only give out loans as a fraction of their reserves at the central bank. However, as has been stated by the Bank of England (McLeay et al. 2014a) and proven empirically (Werner, 2014), in practice, banks do not need to wait to enlarge their reserves to create money. Banks give out loans and make money based on how they assess the repayment probability of customers (Ryan-Collins et al., 2012; Werner, 2014). When a bank approves a loan, it inputs the amount into the debtor's bank account, thereby creating[2] money. It is as simple as that.

[1] The creation of money by the financial system involves financial transactions between the central bank, private banks, and individuals. See Werner, 2014; McLeay et al. 2014a; 2014b; Ryan-Collins et al., 2012 for detailed explanations of the process by which the central bank and commercial banks create money.

[2] There are of course limits, controls, and regulations to this process. See McLeay et al. (2014) for the Bank of England's explanation of the creation of money in the modern economy, wherein the authors describe money-creation limitations based on market forces and central bank monetary policies.

Commercial banks are for-profit businesses, and so give out loans that are to be repaid with interest; this interest is the bank's profit. Hence, profit-seeking incentivizes banks to allocate money to customers with high repayment probability, which they estimate based on the customer's credit history and the existence of collateral[3]. However, in the context of poverty, where there is reduced access to bank accounts and insufficient information with which to evaluate the repayment probability of an individual, banks are disincentivized to give out loans, and prefer instead to allocate the capital to people with better repayment probabilities (Lietaer & Dunne, 2013; Ryan-Collins et al., 2012). In short, banks have low incentives to give out loans to people who do not have credit history, collateral, or the security of a regular income, intensifying the scarcity of conventional money in the context of poverty.

In order to give out loans to people in poverty and remain profitable, creditors must impose high interest rates. Some loan takers are likely to be unable to keep up with the debt, so are then often obliged to pay interest on interest (i.e., compound interest), which can lead to an exponential growth of debt (Lietaer & Dunne, 2013). As Hartley & Kalli (2021) show, this is not uncommon, and in places of low economic growth, compound interest leads to "unpayable debt, dispossession and indenture of debtors, and wider social upheaval and revolt" (Ibid.:9). The point is that the money that goes to such communities is less than the money that leaves them, which makes the creation of wealth difficult in impoverished communities. This problem, known as leakage (Ward & Lewis, 2002) or disinvestment, occurs when money coming from outside leaves a local economy without circulating locally to create more wealth (Seyfang, 2001). Leakage is a cause of the scarcity of money in a community.

How conventional money is created today also incentivizes the hoarding of money by those who have it. To obtain more capital for investing in the financial market, banks pay interest on people's deposits, which transforms money into a store of value and can take conventional money out of circulation (Kennedy et al. 2012). However, while the function of money as a store of value is of benefit to those with enough saving capacity, it also means that money is taken out of circulation, preventing others from accessing conventional money and paying off their debts (Lietaer & Dunne, 2013; Kennedy et al. 2012).

An important point to note with the conventional monetary system is that money is made to function in contradictory ways: it is supposed to function as

[3] It is worth mentioning that companies are now using mobile data from users to develop credit-scores. See, for example, Hendricks and Budree (2019).

a medium to facilitate the exchange of products and services, and to enable people to sell and buy what they need and pay off their debts. However, interests on capital make money function as a store of value and take it out of circulation, making conventional money scarce for those in need of exchange.

There are three main takeaways from the discussion of how conventional money circulates in contexts of poverty. First, money is created by banks when they give out loans which, in order to be profitable, are not usually given to people living in poverty. Second, the creation of conventional money based on interest-bearing loans means that money moves to economic and financial hubs, and leaks out of poorer communities faster than it goes in. Money is thus scarce from the start. Third, interest on savings incentivizes hoarding, which hinders access to and circulation of money. In sum, money functions in contradictory ways, and the current financial-inclusion agenda depends on a system that is not well suited to helping people living in poverty, as it is prone to leakage and preventing the circulation of money.

B. Complementary currencies as a solution to the scarcity of money

1. Complementary currencies

An alternative approach to addressing the problem of access to money is complementary currencies, which can be defined as "an agreement, within a community, to use something standardized as a medium of exchange" (Lietaer & Dunne, 2013:11). A complementary currency[4] is a type of standardized medium, the primary function of which is to complement conventional money and connect unused resources with unmet needs in a community of users, and in this way improve common wellbeing. Complementary currencies tend to emerge in communities looking to strengthen social ties (Lee,1996; Seyfang, 2001; Doria & Fantacci, 2018) and local social-economic identity (Pacione, 1997). In terms of the focus of this thesis, complementary currencies have recently been used to reappropriate the making of money for the public good

[4] Complementary currencies are also known as alternative, social, local, and community currencies. However, there is not a general agreement on how to refer to these currencies, and in many cases the terms are used interchangeably (Michel & Hudon, 2015). In this thesis I use the term 'complementary currency', with clarifications made where needed.

and improve people's access to money so that they can attain a minimum standard of wellbeing (Barinaga & Zapata-Campos, 2023).

In general, complementary currencies are designed to avoid some of the challenges of conventional money. First, complementary currencies are bound to a community of users implying that its acceptance is limited, and it is useful only to that community of users, thus preventing leakage and potentially increasing the circulation of money within the community (Lietaer & Dunne, 2013). Second, they are not all-purpose money, meaning that they do not usually function as a medium of exchange and means of saving (Kennedy et al., 2012; Lietaer & Dunne, 2013). The accumulation of complementary currency is disincentivized by, for example, charging a fee for the complementary currency being kept out of circulation, and preventing any speculation opportunities (Kennedy, 1995; Lietaer & Dunne, 2013; Amato & Fantacci, 2020).

2. The mapping and categorizing of complementary currencies

The idea of complementary currencies has been popularized by activists and researchers who have constructed knowledge about the concept. The first wave of investigations focused on understanding the motivations of those participating in these complementary-currency projects (Williams, 1996; 2006; Caldwell, 2000; Collom, 2007). Having initially been organized by grassroots movements, complementary currencies began to promote diverse economies based not solely on profitability and market equilibrium (Seyfang, 2000). Many of these currencies were motivated by the values of the anti-capitalist and globalization-resistance movements, wherein people organized themselves to exchange their time and resources for social or ecological reasons. However, while this anti-capitalist logic was fundamental to many of the original grassroots currency movements, North (2007) argues that some joined these complementary-currency projects because they saw them as innovative means of facilitating exchange, rather than for ideological reasons. In this sense, while people's participation in a complementary-currency project can be motivated by political ideas, people can adopt complementary currencies without being aware of or agreeing with their underlying ideologies.

Complementary currencies have emerged all over the world, and the second wave of research focused on mapping cases in order to visualize their geographical spread and diversity. Seyfang and Longhurst (2013) identified

3418 community-currency projects that had been undertaken by 2012.[5] The literature[6] includes the mapping of complementary-currency projects that have been undertaken, in the United Kingdom, the United States, Japan, France, Spain, Argentina, Brazil, and Kenya (Schroeder et al., 2011; Michel & Hudon, 2015; Alves & Santos, 2018). A recent example of mapping was undertaken by Blanc et al. (2022; 2023), who distributed a survey to 82 complementary-currency projects in France and Switzerland to inquire about the currencies' regulations, actors, and technological requirements, and their influence on territorial development. Similarly, September and Kobayashi (2022) studied 12 currencies that had been operating for more than ten years in Japan, and described the operational forms and funding strategies that have guided their success. Such studies have demonstrated the diverse array of complementary currencies, often within the same country or with similar purposes.

Due to the proliferation and diverse array of complementary currencies worldwide, there have been efforts to create typologies and classification systems[7] that facilitate their analysis, comparison, and replication (Blanc, 2011; Martignioni, 2012; Larue, 2020). Blanc (2011) conducted a historical analysis of complementary currencies and identified three ideal typologies based on overall purpose. When the primary purpose is economic, projects are usually guided by an interest in improving sales and employment. When they are guided by social purposes, the main goal is to strengthen social wellbeing and autonomy. Finally, local currencies are those with a territorial purpose, whose primary goal is to affect the "monetary relations in a geopolitically defined space" (Ibid.:6). Other standard dimensions for classifying complementary currencies are based on how they are issued, for example whether based on credit or in connection to a commodity (Lietaer & Kennedy, 2010; Gelleri, 2020), or on user participation in decision-making (Meyer & Hudon, 2017; Larue, 2020). The importance of classification does not relate to

[5] Seyfang and Longhurst (2013) state that, for their sample, they were careful in identifying active projects and looking for evidence of formal or informal networking.

[6] For comprehensive literature reviews on the topic, I recommend Schroeder et al.'s (2011) first literature review on the topic, which gives an overall guide on cases by country, types of currency, and language of contribution, among other factors. Another relevant source is the systematic review of Michel and Hudon (2015), who evaluated how currencies contribute to social, economic, and environmental development. Finally, Alves and Santos (2018) reviewed the literature in the *International Journal of Community Currencies*.

[7] Refer to Martignoni (2012) for a review of different dimensions of classification, and a proposed classification system intended to account for multiple dimensions. See also Larue (2020), who briefly reviews the classification of currencies, and proposes a new system based on ethical components.

there being one ideal type of money, but to evidencing the assortment of components that play out in a complementary-currency project.

3. Complementary-currency outcomes

Complementary currencies are of interest to communities all over the world, as they promise economic and social wellbeing and a potential solution to leakage (Kennedy et al., 2012). It is the promise of community wellbeing that motivated a third wave of research looking into outcomes. Studies on the Chiemgaeur, a complementary currency introduced in 2003 in Germany, and the WIR, introduced in 1934 in Switzerland, have shown that these currencies can increase access to money during economic recessions (Ulanowicz et al., 2009; Zeller, 2020; Gelleri & Stodder, 2021) and increase the rate at which money circulates (Stodder, 2009; de Rosa & Stodder, 2015; Stodder & Lietaer, 2016). However, the macro-economic impact of complementary currencies is still debated, since "the economic activity of community currencies is too low and insignificant in macro-economic terms" (Michel & Hudon, 2015:165).

There is some consensus that complementary currencies have a social impact in terms of strengthening social ties (Seyfang & Longhurst, 2013; Bazzani, 2021), promoting solidarity (Fare, 2011), and recognizing unpaid but essential activities in a community (Lee, 1996; Gomez, 2008; Fare, 2011). For example, studies on Sardex, a complementary currency in Italy, have shown that trust, reciprocity, and collective action within the network of users seemed to improve, and that this effect is increased if the complementary currency is attached to an organization that manages the complementary currency (Dini, 2012; Sartori & Dini, 2016; Bazzani, 2020).

However, scholars also debate the overall social benefits of complementary currencies. It should be noted that research has found that complementary currencies do not seem to influence already-existing systemic inequalities (Barinaga, 2019), and that they can reproduce gender and class disparities that are already present in the broader economy (Gómez, 2010; 2015). For example, members that already have a productive capacity will accumulate more currency, while those without a product or service to offer will struggle to benefit from a complementary currency (Barinaga, 2019). Larue (2022) argues that the fact that these currencies are bound to a specific community constrains spending possibilities and hinders the "opportunity to pursue one's own reasonable life plan" (Ibid.:81). Moreover, as communities of users grow, the social and democratic values that were important at the outset of the currency project are often difficult to maintain (Larue et al., 2022).

In sum, in the literature on complementary currencies, there are no definitive conclusions regarding outcomes (Fare & Ahmed, 2017; Alves & Santos, 2018) Additionally, little attention has been given to processes and relations and how these can influence the complementary-currency project's outcomes. As Fama et al. argue, the study of relational processes in complementary currencies can serve to provide "new insights into the general phenomenon of money and as a laboratory for exploring the possibility to move towards new socio-economic paradigms" (2020:1).

4. A socio-technical perspective on complementary currencies

As I will explain in Chapter 2, money has traditionally been approached as a neutral commodity (Kiyotaki & Wright, 1989) or as a social relation (Ingham, 1996). However, inspired by the field of Science and Technology Studies (STS), researchers have recently begun incorporating a socio-technical perspective in the study of money – specifically, recognizing that money is constituted by socio-technical relations (e.g., Maurer, 2015b, 2017; Barinaga, 2024).

The development of complementary currencies has been accompanied by a transformation in their payment technologies (Blanc, 2011). Early currencies were either printed notes that circulated within a community, or paper ledgers that kept track of the debts and credits of users within a system (Warner, 2014). However, it is expensive to print notes that cannot be forged, and handling and distributing them requires knowledge, and an operational infrastructure that can be expensive (Warner, 2014; Diniz et al., 2016). Today, digital tokens or ledgers are common ways of representing complementary currencies (Diniz et al., 2016; Gelleri, 2020). The literature suggests that digitalization has been seen as an opportunity to lower operational costs, widen the access to population outside the banking system, gather data, and better manage the information that is emerging from complementary currencies (CCIA, 2014; Diniz et al., 2016).

By recognizing the active role that technology has in a complementary currency, a fourth wave of research has introduced a socio-technical perspective to the study of complementary currencies. This methodological perspective, which I will expand in Chapter 3, can be used to study processes, and potentially contribute to the literature on complementary currency with theoretical findings. For example, Barinaga and Zapata-Campos (2023) studied the development of an NGO that develops complementary currencies in Kenya. The authors challenge the idea that complementary currencies are

objects, and instead define them as "heterogeneous socio-technical arrangements developed by networks of community groups, residents, activists and entrepreneurs to facilitate the flow of goods and services and organize people and resources in a local circuit" (Ibid.:5). In other words, they recognize the relational constitution of monetary arrangements. Moreover, they highlight the malleability of complementary currencies by analyzing how rules relating to issuance, usage, payment technologies, and participants were adapted to respond to the difficulties the NGO encountered.

The socio-technical perspective highlights the role of payment technologies and adds a new layer to the academic discussion on complementary currencies. The payment technology used in a complementary currency is vital, because it connects the monetary design and governance (Diniz et al., 2019). As is developed later in this thesis, the influence of technology can be discussed in relation to three main points: access to decision-making regarding the technology, the knowledge required to influence the technology, and the values embedded in the payment technology.

A socio-technical perspective has enabled researchers to shed light on how decision-making is undertaken with regard to payment technologies. Brazil, a country with a long history of complementary currencies, transitioned from paper-based complementary currencies to mobile apps, highlighting different challenges in the technological transition (Diniz et al., 2016; Faria et al., 2020; Ansorena et al., 2021). Faria et al. (2020) documented how community-driven credit and loan organizations that used a shared payment technology for their currencies were struggling to access the decision-making processes relating to new software functionalities and agreements regarding permission to access the source code, transaction database, and commercial contracts in order to make use of (i.e. benefit from) a new mobile app. The lack of access that communities were given to the data gathered through the mobile technology, the authors show, hindered the ability of community-driven organizations to mobilize resources to meet local needs.

A second element that has been highlighted by socio-technical perspectives relates to the power imbalances created by the need for engineering knowledge to influence the technical development of a currency. Sanches et al. (2022), who researched the design of solidarity cryptocurrencies, argue that "actors who dominate the languages of specialized technical work also dominate the design process" (Ibid.:14). This technical divide can create design tensions between the socially- and participatory-oriented frames of the communities of users, and the engineering design frames oriented to "deadlines, planning, budgets, tasks, and the delivery of a self-contained artefact, where the design

of a technology artefact is a priority, and the role of technical designers is predominant" (Ibid.:9). In the case of social cryptocurrencies, Meyer and Hudon (2017) note that even though these digital currencies have open forums to discuss topics related to changing the currency, it is usually a small group of users who end up making the decisions.

A final and important element is related to the ideas that technologies embed in its design. An interesting example was documented by Barinaga (2020), who studied the case of a complementary currency in Kenya. Barinaga found that market ideas of efficiency and speculation were being embedded in the technology's algorithms, and argued that this promotion of speculation through the technology may have hindered the local financial practices, which were originally based on participatory decision-making, and the distribution of money amongst members. This finding indicates that complementary currencies can also impact users' practices, showing the importance of investigating how economic ideas are embedded in payment technologies.

The use of socio-technical perspectives represents a significant shift in the study of complementary currencies. First, such a position defines complementary currencies as socio-technical arrangements, and focuses on the relational components between the actors, designs, and technologies that are arranged into complementary currencies (Barinaga & Zapata-Campos, 2023; Blanc & Fare, 2022). Second, it highlights how the malleability of monetary arrangements enables communities to embed different values, adapt global knowledge to local needs, and articulate the local economy (Barinaga & Zapata-Campos, 2023). Finally, it pays close empirical attention to the processes that lead to the design, governance, and adaptation of these monetary arrangements.

When investigating the relations between payment technologies and communities of users, most of the available research focuses on engineering aspects and the challenges that communities face in participating in discussions regarding the technical components of a payment technology, such as access to databases and source code (Diniz et al., 2016; Faria et al., 2020; Ansorena et al., 2021). It also highlights the differences between the engineering 'mentality' and community perspectives, in terms of the design of payment technologies (Sanches et al., 2022) and the repercussions that ideas embedded in a payment technology might have for users' practices (Barinaga, 2020).

The socio-technical perspective has helped researchers to focus on processes and address the role of technology, which was previously neglected. A focus on processes facilitates a deeper understanding of how and why certain socio-

technical arrangements are put in place and can reveal the underlying mechanisms and interactions that lead to particular outcomes. The process of implementing a complementary currency appears as a relevant instance to study how socio-technical relations unfold and influence a complementary-currency project, as it in this process where relations amongst actors, designs, and technologies begin to shape up.

5. The process of implementing a complementary currency

When implementation is discussed in the literature on complementary currencies, it is common to list activities and challenges to consider when starting a complementary currency (see e.g., CCIA, 2014; Ruddick, 2011; Gelleri, 2009; Dissaux & Ruddick, 2017). Most of the research is developed for and by practitioners. In this sense, they usually describe organizational, financial, legal, and technological activities that are relevant when implementing a complementary currency. An important reference work on implementation is People Power Money by the 'Community Currencies in Action' project (2014). Based on experiences of multiple currencies, the book describes groups of activities that are relevant when implementing a complementary currency. These include the structuring of a transparent, flexible, and democratic governance body, the developing of a business plan, fundraising for short- and long-term financial sustainability, and the use of digital technologies to facilitate membership management, ensure a marketplace, monitor and report activity, and communicate with people who use complementary currencies. From this perspective, implementation seems to be the execution of a plan.

Studying the implementation of a Kenyan complementary currency, Dissaux and Ruddick (2017) use the experience of one of the authors to explain that "the issuance of the CCs [complementary currencies] is preceded by an initial stage of mobilization, organization and deliberation in each of the communities" (Ibid.:3). 'Mobilization' refers to the tasks related to education and training, the goal of which is to build interest in and knowledge about a complementary currency and the local economy. 'Organization' refers to the process of individuals gathering endorsements from the community, and the formal constitution of the group. 'Deliberation' refers to the design of currency and definition of rules that the members have to abide by. Finally, 'issuance' refers to the process of issuing and introducing the complementary currency. However, no critical analysis is done regarding how certain decisions in the

implementation process are made and the implications in the complementary currency.

An activity in the implementation of a complementary currency that has been studied at large is the definition of design principles. In general, the literature suggests that design principles need to be adapted to the reality of the users. A plethora of principles for how complementary currencies should be designed exist. For example, to comply with sustainable-development goals (e.g., Diniz et al., 2024), the governing of the commons (e.g., Meyer & Hudon, 2017; Barinaga et al., 2021, Siqueira et al., 2020), and ecological economics (e.g., Alves et al., 2022), to give a few examples.

A recent example of design principles is discussed by Diniz et al. (2024). The authors used a design-research approach to propose principles for complementary-currency projects oriented around the sustainable development goals (SDGs). The design principles are the (i) analysis of context, examining the economic and institutional environments; (ii) description of goals, identifying specific aims tied to the SDGs; (iii) detailing the mechanisms, including governance and architectural features, necessary for implementation; (iv) defining evaluation criteria and establishing metrics for assessing the project's outcomes and alignment with its intended goals. However, design is different to implementation (Ibid.) and due to a lack of longitudinal and participatory case studies, less is known about the practical implementation of design principles in the complementary-currency project.

Lietaer and Kennedy (2010) stress that "no monetary system can be sustainable without work" (229; translation mine). The financing of a complementary currency relates to the ways in which the costs of running a project are covered. This is of particular interest when the implementation of a complementary currency is being undertaken in the context of scarcity, as research foundations or non-governmental organizations (NGOs), that is external actors, generally fund such projects. Nevertheless, in the current literature, little is known about the influence that these external actors' role have in the socio-technical arrangement.

The current literature on implementation has done important work in describing different activities that could be carried out when starting-up a complementary-currency project. However, little is known about how these activities relate to one another throughout the implementation process, how these relations change, and the influence of these relations on the process itself and the complementary currency. Additionally, no critical analysis is done regarding the implications of economic and technical decisions in the

implementation process. Moreover, in contexts of scarcity, little is known about the influence that external actors have over these decisions.

6. The role of external actors in the implementation of complementary currencies

The idea of adapting complementary currencies to particular needs has been getting the attention of governments and NGOs working to combat poverty. A well-known case of a government using the idea of complementary currencies is the case of the 'Mumbuca', which was developed by the municipality of Maricá in Brazil. The project began in 2013, when the local government partnered with a community-based organization, Instituto Banco Palmas, to distribute a cash-transfer program in complementary currency to the poorest populations in the city (Ansorena et al. 2021). This complementary currency increased local commerce by 73% in twelve years, and "promoted a sense of community and solidarity" among users (Cernev & Diniz, 2020:489). The success of the Mumbuca has inspired municipalities in Rio de Janeiro to use complementary currencies as part of their poverty alleviation and productive development programs (Barinaga et al., 2023; Melo, 2023).

Another well-studied case of using complementary currencies for humanitarian aid is Sarafu in Kenya, which started with the development of Eco-Pesa, a paper-based currency, in 2010 (Ruddick, 2011). Following several years of technological and organizational transformations, Sarafu works as an open-source blockchain-based digital currency (Ussher et al. 2021; Barinaga & Zapata Campos, 2023). Due to Sarafu's coverage and technological infrastructure, the Red Cross has injected at least 100,000 US dollars via its cash-transfer program (Ussher et al., 2021). Several studies have reported on Sarafu's impact on access to food and jobs among impoverished populations since its inception (Ruddick et al., 2015; Barinaga & Zapata Campos, 2023; Ussher et al., 2021; Mqamelo, 2022; Mattsson et al., 2022; Kuk et al., 2024).

Discussions regarding the financial-inclusion agenda and the use of complementary currencies as a solution to poverty have paved the way for more research regarding the role of external actors. Studies have found that, when the governance of socio-technical arrangements of money is in the hands of actors external to the community of users, access to the information needed to mobilize resources in order to adapt complementary currencies to local needs is restricted (Faria et al. 2022). Moreover, because they have the aim of developing efficient payment technologies, external actors can influence local financial practices in unexpected ways (Barinaga, 2020).

Blanc and Fare (2013) explored the potential role of governments and local administrations in the implementation of a complementary currency. The authors found that governmental actors can threaten, be disinterested in, or financially and technically support implementation processes. However, their findings "do not build on a specific case study with original data, but […] various fieldwork and monographs" (Ibid.:64).

More recently, Kuk and Giamporcaro (2024) used the concept of imaginaries to study how external actors shape the design and implementation of complementary currencies. The authors explain that imaginaries can be based on the past to portray a socio-technical vision of society and the economy, be used to anticipate or forecast potential futures, or serve to oppose dominant ideas in society. In their study of how an NGO introduced complementary currencies in Kenya, they show two different ways in which the NGO made use of imaginaries to adapt its complementary currency. First, by using simulation models to forecast economic futures and, second, it built on a technology-for-good imaginary to adapt technologies with the "vision of championing smart innovation to address grand challenges" (Ibid.:77). The authors concluded, however, that the requirements for aligning the imaginaries with the complementary currency collided with the interests and needs of the currency users. Hence, highlighting the need for a more nuanced understanding of "how imaginaries shape and influence the trajectory of social change initiatives" (Ibid.:989).

Few case studies have explored how external actors influence socio-technical relations during the implementation of a complementary currency in the context of scarcity. Furthermore, more needs to be studied regarding how the imaginaries of external actors shape complementary currencies. In this sense, using a socio-technical perspective could provide a deeper understanding of how the relations between external actors, communities of users, payment technologies, and imaginaries shape and are shaped during the process of implementing a complementary currency.

C. The aim of studying the implementation of complementary currencies in the context of scarcity

The first goal of the UN Sustainable Development Agenda is to end poverty. Humanity needs different strategies to address this, and the financial-inclusion agenda is a mainstream one. However, though almost 10 years have passed since the sustainable agenda and the SDGs were established, more efforts are needed to advance in terms of poverty reduction. Complementary currencies appear to be promising means of addressing the lack of access to money of people living in poverty.

There are opportunities to strengthen and contribute to what we know about complementary currencies. The mapping and classification of the different complementary currencies and the study of their potential outcomes can be complemented by a focus on processes. In particular, the understanding of the process of implementing complementary currencies can reveal the underlying mechanisms and interactions that lead to particular outcomes. The current literature on implementation has described different activities that are relevant for starting-up a complementary currency, and this knowledge can be strengthened by examining how the interrelation amongst implementation activities influences a monetary arrangement. In this sense, a socio-technical perspective which has already been used to study the engineering of payment technologies, can be put to work to study the mechanisms by which economic ideas are embedded in payment technologies and how external actor's imaginaries shape and are shaped through the implementation process. Moreover, in the literature on complementary currencies in general, research cases are usually retrospective, lack strong empirical foundations, and do not use participatory methodologies (Schroeder et al., 2011; Alves & Santos, 2018). Hence, a longitudinal and empirically grounded study using participatory methodologies are needed.

Thus, there is a need for an in-depth study of an implementation process, particularly from a socio-technical perspective. The research question that guided this study was: **How is a complementary currency implemented in a context of scarcity?**

Through the exploration of this research question, this study has developed knowledge about the process of implementing a complementary currency in situ – as it happened. The aims of this study were threefold. First, to contribute

to the literature on complementary currencies by theorizing regarding the influence of socio-technical relations on the implementation of complementary currency arrangements. Second, to discuss the roles of external actors in the implementation of complementary currencies in the context of scarcity. Third, to suggest some guidelines for the implementation of complementary currencies as development tools.

D. The structure of this thesis

In order to investigate how complementary currencies are implemented in the context of monetary scarcity, important work had to be done. The investigative, analytical, and argumentative tasks that were carried out are documented over the course of eight chapters. This first chapter has problematized the mainstream approach to the scarcity of conventional money, presented the idea of complementary currencies as an alternative solution to scarcity of money, and motivated the relevance of developing our knowledge of the processes of implementing complementary currencies in contexts where conventional money is scarce.

The second chapter presents the theoretical foundation of the thesis. To begin the study of money, a good starting point is to look at different approaches to it, and to recognize that money can be approached as a 'thing', a relation, and something that has different meanings when it is used, in order to help us to think about money in different ways. Money, it seems, is constituted by both the social and technical worlds; hence, its study requires an approach that recognizes and builds on this. An approach inspired by STS recognizes that money is constituted by social and technical relations – that, in other words, money is a socio-technical arrangement. This study utilizes this socio-technical approach to money, and turns an analytical gaze to the relations among political-economic ideas, authorities, issuers, users, and payment technologies in processes relating to implementing monetary arrangements.

Studying the implementation of a monetary arrangement in situ, as it happens, requires having the appropriate research tools. The third chapter introduces the methodology that was used to study money in the making. This study used a socio-technical perspective, which recognized social and technical relations as constitutive elements of social phenomena such as money, and focused the analytical gaze on the relational processes that constitute it. To investigate the socio-technical relations in the making of money, inspired by the field of STS,

this study's methodology recognized a processual logic, acknowledged non-humans (e.g., payment technology) as potential actors in organizing processes, and used the concept of translation to describe and analyze which, why, and how associations were made and changed over time. The chapter describes the study's data-collection and analysis processes, and concludes with my considerations on ethics and positionality.

The fourth chapter presents the research setting: the Grassroots Financial Innovation (GFI) project. In the GFI project, a group of scholars and an NGO came together with the goal of implement complementary currencies for low-income populations in Kenya. The plan was to learn from the complementary currencies that had already been developed in Kenya, and to implement a new one with the support of Kenyan communities. By following the development of the GFI project between 2018 and 2022 – a period during which the COVID-19 pandemic took place – I traced the socio-technical relations that led to the implementation of a complementary currency in the biggest open-air market in Kenya. The GFI project was an ideal site for studying how external actors, such as a group of researchers and an NGO, can support poor populations during the process of implementing a complementary currency, and offered an opportunity to empirically follow, as they occurred, the controversies that emerged during the process.

Chapter five explores the two political-economic ideas for how the complementary currency was to work within the GFI project. One side saw the complementary currency as an efficient medium for the circulation of aid, a means of including people in different markets through networks of currencies, and a way of providing arbitrage possibilities that would enable the self-regulation of the system. The other side saw the complementary currency as a way to involve people in the design and management of their monetary arrangements to ensure it responded to their own needs. These were two contrasting political-economic ideas for how the complementary currency was to be developed in the context of scarcity, even though both were initially articulated with a desire for people's wellbeing.

Chapter six details how political-economic ideas are translated into payment technologies. The chapter traces the controversy relating to which payment technology was to be used in the implementation of the complementary currency, and explores how the use of a payment technology entails a particular approach to money and user participation within a monetary arrangement. The findings show that payment technologies are not neutral, and that whoever controls these can include or exclude actors and their ideas in monetary arrangements.

The seventh chapter examines multiple sides of a monetary arrangement by tracing how the relation between ideas, activities, and actors transform in the process. The implementation process enabled the spreading of ideas, strengthening of community relations, and adoption of financial innovation, aid to local practices. In particular, this chapter explores how, despite the fact that ideas are embedded in payment technologies, the reproduction of these ideas is not a given, as a community of users may interact with the technology in other ways than those intended in its design. In sum, a complementary currency can be designed, but its implementation can display multiple sides of a monetary arrangement.

The eighth and final chapter discusses the contributions of this study to the field of complementary currencies, in particular to the literature on their implementation. Rather than viewing implementation as the execution of tasks, this study reframes implementation as an evolving set of organising activities conceptualized as *modulating, representational*, and *vernacular*. Moreover, this research introduces two different imaginaries of development – *Market Inclusivism* and *Monetary Emancipation* – and explores how these imaginaries shape and are shaped during the implementation of complementary currencies in the context of scarcity. Moreover, I identify how organizing activities can enable external actors and users to influence the monetary arrangement. Through the chapter, I suggest possible avenues for future research and conclude it by presenting guidelines regarding the organizing of complementary currencies in contexts of scarcity.

You go to school to learn the rules
On how to love and live your life
But think about it twice
The pushers push, the fixers fix
The judge acquits
The junkie leads his life
For the dollar bill
Funky dollar bill
- Hazel et al. (1970)

2. Approaching money

This chapter presents the theoretical approach of the thesis. To study how money can be implemented, a good starting point is recognizing that money can be approached in various ways: as a 'thing', a relation, and something that can have different meanings when used. Money is often considered to be constituted by both the social and technical worlds, and its study requires an approach that recognizes and builds upon this. A recent approach that is inspired by an STS perspective recognizes that money is constituted by social and technical relations—in other words, it approaches money as a socio-technical arrangement. This study takes this socio-technical approach to money, and turns an analytical gaze to the relations between political-economic ideas, authorities, issuers, users, and payment technologies in the process of making money.

A. Functions of money

Money is something that everyone can (and usually does) talk about. In mainstream economics it is common to define money through its functions as a unit of account, a means of payment, a medium of exchange, and a store of value. Money functions as a *unit of account* when something, usually an object, is used as a measure of equivalence and point of reference to establish prices. Money acts as a *medium of exchange* when something is used as a transitory medium to access desired goods and services. Money functions as a *means of payment* when something is used to settle acquired obligations. Finally, money functions as a *store of value* when it is stored for future access to goods and services.

Let us explore the functions of money through a thought experiment: Imagine you are walking on the beach with someone you love, and every time you walk through a particularly nice part, you pick up a seashell. After a long day of walking, you arrive at the harbor ready to buy a hot coffee. The barista is part of a community of seashell collectors, and is willing to accept them in his store (shells as a means of payment). You both agree to exchange ten of your shells for one coffee (shells as a unit of account and a medium of exchange). The barista recognizes that the shells could be exchanged with other businesses in the village, and decides to store them for the future (shells as a store of value). Seashells have here functioned as money.

It should be noted, however, that money is much more than what it functions as. As Feinig (2022:11) argues, "if money users limit their understanding of money to a list of functions, their capacity to relate to money as a malleable institution remains truncated". In this sense, looking at money through merely its function ignores the set of relations behind it and the processes, decisions, and actors of money are blackboxed. The following sections aim to open up the 'black box' of money and outline the theoretical elements that will inform this study.

B. Approaching money as a commodity or as a credit-debt relation

While there is a general agreement on how money can function, there is less agreement on what it is and how it began. In economics, there are two common approaches to money that have dominated the debate: one that regards money as a commodity, and one that sees it in terms of the credit-debt relation (Goodhart, 1998).

1. Money as a commodity

In classical economics, and as we usually learn in school, money represents a commodity (i.e. goods, a service, or land) that a person uses to facilitate exchange. The political economist Adam Smith explained the emergence of money in conjunction with what he defined as the commerce society:

> *When the division of labour has been once thoroughly established, it is but a very small part of a man's wants which the produce of his own labour can supply. He supplies the far greater part of them by*

> *exchanging that surplus part of the produce of his own labour, which is over and above his own consumption, for such parts of the produce of other men's labour as he has occasion for. Every man thus lives by exchanging, or becomes in some measure a merchant, and the society itself grows to be what is properly a commercial society.* (Smith, 1869:34)

As society became more specialized, the story goes, it was common to exchange goods and services through bartering; however, problems with this included the *double coincidence of wants,* which refers to the difficulty of finding two actors who each want to sell what the other wants to buy, and the challenge of defining at what rate an exchange should be made. Money emerged as a logical solution to these problems since it could function as a "transitory element that temporally intervenes in sale and purchase" (Jevons, 1876), i.e. a medium of exchange. In other words, one could use a commodity as a temporal element until the desired good was obtained. Moreover, this commodity could serve as a standard unit of account to express a relation between something that one had, and something that one wanted.

Money, argue some orthodox economists, evolved as a result of individuals wanting to decrease their transaction costs, reduce the need for individual creditworthiness, and increase their profits (Smith, 1869; Menger, 1892; Horwitz, 2001; de Bruin et al., 2023). Commodities with specific properties[1], such as portability, divisibility, storability, fungibility, and homogeneity, are more desirable as media of exchange (Jevons, 1876; Menger, 1892;). Those possessing easily exchangeable commodities have an advantage in the market and can make more profit. In this sense, people looking to maximize their earnings accumulate the commodities that function as the best media of exchange. This is why metals, such as gold and silver, became commonly used as money, and were later transformed into coins in the interest of efficiency.

A key argument in the commodity approach is that money originated in a decentralized way,[2] and not by order of the State. As Menger (1892:248)

[1] Both Menger (1892) and Jevons (1876) describe in detail different qualities of money. Menger (1892) focuses on the qualities that make a commodity more saleable, based on a specific market and certain spatial and durability limits. Jevons (1875:32), on the other hand, recognizes that the desired material qualities of money depend on functions, and prioritizes material qualities based on utility, value, portability, indestructibility, homogeneity, divisibility, stability, and recognizability.

[2] An important line of research in economic theory has focused on creating economic models that explain the emergence and development of money as a medium of exchange. For example, Starr (1972) presents an economic model of the structure of exchange in barter and monetary

argues, money emerged "without convention, legal compulsion, nay, even without any regard to the common interest". The original role of the State was to manage the process of coinage by certifying weights of metal, preventing counterfeiting, and settling contracts (Jevons, 1876). Horwitz (2001) explains that the practice of using money became institutionalized by general acceptance, and that new monetary systems developed to handle the challenges of the specific contexts in which they appeared.[3] The point of a commodity approach to money is that the creation of money is not exclusive to the State; rather, it can be undertaken by any institution with the capacity to make the process more convenient for commerce. This explains the emergence of the banks and financial institutions that sustain monetary systems (Menger, 1892; Horwitz, 2001).

In summary, from the perspective of the commodity approach, money develops in order to improve exchange methods. Jevons recounts the development of monetary systems as follows:

> *We commenced the study of money with the barter of ordinary commodities, and money appeared in the first place as some common commodity handed about as a medium of exchange. By degrees, however, the subject assumed a greater and greater degree of complexity. The metals took the place of other commodities as currency, and delicate considerations began to enter concerning token and standard coins. From metallic representative money, we passed to paper representative money, and finally discovered that, by the cheque and clearing system, metallic money was almost eliminated from the internal exchanges of the country. Pecuniary transactions now present themselves in the form of a room full of accountants, hastily adding up sums of money. But we must never forget that all the figures in the books of a bank represent gold,*[4] *and every creditor can demand the payment of the metal.* (Jevons, 1876)

The key to this approach is that money represents a commodity; whether it is paper or coins, money is a neutral representation of a commodity that facilitates exchange. Jevons (1876) argues that its traceability to a tangible commodity is

economies, while Jones (1976) provides an overview of the literature on monetary exchange grounded on orthodox economics, and Kiyotaki and Wright (1989) produced a seminal work that models the emergence of a medium of exchange as part of a non-cooperative equilibrium.

[3] See Jevons' (1875) 'Money and the Mechanism of Exchange' for a detailed history of the evolution of the systems of money from a commodity perspective.

[4] However, it is worth recognizing that, in the conventional monetary system, the connection between money and gold ceased at the end of the gold standard (Hart, 1986).

something "we must never forget". No matter how it is represented, it should be possible to convert money into a commodity which is supposed to give money its value.

The commodity approach does, of course, have its critics, who point to the difficulty of reaching joint agreement regarding a single commodity serving as a medium of exchange. Every town or market needs different commodities, and so common agreement about a unique commodity is near-impossible, at least in terms of the homogeneity found in historical accounts (Mitchell-Innes, 1913 [2004]; Goodhart, 1998; Martin, 2014). A second criticism relates to the process of pricing products; the price of a commodity varies based on demand for it, making it necessary to estimate the conversion rate in every transaction, consequently making the process inefficient (Ingham, 2004). A third criticism focuses on the secondary role given to the State in the origins of money—that is, as a guarantor of the weight and fitness of coins at the service of the market. As I will develop further in the next section, this secondary role is heavily contested by those who place the State at the center of the creation of money, also known as the Chartalists (Wray, 2014).

Let us summarize the key takeaways of a commodity approach to money. First, money represents a commodity, and its primary goal is to optimize the exchange process between buyers and sellers. The monetary system was developed spontaneously to reduce transaction costs and make exchange easier. Second, this approach sees the value intrinsic to money itself, the value in the commodity it represents. Third, money functions as a tool for the market, and so its institutionalization and development should be made by private actors, be independent of the State, and its coordination left to self-regulating markets.

2. Money as credit-debt[5] relation

The British economist Alfred Mitchell-Innes contested the commodity approach to money, arguing that its origin was "the sanctity of an obligation":

> *This is the primitive law of commerce. The constant creation of credits and debts, and their extinction by being cancelled against one another, forms the whole mechanism of commerce and it is so simple that there is no one who cannot understand it. Credit and debt have*

[5] The terms credit-debt and debt-credit are used interchangeably.

> *nothing and never have had anything to do with gold and silver.* (Mitchell-Innes, [1913], 2004:31)

For Mitchell-Innes (1913[2004]), money does not represent commodities, but a system of debt and credit relations in commerce. All people are buyers and sellers at some point; when buying, one becomes a debtor, and when selling, a creditor. Money is created by the record of these commercial relations. Hence, money's most important function is as a means of payment, to liberate a person from debt, which can be quantifiable and transferable (Graeber, 2012).

Authors who recognize money as a relation between debt and credit argue that using money goes beyond commerce. For example, Polanyi and Dalton (1968) argue that any use of money involves a series of obligations and contributions across multiple types of social relationship (e.g. kinship, tribe, village, age group). In this sense, the origins of money should "not be sought in the market but in a much earlier stage in communal development" (Grierson, 1977:33; quoted in Ingham; 1996:519), where the agreed values and norms in society serve to measure the value of the sanctions and rewards given to individuals. Money is a promise towards society; hence, social reciprocity is the basis of money, and its function, as a medium of exchange, should be considered in terms of an accounting system that keeps track of the peoples and institutions' credit and debt accounts as they engage in a trade (Martin, 2014).

As an accounting system, money does not have an intrinsic value. It can be made of paper, metal, or, as most of our money today, digital; the important thing is that there is a system that tracks debts and credits and clears accounts (Wray, 2014). For example, historical recounts often registered using tallies (Mitchell-Innes, 1913 [2014]; Graeber, 2012; Martin, 2014), which indicate the quantity that was owed, the names of both the creditor and the debtor, and the date. Tallies were stored in temples and destroyed once the debt was settled. It was the debt-credit relations that these tallies recorded that was important; the tallies themselves had no intrinsic value.

From a debt-credit perspective, money represents someone's capacity to repay debt. On the one hand, money enables the procurement of goods and services when needed; on the other, the debtor legitimacy is estimated based on his or her creditworthiness, which is assessed based on their future capacity to sell products, services, or properties in order to acquire credits and settle debts (Mitchell-Innes, [1913], 2004). The challenge for those in need is, as Bell (2001:151) comments, "to find someone who is willing to become a creditor (i.e. to hold that promise or debt)", hence, the value of money hinges on the

creditworthiness of the issuer and the community that it permits people to participate of.

The German economist Georg Friedrich Knapp would argue that the State had a significant role[6] in the origins of money due to its role as a creditor to all (Knapp, 1924; Lerner, 1974; Bell, 1998; Wray, 2004) because of its coercive capacity to claim obligations (taxes) from people in a unit of its desire. Moreover, the State has the capacity to not only collect taxes but issue units, which we can refer to as 'tokens', to pay for the services it requires. Hence, it creates both supply and demand for the tokens that it creates. As Lerner (1947:313) explains: "everyone who has obligations to the state will be willing to accept the pieces of paper with which he can settle the obligations because they know that the taxpayers will accept them in turn". In other words, there is a process of making state-created tokens a relevant means of payment in order to settle debts relating to state and private affairs (Wray, 2014).

Those who set the unit of account can use money to fulfill social needs that fall outside the reach of individuals (Keynes, 1926). Money can be used for the mobilization of resources within a collective, and those who define the unit of account have the ability to decide what type of services or goods to prioritize. As Keynes (Ibid.:16) argues: "the important thing for government is not to do things which individuals are doing already, and to do them a little better or a little worse; but to do those things which at present are not done at all". In this sense, a token issuer such as the State has the possibility to guide labor towards the production of collective goods (e.g. building roads or schools) by issuing the tokens to pay for that labor. In short, money can be used as a governance tool to match resources to unmet needs.

In the modern monetary system, the State defines a token, imposes its circulation through the forcing of taxes and enforcement of the law, and delegates the issuance of conventional money to banks (Bell, 2001; Desan, 2014; McLeay et al., 2014). However, many critics[7] of a credit approach to money are focused on the central role given to the State in creating money. While some economists argue that money is created via State expenditure,

[6] This is usually referred as Chartalism. A detailed review of the Chartalist theory of money goes beyond the scope of this thesis. See Bell (2001) for a chartalist approach to the creation of money, and Wray (2014) for a historical exploration of the development of a state theory of money, initially by Knapp and influenced by Mitchell-Innes, and how this led to modern money theory.

[7]Refer to Febrero (2009) for a criticism of chartalism, and Goodhart (1998) for a comparison between chartalism and commodity approaches to money.

critics say that the creation of money is not, and should not, be the monopoly of the State. Financial institutions with the legitimacy to provide a system to clear debts and prevent misuse of the system can also create 'private' money in denominations defined by the State (Davidson, 1970; Hayek, 1976). Moreover, banks can create money even in the presence of a government with poor legitimacy,[8] since they can create private debt and make it function as a medium of exchange (Rochon & Vernengo, 2003). Some even argue that without the financial system, the State would not have the operational capacity to issue and collect tokens through taxes (Febrero, 2009). A final argument is based on the State's misuse of money: the State abuses its position by overspending[9] in the economy, and the excess of circulating money in pursuit of a limited number of products and services increases prices in the economy (Hayek, 1976).

Let us summarize the key takeaways of the credit-debt approach to money: First, money originates from relations of credit-debt in a society, meaning there are always debtors (who buy) and creditors (who sell) who are willing to settle obligations. The value of money is extrinsic to it, and it resides in the creditworthiness of those using the currency. Second, a creditor common to all (e.g. the State) can issue tokens and spend them on whatever services it requires. Tokens become the general unit of account and a means to settle both individual and collective debts, and can be used as a governance tool.

3. Money: two sides of a coin

The commodity and debt-credit approaches offer contrasting views on money (Table 1). For example, in the commodity approach, money is a neutral representation of a commodity, and develops during a search for market efficiency. Moreover, money's fundamental functions are being a means for procuring desired commodities (i.e. medium of exchange), and as a reference point for estimating the values of different commodities in relation to other standard commodities (i.e. common measure of value). The debt-credit approach to money begins with social obligations, and prioritizes the function

[8] This is debatable, since states usually act as debtors of last resort as a way of giving stability and confidence to the financial system (Ryan-Collins et al., 2012).

[9] However, as Lerner (1947) argues, it is the responsibility of the creator of money to assure the stability of its value and the soundness of the economy. Hence, the State is the actor who is in the best position to do this. In contrast to this, Hayek (1976) suggests that the creation of money should be a private and competitive endeavor, with the argument that private enterprises have incentives to provide better "money" in order to maximize their profits.

of money as a unit for keeping track of debts among individuals and collectives (i.e. a unit of account) and settling debts (i.e. means of payment).

Table 1. The differences between the commodity and debt-credit approaches to money.

Variable	Description	Commodity	Debt-credit
Development of money	How did money emerge and evolve over time?	By a decentralized desire to minimize transaction costs and increase individual profit. Specialized institutions are responsible for developing and maintaining the system to facilitate commerce.	There is a need to account for relationships between debtors and creditors in a society. A common creditor to all has the capacity to impose whatever it sees as a useful means of settling debt-credit relations.
Purpose of money	What is the primary purpose of money?	To improve the efficiency of market transactions.	Money serves to account for records and discharge obligations in a given community.
Key functions of money	Which functions of money are prioritized in the configuration of money?	Means of exchange and measures of value.	A standard unit of account and means of payment.
Value of money	What is the value of money?	The commodity, which money is just a representation of. Value is intrinsic.	Value rests on the creditors trust that debtors will pay their obligations. Value is extrinsic to money.

These approaches were usually treated as being contradictory and incommensurable, but today it is recognized that they can coexist (Hart, 1986; Dodd, 2005). In other words, money can represent relations between people, and can also represent things. Hart (1986) uses the image of a coin to illustrate this:

> *On one side is 'heads' - the symbol of the political authority which minted the coin; on the other side is 'tails' - the precise specification of the amount the coin is worth as payment in exchange. One side reminds us that states underwrite currencies and that money is originally a relation between persons in society, a token perhaps. The other reveals the coin as a thing, capable of entering into definite relations with other things, as a quantitative ratio independent of the persons engaged in any particular transaction. In this latter respect money is like a commodity and its logic is that of anonymous markets. Heads and tails stand for social organization from the* ***top*** *down and*

> *from the **bottom** up, epitomized in modern theory by the State and the market respectively.* (Hart, 1986:638, emphasis in the original)

All in all, what Hart (1986) points out is that money can work both as a relation and as a commodity. On the one hand, money can be approached as a relation between individuals and the State, and the State can make use of its central position to set a unit of account, issue and spend money, and withdraw it through taxes. On the other hand, when approached as a commodity, money can act as a quantitative representation of other things, independent of the persons engaged in any particular transaction. In other words, money can create value for both the State and the Market. But money is also used by laypeople, which is why scholars have also looked at how money is embedded in individuals' sociocultural contexts.

C. Approaching money in use

While economists have discussed what money is and how it is used by the State and the Market, anthropologists and sociologists have taken a substantivist approach to money, investigating how it operates in social, cultural, and political systems (see e.g. Polanyi & Dalton, 1968; Dodd, 1994; Simmel, 1991, 2011; Zelizer, 1995; Graeber 2011).

Money, argues Georg Simmel ([1900] 2011), is simultaneously a connecting and separating factor in society. The interests and personal satisfaction of individuals' were previously bounded within the limited communities that they were part of. However, money enlarged the individual's ability to 'communicate' with others, by serving as a common means of transacting—that is, spending and receiving. The use of money as a transitory element permitted the connection and unification of interest between different social and productive circles. At the same time, money gave people autonomy and independence, by separating them from relationships of personal character and constrained commitments (Simmel, 1991). Simmel argues that monetary transactions are impersonal and *colorless*, as they permit relations based on "the anonymity of the other and their indifference to their individuality, a relationship to them without regard to whom it is in any particular instance" (Ibid.:21).

Money, argues Simmel, emerged as a transitory 'thing' to ease bartering, but ended up being the goal in itself, transforming modern society: "because the majority of modern people must focus on the acquisition of money as their

most proximate goal for most of their lives, the notion arises that all happiness and all definitive satisfaction is firmly connected to the possession of a certain sum of money" (Simmel, 1991:25). In this sense, something that was supposed to be transitory became a goal in itself, with people "calculating and reducing qualitative values to quantitative ones" (Ibid.:28). Hence, for Simmel, money transformed the machine of life into a perpetuum mobile, with the constant search for money as the ultimate goal.

The economic sociologist Viviana Zelizer (1995) explored how laypeople used money in the economy, and showed that money was not as impersonal as it seemed. Her studies of a plethora of cases involving housewives, the poor, and even prostitutes showed that when people used money, its meaning was adapted to the social relations that people engaged with. The process of giving special uses and meanings to money based on people social relations was termed 'earmarking' (Zelizer, 2012).

Earmarking is defined as the act wherein people "routinely assign different meanings and separate uses to particular monies" (Ibid.:5).

> *People sorted ostensibly homogeneous legal tender into distinct categories, and they created other currencies that lacked backing from the State. They marked distinct categories of social relations, furthermore, by means of distinct forms of monetary transfers. This, I claim, is how money works: in order to make sense of their complex and often chaotic social ties, people constantly innovate and differentiate currencies, bringing different meanings to their various exchanges. Thus, a multiplicity of socially meaningful currencies replaces the standard model of a single, neutral, depersonalizing legal tender.* (Zelizer, 1996:484)

Zelizer (1995) studied the case of American society and investigated the earmarking of charitable funds as assistance for people experiencing poverty. She investigated how different organizations in charge of distributing aid to poor populations and their social workers made efforts to use the charitable funds in ways that would help the poor. Initially, this involved not giving people experiencing poverty money directly, on the assumption that they would misuse it. Later, the charity began providing these people with vouchers as a form of currency, which were designed by charitable organizations to teach them how to manage their finances. The recipients were expected to buy certain types of food and use money in sensible ways, at least from the perspective of the charity organizations. However, the system was contested by the users, who earmarked the vouchers in ways that made sense to them, for example making agreements with local stores to enable them to buy products

that the organizations considered to be unnecessary (e.g. fancy foods or toys for their children).

Zelizer's (1995) studies contrasted with, at the time, mainstream economic approaches to money, which assumed that it is neutral, and were based on profit-maximization and individualistic motives. Through her substantivist studies, Zelizer demonstrated that people use money in ways that are relevant to them, and which do not necessarily follow the utilitarian approaches assumed by economic theory of the time. As Zelizer (2000:842) explains "rather like forms of clothing, styles of speech, choices of location, and kinds of meals, forms of payment mark the character and range of the social relationship people are currently enacting".

The point I want to highlight is that when currency reaches the hands of laypeople, it seems that whatever purpose it was designed for can be redefined. While the objective of a system designed by experts is often rational, scientific, and even assumed to be beneficial to poor communities, people ultimately use money and give it meaning based on the relations they enact.

One example of how people are constantly earmarking money can be found in Kenya. Schmidt (2022) wanted to understand why some low-income people in Kenya were not interested in receiving free money from Western organizations, and in the process found that respondents give different meanings to money depending on their origins and uses of it:

> *It is thus unsurprising that I came across a variety of different and related classificatory terms, such as pesa marach ('bad money'), pesa nono ('free money'), and pesa mamit ('sweet money'; Schmidt 2017)[…]. While pesa marach referred to banknotes and coins that were bewitched and caused the owner to make disastrous decisions such as spending the night with a prostitute, pesa nono described money given to jo-Kaleko [the informant] by politicians. Some viewed such exchanges as legitimate exchanges of money for votes, while others framed them as undeserved and not grounded in 'hard work' (tich matek). Pesa mamit appeared to capture the common understanding of money that also became manifest in phrases like 'money is money'.* (Schmidt, 2022:120)

These findings are an example of earmarking based on people's social relations and cultural context. While all used Kenyan Shillings, money was earmarked differently if it was used to spend time with a prostitute, for a common exchange, or to pay for a vote.

In sum, the use of money is relational, and embedded in complex social and cultural contexts. People are constantly redefining the meaning of money in its use. Hence, regardless of whether money is approached as a commodity or a relation, people can use and give their own meanings to it. The point is that, despite how money is designed, people use money and give it meaning to fit their social relations.

D. Approaching money as a socio-technical arrangement

1. A socio-technical approach to money

Recognizing that money can be approached as a 'thing', a relation, and something that when earnt and used can have different meanings, makes us think about money from a social and technical perspective. The social refers to the "abstract concepts such as norms, policies, communication patterns etc." (Leonardi, 2013:74) and the technical to "the arrangement of an artifact's physical and/or digital materials into particular forms that endure across differences in place and time and are important to users" (Leonardi, 2012:10). Money, it seems, is constituted by both social and technical relations and its study requires an approach that recognizes and builds on this observation. It is the relation between the social and the technical, how these change, and influence each other what a socio-technical perspective is interested on.

Inspired by STS, scholars have presented socio-technical perspectives on economics (Callon, 1998; Mackenzie, et al., 2007; Pinch & Swedberg, 2008). This has influenced the study of finance (MacKenzie, 2003; 2006), and more recently money (Maurer, 2006). As I will discuss further in Chapter 3, a socio-technical perspective recognizes relations between the social and the technical as constitutive elements of social phenomena such as money. From this perspective, political-economic idea, norms, and regulations (i.e., the social) are interrelated with elements such as payment software, telecommunications infrastructures, and mobile telephones (i.e., the technical). These socio-technical relations shape and are shaped by the arrangement itself (Maurer et al., 2018; Bernards & Campbell-Verduyn, 2019; Rella, 2020). In other words, money can be approached as a socio-technical arrangement that connects actors and organizes the flow of resources in society.

Approaching money as a socio-technical arrangement has ontological and epistemological implications. Being constituted by socio-technical relations means that money is an actor in the collective, and is constituted by the collective (Barinaga, 2024). Each particular socio-technical arrangement depends on the actors, political-economic ideas, and relationships that compose it, and studying such an arrangement requires one to look at the association processes and how these constitute the arrangement.

2. The process of constituting a socio-technical arrangement of money

Desan (2014) shows that making money is a social and material process that configures different actors in order to satisfy particular interests and needs.

> *"[…]money conveyed value in the deals, purchases, and payments of daily life, but exactly how it did so—how it related the people holding it to each other, how it connected them to the political centre, how it affected their activities and attitudes to the outside world—depended on a blend of decisions that were political, material, social, and legal[…]"- (Desan, 2014:34)*

Money results from decisions involving social and technical elements. Hence, when studying the creation of money, one should avoid the assumption that money simply enables exchanges and create a story that considers the constant operation of money and "acknowledges, even draws upon, money's constant construction" (Desan, 2014:28). Consequently, studying the process of making money involves a focus on the dynamic relations of a monetary arrangement and displays the connection between how money functions and the relations it enables. Some of the recognized elements in the process of making money are the central authorities; money issuers and money users; monetary design; and payment technologies.

a) Political-economic ideas, roles, and rules

The making of money entails political processes wherein some people have the responsibility to make decisions regarding how monetary arrangements function (Feinig, 2022). This decision-making is usually carried out by a central authority, which is in a position to define value in a way that no individual user nor pair of individual users can, and this is what makes the authority unique (Desan, 2014). While the State is an obvious example of a central authority at a national level, complementary currencies show a diverse

set of actors, each of which has the legitimacy and mobilization capacity to play the role of central authority at a community level (Lietaer & Dunne, 2013).

The central authority decides on the political-economic ideas that are embedded in money's design (Feinig, 2017). For example, through his study of monetary development in colonial North America, Feinig (2017; 2022) contrasts two political-economic ideas. The first is based on the idea of minimal state intervention and profit maximization through financial speculation, along with favoring monetary designs in which the market itself self-regulates and achieves overall wellbeing. The second sees monetary design as an ideally democratic process that is open to the interests of those producing the goods and services that satisfy people's existential needs, and argues that this, rather than financial creditors, should be prioritized (Feinig, 2017). In this sense, the central authority regulates and sets the political-economic vision that a monetary arrangement can take.

Central authorities are key, as they create the rules of the monetary system. These are rules that are likely put in place to benefit the interests of the central authority, and materialize its political-economic vision (Ingham, 2004; Desan, 2014). These decisions influence who and how different actors can participate in the monetary system.

The other actors involved in the monetary system are the money issuers and money users. Feinig (2022), on the one hand, defines money issuers as actors with the capacity to establish a currency—a process that can be undertaken for profit (as by e.g. banks) or through the imposition of an obligation (e.g. State tax) and the limit of an issuer's currency is set by the general acceptance of that currency. On the other hand, money users need to offer goods and services in order to earn currency, and usually[10] cannot themselves issue a currency that achieves general acceptance.

While in some cases money users are aware of who and how money is issued, in many cases they are not. The latter situation is what Feinig (2022) terms 'monetary silencing'.

> *When institutions, knowledges, and political projects disconnect money users from the politics of money creation, monetary silence can enable an upside-down world in which actual resources and skills*

[10] This is not always the case. As will be explained in the section on ways of issuing, circulating, and withdrawing money, mutual credit systems are based on the idea that money is issued in the act of spending, making those who participate in the system both issuers and users.

> *come to appear as an appendix to what really counts: money. The creature of laws, keystrokes, and mints becomes precious and scarce, while that which is priceless indeed—the skills and labor of real, living individuals who as part of ecosystems reproduce societies—seems to be useful only if there is money to put it to use.* (Feinig, 2022:12)

Feinig (2022) identifies various elements that can silence the politics of money creation. Monetary silencing can occur because of the ways money institutions (e.g. a central bank) work can make money users think that only the government has a say in the creation of money. When money creation is in the hands of private organizations (e.g. banks), Feinig argues, money can become so complex and obscure that people have difficulty grasping the internal relationships that make up the system. Feinig also suggests that the knowledge possessed by authorities is a cause of monetary silence—for example, when orthodox economists argue that 'money is what money does' and prioritize function over relationships.

Let me stress: the process of making money is not neutral. A monetary design entails essential decisions that influence society. Hence, it is crucial to trace who makes decisions about how money is issued, put into circulation, and withdrawn.

b) *Money design: issuance, circulation, and withdrawal*

Whoever participates in monetary design has influence over who can issue money and which interests are prioritized.

> *Monetary design is a form of disguised law, a malleable and always-political mechanism for authorizing actors to do certain things. We decide against what to issue money: we decide who and what is productive. We curtail credit for certain purposes: we decide that your productive proposition is not a priority. We issue money to you: we authorize you to claim resources and put them to use.* (Feinig, 2022:147)

Money design relates to how it is issued and put into circulation. In the process of making money, it is essential to reflect on the following questions: Who is qualified to issue currency? On what basis should the currency be issued? How much currency may be put into circulation? (Greco, 2009; Desan, 2014; Feinig,

2017). The answers to these questions result in different types of socio-technical arrangements of money.

Common issuance mechanisms are reserve-backed, fiat, and mutual credit systems. Reserve-backed currencies, as the name indicates, are ones that use a commodity as a basis for issuing an amount of money to be put into circulation (i.e. monetary supply). Usually, these currencies have a reserve in commodity (e.g. maize or euro), which serves as collateral in case people want to opt out of the system. Using this reserve as a base, the money issuer creates[11] a correlated currency supply and distributes it among the users (Lietaer & Kennedy, 2010).

Having a commodity as a reserve is usually linked to a conversion possibility, which allows users to exchange the issued currency for the commodity in reserve, often for a fee. In this type of architecture, the reserve is an essential element of the currency's legitimacy. The central authority or money issuer generally controls the reserve and defines the policies relating to conversion. Through conversion, currency units are taken out of circulation in the community.

Fiat issuances work similarly to the national or conventional monetary system. In fiat systems, central authorities can issue as many tokens as needed, and define mechanisms to withdraw these from the system, for example through taxes, an expiration date, or reducing the face value of the token over time. Since a fiat system depends on the legitimacy of the central authority, it is common to for users to have some sort of representation in decision-making. However, a central authority's legitimacy can also be achieved by coercive mechanisms.

Mutual credit[12] systems are the realization of individual credit-debt accounting of relations.[13] Individuals are given an overdraft facility—that is, to incur in debt up to a point. In this sense, money users become issuers when they use their possibility to go overdraft. As the goal of the system is to avoid overspending or overaccumulation, it is common that users also have a surplus limit—that is, an amount of credit the user is allowed to give. These overdraft

[11] This is usually done by a money multiplier (MM); here, the quantity of the complementary currency unit is the amount of reserve * MM.

[12] Mutual credits are also referred as 'barter circles' or 'multilateral clearing systems' (Amato & Fantacci, 2020).

[13] In Chapter 6, 'The mutual credit system', I provide a more detailed explanation of this issuance mechanism.

and surplus facilities[14] are made possible by the system's constitution, and do not involve indebtedness between one member and another. In other words, the user is in debt or credit, not to an individual but to the whole community; individual credits and debts are constantly being settled[15].

Mutual credit systems are anchored in local identity, a degree of responsibility for each other, and a feeling of moral obligation towards the other (Amato & Fantacci, 2020). Every sale contributes to the collective; by buying, individuals benefit from the community, and make a promise of a future contribution to the community, in other words acquire a debt. Due to the collective character of mutual credit systems, it is a common practice to avoid both any form of conversion to national currency and speculative practices (Amato & Fantacci, 2020).

Issuance mechanisms determine the different roles and relations of such systems (Table 2). In the case of reserve-backed currencies, the backing commodity legitimizes the currency, and facilitates the connection between other monetary systems through common backing commodities. Fiat currencies depend on the legitimacy of the central authority, which can act as the issuer or delegate this role to a third party. The mutual credit system is unique, since its legitimacy depends on the community's creditworthiness, and individuals are both issuers and users of money. The central authority's role in a mutual credit system is to set the overall communal regulations, maintain the system and ensure that contracts are respected.

[14] Depending on the governance system, these overdraft and surplus limits can be defined collectively, or independently by a clearing house. Communities that use account clearing usually have an organization that acts as the clearing house. Some well-studied clearing organizations are the Sardex in Italy and the WIR in Switzerland. In the case of the Sardex, every time a business wants to join the network, it must apply for a membership, pay a fee, and accept an ad-hoc contract that protects the users in the community from potential defaults. The WIR, which was started in 1936, is one of the oldest documented cases of an organization providing an account-clearing service (Stodder, 2009). Greco (2009) notes that the WIR Bank uses some form of collateral (usually real estate) for the overdraft facility of members.

[15] It is common for mutual credits to use the account-clearing method, which has a long history. Jevons (1876) described it when explaining the evolution of money. Keynes proposed this type of method for the International Monetary System after the Second World War (Keynes et al., 1971; Horsefield, 1969), and today's banks use this account system to settle accounts between them (Ryan-Collins et al., 2012). It is worth noting that mutual credit systems were a common design for the community currencies that emerged in the UK during the 1980s and 1990s, where they were were part of the pioneering 'community-currency movement' (see Greco, 2009:169; Blanc, 2011).

Table 2. Different monetary designs.

	Reserve- backed	Fiat	Mutual credit
Legitimacy	Commodity	The central authority	The productive capacity and creditworthiness of the community of issuers/users
Role of central authority	Control the reserves and define the rules of conversion	Define the rules of issuance and withdrawal	Assure that the contracts amongst individuals are respected
Money Issuer	The central authority can issue or delegate the currency to a third party.	The central authority can issue or delegate the currency to a third party	Individuals in the act of spending
Money User	Users of the system with minor influence on the system	Users of the system with potential influence on the system	Individuals act as issuers/users
Approach to money	Commodity	Credit (emphasis on a creditor common to all)	Credit (emphasis in the productive capacity of the individual and the collective)

It is important to bear in mind that socio-technical arrangements of money can be continuously adapted to different interests, needs, and circumstances. Because of this, there are many ways of setting up the issuance, circulation, and withdrawal of currency in connection to a monetary arrangement and each design will influence how the monetary arrangement functions and its interconnection with a payment technology.

c) *Role of payment technologies in a monetary arrangement*

A socio-technical approach to money also recognizes the role the technical in a monetary arrangement. Money is not abstract; it requires a payment technology, be that physical or digital, in order to enter circulation. However, payment technologies are not just an issue of form. Desan's account of how the Anglo-Saxon monarchs introduced money offers an example of the importance of the technical in monetary design:

> *At the same time, the metal content of money gave those holding it a kind of collateral. Commodity money identified stability with a natural item, a material guarantee. That security may have been particularly important in legitimating royal rule early on. Should a regime fail and, with it, the counted quality of money, people would still hold its commodity value if not its monetary value. Short of that*

> *rather desperate end, the system implied a connection between political stability and the physical content of money.* (Desan, 2015:12)

This case illustrates the constitutive role of the social and technical in money: metal money was used to pay taxes to the State, enabling it to spend in the society and leading to practices related to minting. The payment technology was also a source of legitimacy, as fake units[16] can put the system at risk. Hence, whoever manages a payment technology must try to protect the currency from counterfeiting. Metal currencies provided money issuers and users with particular benefits. For money issuers metal currencies offered them control over the minting process and the distribution and withdrawal of currency. To the money users, it offered a sense of protection during times of political instability, as coins could be taken to other mints and used under different regimes, or melted and stored for the future.

In sum, payment technologies are not just an issue of form; rather, they can be strategic actors in monetary arrangements. Payment technologies contribute to a system's legitimacy, and their connection to the issuance mechanism can facilitate the governance of a collective. In other words, *matter* matters in money and can enable different relations in a monetary arrangement. In this sense, it is important to consider how payment technologies influence and are influenced by, for example, users, issuers, and technology corporations.

3. The performativity of monetary arrangements

The fact that money is a socio-technical arrangement also means that the arrangement itself can influence the behaviors of the collective that composes it (Bazzani, 2022; Barinaga, 2024). In other words, money can be performative. Barinaga (2024) approaches money as a socio-technical arrangement and argues that how money is issued and taken out of circulation can influence how people interact with it. To illustrate this, she studies a range of cases, ranging from municipal money in the 1930s to the cryptocurrencies of the early twenty-first century.

[16] In the case of coins or notes, counterfeiting is combated using specialized materials and security features, such as complex substrate recipes, watermarks, and ultraviolet inks, among others (Chambers et al. 2014). However, in the case of digital accounts, the problem resides in identity theft and the double-spending problem: "a potential flaw in a cryptocurrency or other digital cash scheme whereby the same single digital token can be spent more than once, and this is possible because a digital token consists of a digital file that can be duplicated or falsified" (Chohan, 2021).

One of the cases that Barinaga investigated in order to illustrate her point is the Málaga Común in Spain. This complementary currency used a mutual credit system and emerged following the 2008 financial crisis. Baringa found that how money was designed made people re-evaluate their understanding of it, in particular the negative perception they had regarding debt. While facing challenges, the mutual credit system taught the members of Málaga Común the importance of debt-credit relations in creating a community. As one of Baringa's informants expressed: "being in debt means that you have generated activity for the community […] debt doesn't matter. Some have to be in debt for others to be in credit" (Ibid.:72). The key argument here is that the creation of debts and credits created longstanding relations between people, and both constructed and strengthened a community.

Barinaga (2024) argues that those who design money can create obligations between individuals and the collective in such a way that individual interests can be aligned to those of the collective. In her words, "as money is constituted, it constitutes community" (Ibid.:137). Because of this, how money is issued, circulated, and withdrawn makes it possible to shape the relationships between individuals and the larger community.

> *We then need only to describe those relationships, wonder about what makes people relate forward and back in continuous give-and-take interactions that keep money-tokens moving through interactional circuits. And we need to identify those interactional patterns that keep people interacting. For it is continuous interactions that bring life to money; money works through constant relational work.* Barinaga (Ibid.:132)

In sum, the way money is issued and withdrawn can influence how people interact. This is an important recognition for multiple reasons. Firstly, it points to money design as an element in the monetary arrangements, in the sense that the rules governing how money is issued, put into circulation, and withdrawn has influence in the socio-technical arrangement as well. Second, it proposes that monetary arrangements can be engineered so as to influence how people relate to each other, and in this sense transform collectives.

E. Tracing the *process* of making money

From a socio-technical perspective, money is not simply a commodity or a credit-debt relation; rather, it can be approached as an arrangement of political-

economic ideas, institutions, technologies, designs, and people. Studying the associations that constitute money is important, as a socio-technical approach recognizes that these relations influence and are influenced by the arrangement itself. Therefore, the analytical gaze when studying the implementation of complementary currencies should be focused on the relational processes that compose it. In order to trace the emergence and transformation of relational processes in the social and technical worlds an appropriate methodology needs to be in place.

3. Studying money in the making

This chapter introduces the methodology used to study money in the making. The study applied a socio-technical perspective, which recognizes social and technical relations as constitutive elements of social phenomena such as money, and directs the analytical gaze towards the relational processes that constitute it. To investigate the socio-technical relations that make up money, and inspired by the field of STS, this study's methodology recognized a processual logic, acknowledged non-humans as potential actors in organizing processes, and used the concept of translation to describe and analyze which, why, and how associations are made, and how they change over time. Moreover, this chapter describes the study's data collection and analysis processes, and concludes with considerations on ethics and positionality.

A. Studying socio-technical arrangements of money

1. Socio-technical arrangements

Inspired by the field of STS, and as presented in Chapter 2, this study approaches money as a socio-technical arrangement. This approach recognizes the relationships between elements such as money issuers/users, central authorities, imaginaries, and payment technologies, and sees these as constitutive of money. Investigating how a monetary arrangement is implemented requires a methodology that supports the study of how relations between the social and technical influence each other.

A socio-technical perspective recognizes the "enactment of a particular set of activities that meld materiality with institutions, norms, discourses, and all other phenomena we typically define as 'social'" (Leonardi, 2013:74). From this perspective, it is important to investigate how the technical is made and in what contexts, and to then observe how technical objects are used over time and in shaping the individuals or organizations that use it (Ibid.). Thus, the object of investigation is not the technical object nor the social, but rather how the relationships between both participate in the making of society and knowledge (Callon & Latour, 1981; Akrich, 1992; Latour, 1984; Callon, 1986; Orlikowski & Scott, 2008).

It is crucial, when taking a socio-technical perspective, to bear in mind that technical objects are present in social phenomena. Technical objects are created through social processes and used in social contexts, and social action is possible because of their presence (Leonardi, 2012). As students of the socio-technical, it is important that we explore both how technical objects become stabilized, and how the stabilization of these objects affects the socio-technical arrangements they are part of. A socio-technical perspective acknowledges that humans and technical objects can be entangled and mutually constitutive.

2. Tracing relational processes

To investigate how socio-technical relations shape a monetary arrangement, it is necessary to have the appropriate research tools. One way to study these dynamic arrangements is to trace, as they evolve, how groups contest and negotiate decisions, redefine problems, and align each other's interests in order to (de)stabilize the relationships in an arrangement. This methodological approach has been used to study organizational processes (Law, 1994; Czarniawska, 2014), the economy and markets (Callon, 1998; Kjellberg & Helgesson, 2006; 2007), technological developments (Callon, 1984; 1986; Latour, 2004), and, more recently, complementary currencies (Faria et al., 2022; Barinaga & Zapata Campos, 2023).

Following the recommendations of scholars in line with STS (e.g., Latour, 2004; 2007; Kjellberg & Sjögren, 2020), my methodology is not a framework for defining categories in order to describe a final product, but a way of looking into the processes that lead to more or less stable arrangements. The aim is to trace the relational processes that stabilize into socio-technical arrangements, and to explore how these change over time and their influence on the arrangements.

The concept of *translation* is useful to explain how relational processes change overtime. Callon's (1986) seminal study on the scallop production in France shows how researchers, fishermen, and scallops negotiated their interests and transformed their relations in the process of developing a strategy for different actors to follow. Callon (ibid) describes translation as the process by which actors challenge certain associations, present both their own interests and those of others, attempt to align with the interests of other actors, forge alliances in order to strengthen positions, and dissolve or form associations in the process. Studying translation processes facilitates the explanation of change in a relational phenomenon.

In translation processes actors can adapt ideas into technical objects so that the technical can act and mobilize the intentions embedded within it through space and time. The example of a note with the face of a president is a great way to illustrate the translation of intention into a material object. The note represents political and economic power, which is translated into the design and production of a note that carries the government's stamp or image. The government's symbol is embedded on the note, materializing its authority. The note not only serves as currency for everyday trade but also acts as a symbol of the government's power. Every time the note is used in an exchange, the users are reminded of the government's rule and the standard of value it has set. However, the intended functions of these objects can be adapted to satisfy the users' own needs. For example, in Venezuela due to the country's inflation people prefer to make origami and crafts with the notes and sell them in Colombia to gather resources to survive (Rovig & Chaparro, 2021).

As Czarniawska and Joerges (1996:23) explain:

> *The translation model can help us to reconcile the fact that a text is at the same time object-like and yet it can be read in differing ways. Also, it answers the question about the energy needed for travelling: it is the people, whether we see them as users or creators, who energize an idea any time they translate it for their own or somebody else's use.*

The use of translation has two key implications: First, it concedes that ideas can be embedded in objects (e.g., payment technologies, texts) to make them more durable and transferable; and second, it recognizes that in order for these ideas to travel, an actor needs to take up the idea (or object) and adopt it, change it, or modify it (Latour, 1984). The point is that by rendering chains of translation between heterogeneous actors, it is possible to explain how

technical elements are associated in the arrangement and influences it through space and time.

In sum, the methodological approach integrates a processual logic, recognizes non-humans (e.g. technical objects) as potential participants in relational processes, and aims to explain how associations are made through space and time. This methodology is useful for studying the process of implementing a complementary currency for several reasons. First, because it facilitates the study of the situations in which things change. Second, it recognizes non-humans as active participants in organizing processes, and so acknowledges the importance of studying, not just humans, but ideas, nature, and technologies as potential actors in a monetary arrangement. Third and finally, the idea of translation helps to identify which, why, and how relations between the social and technical are made, and their consequences in a monetary arrangement. As Latour (1996:375) puts it: "no explanation is stronger or more powerful than establishing links between unrelated elements or showing how one element holds many others".

B. Tracing the implementation of a complementary currency in Kenya

1. Selection of the case

Methods of exploring relational processes are not relevant to every case study. As Kjellberg and Sjögren (2020:260) explain, it is crucial to have access to the case "before everything is settled or when previous settlements are disrupted". Moreover, change takes time, so it is also important to have access to cases that can be studied over time. Finally, such methods direct the attention to the interactions between actors in order to explain how and why things change, and thus require access to rich empirical data (Ibid). In this sense, the use of socio-technical inspired methods also depends on the suitability of the case and its available data.

This study aimed to undertake empirically grounded research on the implementation of a complementary-currency arrangement. In the autumn of 2019, I was presented with the opportunity to follow, as it happened, a project called Grassroots Financial Innovation (GFI). The objective of the GFI project was to study existing complementary currencies in Kenya, and to implement

new ones. As I will describe further in Chapter 4, this project was put together by an association between researchers from Scandinavian and Kenyan universities, an NGO that had been implementing complementary currencies in the region for several years, and Kenyan community-based organizations (CBOs).

The GFI project was an ideal case study for researching the implementation of a monetary arrangement in the context of scarcity for several reasons. First, the overall goal was to implement complementary currencies, and so the project offered an opportunity to empirically trace relational processes and investigate what motivates changes and how these affect the socio-technical arrangement of money, in the making. In addition, this project was expected to last at least four years and I was able to get involved early in the process, making it suitable for longitudinal analysis. Last but not least, the project was located in Kisumu, a region in Kenya where 36% of the population cannot purchase commonly consumed goods and services (Kenya National Bureau of Statistics, 2023). The context of poverty made this a relevant case study for learning about the implementation of complementary currencies in the context of scarcity. In summary, the GFI project was an ideal case study for researching the implementation of complementary currencies in the context of scarcity, and offered an opportunity to empirically trace, as it occurred, the constitution of a socio-technical arrangement of money.

2. Conducting research during COVID-19

COVID-19 had practical and empirical consequences for the study. The original plan was for me to be in Kenya for an extended period, but the Pandemic changed plans, forcing me to stay in Sweden as I could not travel to Kenya. However, this was also the case for the group members outside Kenya, so many of the GFI project's discussions and decision meetings were held online.

While conducting research online was not ideal, it became a standard research practice during this period. Howlett (2022) argues that the ubiquity of online meetings during COVID-19 impacted qualitative research, and that the fact that people could attend meetings online allowed the participation of those for whom geographical boundaries would otherwise have been limiting. In addition, people could participate in meetings from their homes, which created more intimate relationships. Finally, familiarity with the use of digital platforms in everyday practices may have led people to present themselves similarly online and offline (Ibid.). Digital tools for recording and transcribing

meetings developed rapidly during COVID-19, and became ubiquitous in research practice (Howlett, 2022; Keen et al., 2022). The adoption of digital tools by GFI group members turned out to be for the benefit of the study, since the online meetings that I was not present at were recorded, giving me access to them.

COVID-19 also had empirical implications for the study. The humanitarian crisis was difficult for everyone, everywhere, and COVID-19 turned out to be an actor in the GFI project. COVID-19's interactions with the GFI project provided interesting empirical examples of how a non-human actor can shape a monetary arrangement – for example, as I will develop further in the empirical chapters, by pressuring actors to deviate from the original implementation plan, and by motivating the introduction of development aid within the monetary arrangement.

3. Empirical data

I started working on this study in 2019, and gathered available material ranging from the beginning of the GFI in 2018 until Autumn 2023, when the complementary currency in Kisumu continued without the support of the Research Team. Throughout this time, I compiled more than 60 hours of video meetings recorded by the GFI project and conducted 20 in-depth interviews, either online or in-person. I also obtained access to materials such as project proposals, teaching materials, meeting minutes, payment-technology documents, and internal communications.[1]

a) Participant observation

Participant observation allows the researcher to shadow actors, conduct interviews, and participate in a project's daily activities, and can be complemented with project documents and internal emails (Czarniawska, 2014b). As the project unfolded, I participated in various online meetings, in which discussions and decisions were made regarding the complementary currency. Due to the online setting of the discussions, I could transcribe, anonymize, and use this material for my analytical purposes.

[1] See the Appendix for a table detailing the types, dates, and content of my empirical material. It is worth noting that the data-management plan for my research project followed Lund University's guidelines, and the material was uploaded to the university's data-management platform.

COVID-19 meant that between early 2020 and late 2022, all meetings were held online. I was able to participate in various online interactions, which I sorted into 'management', 'community decision', and 'training meeting' categories. The management meetings covered topics related to the project's research and implementation activities; initially, these meetings were hosted by the Research Team every two weeks, but towards the end of the project they were held roughly once per month, or at the request of the team members. From the beginning of 2020 to the end of 2022, I participated in more than 20 of these meetings, and had access to the meeting minutes and, when available, the recordings. Usually, these gatherings were spaces for sharing information regarding issues in Kenya, administration of the payment technology, updates on research activities, and general project-management topics such as budgeting and reporting to funders. The management meetings allowed internal discussions within the team to be traced. For example, during one of these meetings, the Kenyan and European researchers debated the introduction of development aid, more on this will be shown in detail in Chapter 7.

The other two types of meeting were community decision and training sessions, and were participated in by the Kenyan communities. In the decision meetings, the researchers would present certain information or pose questions requiring action to the Kenyan communities. I had access to three main meetings in which the Kenyan communities learned about different payment technologies. After the meetings, they were expected to decide which payment technology they wanted to be used in the complementary currency. These decision meetings were vital as the actors explained their interests and positions regarding the introduction of the complementary currency. In Chapter 6, I analyze the controversy regarding the ideas that would be translated into a payment technology; based on the conversations that took place, I gathered data when the actors explained their payment technologies, the risks they identified in the monetary models, and the main reasons for supporting one or the other payment technology. Finally, there were training sessions with the Kenyan communities, during which the essential administrative and conceptual elements of the complementary currency were communicated. During these sessions, I captured how certain goals within the project were translated into training materials, and later translated into the Kenyan community's parametrization of the complementary currency. These translation processes are discussed in Chapter 7.

It is important to note that I could not access internal meetings held by the Kenyan communities. I was usually present when the Research Team presented information to the Kenyan communities, and when the communities

informed the Research Team of their decisions. However, the communities' internal deliberations were usually made outside of meetings or in their own language, preventing me from accessing their argumentation and decision processes. However, I asked about their opinions and ideas during the online meetings or through interviews.

My empirical analysis was also informed by field notes made during three in-person visits to Kenya. My first visit occurred before COVID-19, in November 2019, and lasted 12 days. From January 2020 to September 2021 there were travel restrictions from Sweden to Kenya, and so it was not possible for me to travel. However, after the restrictions were lifted I visited Kenya for ten days in September 2021 and 12 days in October 2022.

During these field visits, I participated in many implementation activities. For example, in 2019, I participated in the project kick-off, during which the various actors presented their plans and, during informal chats, I started to identify the divergent perspectives on the payment technology. Some seemed to assume the usage of the NGO's payment technology, while others talked about a technology analysis instead. In 2021 and 2022 I was part of visits that the Research Team made to local Kenyan associations to disseminate the idea of complementary currencies. Participating in these visits informed me of the terms, concepts, and ideas that the Research Team used to communicate with the Kenyan communities. I also participated in market days, during which the users of the complementary currency would come together to trade goods and services using the currency. Finally, during all my field visits, I had informal conversations with the researchers, during which we reflected on the day and planned further project activities. These ranged from lunches, breaks, and car trips to work sites, and gave me important hints about the challenges within the project and which relations these challenges were affecting.

In sum, participant observation was fundamental to the data-gathering process. By following actors and participating in formal and informal meetings, I obtained an understanding of the claims and arguments of the actors themselves, and was able to construct my empirical material.

b) Interviews

Formal and informal interviews were carried out at different points in the implementation process. I used semi-structured interviews to learn about the events that had taken place before I joined the project in 2019, on the basis that this method facilitates recounting of past events and brings forward interviewees' accounts of certain situations (Czarniawska, 2014b). The

interviews began by asking the project participants for their consent to record the interview,[2] providing a general summary of my research project, and asking how they got involved in the GFI project. During the interviews I was flexible in listening to the participants, and exploring other ideas that evolved based on their answers. For example, during the first exploratory interviews and after some warming-up questions, I asked "Could you tell me how the project got to where it is today?". This question was helpful for relational-tracing purposes, since it enabled well-articulated answers and storytelling by the interviewees.

The first round of interviews was held in June 2020. Around this time, the implementation of the complementary currency had begun, and some of the disagreements within the project were being settled. Conducting interviews at this point allowed me to dig into different perspectives on the disagreements, and gather richer data. For example, relations were tense after decision meetings regarding the payment technology; during the interviews, I asked my informants how they perceived the decision meetings had gone, and for their perspectives on the disagreement and how this affected overall collaboration. However, interviews cannot be trusted entirely, since they can contain biases. Therefore, triangulation between interviews, project documentation, and participant observation enhanced the construction of my empirical material. For example, I compared what the interviewees said regarding their responsibility regarding the payment technology, and found discrepancies as compared to how this had been described in the initial implementation plan.

During fieldwork visits in 2021 and 2022, I was able to interview users of the complementary currency about how they were using it. For example, I asked the interviewees who they sold to or bought from the most, about the challenges of using the payment technology, and for their insights regarding the currency's impact on them. In my final fieldwork visit, I interviewed the Kenyan community members who had led the implementation of the complementary currency on-site, and inquired about their experiences.

In sum, the interviews produced key complementary data for this study. They provided access to the reflections of the actors regarding past events, and opportunities for actors to present their arguments as to why they had acted in certain ways.

[2] More detail regarding this is presented in the 'Ethics' section of this chapter.

c) *Technical objects*

A socio-technical perspective recognizes the role of technical objects in the constitution of a phenomenon; thus, these are an important source of empirical material, in particular, documents and payment technologies. There were different types of documents that emerged from the implementation of the complementary currency. These included documents the researchers wrote as part of the project application, documentation of the payment technologies, and training materials such as presentations and pamphlets. These were particularly valuable for studying translation processes. For example, in Chapter 5, I made use of the NGO's strategic plan and the GFI project's research plan, to elaborate on the political-economic ideas of each actor and set the stage for the controversies that develop in Chapter 6 and Chapter 7. I also engaged with the accounting algorithms embedded in the different payment technologies. Studying the payment technologies was helpful in providing an understanding of how different approaches to money were translated into mathematical algorithms. Finally, I had access to meeting minutes, message groups, and emails wherein the project participants shared experiences and discussed controversial issues. For example, in one of the message groups I learned about disagreement regarding a technology analysis that the GFI project was going to carry out.

Technical objects interact with actors in different ways, and it was my task to observe and document these interactions and explain how these relations influenced the monetary arrangement. I studied the participation of payment technologies, in two ways. First, I followed the payment technologies in the field, and observed how different actors interacted with them. As I show in Chapter 5, they stimulated users to maximize profits through arbitrage, causing doubt within the research team on using certain payment technology. In Chapter 7, by tracing the use of the payment technology, I was able to identify the ways in which the complementary currency was being used that contradicted how it was originally designed. Second, technical objects can be imbued with ideas, and people can discuss which ideas to prioritize. As I show in Chapter 5 and Chapter 6, the discussions that were triggered by technical objects permitted me to identify why and how actors were included in and excluded from the monetary arrangement, and to explain how political-economic ideas and monetary designs were translated into the payment technologies. All in all, the study of technical objects and their interrelation in the arrangement served to provide a deeper understanding of how monetary designs and users interact with payment technologies.

4. Analyzing relations within a monetary arrangement

a) Sorting the empirical data

Early in the data-collection phase, I started the process of sorting, reducing, and arguing (Rennstam & Wästerfors, 2018). Sorting is a way of organizing a large quantity of empirical data gathered throughout a study. I sorted the data into two categories: transcriptions of conversations held in real time, and documents. This classification enabled me to contrast and complement arguments that appeared within conversations with ones detailed in documents written by the actors. Later, with the use of the NVivo data-analysis software, I sorted the data into categories to help me keep track of the topics that emerged from the material, and to organize these into overall categories for future analysis.

The documents were categorized as 'planning documents', 'by-laws', and 'training material'. The planning documents were sub-categorized based on the desires and ideas expressed, with verbs such as 'empowering', 'localizing', 'decentralizing', 'converting', and 'distributing' being salient. Based on this first sorting process, I created overall categories such as 'aims', 'frames of inclusion', and 'mechanisms of control'. These categories were used in Chapter 5. Among the by-laws, I identified categories such as 'sanctions', 'standards', 'usage', and 'goal'. I later produced general categories such as 'resource mobilization' and 'community organizing', which were used in Chapter 7.

For conversations held in real time I divided the empirical data into 'decision and management meetings', 'fieldwork', and 'interviews'. In meetings where decisions regarding the payment technology were made, it was useful to categorize the claims of actors and opposing viewpoints. I made categories based on in-vivo terms such as 'reserves', 'conversion', 'community', 'mutual credits', 'participation', and 'balances'. These categories facilitated the explanations of the actors' decisions presented in Chapter 6, as well as the construction of overall categories such as 'approaches to money' and 'positioning users'. In the case of the fieldwork notes, I produced overall categories such as 'designing money', 'governing strategies', 'using money', and 'adapting practices'.

b) *Reducing through the tracing of controversies*

Once I had in-depth knowledge of the empirical data, I started a reduction process. As outlined by Rennstam and Wästerfors (2018), this entails using the sorted data to construct the empirical material. I approached reducing as a process of transforming something into a different state, or translating it. In this sense, reducing is the process of selecting empirical passages, field notes, quotes, and images, for example, and representing them in a particular way.

In the reduction phase, I pondered my research question and decided which empirical threads and analytical points were relevant to explore my research question. Controversies are helpful starting points for studying relational processes (Callon, 1986; Akrich, 1992; Latour, 2007; Venturini, 2010), and are "situations where actors disagree (or better agree on their disagreement)" (Venturini, 2010:261). Controversies are good starting point for tracing histories because looking into the past is required in order to explain multiple viewpoints, and this can lead to theories, ideas, beliefs, and/or interests, and the tracing of the translation of these through time and space. This is the case of Chapter 5, where I made use of technical documents to trace and analyze the arguments that led to the future controversies. Unfolding controversies serve as guiding threads for how arrangements develop over time, which the researcher can use for analytical and explanatory purposes.

For example, a large controversy was the question of whether to include external aid in the monetary arrangement. This led to the inclusion of some actors and exclusion of others, and influenced how money was to be issued, put into circulation, and withdrawn within the Kenyan community. Venturini (2010) argues that, when studying controversies, it is important to constantly revisit the gathered material in search of data that can enrich the descriptions and give a more comprehensive account of the different viewpoints involved in a controversy. The task was to try to come up with representations that felt as if the actors were speaking for themselves. For example, when actors problematized the inclusion of external aid, I made use of conversations held in real time to trace the ideas and motivations of actors when they entered the project. Consequently, new actors, such as development organizations, were brought into the study as providers of development aid. In sum, the reduction process, which focused on tracing controversies, entailed identifying examples of arguments and using these to make analytical commentaries that followed narrative threads.

However, data on its own is not enough to convey a point. Rennstam and Wästerfors (2018) argue that researchers must make decisions regarding what

can be said and how it will be presented in order for others to understand the material. I reduced my empirical material mainly through two types of representations. The first type of representation is constituted by the empirical chapters, which I crafted based on the 'excerpt-commentary units' technique (Emerson et al., 2011). In this sense, I crafted units wherein I introduced the analytical point to the reader, gave orienting information to provide an understanding of the context of the excerpt, showed the excerpt, and presented an analytical commentary that provided the nuances and details relevant to the analytical point.

Having identified the relevant actors in the GFI and their controversies, I looked into the data and constructed three empirical chapters. Chapter 5 presents the contrasting political-economic ideas present in the project. Chapter 6 demonstrates the translation of ideas into payment technologies. Chapter 7 shows how various activities emerged from the implementation of the complementary currency, and how their interrelation influenced the monetary arrangement.

The second type of representation did not relate to a traditional approach to research, in terms of the dissemination of results in written form. The practice of "adding attention to both knowledge expression and knowledge travel alongside dominant commitments to knowledge production" is known in the STS community as "making and doing" (Downey & Zuiderent-Jerak, 2021:2). This practice acknowledges the use of different representations, in the form of videos, texts, computer models, and scripts of code, in exploring the researcher's sensibilities and eliciting alternative interpretations (Downey & Zuiderent-Jerak, 2016). The point with this second type of representation is that, in their making, I reflected on insights, which in turn became the basis of the representations in the text itself.

One example of this is the short video Funk Technology – let's do our thing (Ocampo, 2022).[3] This representation was inspired by the controversy that emerged during the introduction of external ideas, and adaptation of these to local practices. In this exploration, I made use of song lyrics and music in combination with videos and images I took during market days, where Kenyan merchants met, transacted, and had a good laugh (Chapter 7). It was a representation of how Kenyan financial and economic practices are entangled with prayer, dancing, and laughter. In November 2022, I presented this

[3] The film is inspired by Pecha Kucha presentation style. This style uses a fast-paced presentation style that forces viewer to focus on their message with automated, 20-second slides (Beyer, 2011).

representation and discussed how the recognition of emotions and sensuality in the production of knowledge cannot be solely understood using the Western, rationalist conception of technology. Moreover, this representation was related to the argument that complementary currencies influence and are influenced by vernacular activities (Chapter 7), and the process of working on it helped my overall categorization of the approaches to money and user participation presented in Chapter 6.

c) Arguing using the empirical material

After reducing the empirical material, I used it to argue and participate in an academic discussion. As Rennstam and Wästerfors (2018) explain, theorization is done by arguing based on empirical material. Argumentation can be undertaken by presenting the empirical material, along with in-depth explanations that further the understanding of the studied phenomena; this enables the researcher to participate in an academic discussion (Ibid.). One does not arrive at a discussion alone, and my empirical material helped me to establish academic conversations within the field of complementary currencies and financial inclusion. Practically, this meant using my empirical findings to discuss the particularities of implementing complementary currencies in the context of scarcity, and explaining the relevance of this process to a wider audience.

In Chapter 8 I present the two main contributions of the study. First, I engage in a discussion of complementary-currency implementation, arguing that implementation is a process that is shaped by three types of evolving organizing activity: *modulating, representational,* and *vernacular*. Second, I build on the study's findings to show the influence of external actors on monetary arrangements, and how imaginaries can influence the inclusion and exclusion of actors and relations within the monetary arrangement.

d) The process of crafting empirical material

In sum, through the process of gathering, sorting, and reducing data, I was able to craft my empirical material and argue using it. My analytical process was not linear: rather, the study was the result of continuous gathering and reading of empirical data, constantly evolving categorization, and reduction of the empirical material in different ways and styles. These processes permitted me to construct the empirical material that I later used to theorize regarding the implementation of complementary currencies, discuss the participation of external actors and local communities in the creation of money, and explore

how activities that emerge during the implementation of a monetary arrangement can broaden the subject of analysis in relation to the scholarship of complementary currencies.

C. Positionality and ethics within an action-research project

1. Positionality

As a researcher I was no 'fly on the wall', and my position in the project fluctuated between that of an insider, an outsider, and somewhere in between (Dwyer & Buckle, 2009; Kerstetter, 2012; Jimenez et al., 2022). I was introduced to the GFI project by Professor Ester Barinaga, my principal supervisor, with whom I had previously worked. In Autumn 2019, she invited me to accompany her on a trip to learn more about the complementary currencies being developed in Kenya, and to participate in the GFI project's kick-off event. During this visit I had the opportunity to meet the rest of the project team; following it, I started building my relationships with the members of the team, which likely benefited from Ester's introduction. I also met the director of a Fintech NGO who was a partner in the project, with whom I have been in contact since Ester introduced us in 2018. With his help, I have explored the possibility of developing indicators and a computational model for complementary currencies. The professional connections and previous work with the team were essential factors in building trust and obtaining access to the GFI project.

Being a PhD student situated me as an insider in the research group. Due to my interest in the project and my willingness to contribute to the group, my involvement in the project grew to the point that I voluntarily assisted in some of the project's tasks. For example, I supported the preparation of a baseline survey. With this first engagement, I became closer to the GFI project and was included in emails and communication groups. The access to these communication channels helped me to learn about controversies, and guided my inquiring gaze. Through Fall and Winter 2019, I developed a simulation model that was inspired by the technology being developed by the NGO. The Director was helpful in this process, and we had regular calls to discuss my questions. Because of this relationship, he invited me to participate in the management meetings of the GFI project. Finally, I implemented the

performance statistics based on the transaction data for the complementary currency. My technical expertise was useful to the Research Team, and gave me access to many of the technical discussions that the payment-technology consultants and researchers held. Thanks to my involvement in the research activities, I was able to position myself in the group and build a sense of legitimacy and trust in me. This position permitted me to participate in discussions, ask questions, and give my opinions. My technical involvement helped me to gain access to the implementation process.

However, this also meant that I became an insider, and at times felt emotionally involved with discussions regarding the project. For example, at one point I was biased regarding the interests of the Research Team and how these interacted with the community of users. One of the benefits of transcriptions and videos was that I could go through these several times during the research period. The possibility of revisiting the material after months had passed decreased the risk of bias due to being too close to the discussions.

Not being from Kenya while being part of an action-research project had several limitations. While English is a common language in Kenya, most of the discussions between locals were in Kiswahili or in Luo languages, with the latter being the most common language in the region. In terms of my involvement with the Kenyan community, I mainly observed, and did not participate directly in their activities. Furthermore, arriving in Kenya as part of a European project had implications: as an external actor, many Kenyans saw me as one of many 'mzungu',[4] who come to Kenya with development promises and money. For others I was Juan, the researchers' assistant, who took photos and videos. Coming from Colombia, a country with a colonial past, made me feel close to Kenya, and I usually told people about my origins. I am unsure whether this affected my position as an outsider, but it helped me to feel closer to them.

As a Colombian living and studying in Sweden, I felt somewhere in between. I was interested in working in Kenya since both countries experience inequality and poverty, and there is an opportunity for knowledge transfer. Colombia and Kenya share common manifestations of inequality and poverty, which I experienced in my visits to low-income urban settlements and during day-to-day activities. I began this research as an outsider in Kenya, but felt familiar with its socio-economic divisions. Religious practices such as praying and respect for hierarchies and elders are cultural practices that, as a Colombian, I

[4] This is a term used to describe white people in Kenya.

could easily relate to. This cultural recognition facilitated my relationship with the Kenyan communities, and made me feel somewhere between the two cultures. However, I was also aware of and uncomfortable with the position of privilege I possessed, and the idea of oppression that coming from a Western university brings with it. This in-betweenness was expressed in *Funk Technology – Let's do our thing* (Ocampo, 2022), where I tried to show my respect for the innovation and originality of African diaspora's socio-technical culture.

2. Ethics

As is discussed above, my supervisor was one of the subjects of study. This situation may have had the following effects: First, a supervisor influences what is being written. This was true in my case; however, rather than being a problem, it was a source of critical, constructive, and profound societal and theoretical insight, for which I am profoundly grateful. More problematic was that our close immersion in the project could have led to biases. For example, due to tensions inside the GFI project, relations between some members broke down. This meant that feelings were hurt and some members felt offended and mistreated. I had to be careful to represent the different perspectives in a balanced way, and not overestimate or downplay the roles of certain actors. Jens Rennstam, my second supervisor, was of great help in attending to biases, as he was not involved directly in the project. He constantly questioned my assumptions, and in many cases I checked with him that my analysis was respecting the perspectives presented. However, his influence on the document goes beyond his role as an informed outsider, as the methodological precision and written clarity of this document were also largely influenced by him.

The members of the GFI project gave me consent to study the research project, and preliminary versions of the text were sent to them for their comments at various points in time. I took the decision to, unless specified, anonymize all of the actors, and preserve their privacy. Moreover, when recording conversations or taking pictures in the field, consent was requested orally and, in many cases, the taking of pictures was even suggested by those in them. The regulations (i.e. GDPR) for how images can be used in research have changed, and this influenced my work. For example, I took panoramic photographs of the Kibuye market and of people trading with complementary currency during market days. However, due to GDPR and the difficulty of obtaining written consent from everyone in these photographs, I chose not to use these images in this thesis. This was a disappointing decision, since in some cases the

photographs supported my empirical vignettes. However, I decided to collaborate with an artist, who also designed the cover of the book, to produce artistic representations of the original photographs in order to still make use of them (Image 7).

Finally, I state that I generated the theoretical, critical, and analytical content of this thesis myself. I note, however, that I used artificial intelligence (AI) for other research-oriented activities; I used AI-assisted tools (e.g. Litmaps) to identify relevant articles that I could have missed during my initial literature review. Moreover, as English is not my native language, I used writing-assistance tools (e.g., Grammarly, DeepL Write) to improve the clarity of my manuscript. I also used AI (e.g., Chat GPT, Copilot) as a research engine and brainstorming assistant to clarify concepts and definitions, as well as to make these clearer in my writing. For example, I provided the AI assistant with my literature review and research setting, and asked for advice on how to improve it. Based on the feedback, I would do my research, re-write the text, and iterate the process until I felt satisfied. Finally, I used generative AI to ideate about different abstracts and summaries of the chapters.

4. Setting – The Grassroots Financial Innovation Project

This chapter presents the research setting and introduces the case of study: the Grassroots Financial Innovation (GFI) project. Here, a group of scholars and an NGO came together to learn from the complementary currencies that had already been developed in Kenya, and implement a new one for low-income populations with the support of Kenyan communities. By following the development of the GFI project from 2018 to 2023 (a period during which the COVID-19 pandemic took place), I trace the actions that led to the implementation of a complementary currency in the biggest open-air market in Kenya. The GFI project was an ideal site for studying how external actors, such as a group of researchers and an NGO, can support low-income populations in the implementation of the complementary currency, and provided an opportunity to empirically follow, as they occurred, the controversies that emerged during the process.

A. Kenya's financial practices and adoption of financial technologies

Africa is a continent where the challenges of economic exchange, money, and capital allocation have been approached in various ways. Although African innovation is undervalued by mainstream Western research (Adebayo, 1994; Sinclair, 2004; Mavhunga & Dessler, 2007; Mavhunga, 2017), there are accounts of unique precolonial monetary systems in Africa (e.g. Polanyi & Dalton, 1968; Johnson, 1970; Mwangi, 2002), and substantive research has been performed on longstanding financial practices that are referred by some

scholars as Rotating Credit Associations (ROSCAS) (e.g. Geertz, 1962; Ardener, 1964; Adebayo, 1994; Hossein & Christabell, 2022) also known as chamas in Kenya. More recent studies, however, have explored the influence of indigenous African values on the development of related technologies (e.g. Abubakre et al., 2021; Rodyma-Taylor, 2022)

Chamas is the most common informal source of credit in Kenya (FinAccess, 2021). While the concept is adapted in different ways in different countries (Geertz, 1962; Ardener, 1964; Ardener & Burman, 1995), a chama can be described as "an association formed upon a core of participants who agree to make regular monetary contributions to a fund" (Ardener, 1964:201). This fund is redistributed in the form of loans, which can be invested individually or as a group. In practice, they function as follows: For 8–12 months, people voluntarily pool money into a common fund. From this fund, members can get individual loans in varying quantities, for reasonable periods, and at an agreed interest rate that is paid back to the common fund. At the end of the period, each member receives the amount they saved, plus the interest for the loans they took (Geertz, 1962; Ardener, 1964). Barinaga (2020) notes that chamas can be understood as a communal institution governing the flow of money, where "mutualization rules, social practices, and cultural beliefs not only govern financial obligations and enable the coexistence of impersonal and intimate relations within the group; they also contribute to building trust in chamas as financial institutional arrangements for the community" (Ibid:9).

It is not surprising that Kenya is a hub for financial technologies (Langley & Rodima-Taylor, 2022); due to Kenyan's tradition of financial practices, development organizations and FinTech companies have leveraged local financial practices to introduce financial technologies (see e.g. Singh, 2019; Pénicaud & Katakam, 2019; Fishbane, 2014; Oh & Rosenkranz, 2020, Rodima-Taylor, 2022). Mobile money has been used in chamas, where it facilitates transactions and payment of debts when individuals are absent during a meeting. However, this same possibility of absence has hindered members' participation in and communication with groups, which are fundamental to the social nature of the practice (Kiiti & Mutinda, 2018).

Overall, Kenya's context has presented possibilities for various actors who seek to tackle the scarcity of money in low-income populations. This has been done by standardizing, documenting, and distributing information about pre-

existing practices,[1] offering mobile money services,[2] and, more recently, introducing complementary currencies. This was the case for a group of European and Kenyan researchers who are interested in supporting local communities and improving their socio-economic wellbeing.

B. The original actors in the GFI project

The story of how the GFI project began is an example of how money does not necessarily emerge from pursuing a more efficient barter, but also as an orchestrated process that associates different actors that seek to establish a monetary arrangement. To provide an understanding of the formation of this project and the relations that hold them together, below I recount how the project evolved based on my interviews with Moses, Josephine, Ellen, Charles, Sylvester, Xavier, Robert, and Mary.

My study investigated an action-research project that implemented a complementary currency in an open market in Kisumu, Kenya. In 2017, scholars who were researching how community-based organizations attended to their waste-management problems became aware of the local chamas. To improve people's socio-economic wellbeing, the researchers proposed implementing a complementary currency to some CBOs. Starting in 2018, the project brought together scholars from European and Kenyan universities, local merchants from the Kibuye market in Kenya, financial technologies, and non-profit organizations to facilitate the implementation of a complementary currency.

Since 2013, Moses—a Professor at a School of Engineering in Kenya—and Josephine—a Professor of Organization Studies in Sweden—had been researching how low-income citizens, frustrated with a dreadful public waste-management system, had found innovative ways of dealing with waste. During one of the field visits, Josephine learned about how the locals used chamas to deal with the lack of formal access to money, and recognized the research potential of this.

[1] See e.g. Vanmeenen (2010), who documents the work done by the Catholic Relief Services in promoting community-based saving and lending practices with roots in traditional practices (e.g. chamas).

[2] See Chapter 1.

However, neither Moses nor Josephine had research expertise in financial innovations, but Josephine knew someone who did. In 2017, Josephine invited Ellen—an action researcher and, at the time, Professor of Management and Social Innovation in Denmark, who had been researching complementary currencies in Southern Europe—to travel to Kenya to meet some CBOs and learn about their financial practices. During Ellen's visit to Kenya, Josephine encouraged her to introduce the idea of complementary currencies to the locals, whose interest in the concept motivated Ellen to structure a research-project application.

Ellen, who was curious about the effects of financial innovations on local communities, had heard about Inclusion Economics, an NGO focused on the economic development of marginalized communities that was developing complementary currencies in Kenya, and so suggested meeting Charles, the founder, to learn more about their work. Charles first arrived in Kenya as a volunteer for an aid organization; in collaboration with some local partners, he founded Inclusion Economics. Since 2010, Inclusion Economics has been implementing complementary currencies around Kenya, which has provided the organization with international legitimacy and visibility. In 2018, while leading the NGO, Charles was doing his doctoral studies on economics with a focus on quantitative and modelling methods, making his participation in the research project a good fit.

C. The GFI project

For the GFI to come alive, they needed to stabilize their relations. In this case, the way to do this was by obtaining financial resources to pay the salaries of the research and administrative teams; finance the capacity-building activities, travels, and research visits; and fund the payment technology that was to be used in the complementary currency. Gathering these resources required convincing potential funders to believe in the project, and to this end Ellen applied for funding from the Scandinavian Research and Development Organization (SCANDEV). The proposal described the project's goal of supporting local governance, group mobilization, and action research. The action-research component justified the practical and interventionist practices to be used when implementing the complementary currency. In 2018, SCANDEV awarded the research project approximately 1 million euro, for introducing complementary currencies in poor urban settlements and studying governance and diffusion processes.

1. The field team

Xavier, Mary, and Robert were fundamental actors in the daily operations of the project. Xavier was a young community leader who worked in recycling and cleaning services; he met Josephine during her research on waste collection, and joined the GFI project in the summer of 2019. Xavier had a crucial role in developing the communication material for the project, and later took charge of supporting locals in the use of the payment technology. Mary was the field administrator for the project. At that time, she was finishing her Master's degree in tourism, and was hired based on her background in community-development activities. She oversaw the project's daily tasks and coordinated the kick-off event. The last to join the project was Robert, a Kenyan anthropologist who had pursued doctoral studies in Germany. He joined as a post-doctoral researcher, mainly studying how Kenyans used the complementary currencies that had been introduced in their neighborhoods.

2. The local communities

Involving residents was necessary since the researchers needed a point of entry for their studies, and the currency needed a community in order to materialize. Josephine and Moses met Sylvester while working on a waste-management project, and recognized the importance of having him on board. Sylvester was not officially part of the project, but followed the researchers during the process and soon became "the most important ambassador of the idea", according to Josephine, even standing in for the researchers to explain the concept during meetings.

After several visits to Kenya, the project group set the foundation for a potential collaboration with Kenyan communities that were interested in implementing complementary currencies. However, the project required a group of communities that would be interested in experimenting with the idea and that had resources (e.g. food or services) that members of the complementary currency could acquire. After meeting several groups, the researchers decided to collaborate with two market CBOs that worked in Kibuye market; these two, for administrative and governance purposes, later constituted a single entity called the 'Progress Warriors' (more on this in Chapter 7). Located in Kisumu, Kibuye is one of Eastern Kenya's most prominent outdoor markets (Image 1). The members of the two CBOs totaled approximately 200, in most cases were living hand to mouth, and struggled to access conventional money in order to secure their futures. These potential participants offered goods and services to be transacted with the

complementary currency, had previous experience of financial and commercial practices, and offered a great opportunity to disperse the idea through their networks. Several board members represented these groups, all of whom were merchants at Kibuye markets. While some of the community members participated, several engaged in close conversations with the researchers: Steven, Margarethe, Harold, Peter, Laila, and Mama Alva. Steven, Margarethe, and Harold were more active when selecting the payment technology, while Mama Alva and Peter were important actors in the initial usage of the complementary currency.

Image 1. Kibuye Market, with the image blurred to protect identities, September 2019.
Source: Author's archive.

The implementation of the complementary currency was motivated by a shared interest in socio-economic development, and a desire for knowledge creation. A unique set of actors and capabilities was involved in starting-up the project (see Figure 1): Josephine and Ellen brought the complementary currency idea. Moreover, their research and academic experience served to legitimize the project and facilitated the obtaining of funds from SCANDEV. Moses offered fundamental local knowledge and a network, and, since part of the project's objective was focused on capacity building, his university oversaw the engagement of Master's, doctoral, and post-doctoral researchers. Inclusion Economics brought practical experience of creating currencies, international recognition, and a potential payment technology. The community of merchants was central to the project, as they showed interest and engagement and

provided coherence; without them, the currency would not have been possible to implement.

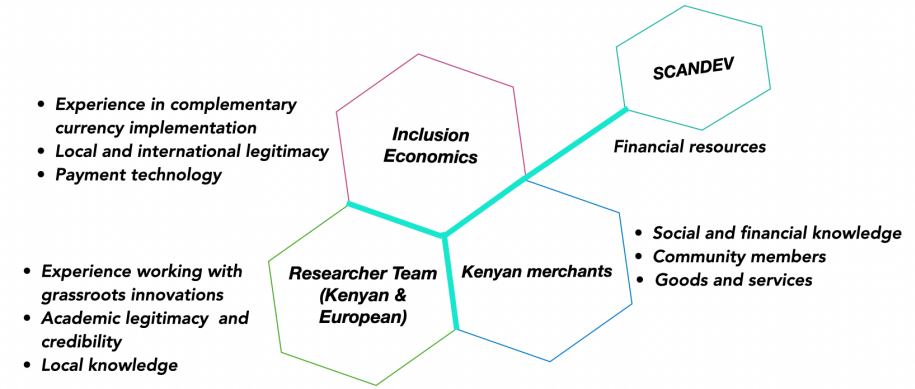

Figure 1. The Grassroots Financial Innovation Project.

The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually slaves of some defunct economist […] it is ideas, not vested interests, which are dangerous for good or evil. – Keynes (2018:383)

5.Contrasting political-economic ideas within the GFI project

This chapter presents two political-economic approaches to the implementation of the complementary currency within the GFI project. One side saw the complementary currency as an efficient medium for the circulation of aid and a means of including people in different markets through networks of currencies, wherein arbitrage possibilities would enable the self-regulation of the system. The other side viewed the complementary currency as a way of empowering local communities, involving people in the design of monetary arrangements, and adapting the currency to the communities local needs. There were thus two contrasting political-economic ideas regarding how the complementary currency was to be implemented in the context of scarcity, even though both were initially articulated in relation to a desire to safeguard people's wellbeing.

A. A promising start for the GFI

In 2018, the GFI was awarded a grant to study existing complementary currencies in Kenya, introduce new complementary currencies, and study practices relating to the governance and diffusion of complementary currencies in the context of scarcity. The project involved a diverse group of researchers and personalities: Josephine is pragmatic and energetic, and had experience working with marginalized communities in Kenya and working relationships with Moses and Ellen. Moses, who always has a smile and a conciliatory spirit, was able to mobilize communities and shared their language, culture, and geography. Ellen, a socially oriented action researcher, had been studying complementary currencies since 2016, and was the research project's driving force. Charles, tech-savvy and entrepreneurial, brought Inclusion Economics'

practical experience in introducing complementary currencies in Kenya, and international legitimacy and recognition. Finally, the Kenyan merchants brought their networks, products, and stories for the researchers to study.

The project formally started in Spring 2019, and its kick-off event was held in Nairobi at the end of that year. The event gathered together people from coastal Kenya who had already been using Inclusion Economics' currencies, and representatives from the region where the GFI project planned to implement the complementary currency in 2021. There were also researchers, representatives of development organizations, and local politicians, all present to learn about the project and the potential benefits of these financial innovations.

The event began with descriptions of how advocates, or champions as they were referred to, were using the paper-based complementary currencies that Inclusion Economics had been introducing since 2010. While putting a note into her pocket, a woman demonstrated how she had saved some Kenyan shillings (KES) by using her complementary currency to buy goods that her husband had given her KES to buy. A teacher we later visited in Kibera (Kenya's largest informal urban settlement) talked about how she accepted complementary currency for school fees. Even a pastor, who was initially skeptical of complementary currencies, described accepting them in weekly contributions to the church. These champions appreciated the currencies, and explained their benefits to the audience. Charles presented his experiences of developing complementary currencies and Inclusion Economics' plans. Finally, Ellen, Josephine, and Moses presented the GFI plan, and ended the event with words of hope and wellbeing for all.

After the kick-off event, the participants agreed that a promising start had been made, and were ready to begin working on their tasks. The following excerpts from the grant application outline the expected role of each actor in the project:

> ***Josephine:*** *supports the research team in Kenya. She is also part of building a strong research environment for grassroots innovations at [European University].*
> ***Moses:*** *organizes and leads the interventionist study in Kisumu.*
> ***Charles:*** *will advise and give practical support regarding the introduction of a complementary currency in three of Kisumu's informal settlements. He will also coordinate the quantitative analysis of the currencies in Mombasa and Nairobi.*
> ***Inclusion Economics:*** *currently introducing blockchain technology within one of the community currencies in Mombasa, and considering*

> *using a blockchain platform for the community currencies to be introduced in Kisumu.*
> ***Kenyan communities:*** *Kisumu and its informal settlements become our 'urban laboratories', in line with governance experiments and grassroots innovation studies.*
> ***Ellen:*** *extensive experience of researching social innovation and entrepreneurship. She coordinates the project and deals with administrative matters. She is also responsible for the final report, communication, and dissemination.*[1,2]

As the excerpts show, Inclusion Economics had an important role in the practical implementation of the currency. The project proposal indicated that the NGO was "considering using a blockchain platform for the community currencies to be introduced in Kisumu". In this sense, it was reasonable to think that Inclusion Economics was responsible for technical implementation of the payment technology behind the complementary currency.

B. Inclusion Coin

During his speech at the kick-off event in 2019, Charles introduced Inclusion Coin, a new digital currency, and plans to develop it into an open-source payment technology. The idea was to enable communities worldwide to issue digital currencies, and to help development organizations transfer development aid to those who needed it.

1. Inclusion Economics' complementary currencies in Kenya

Since 2010, Inclusion Economics had been experimenting with different types of monetary design.[3,4] The first model was a pilot experiment that involved

[1] Note: throughout the thesis, I reference my own empirical material using footnotes, rather than parenthetical citations, in the interest of clarity. All empirical material is listed and described in the Appendix.

[2] GFI Project proposal, 2018.

[3] See Chapter 2 –Table 2 for an overview of the ways currency is issued, put into circulation, and withdrawn.

[4] This description of Inclusion Economics' complementary currencies is based on Research article Inclusion Economics 1, 2021 and Research article Inclusion Economics 2, 2023.

creating a supply of complementary currency backed by a KES donation. People participated in ecological services such as planting trees and collecting waste, and were paid in the complementary currency, which they could then convert into KES. The pilot mobilized people to pick up waste in their neighborhoods, and motivated the organization to develop a new complementary currency.

Between 2013 and 2017, a new issuance, circulation, and withdrawal model that was inspired by the idea of a mutual credit system was organized. The currency supply was issued without backing in conventional money and was instead anchored in the community's productive capacity and trust in promises made by people to accept and spend the currency. To promote the complementary currency's circulation, the paper notes had expiration dates. The model expanded to five communities, all of which issued a different complementary currency. However, the model required much management and engagement by the community – specifically, getting members to attend the decision-making meetings and ensuring that people were not only spending the complementary currency, but accepting it. As in other cases, a problem that was found was that the goods and services being offered were not varied enough, meaning that currency usually ended up in the hands of the same users, who could not use this currency to pay suppliers or did not find ways to spend the accumulated currency within the community. This led to low circulation, and a decision by Inclusion Economics to make a change.

In 2017, the organization developed a third model that was similar to a fiat design, wherein it was in control of the issuance and maintenance of the monetary system. With the financial support of external donors, the organization invested in the productive capacity of communities (e.g., community mills) in order to ensure that people could find services and goods to spend the currency on. Moreover, it established collaborations with local stores that would accept the currency and convert it into KES under policies set by Inclusion Economics. In other words, they backed the currency with productive capacity and KES.

2. From paper-based currency to a digital currency: Inclusion Coin and the BPO protocol

In 2018, Inclusion Economics' monetary arrangement underwent a significant change. As advertised on the organization's social media, a collaboration was initiated with Blockchain Inc. (BPO) "to serve both the blockchain community

and marginalized communities around the world".[5] The company fostered cryptocurrency trading and supported the transformation of Inclusion Economics' paper-based complementary currency into a blockchain-based digital one named Inclusion Coin.

The payment technology developed by Inclusion Economics used blockchain technology. Blockchain technologies offer a solution to the problem of needing to validate the authenticity of records, without recourse to trusted intermediaries (Mattila, 2016). Blockchain is a distributed digital ledger technology that records transactions across multiple computers, promising security, transparency, and immutability. Each transaction is added to a 'block' that is linked in a chronological chain, hence the name 'blockchain'. Blockchain technology can operate across a decentralized network of computers and uses cryptography to ensure the integrity and security of data (Mattila, 2016; Khan et al., 2021). The use of blockchain permits users to access a payment technology without the need the conventional banking system.

Another functionality of blockchain technologies is smart contracts, which are used to facilitate a system's 'decentralized' control. Smart contracts "are executable codes that run on top of the blockchain to facilitate, execute, and enforce an agreement between untrustworthy parties without the involvement of a trusted third party" (Khan et al., 2021:2902). Smart contracts translate pre-defined agreements into algorithms, and automatize their execution.

Inclusion Coin was unique not only because it was digital, but in how it used smart contracts to enable convertibility between different currencies. Specifically, Inclusion Economics introduced the BPO protocol in a smart contract. This protocol used mathematical equations to automate the calculation of exchange rates between cryptocurrencies. These equations are called bonding curves,[6] and are used to calculate the prices of a currency in terms of another based on a common reserve.

A key element of bonding curves is the reserve ratio, which is a fixed, predefined ratio between the supply of the created currency and the common reserve balance that guides price behavior. Every time there is an issuance or withdrawal from either the digital currency supply or the common reserve, the price of the created digital currency is adjusted based on the pre-defined reserve ratio. A reserve ratio of one means that all of the total value of the

[5] Video published on Inclusion Economics' Facebook on June 5, 2018.

[6] For more information on bonding curves see Hertzog et al. (2017).

supply of the created currency must correspond to the common reserve balance, resulting in a stable price; a reserve greater than zero and less than one would make the price more sensitive to any change in the supply of the created currency and common reserve balance. The reserve ratio is pre-defined by the digital currency issuer, which in the case of Inclusion Coin was Inclusion Economics.

The price of a digital currency being sensitive to the issuance of more digital currency or the balance of the common reserve means that even the smallest transaction influences the price of the currency. This is where smart contracts come to play, in terms of the possibility of automatically defining a conversion price between different digital currencies and common reserves. The use of the BPO protocol and blockchain technology made a market of currencies possible, and users could trade different complementary currencies amongst one another.

3. The cash-transfer program

One of Inclusion Economics' plans was to implement a cash-transfer program using their payment technology. Cash-transfer programs are social programs in which aid organizations transfer specific quantities of funds directly to people, who can then spend these funds on whatever they deem to need (Fiszbein & Schady, 2009). Some of the challenges that Inclusion Economics identified in previously established cash-transfer programs related to ensure that donor aid circulated locally, and thus lasted longer; understanding the impact of the cash transfer by visualizing how the beneficiaries used the resources; and the costs of transferring money to the partners running the program and the individuals receiving the cash transfers. To address these, Inclusion Economics proposed a payment technology that enabled the use of blockchain-based digital currencies within a cash-transfer program in a transparent and more affordable way in comparison with other available services.

Inclusion Economics collaborated with the Humanitarian Aid Organization (HAO) to operate their cash-transfer program, and used Inclusion Coin to promote local development. Inclusion Economics intended to use funds provided by the HAO to back the issuing of digital currencies, which were to be distributed to people in need. In 2018 Inclusion Economics reported that

every new user would receive 400 Inclusion Coins,[7] which they could use to buy products and services from local businesses. The system also used M-pesa[8] agents to help users to redeem Inclusion Coin for KES via specific conversion policies created by Inclusion Economics. The organization also developed an online public dashboard that allowed funders, researchers, and other interested parties to follow the impact of the currency through indicators such as transaction volume, user-to-user transactions, and number of users per day. At the end of 2019, the organization reported that approximately 20,000 people were transacting at least once a month.

4. Inclusion Coin's monetary design

Inclusion Economics acted as the central authority for and issuer of Inclusion Coin. The NGO was in charge of developing and maintaining the open-source code for the payment technology, defining the parameters of the bonding curves and conversion policies, and developing the online dashboard. Inclusion Economics also paid all of the costs of running the currency (e.g., hosting servers, usage of telecommunications infrastructure, support team) to ensure that people could use the digital currency free of charge.

Based on a reserve in KES and connected to the blockchain through a stablecoin,[9] Inclusion Economics issued Inclusion Coins and distributed them to recipient accounts. Using their feature phones[10] and a communication protocol known as unstructured supplementary service data (USSD),[11] the recipients could transfer digital units using text messages. The transactions were recorded in a public blockchain promising transparency and security for the actors involved. The plan was that users could withdraw Inclusion Coins

[7] Research Document Inclusion Economics 1, 2021.

[8] See Chapter 1 for more on M-pesa.

[9] Stablecoins are a type of cryptocurrency whose value is pegged to another asset, such as euros or US dollars, to maintain a stable price.

[10] A feature phone can be defined as a mobile phone that can use the internet in basic ways as well as making calls and sending messages, but does not have more advanced features such as a touchscreen.

[11] As few users had smartphones, USSD enables people to make transaction through their feature phones. See Hinrichsen (2020) for a description of how USSD works and applications for development.

by converting them into KES at an exchange rate automatically defined by the BPO protocol embedded in the payment technology.

One of Inclusion Economics' future goals was to serve as a channel for aid. Hence, the redemption of Inclusion Coins for KES was part of the monetary design. The goal was to ensure that donor aid circulated locally, and thus lasted longer, by allowing people to use Inclusion Coin with local businesses; this would aid it in circulating for as long as possible before it was converted into KES (see Figure 2). Inclusion Economics defined specific conversion rules that limited the amount of KES that could be redeemed and the period for conversion. Due to the geographical scale of Inclusion Economics' operation, the organization partnered with local M-pesa agents to allow Inclusion Coins to be converted into M-pesa.[12]

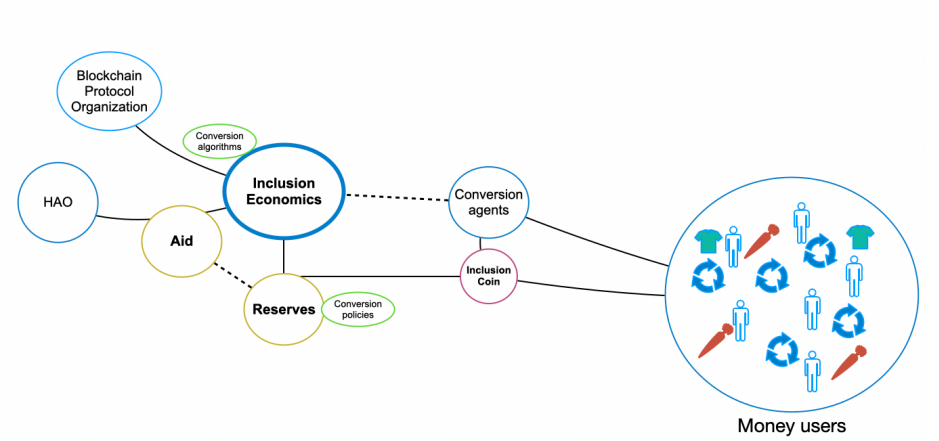

Figure 2. The Inclusion Coin's monetary design.

In summary, Inclusion Economics acted as the central authority for Inclusion Coin, defining the payment-technology parameters and conversion policies and issuing the currency. Development organizations could fund Inclusion Coins, which Inclusion Economics distributed to users. Users could use them to exchange inside the community of Inclusion Coin users or withdraw Inclusion Coins by converting them into KES.

[12] There was a conversion fee, but this was covered by Inclusion Economics and had no additional cost for the money user.

C. Contrasting political-economic ideas in a complementary currency project

At the end of 2019, there were differing expectations regarding the use of Inclusion Coin within the GFI project. The project proposal suggested that the currencies that were to be implemented in 2021 could use the payment technology that Inclusion Economics was developing. However, Inclusion Coin's conversion possibility and the automatization of rules through smart contracts generated concerns for some of the project members, whom I collectively refer to as the *Research Team*. In the following sections, I present how Inclusion Economics and the Research Team envisioned the implementation of complementary currencies in contexts of scarcity.

1. An efficient medium for circulation of aid ≠ monetary empowerment of communities

While both actors aimed for socio-economic wellbeing, they envisioned implementation of this in different ways: Inclusion Economics saw complementary currencies as a tool for a more efficient circulation of aid, while the Research Team viewed complementary currencies as a tool for the monetary empowerment of communities.

To help populations in poverty, Inclusion Economics proposed connecting markets, external aid, and complementary currencies. As stated in the organization's 2020 white paper[13,14], the organization argued that the "scarcity of a medium of exchange" prevented local economies from developing. In this sense, Inclusion Economics felt that it was vitally important to give people access to a payment technology that could be used locally as a medium of exchange.

[13] A white paper is a comprehensive document outlining the technical and economic aspect of a cryptocurrency. See Caliskan (2020) for a detailed analysis of 100 cryptocurrency white papers. Caliskan also proposes an actor-based taxonomy of blockchain digital architectures, and argues that most white papers persuade readers of the usefulness of their proposal, prove its mathematical validity, and educate the reader on the different ways the proposed systems can be used.

[14] It should be noted that there are different versions of the Inclusion Coin white paper, dating from 2018 to 2021; however, the version that was available at the time of my data collection was the one published in 2020.

Inclusion Economics saw in development aid a means to inject capital into communities in a context of poverty, but recognized certain limitations in this. Interestingly, the problem was framed in terms of what can be understood as leakage[15] of development aid. The following quote from Inclusion Coin white paper explains how development aid could be used to connect low-income people with markets, and the relevance of complementary currencies:

> *Using markets as a way of alleviating poverty and empowering people out of shocks is increasingly becoming more common. There is a wide spectrum in which markets can be used to alleviate needs. Cash and voucher assistance is one that is commonly used to increase vulnerable people's access to markets […] Direct cash transfers are advantageous because they empower people to decide for themselves what they need, which is fundamental for organic market growth. […]. In this environment, national currencies given directly to beneficiaries often stay in local circulation only for a limited time*[16].
>
> *This paper proposes reinventing cash and voucher assistance programs, so they act as a catalyst for sustainable growth for communities. We propose creating [complementary] currencies using blockchain technology to create transparent, inclusive and empowering eco-systems that enable communities to develop and trade their own form of [money] backed by their own productive capacity and seeded by local governments and the aid industry.*[17]

Inclusion Economics wanted to use complementary currencies to extend the time the development aid stayed in the community. The problem with development aid being given as conventional money, Inclusion Economics argued, is that it "often stay[s] in local circulation only for a limited time". In other words, there was a problem of leakage of development aid. Inclusion Economics proposed "reinventing cash and voucher assistance programs" by using blockchain-based digital currencies that could be backed by "local governments and the aid industry". The use of complementary currencies would slow down the leakage of conventional money and the complementary currency would serve, in essence, as a more efficient medium for introducing and circulating aid in impoverished communities.

[15] See Chapter 1 – Scarcity of money?

[16] Inclusion Coin white paper, 2020:3.

[17] Inclusion Coin white paper, 2020:3.

The Research Team, on the other hand, had a different agenda: studying the practices, impacts, and challenges related to "diffuse financial and monetary infrastructures for inclusive economic growth".[18] The Research Team viewed money as a social institution that influences community wellbeing. The quotes below are taken from the GFI project proposal written by the Research Team, and exemplify its approach to money:

> *Money – we know from among others the writings of John Maynard Keynes (1936) – is an institution key in shaping the economy at large as well as the dynamics of markets and the entrepreneurial behaviour of individuals. Accordingly, the design and governance of the institution of money shapes the form and direction of economic and entrepreneurial activity.*[19]
>
> *Community currencies that abounded during the years following the Great Depression showed that both the particular properties designed into the monetary system as well as the type of governance rules used to regulate entry and use of the system shaped the socio-economic interactions resulting as well as their economic impact.*[20]

From the perspective of the Research Team, money plays a powerful role in society; it is an institution that shapes the economy, markets, and individuals. The Research Team recognized the importance of how a monetary system is designed and managed, as this provides shape and direction to the economy and to individual behavior. In this sense, complementary currencies can be designed by local communities to influence their socio-economic wellbeing.

In summary, a key difference between Inclusion Economics and the Research Team was their views on the purposes of complementary currencies. Inclusion Economics saw this as the distribution of development aid and increasing of local circulation of currency prior to conversion into conventional currency. The Research Team saw money as a social institution, and recognized complementary currencies as opportunities for communities to shape their socio-economic wellbeing.

[18] GFI Project proposal, 2018:1.

[19] GFI project proposal, 2018:2.

[20] GFI project proposal, 2018:2.

2. Inclusion in markets ≠ inclusion in monetary governance

Another difference was how each actor framed inclusion within the monetary arrangement. For Inclusion Economics, the focus was including people in different markets through networks of currencies, while the Research Team framed inclusion as the participation of a community of users in the governance of the currency.

Inclusion Economics argued that complementary currencies could be designed to connect different currencies and allow communities to participate in different markets. The excerpts below present Inclusion Economics' idea of creating a network of digital currencies to connect different economies:

> *Inclusion Economics in Kenya is among a growing worldwide movement of community [complementary] currency proponents who see a connected and decentralized economy as one of the most fundamental building blocks for designing a better future for humanity. To seed communities of currencies worldwide and promote equitability and stability, Inclusion Economics seeks to enable and support digital currencies for marginalized communities.*[21]

> *It is a network of networks of these connected community[complementary] currencies that begins to truly differentiate itself from isolated community currency systems or centralized exchanges or centralized network tokens, and provide adequate market acceptance, based in shared protocols for relative value.*[22]

Inclusion Economics envisioned "a connected and decentralized economy" as a key element of community wellbeing, and wanted to facilitate access to different markets. A common critique of complementary currencies is that they limit the purchasing power of a currency to a specific community (Larue, 2022). In a similar way, Inclusion Economics argued that interconnected complementary currencies would improve the ability of users to spend their complementary currency beyond "isolated community currency systems". To facilitate exchange between complementary currencies, Inclusion Economics proposed using the "shared protocols for relative value" – in other words, a common measure of value between different currencies to "provide adequate market acceptance". Such a scenario, wherein money permits individuals to go

[21] Inclusion Coin white paper, 2020:5.

[22] Inclusion Coin white paper, 2020:6.

beyond the boundaries of their own groups and connects them to other, anonymous markets, is a representation of what Simmel ([1900] 2011) argues made money into an impersonal thing, and promoted its accumulation as the ultimate goal.

Inclusion Economics envisioned an infrastructure that facilitated conversion between complementary currencies. To connect different currencies a unifying element is required, and Inclusion Economics was prepared to offer this. As the following excerpt shows, they suggested the issuance of digital currencies through a common reserve:

> *In order to establish systems where markets are inclusive and work more efficiently for currently economically marginalized communities, we propose the adoption of reserve-seeding as a humanitarian aid practice. Such a general reserve, we will call the Inclusion Coin Reserve Token, can include a National Currency stable token (such as DAI[23]) and used to seed digital currencies that use it to automatically link with each other. By staking these Inclusion Coin Reserve Token to digital currencies, communities easily and freely have reserves and collateral systems for their token creation and bypass the initial need to purchase or organically develop market-connecting reserve tokens.*[24]

Inclusion Economics sought to further the idea of utilizing a common reserve to create a network of digital currencies by issuing digital currencies using a common reserve to "automatically link with each other". In principle this common reserve could be any cryptocurrency; in reality, Inclusion Economics' monetary arrangement proposed Inclusion Coin as the common reserve. Inclusion Economics also proposed "reserve-seeding as a humanitarian aid practice", wherein external donors would give aid to 'seed' the common reserve, helping communities to be able to interconnect their own digital currencies. In this sense, digital currencies that utilized Inclusion Coin as a common reserve would be included in Inclusion Economics' monetary arrangement.

The Research Team's perspective on what inclusion meant in a complementary currency project was quite different: it sought to facilitate the development of complementary currencies that were attentive to local needs. Below is an

[23] DAI is a type of cryptocurrency that aims to keep its value stable relative to the US dollar.

[24] Inclusion Coin white paper, 2020:8.

excerpt from the GFI project proposal relating to local adaptation of innovations:

> *Instead of diffusing ready-made solutions in which communities are taken as passive receivers of recipes developed elsewhere, communities themselves reach out in search for networks and ideas of relevance to them, translate those ideas to their context, and develop communal structures for the continuous maintenance of those solutions. […] these South-to-South bottom-up networks bring in locally developed, innovative and flexible solutions, while also learning from their failures (Gutberlet 2015; Mitlin 2015; Boonyabancha & Kerr, 2015; Boonyabancha & Mitlin 2012). Communities, that is, are the driving force, not merely the target beneficiary.*[25]

This excerpt indicates the centrality of the local community in the Research Team's approach; here, communities were not seen as "as passive receivers" but "as the driving force". Moreover, communities were recognized as active creators of their own solutions who look out for "ideas of relevance to them", and adapt these ideas "to their own context". In this sense, the communities included "locally developed, innovative and flexible solutions" in their practices.

Moreover, the project would empower communities by helping them to set up their complementary currency, and avoid their depending entirely on external development aid. Below are further excerpts from the GFI proposal:

> *In common with other grassroots innovations, community currencies build on the idea that marginalized people hold the key to their own solutions (Smith et al. 2017). Accordingly, these initiatives focus on mobilizing local resources and designing governance structures that empower the community.*[26]

> *Empowering vulnerable communities to set up their own community currency systems, leads to grassroots innovations that are attentive to local priorities and cultures and that build on local ideas, knowledges, capabilities and tools to organize communities.*[27]

[25] GFI project proposal, 2018:3.

[26] GFI project proposal, 2018:2.

[27] GFI project proposal, 2018:2.

The Research Team favored a grassroots approach to community development wherein communities have independence in and responsibility for dealing with their problems. This builds on the ability of communities in "mobilizing local resources" and "designing governance structures that empower the community". Communities are empowered because they are recognized as "holding the key to their own solutions". In summary, for the Research Team, inclusion within the complementary-currency project was defined by who could participate in the governance of the complementary currency.

To recap: the second key difference stemmed from the way inclusion was framed in the project. Inclusion Economics framed inclusion as connection between markets and development aid through interconnected digital currencies; the Research Team framed inclusion as the participation of communities in the governance of monetary arrangements that were adapted to their contexts and needs.

3. Self-regulating market of currencies ≠ locally managed currencies

A third and final difference was how the soundness of the monetary system would be achieved. For Inclusion Economics, the focus was on facilitating the self-regulation of the system through arbitrage and automated smart contracts. For the Research Team, promoting local management and control was the mechanism to ensure that the monetary system responded to the local needs.

For Inclusion Economics, the key to balancing the system was facilitating a self-regulating market of currencies based on arbitrage and automated smart contracts. Arbitrage occurs when an actor takes advantage of a price difference by buying in one market and selling in another. This opportunity assumes that individuals always seek to maximize profit. The following excerpt illustrates how Inclusion Economics favored arbitrage and profitability in order to stabilize currency prices in a digital complementary-currency market:

> *[A]s connected [digital complementary currencies] begin to change in relative value the price advantage of one [digital complementary currency] over another will be taken advantage of by users to reduce costs (arbitrage). In this process, the token with a lower exchange value will experience more conversions increasing the token exchange price once again.*[28]

[28]Inclusion Coin white paper, 2020:8.

> *A reserve token's unique value is that it can connect [digital currencies] together and give them a relative price to each other with or without any Stable token (DAI) reserve. Then when a token is added to the reserve of a [digital currency], connected digital currencies now have a gateway to that reserve (i.e. DAI -> National Currency) – and their exchange value to reserve will vary based on how much stays in reserve – but [digital currencies'] local value to each other is based on their relative amounts of the reserve token.*[29]

Thus, the soundness of the system relied on the automation of exchange rates and arbitrage opportunities. The interconnectedness of digital currencies would motivate arbitrage between currencies thus motivating the circulation of currency, as individuals would constantly be looking to "take advantage" and "reduce costs". In addition, enabled by the bonding curves, the possibility to convert digital currencies into development aid provided an opportunity to increase the acceptability and liquidity of the currency. That is, the converting of the digital currency into conventional money was facilitated by the idea individuals desire to maximize benefits to themselves, and this liquidity of digital currency in turn was a self-regulating mechanism.

In contrast to the self-regulated approach, the Research Team was focused on local governance structures, and how these could ensure the monetary system attended local needs. The following excerpts present the Research Team's ideas regarding design and governance:

> *Their effectiveness however, as well as their ability to cope with the challenges common to grassroots innovations, hinges on their particular monetary design as well as on the governance structures set for its regulation and maintenance (Fisher 1933).*[30]

> *Through the study of the Kenyan community [complementary] currencies, we will contribute to developing theory on institutional arrangements and practices related to the effective governance and management of grassroots innovations for inclusive economic growth in general and community [complementary] currencies in particular.*[31]

[29] Inclusion Coin white paper, 2020:8.

[30] GFI project proposal, 2017:3.

[31] GFI project proposal, 2017:3.

The Research Team framed money as an institutional arrangement sustained by community relations. The soundness of the complementary currency depended "on the governance structures set for its regulation and maintenance". One of the aims of the GFI research project was to contribute with theory on "effective governance and management" of complementary currencies; hence, the Research Team gave importance to local management as a mechanism for ensuring that community relations were enacted appropriately.

This third and final difference related to different perspectives on the mechanisms of control of the system. Inclusion Economics was focused on a self-regulating market of currencies, wherein arbitrage was fundamental to the system functioning well. For the Research Team, on the other hand, communal relational management were to ensure the trustworthiness and functioning of the monetary system.

D. Contrasting political-economic ideas within the GFI project

This chapter has presented two contrasting political-economic ideas relating to the purpose and mechanism of control of a complementary currency, and inclusion within the project (Table 3). In terms of purpose, Inclusion Economics sought to use complementary currencies as mechanisms to prolong circulation of aid and increase the likelihood of exchanges occurring in markets made up of different communities. The Research Team, on the other hand, wanted to make use of complementary currencies as mechanisms to empower communities.

A second difference was the framing of inclusion: Inclusion Economics wanted to connect different markets and development aid through interconnected digital currencies. The Research Team framed inclusion as allowing communities to design and govern their monetary arrangements and adapt these to their practices, contexts, and needs.

The final difference related to the mechanism of control. The concept of self-regulating markets of currencies was the cornerstone of Inclusion Economics' approach to system soundness. The Research Team was focused on the communal management as the key for monetary system soundness.

Table 3. Political-economic ideas in the GFI project.

	Description	Inclusion Economics	Research Team
Aim	What is the aim of a complementary currency?	An efficient medium for circulation of development aid	As mechanisms to empower communities
Framing of inclusion	In a complementary currency system, who should be included into what?	Communities included in infrastructures of aid and markets of currencies	Communities included in the design and governance of the monetary systems
Mechanism to keep the system sound	How should the monetary system soundness be achieved? What needs to be controlled and how?	Self-regulating market of currencies . Control over conversion prices	Local management of communal relations

In sum, Inclusion Economics and the Research Team had differing political-economic ideas regarding developing complementary currencies in the context of scarcity. Both began with the idea of using complementary currencies for socio-economic wellbeing, but each approached purpose, framing of inclusion, and mechanism of control in different ways.

6. The materializing of political-economic ideas through payment technologies

This chapter details how political-economic ideas are translated into payment technologies. The controversy regarding which payment technology to use in the implementation of the complementary currency is explained, and the ways in which the use of a payment technology entails a particular approach to money and type of user participation in a monetary arrangement is discussed. The findings show that payment technologies are not neutral; whoever controls them can include or exclude actors and facilitate the translation of ideas in a monetary arrangement.

A. Problematizing Inclusion Coin

Inclusion Economics developed a monetary arrangement based on its political-economic idea of using complementary currencies as infrastructure for development aid. In the fall of 2019, Inclusion Economics began distributing Inclusion Coin in various regions in Kenya, which caused communities that had been transacting using paper-based complementary currencies to switch to using their phones. Inclusion Economics tested the use of the bonding curves and investigated how the Inclusion Coin payment technology could facilitate and enhance the distribution of development aid.

In late 2019 and early 2020, the Research Team began to identify contradictory ideas within the GFI project. During my first experience of fieldwork in Kenya in November 2019, I followed Ellen as she visited communities that were using Inclusion Coin.

Image 2. Following Ellen in rural Kenya, November 2019.
Source: Author's archive.

One hot afternoon, while walking for several hours through rivers and fields of small crops and trees, we talked with Philip, our local guide (Image 2). He was an Inclusion Coin user, and explained how he used the exchange rates to convert Inclusion Coin into KES. The conversation below is an excerpt from my personal field notes[1].

> ***Ellen****: So, how does the exchange rate work?*
> ***Philip****: Sometimes Inclusion Coin goes up to 1.89 KES, and then I exchange it […]. Sometimes, Inclusion Coin is 0.49 KES; at that time, I do not exchange, and keep using Inclusion Coin in my own community. […] Sometimes, it goes low; other times, it goes high.*
> ***Juan:*** *What is the reason for these exchange rates?*
> ***Philip****: That I do not know. You would have to ask at the Inclusion Economics office.*

[1] Field notes, November 16, 2019.

This excerpt exemplifies how Inclusion Coin translated Inclusion Economic ideas as they were being picked up by the users. The payment technology gave users access to conversion rates and assisted them in performing arbitrage. Philip was attentive to the exchange rates that the payment technology allowed him access to, and was converting Inclusion Coin when there was a possibility to earn more KES. This example shows how ideas of market self-regulation and individual gain were translated into the payment technology, and being picked up by users of Inclusion Coin.

The conversation also shows the lack of detailed knowledge and understanding of the underlying technical algorithms that were embedded in Inclusion Coin's payment technology. As a money user, Philip was unaware of how exchange-rate dynamics work, and suggested that we "ask in the Inclusion Economics office" to learn how the exchange-rate system functioned. The parametrization of the payment technology (i.e., bonding curves) was in the hands of Inclusion Economics, who acted as the central authority for Inclusion Coin.

The Research team and local leaders also problematized the association of Inclusion Coin and the GFI project – specifically users' intrinsic motivation to acquire Inclusion Coin, and the dependence on external actors for the future functioning of the complementary currency. During my interview, Moses problematized the dependence on Inclusion Economics for maintaining the monetary arrangement:

> *What happens is that in the absence of Inclusion Economics, the project fails. So, it depends on that organization. We asked if that was the ownership we wanted in Kisumu. We told the community that you must do this project minus [Kenyan university], minus Ellen, and minus the project in general. We asked the community: what do you need to take the project to the next level without anybody? We do not want to hold you. You have had your chama for more than ten years, and we want this also to be in that process. What do you need to put this in place?*[2]

Sylvester, a local leader, also noted the dependence on Inclusion Economics, and reflected on the visits to other communities:

> *[W]e realized that Inclusion Coin was being managed by Inclusion Economics only. And in case they needed to, or in case they stopped funding, or something happened to them, that was the end of the project within the community. So, when we came back to Kisumu, we*

[2] Moses interview, May 2020.

> *started thinking of how best we could safeguard the community interest so that we wouldn't have something that had a short lifespan.*[3]

These excerpts problematize the dependence on Inclusion Economics that was needed for the complementary currency to function. Inclusion Economics designed the monetary arrangement to facilitate the issuance of digital currencies and distribution of development aid. While the community could use Inclusion Coin, the soundness of the payment technology and access to development aid depended on Inclusion Economics – and, as Sylvester put it, "if something happens to them that was the end of the project". For Moses, this dependence on external aid made it difficult for the community to "take the project to the next level without anybody". Using Inclusion Coin was not empowering local monetary communities.

Another critical point was the lack of community participation in the monetary design. The decision over issuing and withdrawing tokens was not within reach of the local community:

> *The community is unaware of how many of the tokens have been injected, so they do not have control, and if they do not have control, they cannot manage it themselves. What we want in Kisumu is for the community to be aware of the number of tokens in circulation and they must have control of it. If they want to increase, they increase. If they do not want to increase, they do not increase. It is up to the community to give the tokens.*[4]

Within the arrangement set up by Inclusion Economics, communities did not have control over the issuance and distribution of complementary currencies. This lack of control over the issuance of money meant that the communities could not "manage it themselves", which hindered how money shaped the socio-economic behaviors of the community. In other words, the communities were not responsible for the mechanisms of control of their complementary-currency system.

Another problem was the involvement of external conversion agents. Below, Moses explains how the external agents influenced the conversion of the Inclusion Coin into aid:

> *We realized that in [another region] there were also agents. The community did not want that. The agents were receiving the Inclusion*

[3] Sylvester interview, May 2020.

[4] Moses interview, May 2020.

> *Coin, but waiting for Inclusion Economics to come and exchange it. They were not ploughing back to the community.*[5]

This excerpt shows how Moses problematized the role of M-pesa agents who collaborated with Inclusion Economics to convert Inclusion Coin into KES; these were part of Inclusion Economics' monetary arrangement, but not necessarily members of the community of users. Moses points out that external agents could decide when to receive Inclusion Coins from the community, which influenced the circulation of Inclusion Coin and aid in the community. Moreover, the agents were not "ploughing back to the community", meaning that the profits and benefits that these agents were obtaining from the system were not necessarily reintroduced to the community. In sum, the arbitrage mechanisms of the Inclusion Coin system seemed to be hindering the community, as agents where allegedly converting Inclusion Coin when the price was beneficial for them.

The association between the GFI project and the Inclusion Economics monetary arrangement[6] was challenged by the Research Team. There were two main arguments as to why the use of Inclusion Economics' payment technology was problematic. First, the dependence on an external actor in order for the complementary currency to function; and second, the money users had limited access to the governance of the monetary system. In other words, the use of Inclusion Coin as a payment technology was no longer aligned with the Research Team's ideas.

From Ellen's perspective,[7] it was never formally agreed that Inclusion Economics payment technology would be used for the project in Kisumu; rather, it was one possibility to be considered. Arguing for the importance of collective decision-making process in the GFI project, although this was not explicitly detailed in the project's grant application, the team decided to conduct a technical analysis of Inclusion Coin.[8] Ellen commissioned Howard for this task. Howard had experience as a consultant on complementary

[5] Moses interview, May 2020.

[6] Inclusion Coin's monetary design was constantly evolving. However, in late 2019 and early 2020, when the GFI project was evaluating the use of Inclusion Coin in the project, the monetary system that Inclusion Economics was experimenting with was based on the bonding-curve design. In 2020, Inclusion Economics reportedly abandoned this, many of the convertibility policies were changed, and agents were no longer part of the system.

[7] Ellen interview, June 2020; Internal chats; Decision Meeting April 2020.

[8] Internal message thread, January 2020.

currencies, and had been part of a money reading group with Ellen since 2017 – a group that I joined in the fall of 2019. The plan was for Howard to go to Kenya to learn about Inclusion Coin and present his analysis to the team.

It was not a surprise that Charles felt unease due to the involvement of Howard in the GFI project. Charles believed that the relation between Inclusion Economics and the GFI project was based on the project's use of Inclusion Economics' payment technology, and that the researchers were just supposed to study "the continuation of the activities that [Inclusion Economics] were already doing, like […] offering services to communities and trying to help them set up currencies".[9] However, things were about to change.

B. COVID-19 changes plans

At the beginning of 2020, COVID-19 affected everyone, everywhere. In the case of the implementation of the complementary currency, the local government in Kisumu imposed curfews in the city. The communities participating in the project were merchants in Kibuye market, one of the largest open-air markets in Kenya. The local government saw the curfew as an opportunity to demolish the market and began renovation work that had been delayed due to informal occupations and lawsuits by local traders. As a result, local traders were left without a permanent place to work, and in many cases stocks of products that were stored at the market were destroyed (Image 3).

[9] Charles interview, May 2020.

Image 3. The demolition of the Kibuye market in Kisumu during the COVID-19 lockdown period.
Source: Photograph by John Chueya (Arina Youth Group) in Simon et al., 2021.[10]

The lives of the Kibuye merchants were being threatened by a virus and economic limitations on their activities. This situation caused uncertainty and endangered people's subsistence. Below is an excerpt from a messaging group[11], showing the challenging situation that people were experiencing.

> *22/03/2020, 17:14 – Researcher 1: How are you?*
> *22/03/2020, 17:20 – Local merchant: Life is becoming unbearable day by day.*
> *22/03/2020, 17:32 –Researcher 1: Is the market still open? How is it where you live?*
> *22/03/2020, 17:48 – Researcher 2: How is the market? I was told things were ugly this afternoon after the market closed.*

[10] Available via license: Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International.

[11] Internal message thread, March 2020.

> *22/03/2020, 17:50 - Local merchant: I am good even though I am locked down. Today, we had a serious give and take in the market, meaning police tear gas and merchants throwing stones.*

The demolition activities that occurred during the COVID-19 pandemic in Kisumu influenced the implementation of the complementary currency. COVID-19 posed an existential threat to Kenyan communities, creating a moral obligation for the GFI project members to help.

C. The introduction of a new payment technology

As I write this now, the Pandemic seems like a nightmare of the past, and now that things have calmed down it's easy to judge what has been done. However, back in 2020, the situation was anything but calm. Communities struggled to survive, and the researchers were concerned by the situation, and frustrated by not being able to go to Kenya to lend a hand. Everyone felt uneasy. According to the project proposal, the implementation of the complementary currency in Kisumu was not to take place until 2021. However, with COVID-19 threatening people's lives and bringing about the demolition of the market, something had to be done. 'If now is not the time for a complementary currency to have a benefit, when will be?', the researchers thought. After discussions regarding the possible risks and challenges, the decision was made to implement the complementary currency one year ahead of schedule. Hence, the decision regarding which payment technology to use had to be made quickly.

Concerns regarding Inclusion Coin had already been raised at this time, and so the researchers felt that it was reasonable to evaluate an alternative. Ellen proposed Circuits, a payment technology that is well known in the ecosystem of complementary currencies. Howard had worked for Circuits and so had contacts within the organization, allowing him to function as one of Circuits' spokespeople.

1. A second payment technology: Circuits

Circuits is a payment technology that was developed and is maintained by a not-for-profit organization of the same name that is based in Europe. Circuits is a pre-packaged product that automatizes the registration of transactions, and offers a user-friendly web and mobile interface that allows people to check

their balance and access products online. It also facilitates system monitoring through pre-designed payment, expenditure, and income reports. The transaction ledger is privately owned by those administrating the service, and members of the community who act as administrators can set functional parameters to suit local needs and access systems reports.

Circuits is a payment technology "created for banks, barters, remittances, and innovative currency systems and used by more than 1500 payment systems worldwide".[12] While Circuits can be used by private organizations (e.g. banks) for a fee, there is also a service for social organizations and projects such as the GFI project. In these cases, the license is free for up to 300 users or less than 100,000 euros in trade.[13]

The introduction of Circuits challenged Inclusion Coin's association with the GFI project. Circuits provided the researchers with a payment technology with the knowledge, legitimacy, and functional infrastructure to contest Inclusion Coin. However, in addition to its functionality, Circuits enabled the researchers to attempt to translate their ideas throughout the implementation process. Circuits allowed the researchers to introduce the concept of a mutual credit system to the discussion.

2. The mutual credit system

Traditionally, mutual credit systems are based on interpersonal, communal relations. The issuance of credit tokens is based on the community's potential to produce goods and services, and people's promises of future contributions. Mutual credit systems are anchored in solid local identity, a degree of responsibility for one another, and a moral obligation between the parties (Amato & Fantacci, 2020).

The best way to understand the idea of a mutual credit system is through an example. Suppose a community of 100 merchants regularly trades in goods (e.g., tomatoes, clothes, beans) and services (e.g., cleaning, transportation) with one another. Each trader can sell and buy within the network and, as they have known one another for a while, they have decided to create a mutual credit system. On the first day of the market, they each have 0 in their account. But if nobody has a positive balance, how can they start to buy?

[12] Circuits website, accessed April 2021.

[13] Circuits website, accessed December 2022.

In mutual credit systems, it is through the act of spending that credit is issued (i.e. credit tokens). The ability to issue credit is based on overdraft facilities given to the members. These facilities are made possible by the system's constitution, and do not involve indebtedness between one member and another; the user is in debt or in credit, not with or to an individual but the collective.

In mutual credit systems, overdrafts and surplus limits are in place to prevent users accumulating excess credit or debt. Depending on the monetary design, these overdraft and surplus limits can be defined collectively, or by the organization that manages the mutual credit system. For example, in the Sardex (an Italian mutual credit system with more than 10,000 accounts), limits are estimated every time a business wants to join the network, and can be defined based on a percentage of the applicant's turnover (Sartori & Dini, 2016). The WIR mutual credit system, which was started in 1934, is one of the oldest documented cases of an organization providing a mutual credit system (Stodder, 2009). Greco (2009) writes that the WIR Bank uses a form of collateral (e.g., real estate) to estimate the overdraft facility of a member. In smaller communities, this overdraft limit can be estimated based on the daily cost of feeding a family, or the average transactions members make with one another.

This overdraft facility allows the user to issue credit tokens, and pay at the moment for the goods they buy, **making every user a monetary issue**r. Let us say that the overdraft limit is 500 credit tokens (CT), and imagine that a trader, Laura, is buying from another trader in the community, Peter (Table 4). Peter sells one bag of tomatoes at 10 CT. At the start of the transaction, both have 0 CT in their accounts, but Laura decides to use her overdraft facility to buy from Peter. After the transaction, Laura will have -10 CT registered in her account, and Peter +10 CT.

Peter should be satisfied, since he sold his product and now has a balance of 10 CT to spend within the network. Laura must clear her debt of 10 CT. However – and this is the key – her debt is not to Peter: she can clear it by selling it to any member of the community. In other words, it is the collective who becomes a common creditor to all. The exchanges amongst people create a system in which debts and credits are cleared.

Let us consider a second transaction. Marie, another community member, is interested in the clothes that Laura sells. In a second transaction, she buys a shirt from Laura that costs 50 CT, leaving Marie with a balance of -50 CT and Laura with a balance of +40 CT (note that Peter's balance remains +10 CT as

no transaction involving him occurred). In our third and final transaction, Peter decides to use his current balance and overdraft limit to buy a table from Marie, which costs 100 CT. This final trade leaves Peter with -90 CT and Marie with +50 CT; as Laura was not involved in the transaction, her balance remains at +40 CT.

Table 4. Transaction ledger.

Transaction in System		Member account balance			System balance
Transaction #	*Description*	*Laura (L)*	*Marie (M)*	*Peter (P)*	*Sum (L,M,P)*
0	No transaction	0	0	0	**0**
1	Laura buys (10) from Peter	(0-10) = -10	0	(0 + 10) = +10	**0**
2	Maries buys (50) from Laura	(-10 + 50)= +40	(0 - 50) = -50	+10	**0**
3	Peter buys (100) from Marie	+40	(-50 +100) = +50	(+10 - 100) = -90	**0**

Both debtors and creditors are fundamental to the proper functioning of the system. Every act of selling contributes to the community, and every act of buying is a commitment to a future contribution, and acceptance of other members' credit tokens. The use of an overdraft does not incur an interest rate or penalty; rather, it is an individual's promise of a future contribution, and a social obligation to the collective. Through constant spending and buying within the community, credit tokens are issued and debts are cleared. It is vital to highlight that, without people in debt, there is no circulation of credit tokens.

There are three main points that I want to emphasize regarding mutual credit systems. First, all members are money issuers, and members are in debt to the collective and not to an individual. Moreover, there is no need for a reserve in order to issue currency.[14] Not being connected to a reserve means that the money supply can adapt to the community's needs, and that no conventional currency is needed in order to issue credit. Credit tokens are issued when people spend within the economy, and are withdrawn when debts are cleared. In other words, the collective and its monetary institutions are strengthened.

Second, in mutual credit systems, it is common for community members to decide on the rules in order to ensure the soundness of the system. These rules

[14] This is why complementary currencies that use this type of issuance mechanism usually avoid any sort of convertibility to conventional currency (Greco, 2009).

might related to the requirements to become a member, and users' overdraft/surplus limits based on their contexts and needs.

Third, governance is critical, since mutual credit systems depend on trust and community relations. In some cases, there also exists a group of people, usually called brokers (Bazzani, 2020), who are responsible for the system's administration; this includes processing membership applications, registering members, and monitoring members with regard to their abiding by the rules (Greco, 2009; Bazzani, 2020). Hence, mutual credit systems depend on the management of communities and enforcement of rules.

The concept of a mutual credit system was in alignment with the Research Team's political-economic ideas. It seems that a mutual credit system would empower the local monetary communities, as the collective would become a "creditor common to all". Moreover, the community could participate in the monetary design, and its soundness would depend on local governance and communal control. In sum, Circuits permitted the translation of the Research Team's ideas into the implementation of the complementary currency.

3. Circuits as a competitor to Inclusion Coin

Through Circuits, different types of relations were established with users, administrators, and brokers. It permits the registration of debts, issues credit tokens, and automates the mathematical operations needed to clear credits and debts. Moreover, Circuits provides an interface that facilitates administration of individuals' accounts, since it enables users to check their balances, overdrafts, and surpluses. In this sense, individual users can see the total amount of their contributions and debts to the collective.

Circuits also allows administrators and brokers to control and govern a complementary currency. By using Circuits, administrators can parametrize each account with overdraft and surplus limits, and ensure that users cannot exceed these. Moreover, by using the reports generated by the Circuits software, the community's brokers can ensure the system's soundness by monitoring the network and all transactions.

It should be noted that establishing a relationship with Circuits allowed the Research Team to have a more prevalent role in the implementation process. For the community to be in complete control of the payment technology and make any software development that they wanted to, the Kenyan merchants needed computing expertise that they did not have at that time. Hence, any additional development in Circuits had to be made by external consultant paid

with the project's funding, hence depended on Research Team consensus. However, this also meant that if the number of users exceeded the number of free licenses given in Circuit's social version, someone would need to pay for the service. If this happened during the implementation process, the costs would need to be covered by the GFI project.

Taken as a whole, Circuits was a suitable competitor to Inclusion Coin: it permitted the implementation of a mutual credit system and the Research Team's political-economic ideas in the monetary arrangement, and enabled the Research Team to have more agency over decisions during the implementation of the complementary currency's payment technology.

D. Deciding on a payment technology

Since the two payment technologies each had supporters, the decision was placed in the hands of the Kenyan merchants. The Research Team facilitated the production of a comparative table by representatives of Circuits and Inclusion Coin to support the community's decision-making process. This table included the description of comparative variables as: decisions of creation and withdrawal of monetary units/tokens, investment required from the community, chama's decision, costs for running the system, among others. In representation of the payment technologies, spokespeople attempted to persuade the Kenyan merchants to adopt their technology and strengthen the payment technology's relation with the GFI project.

A decision concerning which payment technology to use had to be made. This decision was not just operational, however: each payment technology enabled different relations to be made within the monetary arrangement. Inclusion Coin and Circuits translated different political-economic ideas, and so the controversy related to the inclusion/exclusion of these within the monetary arrangement. As will be shown, the translation was evident in how money was to be approached, and the activities that each payment technology facilitated within the monetary arrangement.

1. Approaches to money: Money as a commodity vs. money as credit-debt

The two payment technologies represented two different approaches to money:[15] Inclusion Coin followed a commodity approach to money, where its value was in the commodity it represented and its legitimacy in the reserves. Circuits, on the other hand, had a credit-debt approach; the value hinged in the community and the creditworthiness of the people participating in the complementary currency.

a) The complementary currency as a commodity

In a commodity approach to money, a currency is the representation of a commodity, which is the source of value and legitimacy. Inclusion Coin was to be understood as representing a development aid, in a similar ways as M-pesa's represents KES.[16] An Inclusion Coin spokesperson explained how Inclusion Coin could function as any other mobile money:

> *I think if we just treat it like another money, just like you would M-pesa, it does not have to be that confusing. You know, you do not have a separate account for cash and M-pesa in your table bank [chama], right? So, if we can get it to that point where you just see it as another kind of money, with this kind of money, you can get M-pesa out from the table bank [chama] at the end of the month. […] It is a different kind of money, but it does not have to be treated totally separately from cash or M-pesa.*[17]

Inclusion Coin was thus intended to be interchangeable with mobile money, and understood as from a commodity approach. The idea that users should treat Inclusion Coin "like another money, just like you would M-pesa" was based on the fact that they shared a similar, reserve-backed design. Both could be converted to KES; however, in the case of Inclusion Coin the reserve was donor aid, and there was no additional cost for the users to convert it. Inclusion Coin could be seen as other currencies, comparable to mobile money or cash.

Inclusion Coin represented the reserves, in KES, given as development aid. An Inclusion Coin spokesperson explained the importance of reserves as follows:

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[15] See Chapter 2 – Approaching money as a commodity or as a credit-debt relation.

[16] See Chapter 1 – The financial-inclusion agenda.

[17] Inclusion Coin spokesperson during a decision meeting, March 27, 2020.

> *You know, even when you do create your tokens in the next few months, there is still going to be some sort of standards that we have to uphold. And if you don't like those standards, like having some sort of KES backing it, it's kind of up to you. We can create a system that has no backing behind it and with a similar kind of system, but it's just not going to be tradable with any other system. […] So, from my point of view, all we're doing right here is establishing a credit system. We're backing it with something that we can measure. Right now, we can measure how much KES is behind it.*[18]

This excerpt shows the importance of defining a reserve for the legitimacy of the system and liquidity of the complementary currency. The spokesperson explained that a currency's legitimacy is based on certain standards: in the case of Inclusion Coin, reserves that people could "measure" in terms of "how much KES is behind it". Moreover, it was this reserve what would make the digital currencies liquid, as it would make them acceptable, convertible, and more easily tradable with other currencies.

The Inclusion Coin spokesperson also promoted its use as a store of value. The following excerpt explains how Inclusion Coin could be used for saving:

> *Let us say she buys 5000 shillings worth of sugar, and sells that for 7000 Inclusion Coins. So now she needs that 5000 KES if she wants to go buy sugar again. So, what she does is she puts those 7000 Inclusion Coins into her chama. She could get a loan of Kenyan shillings and Inclusion Coins to go buy more sugar. Then, she would just have to pay back that loan in Inclusion Coins or KES. Just treat it as if it were M-Pesa, as if you've got a loan in paper notes and you're paying it back in M-Pesa. The chama at the end of the month is going to cash that back out, or at least half of it, to be able to fill back up their account.*[19]

Chamas are communal financial practices that are used in Kenya.[20] In chamas, people save together and can take out loans in order to invest individually or as a group. With Inclusion Coin, an individual could put "those 7000 Inclusion Coins into her chama, and she could get a loan of Kenyan shillings". Since it was possible to convert Inclusion Coins into KES, people could save Inclusion

[18] Inclusion Coin spokesperson during a session about Inclusion Coin, April 2020.

[19] Inclusion Coin spokesperson during a decision meeting, April 4, 2020.

[20] For more information about chamas, see Chapter 4 – Kenyan's financial practices and technologies.

Coins in their chamas and take out loans in KES to invest in their productive capacity; the chamas could store Inclusion Coins and, if necessary, convert them into KES. However, this design forced contradictory functions on Inclusion Coin: saving in Inclusion Coin hinders its function as a medium of exchange, and thus its circulation. However, this was not problematic for Inclusion Economics, as saving in Inclusion Coin to later cash out was a way of making donor aid last longer.

In sum, a commodity approach to money was translated into how Inclusion Coin was designed and functioned. Its intrinsic value and legitimacy was based on a reserve; the reserve made it a liquid medium of exchange that was convertible into other currencies, and permitted its use as a store of value. However, for Inclusion Coin to function as a store of value and a liquid currency it required KES, and thus depended on external aid.

b) The complementary currency as credit-debt

Mutual credit systems, such as the one represented by Circuits, are inspired by a credit-debt approach to money. Here, it is the community itself and its creditworthiness that gives value to the token. The value in a currency of this type is extrinsic and lays in the community the currency gives access to:

> *Mutual credit lines represent the capacity to take goods and services from the community.*[21]

In a credit-debt approach to money, value lays in the community that accepts it. In this sense, mutual credits do not represent a commodity, but "the capacity to take goods and services from the community": this stresses the productive capacity of community members, not the commodity that the money is supposed to represent. In other words, it is the access to a community offering goods and services that makes money valuable.

When money is approached as credit-debt relationship, its legitimacy is based on the relations between members of the community. The following quote indicates that legitimacy is based on the creditworthiness of members:

> *Members with negative balances (debt) are expected to give back to the community with goods and services of the same value. Members with positive balances (credit) have the right to take goods and*

[21] Circuits vs. Inclusion Coin comparison table, March 30, 2020.

> *services from the community, in particular from those with negative balances.*[22]

Mutual credit systems are based on the creditworthiness of their members. People "are expected to give back" what they have taken, and every act of using the overdraft facility is an acquired obligation towards the community, where those who contribute have "the right to take […] from the community". For a mutual credit system to function, those with positive balances must know that those using overdrafts will contribute in the future. This indicates the importance of long-term community relations, which require knowledge of the community you are trading with. The legitimacy of such a complementary currency is based on community relations and knowledge about its members.

Finally, credit-debt relations make money independent of reserves. As the following excerpt shows, the credit-debt approach made the issuance of complementary currency independent of conventional money:

> *No possibility to exchange tokens for KES or to exchange KES for tokens. The tokens have no guaranteed collateral, only community promises […] No funds needed to create the tokens (neither external donations nor community savings).*[23]

The above excerpt highlights that in this type of complementary currency there is no need for conventional money for the system to function. Not having "guaranteed collateral" indicates no need for external commodities (e.g., conventional money given by a donor) in order to issue complementary currency. What is behind a complementary currency is "only community promises". In other words, the value is in the community, not something external to them.

In sum, Circuits permitted the translation of a credit-debt approach to money. Its value was based on the ability of members to access good and services, and its legitimacy on their creditworthiness. Most importantly, in the case of the Kenyan merchants, its creation was dependent on their productive capacity, rather than in conventional money issued externally.

[22] Circuits vs. Inclusion Coin comparison table, March 30, 2020.

[23] Circuits vs. Inclusion Coin comparison table, March 30, 2020.

c) *The risks of different monetary approaches in the context of poverty*

The complementary currency was intended to be a useful currency for people living in poverty. Additionally, it is worth mentioning again that all of this was happening during the COVID-19 pandemic. All of the participants in the GFI project understood the moral implications of experimenting with complementary currencies under such circumstances. The following excerpt is taken from a discussion[24] between the spokespeople for Inclusion Coin and Circuits, during which each presented their concerns:

> ***Circuits Spokesperson 2****: In the Inclusion Coin model, the users need to invest their savings. They must put at risk their savings as reserves.*
> ***Inclusion Coin Spokesperson****: No, we are not doing that. We have external donors filling up that reserve.*
> ***Circuits Spokesperson 2:*** *Yeah, exactly. You are air-dropping external donor money. But the community members are expected, eventually, to invest their own savings as a reserve.*
> ***Inclusion Coin Spokesperson:*** *Yes, and they can cash that out as well, plus the donor money.*
> ***Circuits Spokesperson 2:*** *But that is a risk. They can lose it. They can lose 100% of their savings.*
> ***Inclusion Coin Spokesperson****: No, no, no. The worst-case scenario is that they get all their money back. That is the worst case.*
> ***Circuits Spokesperson 2:*** *They are putting their money at risk.*
> ***Inclusion Coin Spokesperson****: In Circuits, they're putting their goods and services at risk.*
> ***Circuits Spokesperson 2:*** *They are exchanging their spare capacity.*
> ***Inclusion Coin Spokesperson:*** *A tomato is spare capacity to who? I think she needs it. They are putting their goods and services at risk. If someone ends up with a bunch of your Circuits tokens and no one wants them back, what happens then?*
> ***Circuits Spokesperson 1:*** *The same can happen with Inclusion Coin.*
> ***Inclusion Coin Spokesperson 1****: No, you can cash it out.*
> ***Circuits Spokesperson 1:*** *People only want Inclusion Coin to change it for Kenyan shillings. Not for Inclusion Coin itself.*
> ***Inclusion Coin Spokesperson:*** *That is the worst-case scenario, and I think it is a good scenario. If you think that the risk for them is less because there is no money nor collateral involved, I think you are*

[24] Conversation during a decision meeting, March 27, 2020.

> *wrong. I think it is the exact opposite. I think adding collateral to these systems is what de-risks them.*

This conversation indicates the concerns the actors had regarding the different approaches to money. The Circuits spokespeople based their arguments on the idea of approaching money as credit-debt. Here, confidence in using Circuits depended on community knowledge and capacity to offer goods and services. Circuits allowed people to create currency by utilizing their overdraft facilities, which meant that those who bought would have to promise to sell something back, and accept other members' payments.

However, the question was: 'what happens if no one wants it back?' This pointed to a central risk of mutual credit systems: if those with Circuits tokens could or would not spend these in the future, they would have lost what they had contributed. Moreover, the question "a tomato is spare capacity to who?" points to the assumption that exchanging scarce goods for a promise of a future contribution can entail a risk for people who live hand-to-mouth. The Inclusion Coin spokespeople argued that having people lose their goods due to unfulfilled promises was risky, and that "collateral to these systems is what de-risks them". Under the policies defined by Inclusion Economics, people could cash out their Inclusion Coins for KES.

The dependence on conventional money with regard to issuing complementary currency was challenged by the Circuits spokespeople, who disagreed with the Inclusion Coin model on the basis that the Kenyan merchants would only be able to independently create their currency by "buying" Inclusion Coins using KES. This would likely have involved taking KES from their savings to "invest" this in Inclusion Coin. Considering the potential market of currencies[25] made things even more risky, since Inclusion Coin would have enabled people to speculate with their savings. In the context of poverty, every KES counts, and tempting people in impoverished communities to put their limited savings into a digital currency was unacceptable for the Circuits spokespeople.

Another important aspect was the idea of convertibility. For the Circuits spokespeople, this was problematic because it would incentivize hoarding and hinder circulation of the complementary currency in the community. The

[25] At the time of the decision meetings, it was reasonable for the Circuits spokespeople to believe that Inclusion Coin users might put their saving at risks when buying Inclusion Coin in the future. However, it should be noted that at that time only Inclusion Economics was creating Inclusion Coin, using funds given by external donors.

ability to convert Inclusion Coin into KES would facilitate leakage of the complementary currency, and hinder its circulation within the community. Thus, this was not felt to be problematic by Inclusion Economics .[26] The idea was to distribute external aid, let it circulate locally as much as possible, and allow people to spend it on what they chose to.

d) *Approaches to money translated into a complementary currency*

All in all, for each model to succeed, its proponents needed to implement their approaches to money (Table 5). Inclusion Coin translated a commodity approach to money, which necessitated Inclusion Economics backing it with a reserve. Circuits, on the other hand, translated a credit-debt approach to money. For this, the community members needed to trust each other and show their creditworthiness. The two approaches clashed and, as has been happening for many years, this discussion could have continued without end.

Table 5. Approaches to money.

	Description	Inclusion Coin	Circuits
Value	What does the complementary currency represent?	A commodity with value in itself (i.e. reserves in KES).	The capacity to access goods and services in the Kenyan community.
Legitimacy	What gives people confidence to use the complementary currency?	A measurable reserve of KES, safeguarded by Inclusion Economics.	Creditworthiness depends on the Kenyan community and their knowledge.
Issuance	What enables the issuance of complementary currency?	Dependent on KES, in the form of development aid or users' savings.	Community promises of future contribution and payment acceptance.

[26] As a cash-transfer program, a lack of user participation in the monetary design was not problematic since the program's goal was to distribute aid to poor populations in an elegant way. It is important to highlight that Inclusion Economics was achieving this goal and, in 2020 (during the COVID-19 pandemic), the organization distributed 100,000 US dollars directly to people in need. Moreover, they reported a transaction volume of almost 300M Inclusion Coins during 2020/21, equivalent to 2.8M US dollars).

2. Approach to user participation: beneficiaries vs. stewards

Each of the two payment technologies was formulated so as to facilitate the participation of the Kenyan merchants in different ways; for the merchants, this was a pressing issue. With Inclusion Coin, the Kenyan merchants would be beneficiaries of external aid and users of a payment technology; with Circuits, each member could be a money issuer, and the community would act as a steward of the monetary system. A critical concern in the decision-making process was thus the positioning of actors within the monetary arrangement.

a) The top-down approach: money users and beneficiaries

Having worked with complementary currencies in Kenya for over ten years, Inclusion Economics was in the process of stabilizing a monetary arrangement that materialized its political-economic ideas. This monetary arrangement gave communities the opportunity to use a digital currency without any cost, and aid organizations the ability to distribute aid [provided by donors] transparently and efficiently.

Inclusion Economics defined the rules and standard of issuance of Inclusion Coin:

> ***Kenyan Merchant:*** *In terms of the regulations, for example, the number of tokens. I think Inclusion Economics is the only one dictating the amount to create. Is it possible for us to decide that we do not want to start with 400, but with 1000 Inclusion Coins? Because currently Inclusion Economics has set up a token where they [users] start with 400.*
> ***Inclusion Coin Spokesperson****: Yeah, but I mean, that would be your own money, so right now, you can take 10,000 shillings and turn it into 20,000 Inclusion Coins, and you could distribute that to your members. […] It is just that new members right now just get 400; if you want more, you must follow the rules on how much is being created and issue it based on some collateral, the KES behind it. That is what we must maintain right now.*[27]

This quote relates to the importance of decisions regarding monetary policies. The question about the possibility for the group "to decide that we do not want to start with the 400" relates to agency over decisions regarding issuance: the Kenyan merchant describes wanting to be a money issuer, and having agency to manage their monetary arrangement. However, Inclusion Coin clarified that

[27] Conversation during a session about Inclusion Coin, March 27, 2020.

"if you want more, you must follow the rules on how much is being created", which meant accepting KES as a reserve and money multiplier,[28] as defined in the Inclusion Coin smart contract. In this sense, using Inclusion Coin meant that if the Kenyan merchants wanted to issue money, they would need to follow the rules defined by Inclusion Economics.

There is a difference between being a money issuer and a money user.[29] Money issuers can define what is valuable and what is not; for example, reserves in maize, recycled plastic, or conventional money. Moreover, money issuers are in a privileged position in that they can mobilize resources and promote behaviors aligned with their interests. This mobilization of resources can respond to the laudable interests of external donors or the needs defined by the community of users. While in theory communities could issue their currency if they seed it with reserves[30] (i.e., KES → Inclusion Coin), at that time only Inclusion Economics had issuance control.

Inclusion Coin had two functions: a complementary currency, and a means to distribute development aid. The fact that Inclusion Economics was responsible for the careful management and transparent distribution of development aid meant that the involvement of the local community in decisions regarding Inclusion Coin was limited. The following excerpt exemplifies this:

> *We are sort of like a department of [HAO] at this point. We are just trying to facilitate and help. The platform is a public blockchain that we do not own. We are trying to make that accessible to the community via these measures. And then we are distributing tokens that are backed by Kenyan shillings to people.*[31]

Inclusion Coin was thus intended to function as infrastructure for aid distribution, connecting donor aid to those in need. Because of the cash-transfer program was funded by external donors, Inclusion Economics could issue and distribute Inclusion Coins. The cash-transfer program also meant that Inclusion Economics needed to ensure that Inclusion Coin was helpful for both the external donors and the beneficiaries. To ensure that the aid last longer and users could exchange with other communities, Inclusion Economics defined specific "measures", or issuance and conversion parameters, that users of

[28] See Chapter 2 –Money design: issuance, circulation, and withdrawal

[29] See Chapter 2 – The process of constituting a socio-technical arrangement of money.

[30] See Chapter 5.

[31] Inclusion Coin spokesperson during a session about Inclusion Coin, March 27, 2020.

Inclusion Coin had to follow. Consequently, monetary policies were not the responsibility of the Kenyan merchants.

Inclusion Economics had control over and responsibility for the monetary arrangement. While in principle Inclusion Economics did not control the functioning of the blockchain, it was able to define money-creation rules and manage the distribution of development aid to communities in need. In this sense, the external donors and Kenyan merchants were users of Inclusion Coin. In sum, Inclusion Economics was the central authority and money issuer, and the Kenyan merchants were beneficiaries of an aid infrastructure and a market of currencies.

b) *The bottom-up approach: money issuers and stewards of monetary systems*

Circuits translated a mutual credit system into a complementary currency. Here, the ability to issue credit tokens is based on overdraft facilities given to the members. Hence, the Kenyan merchants would act as money issuers.

Moreover, with Circuits the Kenyan merchants could parametrize the payment technology. The Circuits spokespeople described the role of the Kenyan merchants in adapting the mutual credit system as follows:

> *I think it is the configuration of the economic model what is the most important. So, whatever rules they [the Kenyan merchants] want to establish in terms of currency issuance, currency circulation, how to withdraw the currency, how to open the credit lines, I think that this is the freedom that they value, in my opinion, and I think it is easy for them in a mutual credit system with Circuits to open their own credit lines.*[32]

> *The community will receive training and advice, but will be sovereign in the self-management of its own mutual credit system.*[33]

> *A community-run committee creates the tokens, by opening mutual credit lines to selected members.*[34]

[32] Circuits spokesperson during a decision meeting, April 4, 2020.

[33] Circuits vs. Inclusion Coin comparison table, March 30, 2020.

[34] Circuits vs. Inclusion Coin comparison table, March 30, 2020.

The above excerpts show that Circuits allowed the Kenyan merchants to make decisions regarding monetary policies. The spokesperson promised that the merchants could decide on "whatever rules they want to establish" under a mutual credit system. This enabled the community to create currency "by opening mutual credit lines to selected members". Circuits promised the Kenyan merchants that they would be "sovereign in the self-management" of their monetary system.

The management of the monetary system was also discussed. With Circuits, the community needed to ensure that people fulfilled their promises of future contribution in order to ensure the system's soundness:

> *Deciding on the credit lines that are open to members entails a responsibility to follow these members and to make sure that this debt is repaid, or to deal with the cost issues.*[35]

> *In case of defaults, the losses should be shared/mutualized among the community. The community-run committee decides how to deal with them.*[36]

As the above excerpts show, assuring that Circuits was adapted to local needs and that members fulfilled their obligations was based on relationship management. Circuits embedded reciprocity and the principle of community trust. Being a sovereign mutual credit system is about the capacity to not only issue currency, but "to follow these members and to make sure that this debt is repaid" – in other words, it is about community monitoring and control. The soundness of a mutual credit system depends on trust that what someone contributes today can be recovered through another member's future contribution. If trust in others is hindered, the system loses its legitimacy and fails. Hence, the community needs to find common agreement on how to deal with defaults. The community is thus responsible for the control mechanisms that ensure the members will fulfill their obligations and the legitimacy of the system maintained.

It is worth noting that the use of Circuits meant that the Research Team had greater influence over the implementation of the complementary currency as compared to the use of Inclusion Coin. For example, Circuits could translate the credit-debt approach endorsed by the Research Team. Another consequence of the introduction of Circuits was that the GFI project would

[35] Circuits spokesperson during a decision meeting, April 4, 2020.

[36] Circuits vs. Inclusion Coin comparison table, March 30, 2020.

need to finance operation and adaptation of the payment technology. The project could use Circuits with the free license, but further adaptations had to be paid for. These included the internet bundles needed to operate the Circuits app, which the project had not budgeted for. Hence, the GFI project would need to pay for an additional text-messaging service (i.e., USSD) in order to improve user accessibility. In this sense, any development of the payment technology would need to be discussed with whoever was in charge of the financial resources.

With Circuits, the Kenyan merchants and Research Team would influence the monetary arrangement. By deciding on Circuits, the Kenyan merchants would, by default, accept the mutual credit system endorsed by the Research Team. This meant that they could participate in the definition of monetary policies (i.e., overdraft/surplus limits), and would be responsible for managing the system. In short, the GFI project would facilitate the payment technology, and the Kenyan merchants could steer their complementary-currency system themselves.

c) *Participation of a community of users*

In sum, the relationship between a payment technology and actors can be mediated in different ways (Table 6). In the case of Inclusion Coin, the monetary policy, system management, and payment-technology maintenance would be overseen by Inclusion Economics, as (in particular) would its connection with development aid. Therefore, the Kenyan merchants would be the *beneficiaries* of the aid infrastructure. Circuits followed the mutual credit system endorsed by the Research Team; here, the Kenyan merchants would be able to parametrize the overdraft/surplus limits. Moreover, the Kenyan merchants would be in charge of managing the system through control mechanisms. In other words, the Kenyan merchants would be *stewards* of their monetary system.

Table 6. Approaches to participation.

	Description	Inclusion Coin	Circuits
Monetary policy	Who decides on the monetary system and its rules?	Inclusion Economics defines the conversion policies	Following the mutual credit system endorsed by the research team, the Kenyan merchants would be issuers and adapt the overdraft and surplus limits

	Description	Inclusion Coin	Circuits
Management of the system	Who ensures the soundness of the monetary system?	Inclusion Economics: in charge of registration, maintenance, and support	Kenyan merchants: in charge of monitoring and enforcing agreements
Maintenance of payment technology	Who is in charge of maintaining the payment technology?	Inclusion Economics and external donors, such as the GFI project	Adaptations need to be agreed, and financed by GFI project

E. Exclusion and inclusion of actors within a monetary arrangement

It was an intense debate. On one side was Inclusion Economics, which saw money as a commodity for people to benefit from; on the other side was the Research Team, which wanted the Kenyan to become stewards of their own monetary system. The following excerpt illustrates the depth of the controversy:

> ***Circuits Spokesperson:*** *This discussion has no solution because, in the end, it is a discussion about conventions, almost ideology, actually.*
> ***Inclusion Coin Spokesperson:*** *You are pushing your ideology on them and risking the financial security of people in doing so. And I agree. Inclusion Coin is like using M-pesa. It is a tool.*
> ***Circuits Spokesperson:*** *It is an ideology. What I mean is that we are never going to end with a single opinion in this discussion. We have our backgrounds; we have our ways of thinking. And that is that. So, in a way this discussion can continue for hours and hours.*[37]

The controversy related to the ideas that could be translated through the complementary currency: in their words, "conventions, almost ideology". The payment technologies were to translate political-economic ideas, and this led to discussion regarding the associations that would be possible within the monetary arrangement. As a result of this controversy, one of the payment

[37] Discussion during decision meeting, April 2020.

technologies, and the ideas that it represented, would be included/excluded from the monetary arrangement.

Each payment technology was associated with the participants in different ways. The Inclusion Coin monetary arrangement was intended to enable aid distribution through a digital complementary currency (Figure 3). Here, Inclusion Economics was the money issuer, and an obligatory point of passage for the functionality of the complementary currency and policies regarding the distribution of aid. In this system, the Kenyan community would be the money users and beneficiaries of aid.

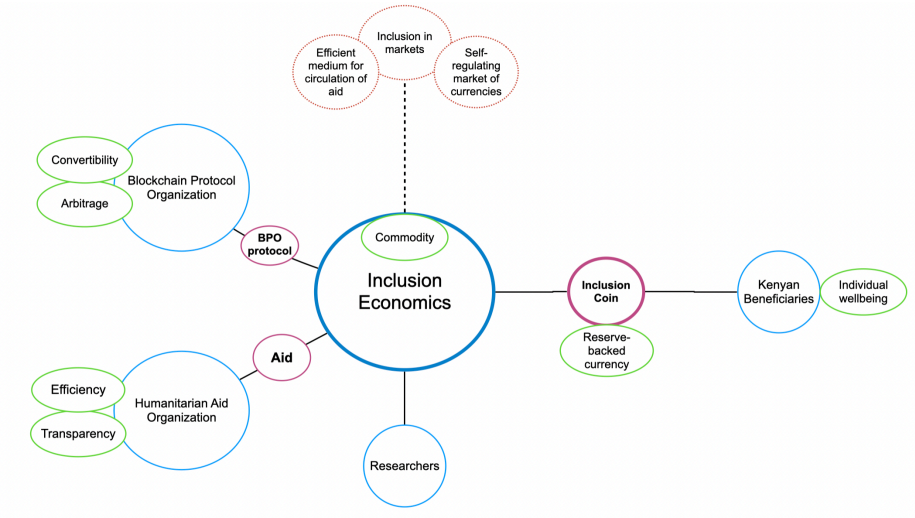

Figure 3. The Inclusion Economics monetary arrangement.

The monetary arrangement of Circuits differed significantly (Figure 4): the Kenyan merchants would be the money issuers, responsible for monetary decisions and the system's management. In other words, the community would be the stewards of their own monetary system, and each Kenyan merchant would be a money issuer. Moreover, the fact that Circuits was a contracted supplier meant that the Research Team was responsible for assuring the adaptation of Circuits to the needs of the Kenyan merchants who at the same time, had a greater agency over the overall implementation of the complementary currency.

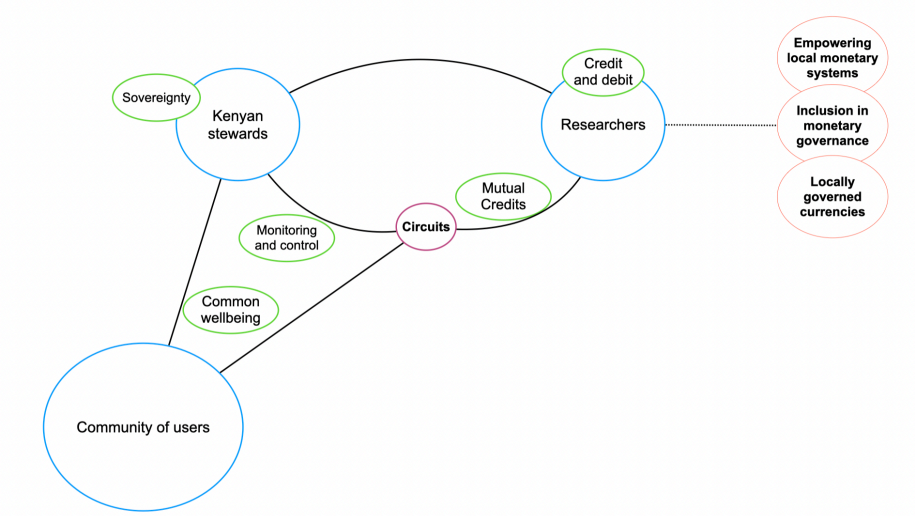

Figure 4. The Circuits monetary arrangement.

In April 2020, the Kenyan merchants called for a meeting to announce their decision to use Circuits as the payment technology. This stabilized the relations between the GFI project and Circuits, but was a breaking point for those between the Research Team and Inclusion Economics. Collaboration between the two ceased in the following year, and the relationship slowly faded. One year after the community's decision, Inclusion Economics formally left the project as a consequence of disputes between the two groups.

The controversy presented throughout this chapter shows a debate regarding the non-neutrality of payment technologies and it displays how ideas are transformed into monetary designs. In the case of the GFI project, whoever was in control of the payment technology could include or exclude actors and their political-economic ideas.

7. Implementing monetary arrangements – multiple sides of a coin

This final empirical chapter examines multiple sides of a monetary arrangement by showing how the it shapes and it is shaped through the activities carried out in the implementation process. In particular, this chapter shows different activities that permitted the spreading of political-economic ideas; the strengthening of the Kenyan community; and redistribution of resources to meet the needs of the community. Finally, my findings show how the interactions between payment technologies and users can enable unintended behaviors. In sum, a complementary currency can be designed, but through its implementation the arrangement can display multiple sides.

A. The ability of money to spread political-economic ideas

Which ideas are used to guide socio-technical arrangements of money is important (Barinaga & Zapata-Campos, 2023; Blanc & Fare, 2022). The decision to use Circuits as the payment technology meant that the complementary currency could implement the Research Team's political-economic ideas in the arrangement. However, for the translation to be completed these ideas needed to be adopted by the Kenyan merchants.

Immediately after the decision meeting, the Research Team arranged training sessions to explain the mutual credit system to the Kenyan merchants. Howard,

who had formally established a relationship with the GFI project as a Circuits consultant, held these training sessions. The training workshops comprised six online sessions that were held in April and May 2020. After each training session, the Kenyan merchants were given specific tasks in order to adapt the complementary currency to their needs and abilities.

During these training sessions, Howard introduced the principles of a mutual credit system to the Kenyan merchants. He explained how, in a mutual credit system, the "members trade without money, using only a bookkeeping system".[1] He also outlined some general principles, such as recognizing that "the value of any currency is only what it can buy",[2] that people with negative balances are "debtors to the community",[3] and that those with positive balances are "creditors of the community".[4] In this way, he introduced the idea of money as a representation of credit and debt relations in a community.

Moreover, Howard suggested the use of strategies that are essential to governance and community well-being in the context of a complementary currency. One of these was the development of a Community Fund; this will be presented in more detail later in the chapter, and was described by Howard as representing "the collective action of the community", being "important to uphold the trust in the community,"[5] and a strategy "to meet pressing needs and invest in community works".[6] In short, Howard advised on different ways to achieve local community governance.

Another critical part of the workshop was introducing the merchants to the various tasks needed to ensure the management of the mutual credit system. For example, monitoring the accounts "and looking for balances to correct the very positive and negative balances",[7] registering people as what "really matters is the size of the network of merchants"[8] in order to increase the system's offer, and brokering tasks to "match supply and demand to prevent

[1] Quote from document: Workshop 1 – Introduction and Governance (W1).

[2] Quote from W1.

[3] Quote from W1.

[4] Quote from W1.

[5] Quote from document: Workshop 2 – Governance and Business plan (W2).

[6] Quote from W2.

[7] Quote from document: Workshop 3 – Business plan and operations (W3).

[8] Quote from W3.

bottlenecks and keep the currency circulating".[9] In essence, the workshops presented mechanisms relating to the control and management of the complementary currency.

In sum, the training sessions promoted the adoption of the political-economic ideas that Circuits facilitated. By translating the concept of money as a credit-debt relation into educational material, it was possible to suggest strategies that allowed the monetary arrangement to be governed, and activities to control and manage the complementary currency to be implemented.

B. Money enables the strengthening of a community

The Kenyan merchants' relationship with Circuits and the Research Team provided the merchants with the ability to adapt certain parameters of the complementary currency to their context. This local adaptation was manifested through various constitutional documents and communal activities. Using the complementary currency, the Kenyan merchants worked to strengthen their community by defining shared goals and rules in the use of the complementary currency, bringing together a common pool of goods and services, and carrying out communal activities.

1. The constitution of the Progress Warriors and MTCr

After the training sessions, and with the support of the Research team, the Progress Warriors started to organize the management of the monetary system. This involved defining leadership team, establishing a community-based organization, and naming the complementary currency. After local discussion processes, and guided by the training sessions, the Kenyan merchants decided to establish a CBO.

In Kenya, it is common for people to pool together resources and manage them collectively through CBOs which are registered non-governmental organizations in which people join in line with common interests, for example, waste management or economic empowerment. The Kenyan merchants that were involved in the implementation of the complementary currency were

[9] Quote from W3.

originally members of two different CBOs with their own particular goals. To redefine the goals of the relationships, they decided to create a new CBO based around the complementary currency, in this way already re-configuring the relations amongst the two different groups. The newly formed group was named "Progress Warriors", which is how I will refer to the Kenyan merchants from now on. Moreover, the Progress Warriors named the complementary currency Maendeleo Trading Credits (MTCr). In Kiswahili, Maendeleo means progress. The inclusion criteria for becoming a member of the Progress Warriors stated that individuals had to "commit to sell and/or buy goods and services from members of the organization using MTCr as a complementary medium of exchange".[10]

The main goal of the Progress Warriors was to promote socio-economic wellbeing through the use of MTCr. The organization's first goal was to use the MTCr to "promote exchange of goods and services amongst members".[11] Another goal was local development, including "reduc[ing] poverty through business initiatives"[12] and "strengthen[ing] community income generation, relationships and networks".[13] The intention was to align people around the use of a complementary currency to bring about economic wellbeing.

The Progress Warriors elected Mama Alva as the chairperson, Margarethe as the treasurer, and Steven as the secretary of the newly created CBO. It is important to note that not all members of the original CBOs became members of the Progress Warriors. As Howard explained in the training session, a general principle is that "the greater the number of businesses participating, the merrier",[14] and "the more diverse the goods and services offered, the better".[15] Thus, it was important for the Progress Warriors to increase membership, and it was the responsibility of the leaders to motivate other merchants to join.

The constitution of the Progress Warriors was the translation of the political-economic idea of having communities governing their own monetary systems. While CBOs are common in Kenya, it was the management of their own

[10] Quote from document: Progress Warriors CBO constitution: Membership.

[11] Quote from document: Progress Warriors CBO constitution: Objectives.

[12] Quote from document: Progress Warriors CBO constitution: Objectives.

[13] Quote from document: Progress Warriors CBO constitution: Objectives.

[14] Quote from W1.

[15] Quote from W2.

monetary system what motivated the constitution of a new CBO, defining the use of the MTCr as the criteria for becoming a member of the Progress Warriors, and enabling the establishment of new relationships amongst people.

2. Defining community rules and monetary policy

The constitution of the Progress Warriors included rules and membership requirements. These were consolidated in the community by-laws, which explained the rules that guided the relations between the Progress Warriors' members, how they were expected to use MTCr, and the monetary policy.

The by-laws also show how, as was promised, the Progress Warriors could set their own monetary policies, and adapt the mutual credit system parameters as they pleased. The monetary policy followed a mutual credit system. The default overdraft limit was set at 1000 MTCr,[16] and the surplus limit was to be defined on a case-by-case basis "determined by the board".[17] These limits specified members' rights when participating in the complementary currency. In practice, the members received overdraft limits of 500 MTCr, and the leaders overdraft limits of 1000 MTCr.

Rules and sanctions were also defined. The leaders of the Progress Warriors decided the members had to transact "at least 500 MTCr per week",[18] and failure to do so would "attract a penalty of 200 MTCr per week".[19] They decided that "bonuses [would be] payable to members who achieve MTCr transactions beyond a certain limit".[20] In other words, the Progress Warriors defined a set of rights and responsibilities as well as a system of sanctions and bonuses concerning the use of MTCr.

The Progress Warriors translated the political-economic ideas behind the mutual credit system into their monetary policy. In this sense, the implementation of the complementary currency permitted the Progress warriors to define their own rules, sanctions, and bonuses with regard to the overdraft/surplus limits and expected amount of trade in MTCr. These

[16] Quote from document: Progress Warriors CBO constitution: Group operations.

[17] Quote from document: Progress Warriors CBO constitution: Group operations.

[18] Quote from document: Progress Warriors CBO constitution: Group operations.

[19] Quote from document: Progress Warriors CBO constitution: Group operations.

[20] Quote from document: Progress Warriors CBO constitution: Group operations.

regulatory activities aimed at maintaining the relations between individuals and the collective, or in other words keeping the monetary sound.

3. The communal activities of the Progress Warriors

Due to the restrictions relating to the COVID-19 pandemic, the Progress Warriors had limited opportunities to trade. However, this was a community of creative and resilient people who felt that, no matter the difficulties, "life must go on".[21] In adapting to the restrictions put in place by the local government, the Progress Warriors created a 'floating' market that moved from place to place and where they could meet and trade. Interestingly, the leaders of the Progress Warriors made a rule that participation in this market day was essential to continued membership', i.e. those who didn't participate in the market day would be penalized, and stated that the market days were "on Tuesday and Thursday […] aimed at increasing trade, thus, more transactions in MTCr".[22] In this sense, communal activities emerged to increase circulation of MTCr and increase the benefit for the Progress Warriors.

During the COVID-19 pandemic, I learned about the market days through pictures shared in the internal messaging group. However, during a field visit in September 2021, I finally joined in with one of these communal practices.[23] While I was exploring the place and taking videos and pictures, the MTCr community slowly but steadily began to arrive. Some brought vegetables, others soap, and one even brought a handmade stove to cook chapati (a Kenyan delight, and my personal favorite). I brought my camera, and Ellen a box of markers and cardboard signs that she used to explain the mutual credit system (Image 4).

[21] Steven during Update regarding the impact of COVID on the Kibuye Market, June 2020.

[22] Quote from document: Progress Warriors CBO: Membership Application.

[23] In another field visit during October 2022, I had the opportunity to experience three market days that involved complementary currencies. These market days were full of color, music, and trade, and were the inspiration for Ocampo (2022).

Image 4. A MTCr Market Day, with the image blurred to protect identities, September 2021. Source: Author's archive.

First, Mama Alva, the Chairperson, introduced as to the group, followed by the usual prayer and Ellen's explanation of the mutual credit system. After this, the members began to trade, and the trading activities continued until everyone had sold all of their products. Some used their phones to make transactions, and some of the older members asked Peter, a younger and engaged Progress Warrior, to help them to complete transactions using their feature phones. Bidding and laughter were everywhere, and in parallel Margarethe, the treasurer, sat in the corner, carrying out the chama and collecting members' weekly contributions in KES.

On another visit in October 2022, it was possible for me to see the importance and impact of these market days. During group interviews with the members of the Progress Warriors, the MTCr market days were described as essential moments during the difficult days of the Pandemic. They gave members of the community the chance to meet, transact, and (probably) have a good laugh. Peter told me that many of the new customers he attracted were thanks to these market days, as they functioned as occasions for meeting other merchants. Similarly, Steven told me that, after a MTCr market day, he always brought food home, and his family was fed.

In sum, the Progress Warriors relations were strengthened through communal activities enabled by MTCr. In particular, MTCr caused the Progress Warriors

to pool their products and services, to the benefit of the organization. Moreover, due to the restrictions put in place due to COVID-19, the implementation of MTCr encouraged the creation of the market days, which were a communal activity that strengthened social and trading relations within the monetary arrangement.

4. Strengthening community relations through MTCr

Through the implementation of MTCr, the Progress Warriors were able to bring together members around the idea of creating a complementary currency and strengthening their relations. The implementation of MTCr led to the development of rules, sanctions, and membership criteria. Moreover, MTCr motivated the creation of a common pool of goods and services and market days. In sum, MTCr enabled the strengthening of the relations within the community.

C. Money as an enabler of the redistribution of resources for common wellbeing

The GFI project had a clear research agenda: investigating "the development and diffusion of financial and monetary infrastructures for urban informal settlements and indicating a novel route for social enterprise and development aid".[24] The difficulties posed by COVID-19 provided an opportunity to investigate how the implementation of a complementary currency could be connected to development aid in order to support people in a time of crisis. However, the introduction of development aid created a controversy within the GFI project, in particular between the European researchers and the Kenyan researchers.

1. Tough times in the field

During Spring 2020, COVID-19 was having a drastic effect on people. The Progress Warriors were struggling to keep their businesses afloat, and the demolition of the market had displaced merchants from their trading places. The leaders of the Progress Warriors reported that they had lost customers who

[24] GFI Project proposal, 2018:1.

knew them based on their market locations, and that they had lost money to debtors who had disappeared without paying them back. Due to the curfew, opportunities to trade were reduced, and the quality of the vegetables had decreased and the price risen due to disruptions on the distribution chain.[25] Finally, due to health regulations, the sale of second-hand goods was prohibited. KES (i.e., conventional money) was not flowing into the community and all of this put the Progress Warrior's way of subsistence at tremendous risk.

Aware of the potential benefits of using complementary currency in a context where KES was scarce, the European researchers were worried about the lack of use of MTCr. Transactions had been going on since May 2020, but only 15 people, mainly the leaders of the Progress Warriors, were registered on it. The leaders explained that registration was hard work due to the curfew and restrictions on meeting with people. However, as one of the European researchers argued: "You need more traders in MTCr so that you have more products to buy and to get more people buying from you".[26] The more people registered in the MTCr system, the more common resources the Progress Warriors could benefit from.

2. Connecting complementary currencies with development aid

The Kenyan and European researchers were critical of how development aid was connected with Inclusion Coin, in particular in relation to conversion possibility. The European researchers felt that, in contrast to this, the mutual credit system could be connected with development aid in a manner that was sympathetic to the interests of the GFI project and its political-economic ideas.

While reflecting on how to help the Progress Warriors and motivate the use of MTCr in June 2020, Ellen invited Howard to a management meeting to present ideas for connecting development aid to the MTCr arrangement. The first idea drew inspiration from a Brazilian Community Development Bank called Banco Palmas, which was set up to "integrat[e] local producers and consumers, in such a way that the greatest possible portion of local wealth circulates locally" (Jayo et al., 2009:9). In other words, the aim was to tackle the

[25] Conversation during update regarding the impact of COVID on the Kibuye Market, June 2020.

[26] Conversation during update regarding the impact of COVID on the Kibuye Market, June 2020.

leakage[27] of currency and activate the local economy. One of the ways Banco Palmas achieved this was by creating a complementary currency called Palmas. The complementary currency used a reserve backed design in which every Palma was backed by Brazilian reals (the conventional currency in Brazil) at one-to-one parity. To activate the local economy, consumers were given microcredits in Palmas. The consumer credit in Palmas had no interest rate and did not require any guarantor (Jayo et al., 2009). Since Palmas were only accepted in the local community, the circulation of currency increased, and the local economy improved. While individuals could not convert the Palmas into reals, the local stores could. However, the conversion was discouraged by charging a 2% fee (Pozzebon et al., 2014).

Inspired by Banco Palmas, the first idea was to give out microcredits in KES and create a corresponding amount of MTCr to invest in local development. As Howard explained:

> *So, in the first case, in the Banco Palmas model, we would grant microcredits in Kenyan shillings and ask them to pay this back without interest in MTCr. We would create the same number of MTCr as the Kenyan shillings we used to provide microcredits. We could use that for reconstruction projects or to make things, or for community projects that they want to do, like cleaning the streets […], and then we would withdraw them from circulation by allowing them to repay the microcredits that we provided.*[28]

Providing microcredits in KES to be paid back in complementary currency would create a supply and demand for MTCr. This would enable the GFI project to issue MTCr corresponding to the amount of debt in KES, and give it to the Progress Warriors leaders to invest in community projects. Those who worked on these projects would be paid in MTCr, and could then spend this with one of the businesses that had received the microcredit in Kenyan shillings. In other words, by giving microcredits in KES to be repaid in MTCr, it would be possible to redistribute resources in the community.

The second idea was to connect MTCr with the payment of the market fees. Howard explained the model as follows:

> *[W]e could pay the taxes of the [Progress Warriors] in Kenyan shillings and then ask them to pay them [in MTCr] to us. So, they are paying the taxes in [MTCr] instead of Kenyan shillings, which would*

[27] See Chapter 1.

[28] Howard during a Research Team meeting on microcredits, June 12, 2020.

> *help boost the community currency a lot. We could increase membership a lot.*[29]

This proposal involved issuing MTCr in a similar manner to the State at a national level: the Progress Warriors would impose an obligatory fee in MTCr members. The overall idea was for the GFI project to pay for local fees in KES that Progress Warriors needed to pay in order to sell in the market. The assumption in this strategy was that people would prefer to pay fees in a complementary currency than in KES as they themselves could issue the complementary currency by contributing with their products and services in the community. As a consequence, the Progress Warrior's membership would increase, and so the offers of goods and services. Moreover, as people would need to pay the membership fees, the demand for MTCr would increase.

Overall, the goal was to use development aid to issue MTCr, invest in the community's wellbeing, and create demand for MTCr. With Howard's first idea, this would be undertaken in a manner similar to Banco Palmas: the GFI project would secure funding to give out loans in conventional currency, to be repaid in MTCr and without interest. With the second idea, the Progress Warriors could impose an obligatory fee to its members and increase demand for MTCr. In both cases, the social obligation to repay the debt would create a demand for MTCr, and motivate its circulation.

3. The challenges of using development aid in Kenya

The European researchers thought that Howard's ideas were relevant to the research and development objectives of the project. They reasoned that, in places like Sweden and Denmark, businesses were given financial help by the state, so why not help people in Kisumu who were struggling in a similar way? Moreover, they wanted to promote the social and economic relations within the monetary arrangement, and needed to find ways to do this. However, this meant once again connecting development aid and the monetary arrangement.

Based on their experiences and local knowledge, the Kenyan researchers were very cautious to introduce development aid, and raised concerns regarding this:

[29] Howard during a Research Team meeting on microcredits, June 12, 2020.

> *We have had instances of groups that […] just want that credit [conventional money]. So, I am just trying to be cautious, that if we present it in that way, some of their efforts might be discouraged.*[30]

> *I thought we could suggest the idea of a revolving fund [chama] which they already know about and which they can even create with their internal resources, without indicating that the researchers could look for final funding to support that revolving fund […] I think we should be cautious about introducing the thought as something that, without external support, [the project] cannot continue.*[31]

The Kenyan researchers wanted the Progress Warriors to participate of the implementation process for the sake of the complementary currency, rather than to obtain development aid. Aid dependence is a controversial topic in Africa. The Nobel Peace Prize winner Wangari Maathai was a Kenyan grassroots leader and political figure who was critical of Africa's dependence on development aid. She argued that the distribution of aid produced a dependence mentality in individuals, and a culture in which "no one takes responsibility for communities' continued development" (Maathai, 2009:69). With this perspective in mind, it is unsurprising that the Kenyan researchers did not support the idea of introducing development aid at this stage of the project.

From the Kenyan researchers' perspective, introducing development aid into the monetary arrangement had at least two potential issues. Microcredits in KES could distort participants' motivations and lead them to focus more on accessing conventional money than strengthening MTCr within the monetary arrangement. Moreover, it could introduce the idea that the MTCr "without external support, cannot continue". The Kenyan researchers suggested letting the Progress Warriors build their own chama practices and develop the community without development aid.

4. Aligning interests for development aid

As action researchers, the European researchers had the goal of supporting communities and improving their wellbeing, and creating academic knowledge in the process. Exploring a connection between development aid and mutual

[30] Kenyan Researcher 1 during the discussion about microcredits, June 2020.

[31] Kenyan Researcher 2 during the discussion about microcredits, June 2020.

credit system offered this. However, as in the case of Inclusion Coin, the Kenyan researchers wanted to avoid dependence on development aid.

COVID-19 had left the merchants without a place to sell, reduced their incomes, and put their economic subsistence at risk. It was a difficult decision, but it was agreed to avoid introducing development aid at such an early stage of the implementation process.

However, just four days after the decision had been agreed, during a follow-up meeting[32] between the leaders of the Progress Warriors and the European and Kenyan researchers, the possibility of involving development aid in the monetary arrangement was discussed again. Mama Alva, chairperson of the Progress Warriors, and Steven, the secretary, claimed for assistance from the European researchers.

> ***Mama Alva:*** *How are you going to help the members?*
> ***Ellen:*** *We are trying to develop the currency to help you. Or what do you mean?*
> ***Steven:*** *What Madam President is trying to put across is, you know, our members are facing the hardest time in their lives. How can you help them to pick up?*
> ***Ellen:*** *I am really lost. How can I? Tell me because I do not know.*
> ***Mama Alva:*** *My people need food. How can they trade? They want to pick up from where they are sitting*

The Progress Warriors leaders were using COVID-19 to support the argument that they needed assistance. The Progress Warriors were facing life-threatening circumstances and "the hardest time in their lives", and needed someone to help them "pick up". In other words, they were experiencing a crisis, and needed help to improve their economic circumstances. The leader of the Progress Warriors made it explicit that they wanted additional help. This call for help gave the European researchers a solid argument to convince the Kenyan researchers to accept the re-introduction of development aid as a way of helping the Progress Warriors during these difficult circumstances.

5. MTCr and the redistribution of resources

In order to obtain development aid, the European and Kenyan researchers needed to convince SCANDEV that distributing aid was aligned with the research interests of the project. The European researchers translated the Banco

[32] Conversation during follow-up meeting, June 16, 2020.

Palmas case into a research proposal to SCANDEV to repurpose a share of the budget as aid to be connected to the MTCr and distributed to the Progress Warriors. This strategy was titled Strategic Community Investment (SCI). SCI presented the possibility for the Progress Warriors to self-manage the external aid, mobilize new members for the monetary arrangement, and increase the use of MTCr. For the researchers, it meant the opportunity to study this process.

SCI was intended to distribute development aid via loans that were free of interest and to be paid back in the MTCr. The development aid was intended to be used by those who took out the loans to strengthen their productive capacity and expand their products and services, thus increasing the attractiveness of the MTCr arrangement. While SCANDEV did not expect a repayment in KES for the aid given, a condition set in the SCI proposal was that the loan takers would need to clear their debts "in the form of MTCr over a given period (e.g., 6 or 12 months)".[33] By taking out a loan in KES, the individuals would acquire an obligation to pay back the loan in MTCr, in consequence creating a demand for MTCr.

The implementation of SCI was to be undertaken based on the established local governance practices of the Progress Warriors. As was written in the application submitted to SCANDEV for funds to be used for SCI, the Progress Warriors were expected to use their "well-established democratic assembly decision-making process",[34] accountability practices, and "institutionalized strong mutuality rules".[35] These community practices would ensure that the development aid would be used following three principles: community-based investment, accountability, and transparency.

The Progress Warriors decided how to distribute the development aid. Ultimately, the Progress Warriors agreed that 50% of the loan would be repaid in MTCr and 50% in KES, and that the repayment in KES would be collectively managed in the chama. The repayment of the loan in KES was a strategy to make the conventional currency stay in the community for longer. At the same time, the repayment in complementary currency motivated demand for MTCr in the community.

[33] Strategic community currency investment: combining community currency with strategic investment, August 2020.

[34] Strategic community currency investment: combining community currency with strategic investment, August 2020.

[35] Strategic community currency investment: combining community currency with strategic investment, August 2020.

Research on chamas has concluded that these are cooperative institutions wherein people make conscious decisions about a community's financial and economic projects (Ardener & Burman, 1995; Hossein & Christabell, 2022). While it is unsurprising that the Progress Warriors integrated a chama group in the management of financial resources (i.e. conventional money), it is interesting that they found a way to connect their local financial practices and the monetary arrangement.

SCI allowed the researchers to kickstart the MTCr Community Fund as a strategy to promote collective wellbeing. The loan that each member would receive in KES would have a corresponding MTCr negative balance registered in their account. In mutual credit systems, every negative balance has a corresponding positive balance, hence, a corresponding positive balance would be registered in a community account called the MTCr Fund (i.e., the Community fund).

The introduction of the SCI required adjustments in the accounting ledgers. First, to distinguish the users' MTCr individual credit/debt balances from their SCI loan balances, it was agreed to create independent SCI accounts where each member would register the loan repayments. In practice this means that each loan taker would get a debt (negative) registered in their SCI account and the corresponding credit (positive) would be registered in the collective MTCr Fund.

Let us go through an example. Peter, Laura, and Richard, all members of the Progress Warriors, get a loan of 100 KES to buy vegetable seeds, meaning that they get 50 MTCr registered as a debt in their SCI account and the corresponding credit, that is 150 MTCr (3 x 50 MTCr), would be registered in the MTCr Fund account (see Table 7).

Table 7. Creating corresponding balances in MTCr.

Transaction in System		SCI Accounts balance				System balance
Transaction #	*Description*	*Peter SCI*	*Laura SCI*	*Richard SCI*	*MTCr Fund*	*Sum (M1,M2.M3, MF)*
0	No transaction	*0*	*0*	*0*	*0*	*0*
1	Peter gets a 100 KES loan from SCI, hence a debt of 50 in MTCr	*0 - 50= –50*	*0*	*0*	*0 +50 = 50*	*0*
2	Laura gets a 100 KES loan from SCI, hence a debt of 50 in MTCr	*-50*	*0 - 50= –50*	*0*	*50+50 = 100*	*0*
3	Richard gets a 100 KES loan from SCI, hence a debt of 50 in MTCr	*-50*	*-50*	*0 -50= –50*	*100 +50 = 150*	*0*

After some time, Peter's kale has grown, and he sells 50 MTCr worth of kale to Teresa. Peter spends 20 MTCr to buy some locally produced honey from Richard and sends 30MTCr to his SCI debt account. Peter's new balance in the SCI account is -20 MTCr; in his normal MTCr account, it is 0. Let us assume the Progress Warriors have also started thinking about how to make use of the MTCr Fund and after democratic deliberation, they collectively decide to organize a cleaning day and pay 70 MTCr to each member who participates (Table 8). Peter joins the cleaning activity, obtains 70 MTCr, decides to send 20 MTCr to his SCI account, and clear his SCI debt (Table 9).

Table 8. MTCr account ledger.

Transaction in System		MTCr Accounts balance					System balance
Transaction #	*Description*	*Peter*	*Teresa*	*Richard*	*MTCr Fund*	*SCI Debt*	*Sum (M1,M2.M3, MF)*
0	No transaction	*0*	*0*	*0*	*150*	*–150*	*0*
1	Teresa buys 50MTCr of Kale from Peter	*0 +50 = +50*	*0-50= -50*	*0*	*150*	*–150*	*0*
2	Peter buys 20MTCr of Honey from Richard	*50 - 20 = 30*	*-50*	*0 + 20 = +20*	*150*	*–150*	*0*
3	Peter sends 30MTCr to his SCI account	*30 - 30 = 0*	*-50*	*20*	*150*	*–150 + 30 = - 120*	*0*
4	Community Pays 70MTCr to Peter for Cleaning Project	*0 + 70 = 70*	*-50*	*20*	*150 -70= 80*	*- 120*	*0*
5	Peter sends 20MTCr to his SCI account	*70 - 20 = 50*	*-50*	*20*	*80*	*-120 + 20= - 100*	*0*

Table 9. Peter's SCI account ledger.

Transaction in System		SCI Accounts balance
Transaction #	*Description*	*Peter SCI*
0	No transaction	***–50***
1	Peter SCI receives 30 MTCr from Peter MTCr account	***-50 + 30 = -20***
2	Peter SCI receives 20 MTCr from Peter MTCr account	***-20 + 20= 0***

The MTCr Fund would allow the Progress Warriors to redistribute resources to meet unmet needs. The Progress Warrior community could "reinvest the MTCr Fund by investing in community-run businesses to build local productive capacity" and "invest in marketing efforts to increase membership" and "community strengthening activities".[36] This allowed the Progress Warriors to plan for collective projects, use these projects to create jobs, and pay workers in MTCr. In other words, the MTCr Fund was intended to enable the Progress Warriors to use the complementary currency to redistribute resources and meet unmet needs.

The introduction of SCI was intended to strengthen the association of MTCr in the arrangement and maximize the potential benefits to the community. As the loans were to be repaid in MTCr, the loan takers would earn MTCr with which to repay the loan in two ways: by selling their goods and services to the members of the Progress Warriors, or by participating in community projects that were to be collectively arranged by the community and financed by the MTCr gathered in the MTCr Fund. In other words, the MTCr enabled development aid to be used to meet individual and collective needs (Figure 5).

[36] Strategic community currency investment: combining community currency with strategic investment, August 2020.

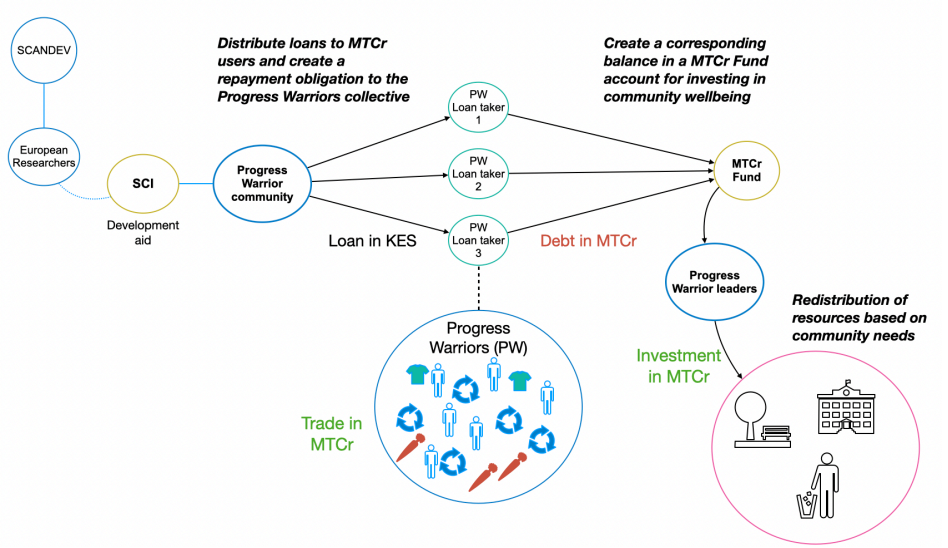

Figure 5. Connecting SCI and the MTCr Fund in the monetary system.

The MTCr system was once again transformed to respond to the request for more help from the Progress Warriors and to adapt to the local circumstances. The SCI permitted the Research Team to translate the Brazilian strategies of introducing development-aid in connection to a complementary currency while adapting them to the MTCr system. The Progress Warriors also made a translation of the SCI by adapting it to their chamas and the MTCr system. Moreover, the SCI promoted the introduction of a social obligation of the individual loan-takers to the collective, and strengthened the possibility for Progress Warriors to redistribute and govern resources in the community, while at the same time creating demand for MTCr and motivating its circulation.

D. The use of payment technologies is not bounded to its design

This section traces a new controversy. However, this was not an explicit disagreement between people, but it emerged from the use of the payment technology. The controversy arose due to the difference between the credit-

debt approach that wanted to be translated through the MTCr mutual credit design, and how it was being used as something that was given, that was scarce, and that had intrinsic value. In other words, the complementary currency was being used from a commodity approach to money.

1. MTCr as something given

In mutual credit systems, overdraft facilities make every user a money issuer. However, during field visits in September 2021, I observed some of the Progress Warriors making use of MTCr as if it was something that had been issued by someone external to them.

Peter was an engaged member of Progress Warriors, an avid user of MTCr, taught other members how to use the payment technology, and helped older members to register their transactions. It is thus reasonable to argue that he was a good representation of how MTCr was used, the information that was transferred in the community, and that his approach to the currency became common among other members of the Progress Warriors.

Peter was keen to show us the payment technology interface (Image 5). The app showed three figures: the balance, the amount available, and the negative balance limit. The negative balance limit was the overdraft limit a user had, while the balance was the current balance based on the user's transactions. This meant that users who contributed (sold) more than they took (bought) would have positive balances, and those who took (bought) more than they contributed (sold) would have negative ones. The amount available was how much overdraft the member was still able to use given his/her balance and overdraft limit. In Image 5, the person had a negative balance of 399, meaning that they had bought more than they had sold, and still 101 units of overdraft capacity available from the default limit of 500.

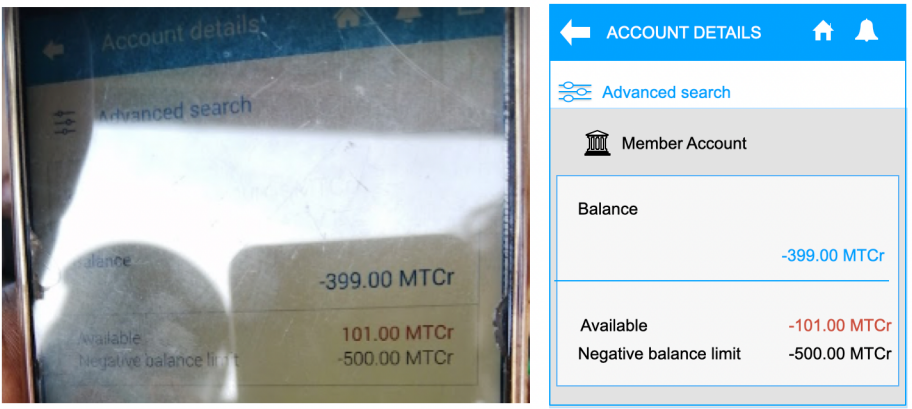

Image 5. The Circuits interface, showing a member's account, September 2021.
Source: Author's collection.

Ellen asked Peter to explain how he used the MTCr overdraft facilities. As the below quote shows, Peter made use of the overdraft facility to approach MTCr as something given, and available for him to use:

> ***Peter**: I take it as available. Available as I can use 900 [MTCr]. I can use the positive from selling my products […] so I have 400 positive MTCr plus the 500 MTCr I was given. So, I have 900 MTCr that I have to use.*[37]

Peter's explanation suggests that he considered the overdraft facility to constitute a way of obtaining MTCr, and that this was "given" to members. In principle this is correct, since every member has access to an overdraft facility. However, as Ellen repeatedly reminded people during her workshops: in mutual credit systems, access to overdraft facilities is to be understood as both a right and an obligation, and the overdraft is not something given without consequence. Moreover, in a mutual credit system, money users can become money issuers; hence, money is not something given externally, but something that the users themselves create. In other words, Peter was not being given 500 MTCr; he had the right to issue up to 500 MTCr, and the obligation to contribute back in order to clear his debt.

When users interacted with the payment-technology interface, the amount-available figure suggested that the overdraft was an amount of currency that

[37] Peter on available balance, September 2021.

they already possessed. This is unsurprising, since 'available' means that something is at someone's disposal. However, without recognition of the fact that the use of an overdraft facility is the acquisition of a debt, the social pressure that mutual credit aims for is lost –the relations between the individual and the collective, between debtors and creditors, dissolve.

2. MTCr as something scarce

In mutual credit systems, supply is not fixed. It fluctuates based on credit and debt balances. However, Peter viewed MTCr as a commodity: if someone had it, others lacked it. In other words, it was seen as something scarce:

> ***Ellen:*** *So how do you manage the use of your MTCr? Do you always try to be in positive [balance]? Always in negative [balance]?*
> ***Peter:*** *I try to be moderate; I am trying to buy and sell. If I go negative, I go out of the market; if I go positive alone, it is as if I am going to own the platform alone. I am a businessperson; I buy and sell.*[38]

Peter's explanation of what it meant to have a positive balance is a different way of using the mutual credit system than was intended. It is important to note that positive and negative balances always coexist in mutual credit systems; there is no positive MTCr balance without a negative one. However, Peter understood positive balance as "own[ing] the platform alone" as if a positive balance meant that the MTCr he had others could not have. But in a mutual credit system this is not entirely accurate as anyone can issue MTCr when they contribute with their products or services. On the other hand, a negative balance means that you have acquired other members' goods and services, and to clear your debt you need to contribute more – or, in other words, 'get into' the market.

Peter might have assumed that the supply of MTCr was fixed. In that case, a person accumulating MTCr would own the MTCr supply, and there would be no MTCr available for other people to trade, hence, 'owning the platform alone'. However, this is not the case in the mutual credit design, where there is not a fixed supply, and issuance is connected to overdraft limits, which change based on the actual demand for goods and services. Nevertheless, Peter seemed to use MTCr as if his possessing it meant that others could not.

[38] Peter on credit limit, September 2021.

3. MTCr as something with value in itself

Another piece of evidence that suggested that some of the Progress Warriors approached MTCr as a commodity was a lack of awareness of the problems of not spending the currency. In a mutual credit system, a stagnant positive balance is a risk – first, because it prevents others clearing their negative balances, and second, because it puts those who are in positive at risk of not being repaid for what they have already contributed.

In preparing for the field visits in September 2021, Ellen had identified several members who were over-accumulating MTCr. One of those members was Laila, a trader who sold beans and nuts.

Image 6. Ellen, Peter, and Mary visit Laila, September 2021.
Source: Author's collection.

With the help of Mary, who translated for us, Laila explained that her products were in high demand, and that even though she bought some products, this spending was not enough for her to use all of her MTCr (Image 6). However,

she continued to accept MTCr in payment for her goods. Laila's behavior provoked a reaction in Ellen, who was aware of the risk that this posed:

> ***Ellen:*** *If you are not using it, you are losing it!*
> ***Laila*** *[amazed]: I lose?*
> ***Ellen:*** *Yes, you lose. If you sell in MTCr but cannot use MTCr, you lose.*
> ***Laila****: Mmhm*
> ***Ellen:*** *You cannot eat MTCr. It is good to use it to buy something to eat.*[39]

Laila's surprise at Ellen's comment indicates a lack of awareness of the risks of accumulating other members' debt. MTCr was not like KES or M-pesa, in the sense that MTCr was not accepted nationally, and not intended to function as a store of future value. The value of MTCr was only what it could be used to buy from the community: if you "cannot use MTCr, you lose".

However, Laila kept increasing her positive balance, and was not aware that her accumulation had two negative consequences for the mutual credit system. First, her positive balance put her in a position of risk. It is important to remember that in mutual credit systems, a positive balance represents a contribution that someone has made to the community. Those with positive balances are "creditors of the community",[40] as expressed in the training sessions. If users with a negative balance do not fulfill their promises of future contribution, those with a positive balance lose what they have contributed. Second, those with a negative balance need to clear their debt, and for this to happen those with a positive balance need to spend in order for those with negative balances to be cleared.

4. MTCr as a commodity

In sum, the payment technology enabled members to use MTCr based on a commodity approach: as something given, scarce, and with value in itself. This finding suggests that the ubiquity of current mobile-money designs (e.g., M-pesa) in Kenya may have had a monetary silencing effect,[41] with people not wondering who issues money and how this takes place.

[39] Conversation during fieldwork, September 2021.

[40] Quote from W1.

[41] See Chapter 2 – Political-economic ideas, roles, and rules.

Moreover, it shows the difficulties involved in changing how people approach money – that is, as a commodity. The findings show that a monetary arrangement can be designed and implemented based on a wide variety of approaches – and, moreover, that even after these processes have been completed, people can interact with payment technologies in myriad ways. This shows the influence that the interface of a payment technology has in a socio-technical arrangement of money. Finally, the ways in which some Progress Warriors used MTCr as a commodity, despite it being designed based on a credit-debit approach, indicate that a monetary design can have a performative role other than the initially intended.

E. Multiple sides of a monetary arrangement

In summary, this chapter has shown the different translation process that can occur during the implementation of a complementary. Political-economic ideas of credit-debt approach to money were translated through the MTCr and adapted to the local contexts. Through the translation processes both The Research Team and Progress Warriors were able to include and exclude different elements in the monetary arrangement.

In the implementation process there were different activities that permitted the translation processes. For example, the development of education material and spread of political-economic ideas through training sessions. These educative sessions influenced the constitution of the Progress Warriors, MTCr, and influenced the regulatory and communal activities of the Progress Warriors. The creation of the Market days and the mandatory participation, being an example of how the Progress Warriors adapted the political-economic ideas to their local circumstances. In short, the implementation of MTCr permitted the translation of the political-economic ideas and their adaptation to the local contexts.

MTCr also mediated a connection between complementary currencies, conventional money, and local financial practices. Through the SCI, the European researchers were able to translate knowledge of how to connect development aid with a complementary currency. In the implementation of the SCI, the Progress Warriors translated this ideas to their local practice by connecting their chama practices to the use of complementary currencies. In other words, the MTCr arrangement connected knowledge, resources, and practices to improve overall wellbeing.

The payment technology influenced how MTCr was used. Despite being designed with a credit-debt approach, the Progress Warriors used MTCr as they did with mobile money, which usually embeds a commodity approach to money. As a consequence of this, the users lost awareness of their individual capacity to issue money and the social obligations between individuals and the collective lost strength. In sum, the interface of the payment technology enabled a commodity approach to money to be associated with the MTCr arrangement.

The implementation of a monetary arrangement is dynamic: actors relate to one another, make use of different technical objects (e.g. payment technologies, by-laws), and transform the monetary arrangement and the activities that emerge from it. These arrangements can operate within social structures and institutions, influence the behavior of individuals, and shape social relationships. In conclusion, money can be designed, but its implementation can display the multiple sides of a ‘coin’.

Revolutionary liberation must be a self-liberation that reaches social dimensions, not "mass liberation" or "class liberation" behind which lurks the rule of an elite, a hierarchy and a state. If a revolution fails to produce a new society by the self-activity and self-mobilization of revolutionaries, if it does not involve the forging of a self in the revolutionary process, the revolution will once again circumvent those whose lives are to be lived every day and leave daily life unaffected. Out of the revolution must emerge a self that takes full possession of daily life, not a daily life that once again takes full possession of the self. The most advanced form of class consciousness thus becomes self-consciousness—the concretization in daily life of the great liberating universals. – Bookchin (1986:38)

8. Organizing money in the context of scarcity

This final chapter discusses the contributions of this study to the field of complementary currencies, and in particular to the literature on their implementation. Traditionally, this literature has focused on implementing complementary currencies, often describing this process as a series of sequential activities. I propose *organizing* as a broader concept that captures the evolving socio-technical relationships involved in the process. This approach sees the organizing of complementary currencies as not based on generic nor sequential tasks, but as being shaped by organizing activities that evolve and influence the process itself. Three types of organizing activities are proposed: *modulating, representational,* and *vernacular*. Moreover, I build on the study's findings to argue that while there can be a common purpose for introducing a complementary currency, different imaginaries can influence the process, and I show how these imaginaries transform in their materialization. Recognizing imaginaries during the implementation of a complementary currency allows for a more nuanced analysis of the means used to achieve an end. Finally, I identify how external actors influence the organization of a monetary arrangement by prioritizing their imaginary, having financial control over payment technology, and possessing specialized monetary knowledge. Based on the results of the study, I suggest possible avenues of future research, and conclude with some practical insights for the organizing of complementary currencies.

A. From implementing to organizing money

Practitioners of complementary currencies present them as alternative ways of addressing people's lack of access to money. Through the implementation of complementary currencies, local communities and external actors (i.e. NGOs, social entrepreneurs, researchers) can rally around to deal with the problem of leakage, and try to ensure that whatever money enters a community stays there for as long as possible. The case of the GFI project has, however, shown that the implementation of complementary currencies is an intricate process that strongly influences how a monetary arrangement develops.

The current literature on implementation describes the activities that are to be executed within a complementary-currency project. These include training, organization, design, and financing activities[1] (see e.g. CCIA, 2014; Ruddick, 2011; Gelleri, 2009; Dissaux & Ruddick, 2017). The socio-technical perspective taken in this study has been useful in moving beyond descriptions of activities so as to capture the dynamic relations between the social and the technical within an implementation process, and to observe how these relations influence a monetary arrangement.

Instead of using the verb 'implement', I propose to speak in terms of 'organizing'. This is because the act of organizing a monetary arrangement often alters the outcome, or influences the activities that are being carried out. Discussing the activities that emerge in the organizing of money is a first contribution to the literature on complementary currency. As I will now explain, this proposed perspective offers a more nuanced characterization of the socio-technical relations present in an implementation process, and how these influence a monetary arrangement.

B. Organizing activities in monetary arrangements

George Simmel argues that money, as a commodity, allows people to disconnect from their local communities, and that it is therefore impersonal and colorless.[2] However, by approaching money as a socio-technical arrangement in this research, it has been possible to study the organizing efforts

[1] See Chapter 1.

[2] See Chapter 2 – Approaching money in use.

to connect, disconnect, and (re)connect a variety of actors such as people, ideas, approaches to money, and payment technologies (see Figure 6). These organizing efforts have involved the inclusion and exclusion of heterogeneous actors, and rendered a socio-technical arrangement anything but 'colorless'.

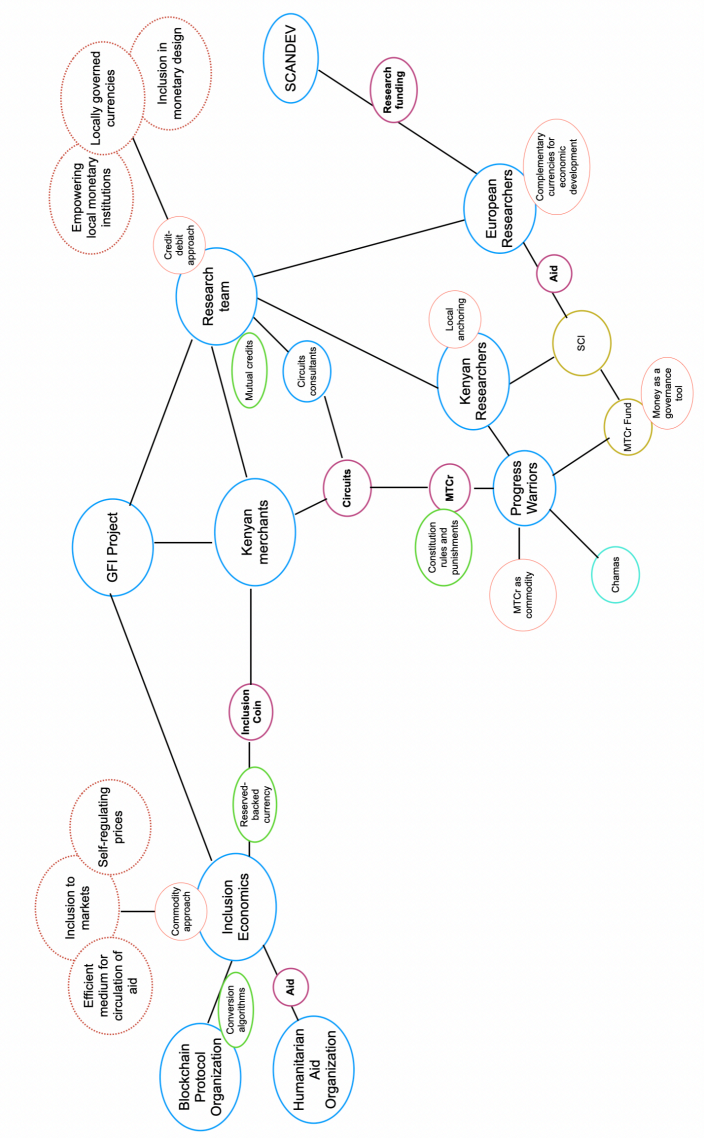

Figure 6. The GFI monetary arrangement.

The changing dynamics of monetary arrangements are driven by a series of distinct but interrelated organizing activities. In what follows, I argue that the organizing of money is constituted by activities that I have categorized as *modulating, representational,* and *vernacular*.

1. Modulating Activities

I term the activities that are intended to guide behavior within a monetary arrangement modulating. I use this to signify the actions that exert a modifying or altering influence, in order to achieve a desired effect on a monetary arrangement. These include the portraying and debating of political-economic ideas, discussions regarding monetary issuance and withdrawal, defining of behavioral rules, monitoring behaviors, and discussion of collaboration agreements. In short, modulating activities have influence over the decision-making and control within a monetary arrangement.

The findings presented in Chapter 5 showed that the act of portraying political-economic ideas, through for example research proposals and white papers, influences how the implementation process plays out. The writing of these documents does not predetermine how money is institutionalized, nor how social interactions play out in a monetary arrangement; however, the normative elements of these documents influence the organizing process, as they serve to explain political-economic ideas, frame problems, and reveal potential mechanism of control.

Political debates are important modulating activities as they present viewpoints and arguments that have an influence on the constitution of the monetary arrangement. As developed in Chapter 6, there was an internal debate about which payment technology to use in the GFI project. No payment technology is neutral and, as the findings present in Chapter 6 show, the core of the debate related to the normative elements that were to be translated through, for example, the monetary design.

How money is designed is said to influence the interpersonal relations that constitute it. Barinaga (2024) argues that "if money is a relational phenomenon, then the question of its value is really a question about the relationships that constitute money" (Ibid.:127). In other words, if the interactions that constitute money change, the collective as a whole can transform. Barinaga argues that monetary design is a way of influencing and

changing those interactions. Thus, based on this figurative language, money *colors us.*

Throughout the empirical chapters, especially Chapters 6 and 7, I explored how the issuance and withdrawal of the monetary arrangement were designed to promote certain relationships. The mutual credit system used for MTCr was based on credit-debt relationships, and took the social obligation of the individual to the collective as a driving element. Surprisingly, my findings in Chapter 7 showed that some users still used MTCr as a commodity, which shows that money can have performative effects; however, these can be different to those originally intended (cf. Barinaga, 2024).

Another type of modulating activity is how money is regulated. For example, Desan (2014) studied different monetary systems and introduced the complex process of money production. Part of her argument is legal, as it maintains that it is agreements and their enforcement that institutionalize money, and shape the social interactions in a monetary system. This leads her to suggest that the regulation of money influences how it can be used as a governance strategy to "spend now and tax later" (Desan, 2016:24), or as cash that "can be counted, transferred, and used to pay off obligations" (Ibid.:25). In opposition to Simmel's (1991) image of money as colorless, impersonal, and individual in character, Desan suggests that it is the predefined regulatory constitution of a monetary system that means that "money is colored from the start" (Desan, 2016:3; my emphasis).

As the findings presented in Chapter 7 show, how money is regulated is an important element in an organizing process. In an effort to promote the use of MTCr and ensure that member would pay their debts, the Progress Warriors defined the rules of trading, participation, monitoring, and control. This also meant that, in principle, the Progress Warriors were in charge of monitoring the accounts of members and their participation, and applying penalties when the rules were not followed. However, it is worth noting that the Progress Warriors could only enforce the repayment of debts through social control, which could have been less effective due to the voluntary nature of participation in MTCr. Another example of such regulation was the repayment agreement of SCI, which stated that debts needed to be repaid in MTCr rather than KES. This agreement was intended to motivate the use of MTCr, strengthen the social obligation between individual members and the collective, and motivate the Progress Warriors to spend MTCr to develop community projects.

All in all, my findings show that modulating activities are intended to exert a modifying influence on a monetary arrangement, and can be developed to respond to unforeseen situations. In the case studied, modulating activities are carried out by the central authorities in charge of monetary design, which in the case of a mutual credit system are not necessarily the same money issuers. In some cases, these activities take the form of debating political-economic ideas or conducting on deciding on strategic actions; in others, they involve establishing and enforcing certain rules relating to transaction or participation. Modulating activities, as seen in the empirical study, are also inspiring the development of technical objects or what I conceptualize as representational activities.

2. Representational activities

The ideas and concepts present within a monetary arrangement can be abstract. In such a scenario, it is necessary to make representations that permit these elements to be associated with other actors in the monetary arrangement. I call these types of activities representational, and they relate to the development of technical objects that serve to portray particular ideas or concepts in connection to the monetary arrangement: for example, the programming of a monetary design using a payment technology, the writing of mathematical algorithms using software, the creation of videos or pamphlets for educational purposes, and the writing of strategic policies or constitutional documents.

The programming of payment technologies is a representational activity. Payment technologies are needed in order to materialize and operationalize a complementary currency. As shown in Chapters 5 and 6, Inclusion Coin made use of software that approached money as a commodity, and facilitated price-setting algorithms that linked reserves and currencies to estimated prices in a network of currencies. Circuits, on the other hand, represented a mutual credit system, and had an algorithm that automatized the clearing of debts and credits and permitted the parametrization and effecting of overdraft and surplus limits. Software, in this case, served to represent certain approaches to money.

However, not all approaches to money coded in technology are equally successful in shaping individual behaviors. In the MTCr system, the Circuits app was used by individuals to keep track of how much MTCr they had accumulated, rather than to maintain awareness of their indebtedness to the collective and feel social pressure. The ubiquity of mobile money (e.g. M-pesa), and the commodity approach to money these are based on, seem to have caused monetary silencing to take place, in that MTCr was created through

relations of debt to the collective, and was independent of conventional currency (i.e. KES). In the case of Inclusion Coin, the arbitrage opportunities and automated pricing allowed individuals to use the payment technology to maximize their individual utility. That is, payment technologies and their embedded monetary designs at times influence, and even strengthen, certain behaviors, but not all of the time. What is perhaps pivotal here is the monetary ideas that are dominant in larger society and the self-consciousness of the individuals.

The development of educational material is another type of representational activity identified in my study. Workshops, videos, and presentations all served to conceptualize and represent ideas and help people to access the knowledge required to participate in the monetary arrangement. As shown in Chapter 7, these educational materials were used in the training sessions that introduced the Kenyan communities to the knowledge and competences required to manage a mutual credit system. Similarly, the educational workshops and videos developed by Ellen reinforced the concept of the mutual credit system and explained the credit-debt approach to interested communities.

All in all, representational activities are fundamental to a monetary arrangement, and needed in order to create and strengthen relations between abstract elements (e.g. monetary theories or political-economic ideas) and other actors in a monetary arrangements. The outputs of representational activities can shape the interactions and relationships between different actors in different places at different times. Hence who managed the representational activities will have influence over the ideas that are to be translated through a monetary arrangement. The findings also show that users have agency, and do not blindly or automatically transform their relations in order to adhere to what a representational activity is made to translate. Users interact with technical objects in their daily life and at the same adapt them to their vernacular activities.

3. Vernacular activities

My findings show that there are other kinds of activities that relate to how the resources of individuals are mobilized and exchanged within a community. These activities can be related to the exchange of products and services or earmarking activities, as well as to the sharing of information and ideas through social interactions. Having searched for a term that conceptualizes this idea, I settled on vernacular, to describe activities that mobilize individual and collective resources within a monetary arrangement. I use the term to

emphasize the localized, culturally specific practices, traditions and interactions, that influence how complementary currencies are used, on the basis that it highlights the unique ways in which communities of users interact with and adapt their participation to a monetary arrangement based on their particular social and cultural contexts. Moreover, the term acknowledges the importance of local knowledge and traditions in monetary arrangements. In other words, money is colored in its use.

The more straightforward vernacular activities are those connected to the redistribution of individual resources within the community, i.e. the exchange activities that relate to using money to transact goods and services. This was evident in the use of MTCr to exchange[3] goods and services, and the conversion of Inclusion Coin into KES. Earmarking[4] can also be considered to be a vernacular activity under my definition, as it is a process of giving multiple meanings to money based on individuals' socio-cultural relations and traditions.

Social meetings are vernacular activities that serve to mobilize intangible resources within a monetary arrangement. The findings presented in Chapter 7 show how the market days forged social and economic relations. Here, in addition to the economic exchanges that were made, these spaces were also used by the group to conduct the chama, and for the members to meet, sing, and pray. These activities created new social and economic relations, and strengthened ongoing ones.

Vernacular activities can also be found when individuals share information, practical skills, and insights gained in everyday life in non-formal educational settings. The knowledge may not be explicitly documented or formally recognized, but it is still valuable and influential in various ways in relation to the functioning of the collective. During the process of implementing a complementary currency the sharing of information in informal settings is important, as this knowledge can influence the practical use of money. As shown in Chapter 7, the information shared with other members by Peter was not necessarily in line with the idea of the mutual credit system as designed by the Research Team. Yet, Peter had more contact with other members, and thus likely more influence on how they used MTCr.

[3] It is worth recognizing that exchange activities are linked to the market, which has been conceptualized as a practice on its own (Kjellberg & Helgesson, 2006; 2007).

[4] See Chapter 2 – Approaching money in use.

In conclusion, vernacular activities encompass the ways in which resources are mobilized and exchanged within a community. These activities reflect the social dimensions of money, illustrating how individuals use and assign meaning to currency and mobilize resources in their everyday lives. Vernacular activities include market days, where members exchange goods and services, and informal gatherings, where knowledge and experiences relating to currency are shared. Such activities contribute to the creation and reinforcing of social bonds, enhancing the sense of community and collective identity. However, they also recognize the needs, understandings, and motivations of individuals in relation to participation in a monetary arrangement.

4. Assembling monetary arrangements

Current literature on the implementation of community currencies portrays implementation as the execution of tasks, and offers useful descriptions of these (e.g. CCIA, 2014; Ruddick, 2011, Gelleri, 2009; Dissaux & Ruddick, 2017). However, little is known about the dynamic socio-technical relations that emerge during an implementation process, and how they influence and are influenced by the monetary arrangement itself. In carrying out activities, relations are being made or unmade, and the monetary arrangement is assembled. I proposed the concepts of modulating, representational, and vernacular activities, as evolving organizing activities that influence how monetary arrangements are assembled (Table 10).

Table 10. Organizing activities.

Activity	Description	Examples
Modulating	Activities that exert a modifying or altering influence, in order to achieve a desired effect on a monetary arrangement	debating strategic decisions; designing systems; monitoring, training
Representational	Development of technical objects that serve to portray particular ideas or concepts in connection to the monetary arrangement	programming of a monetary design using a payment technology, the writing of mathematical algorithms using software, the creation of videos
Vernacular	Activities that mobilize individual and collective resources within a monetary arrangement. I use the term to emphasize the localized, culturally specific, interactions, practices and traditions that influence how complementary currencies are used	exchange of products and services or earmarking activities, as well as to the sharing of information and ideas through social interactions

My point of focus is the relational work that constitutes a monetary arrangement, and that emerges from it. It is worth noting that, for explicatory purposes, these activities were described as being independent of one another. In practice, however, these activities influence one another, and are influenced by how the relations develop, thus assembling a deeply interconnected monetary arrangement.

For example, as shown in Chapter 6, Inclusion Coin facilitated conversion rates to KES. Users were attentive to the conversion rates in relation to exchanging Inclusion Coin for KES, or for goods and services in the community (i.e. vernacular). This was noticed by the Research Team, who understood that this went against the political-economic ideas they had stated in the research proposal, and started a debate (i.e. modulating) regarding the payment technology and proposed an alternative monetary design and payment technology (i.e. representational).

Another example of how arrangements can change color – and that this takes place everywhere, all of the time – relates to the introduction of development aid in the project. The findings presented in Chapter 6 show that one of the arguments that was used to challenge Inclusion Coin was its dependence on development aid. Moreover, as shown in Chapter 7, the Kenyan researchers were opposed to the introduction of development aid as they felt that this could result in a dependence mentality among local community. However, as was also shown in Chapter 7, the Progress Warriors and European researchers the experiencing of COVID-19 and the difficulties of meeting and trading due to curfew, supported the inclusion of development aid in the monetary arrangement (i.e. vernacular). The Progress Warriors argued that COVID-19 posed an existential threat, and the European researchers felt a moral obligation to help due to the crisis (i.e. modulating). Because of this pressure, and on the grounds of the research objectives of the project, the researchers introduced the concept of SCI. This permitted the introduction of development aid, and the writing of guidelines for how aid could be used in the project. This also led to the Progress Warriors to adapt the SCI guidelines to their context, led to the regulation of MTCr loans and the adaptation of the MTCr to their local chamas, and required the programming of new accounts in Circuits (i.e. representational).

These are just two examples of how representations interacted with vernacular activities or triggered modulating activities, and how the interrelation between these activities transforms the relations within an arrangement. In one example, Circuits was included and the association with Inclusion Economics was

weakened; in the other, development aid was associated with the complementary currency.

The socio-technical perspective taken in this study, has been relevant to complement the description of tasks made by, for example, CCIA (2014) or Dissaux and Ruddick (2017). In particular, it has helped in understanding how implementation activities relate to one another. First, implementation is not a linear process, and activities emerge in response to the needs of the process. Second, by adapting to local circumstances and specific actors, monetary arrangements acquire specific characters that are not necessarily planned. Third, arrangements gain stability as socio-technical relations strengthen, but this is not to be taken for granted as interactions are localized. Hence, I argue that the implementation of a complementary currency is changing colors *everywhere, all of the time*.

In line with Barinaga's (2020) point that payment technologies can influence local practices; my results show that economic ideas and payment technologies are interconnected and can influence interactions. However, what my studies show is that vernacular activities also influence the use of a payment technology, and the performative effect of money design cannot be taken for granted, highlighting the importance that vernacular activities have in a monetary arrangement. Moreover, because complementary currencies are context-dependent, an interesting line of investigation would be to study how vernacular activities (e.g. craftsmanship, music development, spiritual celebrations) can be used to inform modulating and representational activities in the implementation of a complementary currency.

However, the idea that activities are being carried out everywhere, all of the time, does not mean that the process of implementing a complementary currency is a spontaneous process. My findings indicate that, explicitly or not, those who participate in the implementation of a complementary currency have images of individual or collective futures (i.e., imaginaries) that they pursue as they carry out activities. In the following section, I will discuss how imaginaries play out in the organizing of a monetary arrangement and consider in detail the influence of external actors when a complementary currency is being implemented in the context of scarcity.

C. The role of imaginaries in the organizing of monetary arrangements

Actors who organize complementary currencies make use of different imaginaries in order to portray futures based on the past, foresee future challenges, or contest predominant imaginaries (Kuk & Giamporcaro, 2024). However, how imaginaries shape and influence the socio-technical relations in a complementary currency arrangement is still a question to be explored. The findings presented in Chapters 5, 6, and 7 outline the imaginaries that the Research Team and Inclusion Economics had, and the influence of these imaginaries on the implementation process. My argument is that imaginaries shape the political-economic ideas, monetary approaches, and positioning of users. At the same time, imaginaries are shaped as they undergo translation processes through modulating, representational, and vernacular activities.

1. Imaginaries of development

My findings show how socio-technical relations change, adapt, and strengthen as imaginaries materialize. In light of the insights presented in Chapters 5, 6 and 7, I present two imaginaries that materialized through the implementation of a complementary currency in the context of scarcity: *market inclusivism* and *monetary emancipation* (Table 11).

Table 11. Imaginaries developed within the complementary-currency project.

	Market inclusivism	Monetary emancipation
Political-economic ideas	• Efficient medium for the circulation of aid in local markets; decreases dependence on mainstream financial services. • Inclusion in infrastructures of aid. • Self-regulating markets.	• Empowering local monetary institutions. • Inclusion of communities in monetary design. • Locally governed currency.
Monetary approach	• The value of the complementary currency is in the commodity it represents. Value is intrinsic to money. • Confidence is given by a measurable common reserve. • Issuance is based on reserve in conventional money (development aid).	• The value of the complementary currency hinges on the creditworthiness and productive capacity of the community of users. Value is extrinsic to money. • Confidence is based on the community's creditworthiness and knowledge.

	Market inclusivism	Monetary emancipation
		• Issuance is based on promises of future contribution.
Position of the community of users	Beneficiaries of a payment technology: Communities must follow the rules of the technology in order to benefit from them.	Stewards of money: Communities have agency over their monetary policies, and are responsible for the soundness of the monetary arrangement.

The first imaginary is conceptualized a market inclusivism as it portrayed the socio-technical arrangement of a complementary currency as the inclusion of users in infrastructures of aid and markets of currencies. The political-economic idea was to use the complementary currency as a more efficient medium for the circulation of aid in local markets, and to decrease dependency on mainstream financial services. Moreover, through a self-regulating market of currencies, the intention was to give individuals the opportunity to use complementary currencies beyond their own community.

The second imaginary titled monetary-emancipation imaginary related to a portrayal of a socio-technical future characterized by the self-governance of monetary arrangements on the part of communities. The political-economic idea was to use the complementary currency to reduce the dependence of communities on externally issued money, and to enable the governance and design of money to redistribute resources and attend to local needs. In other words, it recognized money as a powerful governance instrument.

Imaginaries must be realized, and the findings presented in the empirical chapters demonstrate how representational activities can influence monetary arrangements. For example, as discussed in Chapters 5 and 6, by following a market-inclusivism imaginary, Inclusion Economics had a commodity approach to money. Under this approach, the value of the complementary currency was based on the common reserve it represented, in this case backed by development aid. Hence, the Inclusion Coin monetary system was arranged in such a way that it was able to gather development aid, issue digital currencies, and represent how development aid was distributed through complementary currencies. Moreover, it was programmed with algorithms that automated and represented exchange rates in order to allow the users to pursue individual profits to foster an efficient and self-regulating market of currencies.

In the market-inclusivism imaginary, users are included in a monetary system from which they can benefit. Thus, it is not important that users deal with representational activities such as the programming of the payment technology (e.g. accessing the blockchain or programming smart contracts) and writing the monetary policy (e.g. defining the reserve ratio in the bond curve or conversion policy). In short, if a complementary currency is used to exchange in different markets and users can access development aid, this imaginary is realized. Users should be concerned with vernacular activities, such as spending complementary currency as they please and converting it into aid when possible; representational and modulating activities are the responsibility of an external organization – in this case, Inclusion Economics, which acted as both the central authority and monetary issuer.

In the case of the monetary-emancipation imaginary, money is imagined to be anchored locally and is used as a tool to govern a collective and attend to local needs. In this sense, the monetary system ensured that both the researchers and the community of users were able to participate in the modulating and representational activities. It could be argued that a monetary-emancipation imaginary can also use a commodity approach. Studies of colonial North American currencies have shown (see e.g. Feinig, 2022) that local governments issued currency as a representation of commodities. But the particularities of the validity of a currency, or which commodity to use to back the currency, were the result of collective, and sometimes democratic, processes. The point I want to make is that with monetary emancipation it is the use of money for collective governance and the satisfaction of local needs that is important – and, as the findings presented in Chapters 6 and 7 show, this depends on having control of the payment technology. Hence, the use of Inclusion Coin was not pertinent to the money-emancipation imaginary, as control over the representational and modulating activities was primarily in the hands of Inclusion Economics, rather than the community of users.

As shown in Chapter 7, having control of Circuits was supposed to give the Progress Warriors the ability to govern the collective by redistributing resources and attending to their needs. Moreover, it gave the Research Team the ability to influence the process and materialize their political-economic ideas. Circuits was programmed with a mutual credit system, which was in line with the researchers' credit-debt approach to money, and offered the community of users the chance to adjust the overdraft and surplus limits to their context and needs.

The study shows that the positioning of users is also important in the presented imaginaries of development. As the findings presented in Chapters 5 and 6

show, in a market-inclusivism imaginary, users are beneficiaries of a monetary system; here, democratization relates to the access of a payment technology that requires less specialized knowledge to use, and facilitating the use of a complementary currency and development aid. Inclusion Coin permitted this scalability, since anyone with a mobile phone could register for the program and gain access to the digital currency. The findings presented in Chapter 6 indicate that, from a market-inclusivism perspective, money users do not need to care about who issues money and how it is issued, and should simply follow the rules of the monetary system. In other words, monetary design is silenced, and questions of money creation are dealt with by those who control the payment technology, especially those who manage development aid.

In contrast, the participation of users is at the core of the monetary-emancipation perspective. Communities of users are fundamental as they are stewards who are supposed to understand the needs of members, and collectively participate in modulating activities that will steer the representational and vernacular activities in the monetary arrangement. This is why it was important for the GFI project to collaborate with CBOs and organize representational activities: to train and educate the members in mutual credit systems. Unfortunately, as the findings presented in Chapter 7 show, not all members were aware of their role as money issuers in a mutual credit system, and some still used MTCr based on a commodity approach.

As my findings in Chapters 5 and 6 show, the market-inclusivism and monetary-emancipation imaginaries were contradictory, and afforded particular modulating, representational, and vernacular activities. The internal debates offered a space for Inclusion Economics and the Research Team to argue for their imaginaries; as a result, some actors were excluded and others included. In other words, the monetary arrangement was reconfigured.

My contribution to the literature that discusses the imaginaries of external actors in relation to complementary currencies is twofold. First, I agree with Kuk and Giamporcaro (2024) that imaginaries can be used to prefigure a complementary currency, and contribute with two particular imaginaries that relate to a complementary currency being implemented in the context of scarcity: market inclusivism and monetary emancipation. Second, I contribute knowledge by offering an explanation as to how imaginaries interact with each other and shape the trajectory of a complementary currency. This knowledge was generated through two steps. The first step was to describe imaginaries in terms of their political-economic ideas, monetary approaches, and positioning of users. This permitted me, in the second step, to show how these imaginaries informed the modulating activities that defined who was included and

excluded in the monetary arrangement, and influenced the translation process carried out through the organizing activities.

Recognizing how imaginaries influence the organizing of a complementary currency points to a limitation of the study, and avenues for further research. While the study showed how the Kenyan communities translated the external ideas to their local context, the access to empirical data was limited.[5] In this sense, it was not possible to study the imaginary that guided the Kenyan communities in organizing the complementary currency and how it influenced their association processes in the monetary arrangement. Zapata-Campos et al. (2023) have explored the rationales of Kenyan communities in adopting innovations introduced by external actors. However, the political economic-ideas, monetary approaches, participation mechanisms, and other variables that characterize such imaginaries need further research in order to be understood.

2. The role of external actors in organizing complementary currencies

The recognition of different imaginaries and their influence on the organizing of a complementary currency opens up for discussion regarding the role of external actors. Blanc and Fare (2013) argue that external actors, and government actors in particular, can have support roles within implementation processes. The findings presented in Chapters 6 and 7 show how external actors (i.e. Inclusion Economics and the researchers) have an active participation in the shaping of the complementary currency through their participation on modulating and representational activities and the materialization of their imaginary. In particular, the external actors influenced the organizing process by furthering their imaginaries of development, having financial control over the payment technology, and possessing specialized knowledge required for decision making. I have discussed development imaginaries in detail, so will now elaborate on the importance of funding and specialized knowledge.

To date, the complementary currency literature discusses financing as a cost issue (CCIA, 2014; Schroeder, 2015). However, this study's findings suggest that, when implementing a complementary currency in the context of scarcity,

[5] See Chapter 3 – Empirical data.

financing is relevant not only from a cost perspective, but in terms of which imaginaries are prioritized.

In the context of scarcity, the financing of a payment technology can be used by external actors to influence the monetary arrangement. Faria et al. (2020) have shown that communities not being involved in decisions regarding payment technologies hinders their ability to access and make use of the data emerging from transactions and control the source code of the technologies. The findings presented in Chapters 6 and 7 suggest that the financing of payment technologies also has implications for the imaginaries that are prioritized. Where the payment technology is funded by an external actor that allows the community to use the complementary currency free of charge (in the case of this research as long as the GFI project was funded), the local community is, to some extent, subject to external actors. Thus, when the Kenyan community was given two payment technologies to choose from, it was felt that these translated the development imaginaries of the external actors, and there was no opportunity for the local communities to create a complementary currency from scratch.

Moreover, no matter how open an external actor is to listen to local communities, if communities do not control the payment technology or have the resources to make their own developments, they need to reach a consensus with external actors. In the case of Circuits, the local communities were able to influence some of the modulating activities, such as overdraft/surplus limits, but the representational activities, such as the coding of any particular change in Circuits, needed to be paid for using conventional money. In this sense, any change in the payment technology required the approval of the Research Team, as the GFI project was paying for the Circuits consultants. Similarly, Inclusion Economics did not require local community participation in any representational or modulating activities relating to Inclusion Coin. In other words, in order for communities to be totally independent, they need to take control of the payment technology; however, this can be difficult due to lack of money or specialized knowledge.

The second insight relates to the need for specialized knowledge. As shown by Sanches et al. (2022), in the process of designing a complementary currency, asymmetry of knowledge can hinder the participation of users. In line with this argument, my findings suggest that this is the case not only for technological capabilities from an engineering perspective, but also for specialized monetary and economic knowledge.

The claims of participation and autonomy on the part of the Kenyan Merchants, as discussed in Chapter 6, indicate the importance that they gave to ownership and participation. Based on the findings presented in Chapter 7, it is not evident that the Kenyan merchants were conscious of the benefits that the approach of and participation in the two payment technologies afforded. However, as the debates presented in Chapter 5 and 6 show, Inclusion Economics and the Research Team, however, were aware of these. Thus, a significant level of familiarity with monetary theory is needed for local communities to fully participate in modulating activities, and those with specialized knowledge can dominate decision-making processes and have greater influence on representational activities.

My findings show that local communities need to be able to own payment technologies and understand about monetary design, otherwise relations of dependence with external actors will exist. Literature studying cases where external actors participated in the development of a complementary currencies has already shown the implications of external actors having control over payment technologies (see e.g. Faria, 2020), and the imbalances generated by a lack of software-development capabilities (see e.g. Sanches et al., 2022). My findings show that knowledge asymmetries with regard to economic theory also creates a relation of dependence between communities and external actors. The socio-technical perspective taken permitted me to show how economic ideas shaped the modulating, representational, and vernacular activities during the implementation process. Future research could explore approaches to reducing these knowledge asymmetries, and exploring how this can influence the participation of local communities in modulating and representational activities.

D. Fighting the lack of money in the context of scarcity – practical implications

Throughout my study, I was confronted with situations of scarcity that were exacerbated by COVID-19. This was a constant motivation for me to carry out the research and contribute with knowledge about the mechanisms being used to combat poverty. The United Nations' Secretary-General Special Advocate for Inclusive Finance for Development (UNSGSA) recognizes that, despite the fact that 71% of people in developing countries have an account with a financial institution or a mobile-money service provider, this does not

automatically result in people spending, saving, borrowing, and planning in ways that benefit them in the future (UNSGSA, 2023). Seeing people struggling and in need of solutions reaffirmed the fact that societies need multiple mechanisms to combat poverty, in particular increasing access to safe, affordable, and effective solutions in the form of complementary currencies.

This study showed that there are multiple ways for low-income communities to access conventional monetary systems or create their own monetary arrangements. I want to share an experience I had during my visit to Kenya in October 2022, which I believe encapsulates the diversity of actors that follow their imaginaries regarding how to solve the scarcity of money among individuals living in poverty.

I had been following Ellen for a few days as she trained the Progress Warriors in mutual credit systems and spread the idea of complementary currencies to local communities. Mama Alva, the president of the Progress Warriors, had arranged for us to meet with a CBO that was interested in learning about MTCr. As was now customary, Ellen took out her cardboard signs and explained how the mutual credit system helped people to trade by clearing out accounts, without the need for conventional money. As we were preparing to leave, a young man approached the crowd and began to speak (Image 7).

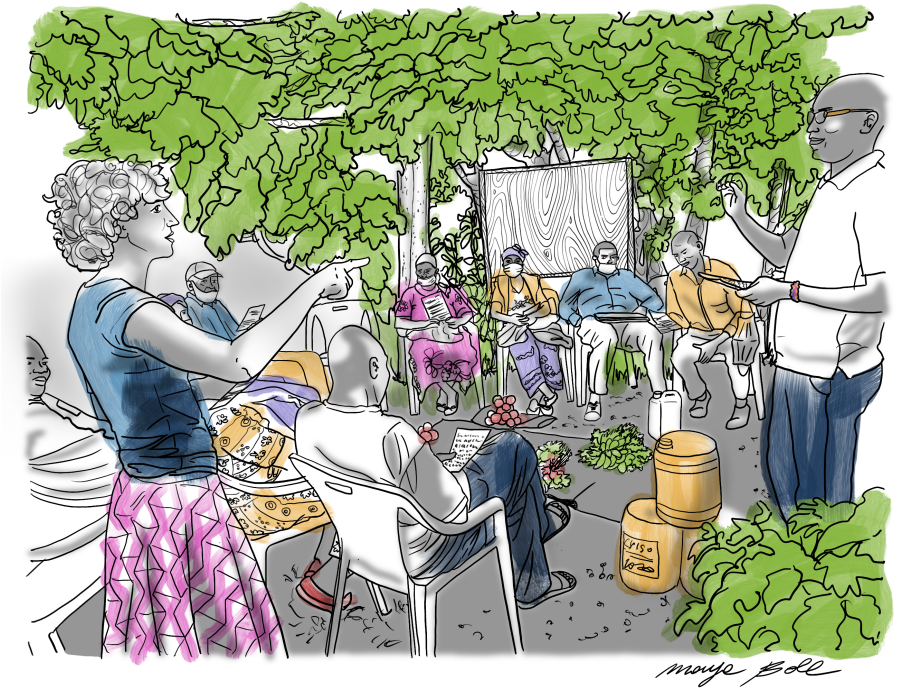

Image 7: Ellen and the salesman.
Source: Illustration by Maya Boll, based on the author's collection.[6]

The young man was selling micro-credits. As he spoke to the people gathered, Ellen and I studied a brochure in English that the salesman had distributed. The document offered people "an alternative for economic and personal growth to meet financial needs".[7] Suddenly, Ellen interrupted the salesman, asking about the interest rates and questioning why people had to pay just to apply. The salesman referred her to the brochure and continued to address the crowd in the local language.

Studies have found that micro-credits have modest positive impacts (Buckley, 1997; Banerjee et al., 2015a; Banerjee et al., 2015b; Smits & Günther, 2017), and in many cases ultimately exploit those who take out loan (Sherratt, 2015).

[6] As discussed in Chapter 3 – Ethics, the original photograph was not possible to reproduce due to not having permission for this from everyone pictured; hence to protect people's identities, an illustration based on the original photograph was commissioned.

[7] MFI pamphlet, September 2021.

Moreover, some of these credit institutions make use of predatory practices, as Robert, a Kenyan researcher in the GFI project, explained to me during an interview. Robert is the person in his community that people come to for help and sound advice, and one day one of his childhood friends called him in desperation. Robert explained that "some thugs representing local micro-credit businesses were collecting money from late payers and had locked a group of women in the back of a van to get their families to pay back their loans".8 Fortunately, Robert contacted the police and persuaded the men to release the women or face kidnapping charges. This situation could have been much worse.

After the salesman had finished his presentation, he left. Ellen immediately expressed her concerns regarding microcredits, and implored the gathered people to avoid them as a way to access conventional money, arguing that they may help in meeting short-term needs but could end up damaging long-term wellbeing. She also reminded them that complementary currencies would help them to trade and not cost them anything; they would "create their own money". Perplexed by what had just happened, the audience nodded in agreement with Ellen's assertions.

People offering their financial products with the promise of economic wellbeing is nothing new to people living in the context of scarcity (Zapata-Campos et al., 2023). This encounter between Ellen and the salesman (or what he represented) also relates to my findings regarding how different imaginaries address the scarcity of money.

The financial-inclusion agenda, and microcredits in particular, provide access to conventional money. This concept brings together actors who are interested in "addressing the financial needs of the materially poor through large-scale, market-driven interventions" (Schwittay, 2011b:384). In the financial-inclusion agenda, the main goal is to make financial products accessible to people in poverty. Hence, start-ups, MFIs, and even multilateral organizations (e.g. The World Bank) are constantly arranging financial technologies, regulations, and business models that promise to lower costs and improve services for the poor (Schwittay, 2011b; 2014; Maurer, 2015a; Langley & Leyshon, 2017; 2022). The financial-inclusion agenda assumes that money is only accessible through the mainstream financial system, and positions the poor as customers of financial, insurance, and monetary services. In other

[8] 211010_Interview with Robert

words, the poor's lack of access to conventional money becomes an opportunity for profit for other actors, such as MFIs.

Not all mechanisms that seek to eradicate a lack of money are predatory but, as I have shown, some are more considerate with regard to the situations and needs of users than others, or enable more democratic participation in their development. The point I want to make is that while the goal can be the same, the means can be different. This was the case in the GFI project, where different imaginaries regarding how to use complementary currency had the same purpose – to eradicate poverty – but still collided.

This thesis invites you to reflect on the role of external actors in introducing complementary currencies in the context of scarcity. Is it the role of these actors to give people the fish, or to teach them how to fish? In other words, should people be the beneficiaries of complementary currencies for development aid, or stewards of money? In the case of the GFI project, it is possible to conclude that both approaches were well-intentioned. On the one hand, I agree that people should organize and act by themselves and think that self-organization is a way for people to take control of their problems and achieve long-term transformation. On the other hand, after seeing the conditions of insecurity in which some people live, simply using complementary currencies can give people access to development aid and satisfy short-term existential needs.

It is not an easy discussion, as there is a trade-off between short-term survival and long-term transformation. But, as Maathai (2009:70) argues: "unless the people understand that they are expected to empower themselves after the donors are gone, they will not take the appropriate steps: not because they do not like what the donors are doing, or because the help was given for them for free, but because they do not see its value". I agree with Maathai, and argue that the role of external actors depends on the communities themselves and what their capacities, needs, and desires guide them to do with the resources and knowledge they are exposed to.

Ultimately, it is the wellbeing of impoverished individuals what is at stake. In this sense, the findings of this study offer practical considerations that relate to grassroots communities, development organizations, social entrepreneurs, and local governments, who view complementary currencies as opportunities to support poor populations. Based on the study's findings, I propose a series of guidelines that can be used by interested actors who seek to organize complementary currencies.

Try to understand each other imaginaries and co-construct, if possible, a shared one. My study shows the influence of imaginaries in the implementation of complementary currencies. Before a project starts, it is important to align project members; hence, I suggest ensuring open dialogs about each actor's imaginaries. These dialogs can co-construct imaginaries in terms of shared political-economic ideas, monetary approaches, and the positioning of users. Vernacular activities are key in this phase as they enable interactions that can benefit the generation local knowledge and generation of trust amongst participants. The controversies traced in this thesis can be used as examples of the types of discussions that can emerge, and can be adapted to the particularities of a community that is organizing its own complementary currency.

Share, learn, and build upon different activities. My study has recognized the emergence of multiple activities in relation to organizing money. When encountering specific challenges in the organizing process, I suggest thinking in terms of modulating, representational, and vernacular activities in order to identify what needs to be done. These are overall classifications that should serve as inspiration for responding to local contexts and needs. Modulating activities can help to arrive at common behavioral agreements, representational activities to transfer ideas throughout the arrangement, and vernacular activities to mobilize the collective and individuals and facilitate personal interactions. It is important to consider that individuals from low-income backgrounds may not have been exposed to finance or management theories. However, they can still comprehend and participate in discussions by using their local terminology and drawing on their experiences.

Focus on the process, rather than the goal. Success in organizing a complementary currency is not assured. Hence, actors should make use of the implementation process to facilitate financial education (e.g., credit, savings, planning), small-business financial management (e.g., pricing and costs), and project planning (e.g., needs identification, resource allocation, budgeting). By strengthening capabilities, knowledge asymmetries can be reduced, and participants can obtain a better understating of why complementary currencies are relevant to the collective and to themselves. Moreover, to strengthen the monetary arrangement it is useful to create cycles of modulating, representational, and vernacular activities.

Technology is not a neutral tool, and should be approached with attentiveness. It is important to consider both the ideas contained within technology and how it interacts with people. The findings of this study show that payment technologies are representations of different political-economic ideas,

approaches to money, and user participation. In order to ensure inclusivity throughout the implementation process, I suggest learning about how people interact with technology and avoiding the presumption that digitalization is relevant in all cases. Moreover, it is key to decrease any knowledge asymmetries by creating educational toolkits and case studies, to facilitate learning about the economic and engineering implications of certain decisions.

Every actor should recognize the responsibility of their participation. This study demonstrates that external actors do not simply assist in the process of implementing complementary currencies, but have important roles in the process. I suggest that these roles, and their power, should be made clear, and not considered to be unimportant. In this sense, the relations between external actors and communities should be somehow regulated, as a sign of mutual respect. Local participants should also recognize the responsibility in the process and take control of their own transformative project. As Hazel et al. (1970b) state: "freedom is free of the need to be free" or in other words, knowledge and experiences should be treated with care and respect, and trusting each other's capacity to learn, reflect, and transform is a fundamental step.

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Appendix

A. Descriptive table of empirical data

Name	Type	Date	Description
Inclusion Economics collaboration with BPO	Video in Facebook	180605	Video published on Inclusion Economics' Facebook on
GFI grant application	Researcher document	180801	GFI application, in which the research and activity plan are stated
Fieldnotes from the first visit to Kenya	Fieldnotes	191114	Detailed daily notes of every day of my first visit to Kenya with Ellen
Inclusion Economics: white paper	Inclusion Economics document	200113	White paper for Inclusion Economics
Inclusion Coin question session	Transcript of the decision meeting	200327	The session where the community had the chance to ask Inclusion Economics representatives about the function of their payment technology
Payment technologies comparative table	Researcher document	200330	A table in which Circuits and Inclusion Coin presented their perspectives on several variables
Community meeting regarding payment technology	Transcript of the decision meeting	200407	The decision meeting where the Progress Warriors decided on the payment technology
Management discussion regarding roles and different monetary approaches	Transcript of management meeting	200417	The meeting where the GFI discussed the role and activities of each member following the decision regarding payment technology

Name	Type	Date	Description
Sylvester	Interview	200501	Interview following the decision regarding payment technology
Xavier	Interview	200501	Interview following the decision regarding payment technology
Charles	Interview	200507	Interview following the decision regarding payment technology
Josephine	Interview	200518	Interview following the decision regarding payment technology
Barter Circle Workshop 3_ Business Plan and Operations	Training material	200522	Training material for the Progress Warriors
Barter Circle Workshop 2 _ Governance & Business Plan	Training material	200522	Training material for the Progress Warriors
Barter Circle Workshop 1 _ Introduction & Governance	Training material	200522	Training material for the Progress Warriors
Guidelines for Membership	Progress Warriors internal document	200601	Guidelines for MTCr membership
Research Team on Microcredits	Transcript of management meeting	200612	Howard and Ellen propose to the research team a microcredits idea relating to MTCr
Update regarding the impact of COVID on the Kibuye Market	Transcript of management meeting	200616	The community voiced the need for help from the researchers. This re-introduced the possibility of developing microcredits or cash transfers in connection with MTCr
Email on slow MTCr registration	Internal email	200639	Email regarding why the registration of MTCr was slow, and some hypotheses from the Kenyan side
Conditional cash transfer	Transcript of management meeting	200707	The Research Team asks the Progress Warriors for ideas about how to invest in SCI
Moses	Interview	200801	Interview following the decision regarding payment technology
Ellen	Interview	200801	Interview following the decision regarding payment technology

Name	Type	Date	Description
CC+strategic investment	Researcher document	200810	Application to SCANDEV for redistribution of budget to fund SCI
SIF update	Transcript of management meeting	210118	Ellen asks the local team about the implementation of the fund. It has been more than six months since the budget was approved, but there has been no implementation or development in the field
Conditioned_Investment_Maendeleo	Progress Warriors internal document	210118	Progress Warriors' rules regarding SCI distribution
Conditioned_Investment_Maendeleo	Progress Warriors internal document	210118	Regulations for how SCI disbursement will function between the Research Team and the Progress Warriors
Circuits website	Website	210410 & 221201	Circuits website with technical, organizational information about the payment technology
MTCr FUND MAENDELEO TRADING CREDIT	Progress Warriors internal document	210518	Regulations for accessing and using the MTCR Fund
SCI – Sanctions	Internal email	210518	Discussion regarding the automatization of sanctions
SIF and UBI	Transcript of management meeting	210528	Howard presents the idea of adding a UBI using German funds and working more closely for MTCr
Ellen prioritizing what needs to be automatized in Circuits	Internal email	210531	Discussing the development of MTCr
Howard and Moses identify problems with implementation of SCI	Internal email	210817	Email discussing SCI and the implementation of Circuits
Mary	Interview	210910	Interview with Mary during the second visit to Kenya
Ellen and Mama Alva	Audio recording	210920	Ellen and Mama Alva talk about MTCr and how it is going
Laila the wholesaler	Audio recording	210920	Ellen and Laila talk about MTCr and the risks
Margarethe	Audio recording	210920	Margarethe talks about MTCr and people in debt
Peter and Thaddeus	Audio recording	210920	Peter and Thaddeus explain how they use the MTCr app
Peter on credit limit	Audio recording	210920	Peter explains how he uses MTCr
Peter on available balance	Audio recording	210920	Peter explains how he uses MTCr
Mama Alva on how she uses MTCr	Audio recording	210920	Mama Alva talks about credit limits

Name	Type	Date	Description
Ellen and Mama Alva	Audio recording	210920	Ellen and Mama Alva talk about MTCr and how it is going
Peter and Thaddeus II	Audio recording	210920	Peter and Thaddeus explain how they use the MTCr app
Mama Alva on challenges	Audio recording	210920	Mama Alva on challenges in the implementation of the MTCr
Steven and his experiences of MTCr	Audio recording	210922	Steven's experiences with MTCr and Market Day
Ellen's research plan is sent to Kenyan researchers after fieldwork	Internal email	211004	Activity plan for the Kenyan team after the fieldwork visit where Ellen identified problems with MTCr function
Moses	Interview	211008	Interview about the state of the project and the current challenges
Robert	Interview	211010	Interview following the decision regarding payment technology
MTCR Constitution	Progress Warriors internal document	211018	By-laws of the Progress Warriors
Research article Inclusion Economics 1	Document	211118	Research document presenting the story of Inclusion Economics
MTCr brochure	Researcher document	220108	Document developed by the researchers to spread MTCr
Training manual on MTCr	Researcher document	220214	Document developed by the researchers to spread MTCr
Research article Inclusion Economics 2	Document	230802	Research document presenting the story of Inclusion Economics
Meeting minutes of the research team	Meeting minutes	Throughout the project	Meeting minutes with topics discussed by the research team in their management meetings (more than 20)

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Organizing Money

Communities are increasingly turning to complementary currencies as an alternative approach to addressing the problem of poverty caused by the scarcity of conventional money. But what does the process of implementing such currencies look like, and how do they reshape the social, economic, and technical relations in which they operate?

Using a socio-technical perspective, this research traces the Grassroots Financial Innovation project in Kenya, and the implementation of a complementary currency from 2018 to 2023. This study reframes implementation as an evolving set of organizing activities and explores how imaginaries of development shape and are shaped during the implementation of a complementary currency.

This book offers valuable insights for scholars, development agencies, and grassroots communities, interested in the opportunities and responsibilities of implementing complementary currencies.

Juan Ocampo is a Colombian engineer and social scientist. As an engineer he is curious about technology development and implementation which, as a social scientist, he studies with a concern for societal and environmental issues.

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