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# DIGITAL COMMUNITY CURRENCIES AND LOW-INCOME WOMEN: CAN THE DIGITALIZATION OF CCS ENHANCE GENDER EQUALITY?

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**ABSTRACT:**

This paper explores the potential of digital community currencies (CCs) to advance gender equality, focusing on the case of the Mumbuca digital CC in Maricá, Brazil. While digital CCs have been increasingly studied, their gendered impacts remain underexplored. The Mumbuca currency, implemented through a municipal income transfer program, primarily benefits low-income residents (most of whom are women) and is accessible via magnetic card and the E-Dinheiro app. The study examines the Mumbuca CC from both micro and macro perspectives. At the micro level, it assesses how the currency can enhance women's financial access, autonomy, and economic participation, while also identifying barriers to inclusion. At the macro level, it considers systemic challenges, including the lack of gender-disaggregated data, the sustainability of the digital currency model, and its interaction with Brazil's broader financial digitalization. Drawing on literature on digital financial services and limited official data, the study suggests that while the Mumbuca CC has the potential to promote gender equality, this potential is not fully realized due to the lack of data and the absence of a gender-sensitive design. The paper concludes that digital CC initiatives should be developed with a gender lens to effectively empower women and address structural inequalities in local contexts.

**KEYWORDS:**

Digital Community Currency; Mumbuca; Women; Gender-Sensitive-Design; Gender Equality

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## 1. INTRODUCTION

The financial ecosystems of various countries have undergone a significant digital transformation, evident in the advancement of Central Bank Digital Currencies (CBDCs), instant payment systems (as seen in Brazil and India[1]), and e-money (such as in Kenya[2]). This trend has also extended to community currencies (CCs). Different nations have begun to implement digital CCs, utilizing technologies like blockchain (as with Sarafu in several African countries[3]).

In the context of digitalization, a less explored topic in the literature concerns the potential benefits and barriers of digitalization of CCs for women who use them. This paper seeks to fill this gap, by discussing the potential and challenges of digital CCs in promoting gender equality, with a specific focus on the Brazilian experience. The research analyzes the Mumbuca digital CC, implemented by the municipal government in the Brazilian city, called Maricá, as part of a public income transfer policy aimed at fostering local economic development and improving the quality of life of low-income residents (Silva et al., 2020). Mumbuca digital CC is accessible through a magnetic card and an app called E-Dinheiro, which provides several digital financial services to its users (Instituto E-Dinheiro Brasil Maricá, 2018, 2021, 2024b, 2024c).

The research analyzes the Mumbuca digital CC from a gender perspective across two dimensions: micro and macro. At the micro level, the study explores the benefits and challenges that the digital CC and the E-Dinheiro app may present for women in Maricá. At the macro level, it examines the opportunities and challenges associated with the digital CC and the E-Dinheiro platform from a broader, systemic perspective rather than an individual one.

The methodological approach adopted in this analysis draws primarily on the existing literature, as well as official reports and documents from the Municipality of Maricá, Banco Mumbuca (the institution that issues and distributes the Mumbuca digital CC), Instituto E-Dinheiro (the entity responsible for the E-Dinheiro platform, through which Mumbuca transactions are carried out and financial services are provided), and Brazilian government authorities.

A clear limitation of this paper lies in the lack of available data (particularly gender-disaggregated data) which constrains the scope of the analysis and gives the study an exploratory character. Nevertheless, based on the research conducted, the paper highlights the potential of digital community currencies as tools for promoting gender equality among women users. While the primary focus is on the digital CC implemented in the city of Maricá, the benefits, challenges, and opportunities identified are potentially relevant to various contexts around the world. Although these dynamics may manifest differently depending on the local setting, they underscore the importance of incorporating a gender lens into the design and implementation of digital community currencies.

This research is structured into three sections, in addition to the introduction (section 1). Section 2 offers a brief overview of digital community currencies and their connection to gender equality, followed by an introduction to the Mumbuca digital CC. Section 3 discusses the Mumbuca digital CC from both micro and macro perspectives using a gender lens. Finally, Section 4 presents the concluding remarks on the topic.

## 2. LITERATURE REVIEW: DIGITAL FINANCE INSTRUMENTS AND GENDER

Digital finance instruments can play an important role in promoting gender equality (see, for instance, AFI, 2016; OECD, 2022; UN Women, 2023). Given the lack of literature specifically addressing digital community currencies (digital CCs) from a gender perspective and considering that digital CCs can be regarded as a particular type of digital finance instrument, this section identifies the main benefits and challenges highlighted in the existing literature concerning the relationship between digital finance and gender equality.

### *2.1 Potential benefits*

There are four potential benefits that digital financial services can offer women: (1) cost and time savings; (2) greater control over their financial lives; (3) empowerment through enabling female entrepreneurship; and (4) facilitating the receipt of social benefits.

First, cost and time savings. Digitalization can generate cost and time savings by reducing the distance between the supply of and demand for financial services (GPFI, 2020; UNSGSA et al., 2023). With digital financial services, women

[1] In Brazil, the instant payment system is called Pix, and is analyzed in section 3.2.3. In India, the instant payment system is called Unified Payments Interface (UPI) (BRICS, 2021).
[2] In Kenya, the e-money system implemented is called M-Pesa. For more, see: Ndung'u (2018); Reed et al. (2020).
[3] See: Mattson et al. (2022); Ba et al. (2023).

no longer need to visit physical branches; they can simply use electronic devices to access the internet. This is particularly advantageous for those who live in isolated or rural areas.

Second, greater control and autonomy over women financial lives. Digitalization can give women greater control over the money flowing into and out of their accounts (GPFI, 2020), which has the potential to contribute to their economic empowerment, especially in situations where marital control may be an issue. Additionally, having more control over their finances may enable help women save or invest their money more effectively (GPFI, 2020; Kulkarni and Ghosh, 2021), while also enhancing their decision-making power and economic independence (Kulkarni and Ghosh, 2021).

Third, empowerment through enabling female entrepreneurship. Digitalization can foster greater female entrepreneurship by improving women's access to invest in their own businesses, particularly through microfinance services and small-value credit lines for low-income individuals and entrepreneurial entities (Soares, 2018). Access to microcredit has been shown to be a powerful tool for promoting female empowerment across various dimensions (economic, political, social etc.), contributing to poverty reduction and addressing financial exclusion among women[4] (Buchenrieder et al., 2019; Kusi et al., 2019; Sahu et al., 2021; Fayyaz et al., 2022).

Fourth, digitalization of financial services facilitates the receipt of social benefits. This is especially significant for women in low-income communities, who are beneficiaries of these kinds of benefits. By leveraging digital platforms, these services enable women to access financial resources more efficiently, avoiding the logistical challenges of traditional banking and ensuring more timely and secure receipt of funds (GPFI, 2020). Moreover, considering that women are generally the primary individuals responsible for domestic work and for the care of children and family members, their available time tends to be more limited compared to men's (European Institute for Gender Equality, 2021; Varela and Moridi, 2024), making time and cost savings even more valuable.

This accessibility not only improves the efficiency of resource distribution but also enhances women's financial autonomy. By having control over their accounts and the ability to manage their transactions independently, women are empowered to make financial decisions that directly benefit themselves and their households (GPFI, 2020). Moreover, digital financial platforms open opportunities for women to engage in other financial activities, such as saving, budgeting, and even start or expand their businesses, fostering greater economic independence and empowerment.

### *2.2 Possible barriers*

In addition to the advantages that the digitalization of financial services can offer to women and, consequently, contribute to gender equality, there are also potential barriers that could prevent women from accessing digital financial instruments. Here we highlight three: (1) high costs of data plans and electronic devices; (2) digital and financial illiteracy; and (3) gender social norms.

The first challenge relates to the high costs associated with obtaining data plans and electronic devices. While this is an obstacle for both men and women, it disproportionately impacts women due to their typically lower purchasing power (World Bank Group, 2021).

A second significant obstacle is digital and financial literacy (World Bank Group, 2021). The digitalization of financial services requires a minimum knowledge of finance and technology use.

The third and last barrier concerns gender social norms. Gender bias in social norms is a problem worldwide affecting both advanced and developing economies, with 9 out of 10 individuals - men and women alike - holding biases against women (UNDP, 2023, p. 3). These gender norms are particularly concerning due to their ability to profoundly influence attitudes, social relationships, and power dynamics within society (UNDP, 2023).

Such social norms can create barriers for women seeking access to digital financial services (World Bank Group, 2021). In cultures that subjugate women, restrictions on internet access are common. For example, in Pakistan, 38% of women cite family disapproval as a reason for not owning a phone, compared to only 7% of men (World Bank Group, 2021, p. 18).

[4] There are also critical studies regarding this assertion, arguing that it is inefficient due to various factors, such as the high default rates among borrowers and elevated interest rates (Levin, 2012). Additionally, some researchers contend that microcredit alone is insufficient; it should be accompanied by other measures, such as financial education for borrowers and monitoring of investments (Khandker et al., 2016).

### *2.3 Digital community currencies and gender*

Community currencies are complementary currencies whose circulation is limited to a specific locality or region[5]. They are not intended to replace the official currency, but rather to stimulate economic and social development in the areas where they circulate. Such currencies play an important role in development, since they can help achieve twelve of the seventeen Sustainable Development Goals (SDGs) outlined in the 2030 Agenda, including gender equality (SDG 5) (Escobar et al., 2020; Diniz et al., 2024).

A community currency system can enable the recognition and compensation for work performed by women that is often overlooked, such as domestic and caregiving activities (Escobar et al., 2020; Seyfang, 2001). CCs can also promote the empowerment of women by ensuring equal rights to economic resources and access to financial services (Escobar et al., 2020; Seyfang, 2001).

In the case of digital CCs, they can facilitate the delivery of digital financial services (e.g., payments, loans, savings, remittances, and insurance) through digital channels including mobile phones, ATMs, POS terminals, NFC-enabled devices, and electronically enabled cards (AFI, 2016).

Digital CCs are a relatively recent topic, but the literature on the subject has been growing[6]. However, there is a noticeable lack of focus on digital community currencies from a gender perspective. While several studies examine how digitalization, particularly in the context of digital financial services, can promote gender equality and the challenges it faces (GPFI, 2020; UNSDG, 2020; Kulkarni and Ghosh, 2021; World Bank Group, 2021; UNSGSA et al., 2023), there remains a gap in understanding whether and how digital CCs can contribute to this goal.

There are many examples where women make up the majority of community currencies users, both analog and digital (Irene, n.d.; Seyfang, 2001; Avanzo, 2019; Prefeitura de Maricá, 2021;). So why are there no studies focused on them?

According to Perez (2019), the lack of gender-specific information is generally not intentional or malicious, but rather the result of a way of thinking that has prevailed for millennia, becoming a "non-thinking." This mindset needs to change, and conducting gender-focused studies is one of the steps toward achieving that.

Therefore, this research aims to address the gap concerning digital CCs and gender, with a focus on the Brazilian case of the Mumbuca digital CC.

## 3. METHODOLOGICAL APPROACH

This study adopts a qualitative and exploratory approach aimed at analyzing the potential of Mumbuca digital CC to promote gender equality. A key limitation of this research is the lack of available data, particularly the absence of sex-disaggregated information. For this reason, the study relies on broader national-level data from Brazil to conduct a qualitative and exploratory analysis of the topics discussed.

Just as data on the Mumbuca digital CC are limited, the literature specifically addressing digital community currencies and gender is also scarce. Therefore, this analysis examines the Mumbuca digital CC through the lens of the potential benefits and barriers identified in Section 2, about the literature on digital financial instruments and gender equality.

To this end, the analysis draws primarily on official reports and documents issued by the Municipality of Maricá, Banco Mumbuca, and Instituto E-Dinheiro, which operates the digital platform that supports the currency's circulation. Complementary sources include public reports from the Central Bank of Brazil, the United Nations Development Programme (UNDP), the Brazilian Network Information Center (Nic.Br), and national statistics from the Brazilian Institute of Geography and Statistics (IBGE).

The research analyzes the Mumbuca digital CC from a gender perspective across two dimensions: micro and macro. At the micro level, the study examines the benefits and challenges that the digital CC and the E-Dinheiro app may pose for women in Maricá. Drawing on the literature and official reports, it assesses the four potential advantages and three barriers previously identified in Section 2, applying them to the specific case of the Mumbuca digital CC.

[5] This is a general definition, but community currencies can lead to different conceptual discussions depending on their design and specific characteristics. For more on this topic, see: Metzger et al. (2023).
[6] Several works discuss the topic. To list some: Faria (2018), Diniz et al. (2021); Mattsson et al. (2022); Silva de Faria et al., (2022); Ba (2023); Mattson et al. (2023); Wu et al. (2023).

On the other hand, at the macro level, the paper examines the opportunities and challenges associated with this digital CC and the E-Dinheiro app from a broader, systemic perspective, rather than an individual one. The paper highlights three key considerations for decision-makers involved in digital CC initiatives: (1) the importance of gender-disaggregated data, (2) the need for long-term planning to ensure the sustainability of the digital CCs, and (3) the alignment of digital CC projects with the ongoing digitalization of the Brazilian financial ecosystem.

Building on this methodological approach, the research ultimately seeks to propose recommendations and future research directions, integrating insights from both the micro and macro dimensions.

## 4. MUMBUCA DIGITAL CC AND THE E-DINHEIRO APP

Brazil has a long-standing history with community currencies. In the country, CCs have traditionally been linked to the establishment of Community Banks, which are responsible for issuing, managing, and circulating these currencies (Garcia, 2021a, 2021b)[7]-[8].

In general, the CCs implemented in Brazil were analog. However, some communities began to implement digital CCs, which were used through magnetic cards. The first of these was the Jamari digital CC[9], implemented in 2012, in the city of Ariquemes (Garcia, 2021a, 2021b). Launched in 2013, the Mumbuca digital CC has undoubtedly become the most well-known case of a digital CC in Brazil. It has been (and continues to be) the subject of various studies (Silva, 2020; Diniz et al., 2021; Silva de Faria et al., 2022).

The Mumbuca digital CC was created by the Municipal Government of Maricá (a city located in the State of Rio de Janeiro, Brazil), which also established the Mumbuca Community Bank to manage the currency and provide financial services to the population (Maricá, 2013). It was, therefore, a top-down initiative. This digital CC is offered electronically (hence, a digital CC) and has parity with the official currency, the Brazilian real (BRL), which is a common practice for CCs in Brazil. In other words, one unit of Mumbuca is equivalent to one BRL (Instituto E-Dinheiro Maricá and Prefeitura de Maricá, n.d.).

Initially, it was used only through magnetic cards, and its distribution has always been linked to public income transfer policies - beneficiaries received a magnetic card loaded with Mumbucas to make purchases, payments, etc. (Maricá, 2013; Prefeitura de Maricá, 2024a).

Since 2018, the Mumbuca digital CC has also been offered through an app called E-Dinheiro. This app, developed by the "social" fintech called Instituto E-Dinheiro, functions as an electronic payment system (Instituto E-Dinheiro Brasil, n.d.(b)) similar to well-known platforms like Venmo, Apple Pay or Google Pay. One of the goals of the E-Dinheiro system is to form partnerships with community banks to attract users and local businesses (Garcia, 2021a, 2021b).

The E-Dinheiro app offers banking services, most of which are free to users. It enables functions such as bill payments, purchases, and mobile recharges (Instituto E-Dinheiro Brasil, n.d.(a)). The app charges a 2% administrative fee on each transaction made with the Mumbuca digital CC in commercial establishments (Instituto E-Dinheiro Brasil Maricá, 2021). The funds collected through this administrative fee are transferred to a fund managed by the Mumbuca Community Bank. Of these funds, 40% is used to cover the bank's operating costs (employee salaries, payment of expenses, etc.) and to implement community-focused initiatives (such as financial education courses and professional training) (Instituto E-Dinheiro Brasil Maricá, 2018, 2021), while 60% is allocated to granting zero-interest or low-interest microloans in digital CC (Instituto E-Dinheiro Brasil Maricá, 2024a).

This fund also receives money (in official currency) from the Municipality of Maricá to cover social income transfer benefits, which the Mumbuca Community Bank then redistributes as digital CC to beneficiaries via the E-Dinheiro app (Diniz et al., 2021).

[7] The first Community Bank in Brazil was Banco Palmas (or Community Bank Palmas), founded in 1993, which launched and managed the CC called Palmas (Mostagi et al., 2019). Its success was so significant that the Banco Palmas case became the subject of numerous studies (Jayo et al., 2008; Place, 2011; Fare, 2015) and inspired the creation of hundreds of community banks and CCs throughout Brazil, with varying degrees of success (Garcia, 2021).

[8] For a comprehensive history of community currencies in Brazil, see Garcia (2021a; 2021b), available in Portuguese only.

[9] The Mumbuca digital CC is often mistakenly regarded as the first digital community currency in Brazil (Garcia, 2021). While it was not the first, it has been - and continues to be - the most significant success story in Brazil regarding digital community currencies.

The Mumbuca digital CC has had a significant impact on society. During the COVID-19 pandemic, the negative effects of this global health crisis were mitigated due to the use of this digital CC (Diniz et al., 2021). For instance, in November 2020 (at the peak of the pandemic), the city of Maricá reported the creation of 967 new jobs, while the state of Rio de Janeiro (where Maricá is located) saw a decline of 133,754 formal jobs (Diniz et al., 2021, p. 11).

The experience of the Mumbuca digital CC has influenced nearby cities, which began implementing their own digital CCs starting in 2021[10]. The approach has remained the same: using digital CCs as a tool for income transfer policies targeting low-income families, with these digital CCs being offered through the E-Dinheiro app to enable access to digital financial services.

### *4.1 The challenge of data scarcity regarding the Mumbuca digital CC*

Although Mumbuca digital CC has been in circulation since 2013, data concerning gender is scarce and lacks detailed insights, despite ongoing research aimed at addressing this gap (Andersen et al., 2020). Most statistics do not differentiate users by gender (Instituto E-Dinheiro Brasil Maricá, 2021) making it difficult to conduct deeper analyses in terms of gender dynamics. For example, while it was reported in 2021 that 90% of the accounts opened at the Community Bank Mumbuca (or "Banco Mumbuca") were held by women (Prefeitura de Maricá, 2021), there is little information on how these women use the currency, their economic activities, or the broader impact of the digital CC on their financial inclusion and empowerment.

In 2024, the Municipality stated (without providing specific data) that the majority of those involved with the Mumbuca digital CC are women - whether beneficiaries, merchants, or Mumbuca Community Bank employees (Prefeitura de Maricá, 2024b). However, the lack of sex-disaggregated data prevents a more comprehensive understanding of the participation and impact of this digital currency on women's economic lives.

### *4.2 Results*

The analysis of the Mumbuca digital CC from a gender perspective can be approached through two dimensions: micro and macro. On a micro level, the focus is on exploring the potential benefits and challenges that the digital CC and the E-Dinheiro app may bring to the women of Maricá. On a macro level, the discussion expands to examine the broader opportunities and challenges posed by the digital CC and the E-Dinheiro app from a wider perspective.

#### *4.2.1 Mumbuca digital CC and gender: a micro analysis*

As previously mentioned, the relationship between digital CCs and gender equality is a topic that has been scarcely explored in the literature. On the other hand, the connection between the digitalization of financial services and gender equality/women's empowerment is often discussed, making it possible to identify both the potential benefits and barriers of this relationship. In this section, we will examine how these potential benefits and barriers may (or may not) be present in the use of the Mumbuca digital CC, considering a gender perspective.

#### ***Potential benefits***

In Section 2, four potential benefits that digital financial services can offer women were highlighted: (1) cost and time savings; (2) greater control over their financial lives; (3) empowerment through female entrepreneurship; and (4) facilitation of access to social benefits.

The following section analyzes these potential benefits considering the Mumbuca Digital CC case.

The first benefit, cost and time savings, is evident with the Mumbuca digital CC. The E-Dinheiro app allows users to conduct transactions using the digital CC, in addition to providing various banking services, most of which are free to the population (Instituto E-Dinheiro Brasil, n.d.(a)). Moreover, the app claims to charge lower fees than traditional banks and credit card companies (Instituto E-Dinheiro Brasil, n.d.(a). While no comprehensive study has compared fee structures, this difference is apparent in certain cases. For example, Community Bank Mumbuca offers

[10] As of now, seven digital community currencies have been implemented: Pedra Bonita in the city of Itaboraí in 2021 (Itaboraí, 2021); Itajuru in the city of Cabo Frio in 2021 (Cabo Frio, 2021); Elefantina in the city of Porciúncula in 2022 (Porciúncula, 2022); Saquá in the city of Saquarema in 2022 (Saquarema, 2022); Caboclinho in the city of Iguaba Grande in 2022 (Iguaba Grande); and Macaíba in the city of Macaé in 2023 (Macaé, 2023).

microcredit lines in digital CC with either no interest or interest rates capped at 1% per month11-12. In addition to not offering services in digital community currencies (CCs), traditional banks tend to charge higher interest rates on microcredit lines.

The ability for women in Maricá to conduct financial transactions using digital CC directly via mobile phones eliminates the need to travel to physical bank branches for tasks such as paying bills or taking out loans. This not only saves them time and money but also enables them to allocate these resources to other important activities.

The second benefit, greater control and autonomy over women financial lives, is also evident in the case of the E-Dinheiro app and the Mumbuca digital CC. Women who receive digital CCs in their digital accounts through the app - whether due to social benefits or as entrepreneurs receiving payments in digital CCs at their businesses - can more easily monitor and manage their personal finances. The app allows users to quickly access their digital CC statements via mobile phone, providing an easy way to track spending, create budgets, and view transaction history (Instituto E-Dinheiro Brasil Maricá, 2024b).

The third benefit is empowerment through enabling female entrepreneurship. As mentioned before, microcredit has been shown to be a powerful tool for promoting female empowerment across various dimensions (economic, political, social etc.), contributing to poverty reduction and addressing financial exclusion among women13 (Buchenrieder et al., 2019; Kusi et al., 2019; Sahu et al., 2021; Fayyaz et al., 2022). In addition to lowering costs (the first benefit mentioned in this section), the E-Dinheiro app allows users to apply for microcredit lines in digital CC (Instituto E-Dinheiro Brasil Maricá, 2024c). This is crucial for women entrepreneurs who need credit to invest in their businesses or for those looking to start small businesses. By providing access to financial resources in an affordable and accessible manner, the app can play a key role in supporting women's entrepreneurial initiatives.

In the case of microcredit offered by Mumbuca Community Bank in digital CC, the process involves less bureaucracy compared to traditional banks, which typically require various documents and guarantees from borrowers. At Bank Mumbuca, no collateral is required. However, to access credit, borrowers must form groups, a system known as "solidarity guarantee" (Instituto E-Dinheiro Brasil Maricá, 2024a). Each group member receives the credit in digital CC individually in their own digital account on the E-Dinheiro app. The solidarity guarantee works by having the group members act as guarantors for one another. Payments are made collectively in the group's name, meaning that if one member is unable to pay their share when the loan repayment is due, the other group members must cover the shortfall (Instituto E-Dinheiro Brasil Maricá, 2024a).

Another advantage over traditional banks is the fees involved. Loans provided by Mumbuca Community Bank are interest-free or lower than traditional banks14, and there is no charge for the so-called "credit administration fee" (Instituto E-Dinheiro Brasil Maricá, 2024a). This makes the microcredit program more accessible and affordable for women entrepreneurs, reducing financial barriers to starting or growing their businesses.

The fourth and final benefit is the ease of receiving social benefits. The Mumbuca digital CC and the E-Dinheiro app provide a clear example of this advantage. In Maricá, the injection of digital CCs into the local economy occurs as part of a public income transfer policy for low-income residents (Silva et al., 2020). This method not only reduces bureaucratic delays but also minimizes the need for physical interactions with banks or government offices, both of which can be particularly burdensome for women managing household duties or small businesses.

In 2021, 90% of the accounts opened at Community Bank Mumbuca were held by women (Prefeitura de Maricá, 2021). This elevated percentage highlights the central role women play in the program, as they are often the direct beneficiaries of social programs aimed at improving family welfare (Prefeitura de Maricá, 2024c). The digitalization

11 The E-Dinheiro app charges a 2% fee on each transaction made at commercial establishments. The funds collected from this fee are deposited into a pool managed by the Community Bank Mumbuca. Of these funds, 60% are allocated to providing loans to the community (Instituto E-Dinheiro Brasil Maricá, 2024a).

12 The Community Bank Mumbuca offers various microcredit lines, some interest-free and others with interest (Banco Mumbuca, 2024): (1) microcredit line for purchasing furniture and appliances or for home renovations—interest-free; (2) microcredit line for business investments: available for those looking to start a new business or invest in an existing one. Depending on the amount, interest may apply: loans up to R$ 2,000 are interest-free; loans between R$ 2,000 and R$ 5,000 incur a monthly interest rate of 1%; (3) microcredit line for agricultural or fishing investments: interest-free loans for investments in agricultural or fishing ventures.

13 There are also critical studies regarding this assertion, arguing that it is inefficient due to various factors, such as the high default rates among borrowers and elevated interest rates (Levin, 2012). Additionally, some researchers contend that microcredit alone is insufficient; it should be accompanied by other measures, such as financial education for borrowers and monitoring of investments (Khandker et al., 2016).

14 See footnote 12.

of financial services allows these women to access their social benefits quickly and conveniently, directly through their mobile phones via the E-Dinheiro app.

Moreover, as a digital platform, the E-Dinheiro app enables women to better manage their finances and access a range of other financial products and services, which can contribute to their independence and economic empowerment.

***Possible barriers***

In addition to the potential benefits, three barriers were identified that could prevent women from accessing the advantages of digital community currencies (digital CCs): (1) the high costs of data plans and electronic devices; (2) digital and financial illiteracy; and (3) gender social norms. The case of Mumbuca digital CC will be analyzed in light of these challenges.

The first challenge concerns the high costs associated with data plans and electronic devices. In 2023, 88% of the Brazilian population owned at least one mobile phone (Nic.br, 2024, p. 74), leaving 12% without access to mobile devices. Considering that the vast majority of Brazilians already own a mobile device, this does not appear to represent a major barrier in the Brazilian context.

However, a more significant issue lies in the cost of internet access. Among households with no income or earning up to three minimum wages, 87% spend more than 2% of their total income on internet connection costs (Nic.br, 2024a, p. 207). This represents a substantial financial burden, particularly for low-income families. For households earning between three and five minimum wages, this share is 41%, whereas for those earning more than five minimum wages, the percentage drops to 0% (Nic.br, 2024a, p. 207).

Moreover, 75% of low-income individuals rely on prepaid mobile plans, which, although more affordable, generally provide limited data packages (Nic.br, 2024a, p. 214). These limitations can restrict their ability to fully access and benefit from digital financial services, including the use of digital community currencies such as the Mumbuca digital CC.

Furthermore, there is a notable link between economic vulnerability and poor connectivity conditions. Among households with beneficiaries of social programs (such as income transfer programs distributed via digital CCs), 43% have a level of connectivity considered precarious, while only 9% of these households enjoy a high level of connectivity (Nic.br, 2024b, p. 112). This underscores the digital divide affecting economically disadvantaged families, making it more challenging for them to fully benefit from digital financial services.

Once again, there is a lack of data to assess whether the high costs of electronic devices and data plans affect Mumbuca digital CC users specifically. While Brazil's connectivity data is far from ideal, digital CCs can still be used despite the high costs of smartphones and data plans.

Although accessing the E-Dinheiro app requires a smartphone and an internet connection, the Mumbuca Digital CC can also be used through a physical card. This feature means that the use of a smartphone or the internet is not strictly necessary for users who conduct transactions with their cards, thereby making digital CCs more accessible to individuals without consistent digital access. However, vendors still need a smartphone with internet access to accept payments in digital CCs, whether customers pay using a card or a smartphone. To address this limitation and to encourage local businesses to join the system, during the first year of the Mumbuca Digital CC's implementation, the municipal government of Maricá lent smartphones to shop owners who could not afford one (Instituto E-Dinheiro Brasil Maricá, 2024b).

In the absence of concrete data, it is difficult to determine if the costs of smartphones and data plans have posed a barrier to the use of digital CCs. Given that most Mumbuca digital CC users are women, it would be valuable to have data analyzing specific trends, such as whether women regularly monitor and manage their digital CC finances via mobile devices, if they prefer using the card or the app for transactions, the types of data plan they use, and so forth. Having such information could reveal potential bottlenecks that could be addressed to further enhance the use of digital CCs in Maricá.

The second obstacle is digital and financial literacy (World Bank Group, 2021). Digital and financial illiteracy is a great concern in Brazil. The average financial literacy rate among the Brazilian population stands at 59.6 on a scale from 0 to 100 (CBB and FGC, 2023, p. 101). When this statistic is disaggregated by gender, age, and income, the situation is particularly concerning for women and low-income groups: women score 57.8 in financial literacy compared to 61.8 for men (CBB and FGC, 2023, p. 101). In terms of income, the financial literacy rate for individuals

earning up to two minimum wages is 56 (CBB and FGC, 2023, p. 101), illustrating significant disparities that must be addressed to promote equitable access to digital financial services.

Once again, there is a problem of lack of data, since there are no statistics available on digital and financial literacy in the city of Maricá – only for the country as a whole. However, considering the broader context of financial and digital literacy in Brazil, improving these education levels is crucial for users of digital CCs. In fact, at a seminar on the digitalization of the Mumbuca CC, one of the concerns expressed by users was their uncertainty about how to use the app (FGV, 2024a).

In Maricá, initiatives aimed at addressing this issue have existed or at least existed in the past. It has been reported that Community Bank Mumbuca previously offered financial education courses for the community (Instituto E-Dinheiro Brasil Maricá, 2021), but this does not appear to be a regular practice, as no recent information is available about the continuation of these courses.

Additionally, no evaluations have been conducted regarding the effectiveness of these courses, making it difficult to determine whether they have genuinely contributed to enhancing the financial and digital literacy of the population. This lack of assessment highlights the need for systematic follow-up and improvement of educational initiatives to ensure they effectively meet the needs of Mumbuca digital CC users.

The third and last barrier presented is gender bias in social norms (World Bank Group, 2021; UNDP, 2023). In Brazil, gender social norms also present challenges, but the statistics indicate that progress is being made, albeit slowly. The Gender Social Norms Index from UNDP (2023) reveals that between 2010 and 2014, 89.80% of Brazilians exhibited at least one bias, and 51.16% demonstrated at least two biases (UNDP, 2023, p. 28). However, by the period of 2017 to 2022, these figures had improved, with 84.85% of Brazilians exhibiting at least one bias and 47.42% demonstrating at least two (UNDP, 2023, p. 28). This gradual shift highlights the ongoing need to address gender biases in Brazilian society to foster greater equality and access for women, particularly in the realm of digital financial services.

One notable observation is the minimal variation between Brazilian women and men regarding biased opinions on gender. From 2017 to 2022, 84.17% of women held at least one bias, compared to 84.78% of men. The difference becomes more pronounced when considering two biases: during the same period, 43.09% of women and 52.66% of men exhibited at least two biases (UNDP, 2023, p. 29).

Once again, there is no specific data on the negative influence of gender social norms in the city of Maricá. Nevertheless, it is possible to infer that the national trends are likely reflected to some extent in the Maricá population. This suggests that gender social norms may adversely affect the decision-making of women who use digital CCs, potentially reinforcing the caregiver role traditionally assigned to them and influencing how they prioritize their resources. For example, women may prioritize household expenses over investing in personal development, such as entrepreneurial activities or savings.

Therefore, implementing initiatives that can mitigate the impact of gender social norms is essential for promoting gender equality within a community. These initiatives should target both men and women, as it is crucial for individuals of all genders to adopt less biased perspectives on gender roles.

#### *4.2.2. Mumbuca digital CC and gender: a macro analysis*

This section discusses the opportunities and challenges presented by the Mumbuca digital CC and the E-Dinheiro app from a broader perspective – what we called macro analysis. Three key topics are addressed in the following sections: (1) disaggregated data; (2) the sustainability of the Mumbuca digital CC; and (3) the digitalization of the Brazilian financial ecosystem.

##### ***Disaggregated Data***

Any policy undergoing a digitization process must consider the diverse intersections of individuals (such as income, age, gender, race, and more) who comprise the target audience for that policy. Neglecting these dimensions in the regulatory design risks creating programs that may not effectively meet the objectives envisioned by regulators and policymakers. To remedy this, access to data, particularly disaggregated data by gender, is essential, enabling regulators to implement evidence-based initiatives (AFI, 2020; UNSDG, 2020; Bin-human et al., 2020; GPFI, 2022; CGAP, 2024).

The income transfer policy utilizing the Mumbuca digital CC primarily benefits women (Prefeitura de Maricá, 2021). The use of the digital platform E-Dinheiro for transactions involving Mumbuca digital CC provides a unique

opportunity to collect data on users (especially female users) and information relating to the circulation and use of the digital CC. This data can be utilized to identify gaps and inform other initiatives that promote gender equality15.

The lack of disaggregated data by gender is a widespread issue observed not only in the municipality of Maricá but also across Brazil. One of the few known facts is the significant presence of women using digital CCs (Prefeitura de Maricá, 2021, 2024b)16, but little else is understood beyond this17. Therefore, policymakers in Maricá (and in other municipalities implementing their own digital CCs) should prioritize the collection of gender-disaggregated data to implement public policies that specifically incorporate gender dimensions.

***Sustainability of digital CCs in the long run***

The sustainability of community currencies (whether analog or digital) and the Community Banks responsible for issuing them is a widely debated topic (Faria, 2018; Garcia, 2021a, 2021b; Pupo, 2022). Brazil has a substantial history of community currencies that were implemented but ceased to circulate not long after, as well as Community Banks that were established but soon shut down18.

The reasons for this are varied. Regarding the CCs, factors such as lack of financial backing and low adoption by the local community have been significant challenges (Garcia, 2021a; 2021b). In the case of Community Banks, issues like robberies at the bank's branches and financial difficulties (such as challenges in paying employees) have contributed to their decline (Garcia, 2021a; 2021b). Therefore, the implementation of a community currency and a community bank must prioritize sustainability to ensure they are not merely short-term projects but viable long-term initiatives.

In this context, the Community Bank Mumbuca has been successful, operating continuously since 2013. The resources used for the income transfer program funded by the Municipality of Maricá come from oil royalties received by the city, allowing for a robust allocation of funds to sustain the income transfer program in digital CC (Silva et al., 2020).

Although Mumbuca Community Bank was established by the municipal government as a top-down initiative, the long-term plan aimed for the bank's sustainability and its ability to achieve self-management (Maricá, 2013). To ensure this sustainability, revenue generated from transaction fees on digital CCs (2% of each transaction) is crucial. These funds are overseen by the Mumbuca Community Bank, which guarantees both its sustainability and the ongoing delivery of its activities, while also fostering local community development. This includes initiatives such as microcredit loans and social programs offered by this community bank (Instituto E-Dinheiro Brasil Maricá, 2018, 2021, 2024a).

Maintaining the bank's sustainability is important not only to preserve access to services offered by the Mumbuca Community Bank and the E-Dinheiro app for the population, but also for preventing political influences that could jeopardize the circulation of the Mumbuca digital CC and the operations of the community bank. Since the establishment of the bank, all mayors of the city have belonged to the same political party (the left-wing political party called "Workers' Party" – PT, its acronym in portuguese), which has contributed to the continuity of the income transfer program19. However, this situation could change at any time, as a mayor from a different political party could be elected and decide to discontinue the program.

15 The collection of data based on the circulation of the Mumbuca digital CC has enabled studies that uncover previously invisible issues. For example, there is the "problem" of accepting digital CCs in large commercial networks, such as supermarkets, which, unlike smaller businesses, tend to exchange digital Mumbucas for Brazilian reais rather than reinvesting them into the local economy (FGV, 2024b, 2024c).

16 The information regarding the offline payment capability of the E-Dinheiro app and the Mumbuca digital currency is not publicly available in a report or a website. It was obtained from presentations given by representatives of the Instituto E-Dinheiro. (FGV, 2024c).

17 In a recent lecture on the topic, researcher João Porto de Albuquerque stated that there is a lack of data from a female perspective and regarding women, noting that "this reflects historical patterns of perspectives and asymmetries - data on mobility tends to reflect more masculine patterns. As a result, many types of data we have are completely biased" (FGV, 2024b).

18 For a comprehensive history of community currencies and community banks in Brazil, see Garcia (2021a; 2021b), who wrote two books (in portuguese) about all the CCs and Community Banks that were implemented in Brazil.

19 The program was implemented by Mayor Washington Quá Quá, who served from 2013 to 2016. From 2017 to 2024, the mayor was Fabiano Horta, also from the Workers' Party. Now in 2024, Washington Quá Quá has been re-elected and will serve as the mayor of Maricá until 2028.

***The digitalization of Brazil's financial ecosystem***

Brazil has been making significant efforts to digitalize its financial ecosystem. Two noteworthy initiatives are Pix, Brazil's instant payment system, and Drex, the Brazilian Central Bank Digital Currency (CBDC).

The first, "Pix", is the Brazilian instant payment arrangement established in August 2020 by the Central Bank of Brazil (CBB, n.d., 2024; BRICS, 2021; World Bank Group, 2022; IMF, 2023). This system allows financial transactions between individuals, companies, and government entities at any time, every day of the week, including weekends and holidays, without charging fees to users20 (CBB, n.d.).

The popularity of Pix has grown rapidly and continues to increase. Less than two years after it was launched, Pix surpassed the number of transactions made through traditional payment methods in Brazil, such as credit cards, debit cards, and checks (CBB, n.d.). Data from September 2024 indicates approximately 154 million individual users of Pix (CBB, 2024b), representing about 73% of the Brazilian population21. Pix has made digital payments quick, easy, and cost-free, which is why it has become extremely popular since its launch and helped to increase the number of account ownership in Brazil (CBB, 2024a, p. 84).

There are currently no studies analyzing whether Pix represents a threat or an opportunity for community currencies. However, Joaquim Melo, the main architect of community banks and community currencies in Brazil, suggests that Pix offers advantages, as it could be utilized within the E-Dinheiro app (FGV, 2024a). This functionality would allow the transfer of money via Pix from a traditional bank to the E-Dinheiro app, enabling the conversion of that money into a CC (FGV, 2024a). Nevertheless, due to bureaucratic and regulatory issues, this integration was not functioning properly (FGV, 2024a).

Despite these challenges and considering the ease of use and widespread popularity of Pix among Brazilians, it is important to conduct further research on the relationship between Pix and the use of digital community currencies (digital CCs). Such studies could explore ways to enhance integration and interoperability between these systems, while also assessing whether the growing prevalence of Pix may lead to a decline in the use of digital CCs.

The second innovation is Drex22, the Brazilian Central Bank Digital Currency (CBDC)23, which is still under development by the Central Bank of Brazil. The CBB has been investing significant efforts into the project for its CBDC24. The CBB states its intention to design Drex to ensure "a more open financial system that can bring new services and technologies to a broader segment of the population, promoting a greater level of financial inclusion through the democratic availability of investment, credit, and insurance tools, among others" (CBB, 2023b, p. 4)25.

There are also no studies examining the relationship between Drex and digital CCs, possibly because Drex has not yet been implemented. However, this is a new tool that could soon become a reality for Brazilians, including users of digital CCs.

Thinking about the integration of Pix and Drex with the E-Dinheiro app and the use of digital CCs from a gender perspective is a task that requires investment and research. Some questions could guide these studies: will Pix and Drex reduce or increase the use of digital CCs? Can they create even more business opportunities for women entrepreneurs who utilize these digital tools? Could the use of Pix and Drex provide more data to support income transfer policies that incorporate digital CCs?

These questions remain unanswered for now, but policymakers and those responsible for digital CCs like Mumbuca must closely monitor these developments. This vigilance is essential for maximizing the opportunities that the

[20] There are two exceptions for the "no fee" with Pix transactions (CBB, 2020b): (1) for businesses when they use Pix; and (2) if a natural person receives more than 30 Pix transactions per month, from the 31st transaction onward, a fee may apply, as it will be considered that the individual is engaging in commercial activities and thus equated to a legal entity (subject to fee charges), rather than being classified as a mere consumer.

[21] In August 2014, the Brazilian population reached a total of 212.7 million individuals (Agência IBGE, 2024).

[22] For more about Drex, see: CBB (2023e); Sanches and Diniz (2024).

[23] Drex was initially known as "Real Digital", but in 2023 the CBB changed its name to Drex (CBB, 2023d).

[24] Orignally, the goal of CBB was to to implement a CBDC that utilizes distributed ledger technology (DLT), smart contracts, and programmable money, and that can also operate in offline mode (CBB, 2023b). However, regarding t

[25] The implementation of Drex has five anticipated outcomes as outlined by the Central Bank of Brazil (CBB) (2023a, 2023c). First, it aims to enhance the efficiency and security of financial transactions through the Drex Platform. Second, it seeks to reduce transaction and operational costs associated with the creation and management of financial products and services, thereby allowing these offerings to be provided at lower prices to individuals and businesses. Third, it intends to promote competition among financial service providers. Fourth, it aims to improve access to capital markets for small businesses. Last but not least, it seeks to advance financial inclusion.

digitalization of Brazil's financial ecosystem can offer, particularly in how new technologies can be approached from a gender perspective.

### *4.3 Recommendations and research opportunities*

Studies on both analog and digital community currencies (CCs) are often gender-neutral. However, men and women tend to have different profiles, habits, consumption patterns, behaviors, concerns, and preferences. Mapping these differences is essential to gain a clear understanding of the context in which a CC is to be implemented. In the case of a CC created as part of an income transfer policy, understanding gender differences becomes even more critical for addressing gender-related issues and promoting gender equality.

In light of this, the following section presents a set of recommendations for researchers and stakeholders involved not only in the Mumbuca digital CC, but also in other community currencies currently being developed in Brazil as part of income transfer policies, as well as in future digital CC projects that may be implemented.

The first recommendation is to integrate the micro and macro perspectives discussed throughout this study. All actors involved in the design of income transfer policies and in the provision of services through the Mumbuca digital CC should consider not only the individual-level factors that affect women more than men—such as lower levels of digital and financial literacy, lower income, and greater time constraints—but also the broader context in which the currency circulates. The Brazilian financial system has undergone a rapid process of digitalization, which may influence the use of community currencies and, consequently, affect the women who rely on them. Moreover, if women are the main beneficiaries of the program and the primary users of the currency, it becomes crucial to ensure the sustainability of the digital CC, taking into account both individual and systemic factors.

The second and perhaps most relevant recommendation is to collect sex-disaggregated data that enable the design of evidence-based initiatives. As emphasized throughout this paper, the lack of specific data on Maricá hinders a deeper analysis, even though the Mumbuca digital CC, as a form of digital financial service, has significant potential to reduce factors that contribute to gender inequality (as discussed in Section 2 and Subsection 4.2.1).

Digitalization makes it possible to track transactions and identify who (men or women) is performing them. Having access to such data—and effectively analyzing it—is essential to inform, adjust, and improve not only income transfer policies implemented through Mumbuca and other digital CCs, but also other aspects related to their use, such as the provision of microcredit and the development of financial products and services that meet the specific needs of women.

Based on the discussions presented, we also propose a set of questions that could guide future research and the actions of policymakers and other actors involved with digital community currencies (digital CCs):

- How do women use and perceive digital CCs in their daily lives?
- What kinds of economic activities are most supported by these currencies?
- What is the broader impact of digital CCs on women's financial inclusion and empowerment?
- How do social norms shape women's use of digital community currencies?
- How can integration and interoperability between digital CCs and Pix (and, in the future, Drex) be enhanced?
- Are there risks of a decline in the use of digital CCs due to the growing prevalence of Pix or the future introduction of Drex?
- Could the use of Pix and Drex provide more data to support income transfer policies that incorporate digital CCs?
- Could interoperability between digital CCs, Pix, and Drex improve the gender inclusiveness of financial policies?
- How can policymakers, Banco Mumbuca managers, and the E-Dinheiro app developers enhance women's financial and digital literacy?
- What regulatory and institutional arrangements can ensure the sustainability and scalability of digital CCs?
- Could the creation of financial products and services specifically design for women by Banco Mumbuca and the E-Dinheiro app increase women's economic participation, entrepreneurship, and empowerment?

It is a fact that the entire population of Maricá—both men and women—benefits from the use of the social currency. However, it is essential to advance toward reducing and, ideally, eliminating the individual and structural factors that reproduce gender inequalities in society. Doing so would not only benefit women, but also society as a whole, since the promotion of gender equality contributes to the municipality's broader social and economic development.

## 5. FINAL CONSIDERATIONS

This paper aimed to evaluate whether and how digital community currencies can promote gender equality, focusing on the experience of the Mumbuca digital CC. While each community currency (whether digital or analog) has its unique characteristics shaped by the specific contexts in which it operates, the study offers insights into the aspects that should be considered when promoting gender equality within a community.

From a micro perspective, the research highlights that using digital CCs has the potential to deliver benefits for women, such as cost and time savings, increased financial autonomy, enhanced decision-making power, and encouragement of female entrepreneurship. However, the use of digital CCs can pose obstacles in contexts with low levels of digital and financial literacy, as well as in situations where there are high costs associated with devices and internet plans, and where the gender social norms cause a negative impact in the population.

From a macro perspective, the paper underscores the importance of collecting sex-disaggregated data to inform public policies and how this data can be obtained from the information generated through the use of digital financial services and digital CCs. It also identifies the relevance of designing sustainable, long-term projects for digital CCs to avoid external influences – both political and those arising from the digitization of a country's financial ecosystem, as is the case in Brazil.

The article also highlights the importance of analyzing these two perspectives in an integrated manner to guide the actions of policymakers and other actors involved in the design and implementation of digital community currencies, as well as researchers working on this topic.

Considering the Brazilian context, analyzing the Mumbuca digital CC from a gender perspective is particularly relevant given that the city of Maricá's model has influenced new digital CC initiatives in other cities in the state of Rio de Janeiro[26]. Since these models are similar to that of Maricá, it is crucial for public authorities responsible for such initiatives to consider both the potential benefits and the barriers of the Maricá example. This will help them avoid repeating past mistakes and instead create improved initiatives capable of achieving their objectives. In this context, incorporating a gender perspective from the outset is essential to effectively address these goals.

Although this article sought to analyze the potential of the Mumbuca digital CC in promoting gender equality, it is important to note that a major limitation of this study lies in the absence of sex-disaggregated data to assess whether the potential benefits identified would, in fact, contribute to gender equality. Likewise, this lack of data also prevents an assessment of whether the challenges identified might foster or exacerbate gender inequality in Maricá. As a result, the study has a predominantly exploratory character.

However, it is precisely because of this limitation that the present study aims to highlight future research opportunities adopting a gender perspective and promoting the production of sex-disaggregated data to enable both qualitative and quantitative analyses. Furthermore, this study seeks to contribute by outlining policy recommendations for regulators and other actors engaged in the issuance and circulation of the Mumbuca digital CC, so that the promotion of gender equality becomes an explicit and integral objective of the policy design and implementation process.

Collecting such data is essential to determine whether gender-neutral designs of digital community currencies could, in fact, be more effective in promoting gender equality if developed through a gender-sensitive lens.

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[26] See footnote 10.

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