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Reapplication or replication? transformations of technology and of the palmas social currency throughout the e-dinheiro platform

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Abstract

From the perspective that Social Technologies (STs) are built with community participation and are not simply solutions transferred from one reality to another, and given the tendency for social currencies to be digitalized in several countries, the following question arises: What are the gains and losses of digitalizing the social currencies of Community Development Banks (CDBs) in Brazil regarding the reapplication of these Social Technologies? To answer this question, we look at the case of Palmas, a social currency recognized as a Social Technology, and present its history and digitalization process. To do this, we turn to the literature on Social Technology and that relating to the case under analysis. In addition, we incorporated data available from an ongoing national survey. This study indicates that, although the digitalization of social currencies can bring several benefits to their users, how their dissemination process has taken place can de-characterize them as a Social Technology. However, they continue to represent an artifact aimed at social purposes. Some scholars discuss that the social transformation of the territory and the empowerment of its

inhabitants occur in the reapplication process, ensuring social currency as a democratic and emancipatory Social Technology. This study is especially relevant in light of the recent proposal for Bill N° 4476/2023, which aims to regulate social currencies in Brazil, since the content of this proposal shows a lack of knowledge of the history, context, and concept of social currency and technologies that are effectively social, which could create extra challenges for communities to take ownership, an indispensable characteristic for a genuine Social Technology with the potential for social transformation.

Keywords: social technology; social currency; reapplication; palmas; *e-dinheiro* platform.

Introduction

Despite more than two decades of reflection on the need for and emergence of Social Technologies (STs), there is still no consensus on their conceptualization (Araújo & Cândido, 2017; Seixas, Lima & Lima, 2015). In its most widespread version created by the Social Technologies Network (STN), Social Technologies are products, techniques, or methodologies that can be reapplied, developed, or applied in interaction with a community, which are solutions for social transformation through the sustainable use of local resources (RTS, 2010).

Dagnino (2013) says that Social Technologies are the opposite of conventional technologies, which are highly profit-focused and promote social exclusion, as Social Technologies aim for inclusion, participation, and social emancipation. Andrade and Valadão (2017, p. 408) conceptualize them as "collective constructions aimed at solving everyday socio-environmental problems through the interaction, knowledge, and initiatives of the local communities themselves, which enable social inclusion, autonomy, sustainable development, and social transformation". Based on these basic notions, Social Technology has two central features: the purpose of social transformation and collective construction (joint construction), either in its creation process or its dissemination through reapplication in other realities.

Regarding the first characteristic, Social Technologies aim to solve social, economic, environmental, and other problems, enabling the social inclusion of those involved (Bava, 2004; Thomas, 2009). They are an important strategy in the search for sustainable (Lassence & Pedreira, 2004; RTS, 2010) and social development (Duque & Valadão, 2017), in the fight against climate change (Santos, 2011; FBB, 2012; Ventura, Andrade & Fernández, 2014), and for human development (Ventura; Fernández & Andrade, 2012).

Regarding the second feature, Fabri, Freitas, and Poletto (2020) state that Social Technologies are built with community participation and are not solutions that are "transferred" from one reality to another in a process known as replication. In both creation and "transfer", they need to be appropriated by the population in the interaction and adaptation to local realities, characterizing what is known as reapplication. Studies highlight that valuing local knowledge and interests is one of the objectives of the advocates of Social Technologies, who claim that they can combine popular knowledge, social organization, and technical-scientific knowledge (Baumgarten, 2008). The community must be involved in their development, since the Social Technologies movement "seeks to deconstruct the belief in the solution of 'experts' and repositions technology as a collective construction with and by the stakeholders" (Fonseca, 2009, p. 146).

By associating Social Technology with the solidarity economy and the case of social currencies in Brazil, Rigo and Ventura (2019) conclude that, because they aim to boost local economies and because of their construction and reapplication process, they can be considered Social Technologies within the operating mode of the so-called Community Development Banks (CDBs). Community Development Banks are, in short, community associations in solidarity economy and finance, which operate in impoverished territories through productive microcredit and the creation and use of a local currency. Some studies show that the methodology of Community Development Banks provides a balance between supply and demand in the territories, given the suitability and ease of access to credit lines for residents and the maintenance of part of the local resources in the territory through the use of social currency (França Filho & Silva Júnior, 2009).

Brazil's main social currency, the Palmas, was launched in 2002 in Conjunto Palmeiras, a poor community on the outskirts of Fortaleza (CE). This currency was created within the operating methodology of Banco Palmas, the first Brazilian Community Development Bank (CDB), which later led to the creation of a network of Community Development Banks (CDBs) and social currencies called the Brazilian Network of Community Banks (BNCB). Rigo and Ventura (2019) show the theoretical and practical reasons for understanding the Palmas social currency as a Social Technology. According to the authors, "we can affirm that both Banco Palmas and its social currency, the Palmas, can be considered an important Social Technology reapplied to solve economic problems in underdeveloped Brazilian regions" (Rigo & Ventura, 2019, p. 152).

The relevance of this social currency and the past and current transformations in alternative monetary circuits reinforces the importance of revisiting it as a case. The story departs from its first format, when it was still called Palmares and used in an exchange club in the Conjunto Palmeiras neighborhood (between 2000 and 2002), its paper form, the Palmas, which started circulating throughout the neighborhood in 2002, up to its digital form on the *E-dinheiro* platform, starting in 2015. The platform is now adopted in the community and by several Community Development Banks (CDBs) in their communities, besides some Brazilian municipalities. Eleven municipalities have created social currencies for local use only and to transfer income to the more impoverished populations through municipal public policies. Given its specific features, this article will not detail this type of currency. We suggest reading Melo (2023) to understand the event better.

Recently, Sanches *et al.* (2022) emphasized the challenges of the Palmas digitalization process that resulted in the *E-dinheiro* platform and raised the possibility of adopting *blockchain* technology¹ shortly. However, despite recognizing it as a Social Technology, the authors do not discuss the aspects of the *E-dinheiro* platform as a Social Technology. For the Social Technologies Network (2009), reapplication is understood as a new technological application (and not mere replication) adapted to the reality of the territory. It is directly linked to the user community's appropriation of the technology and, therefore, to its effective, transformative potential. This dissemination via the platform may be occurring without being properly adapted to the local reality. In this text, the Social Technology concept employed emphasizes that there is no Social Technology without reapplication.

Based on what has been presented so far, the guiding question of this article is: What are the gains and losses of digitalizing the social currencies of Community Development Banks (CDBs) in Brazil regarding reapplying these Social Technologies? To answer this question, we return to the case of Palmas, from its origins to its transformation into the *E-dinheiro* platform. The gains and

losses of this digitalization process are presented, drawing attention to aspects that can de-characterize social currencies as Social Technologies in their own right. It discusses how the digital social currency is closer to a conventional technology with social purposes than an emancipatory and participatory Social Technology. The relevance of this study is anchored in two contextual aspects: the strong tendency of social currencies to become digitalized and the recently proposed Brazilian bill, which aims to regulate social currencies in the country.

The strong trend of social currencies worldwide becoming digital reinforces this discussion's relevance (Lung & Montalban, 2020; Fois Duclerc, 2023). Research by Blanc, Fare, and Lafuente-Sampietro (2020) shows that three out of 82 French local currencies are exclusively digital. Adopting technologies is not neutral (Dagnino, Brandão & Novaes, 2004). It has sparked debate among scholars and practitioners of Social Technologies and social currencies in several countries. Many fear that digitalization will weaken the ethical and solidarity values underpinning social currencies. Others believe that digitalization expands and strengthens their use within territories.

The concern with a better understanding of social currencies is currently gaining relevance. It has been mobilizing several stakeholders in the solidarity economy, in which they are situated as Social Technologies for local development. Bill N°4476/2023, authored by Congressman Caio Vianna (PSD-RJ), aims to regulate the issuing of social currencies. The content of this project establishes that social currencies must be issued and transacted exclusively in a digital format (Article 3), overly restricting the field and use of social currencies, ignoring their origin and history in Brazil, the contexts in which they are created, the ideas behind their use, and the individual and institutional stakeholders involved. If approved as proposed, this project could cause even more difficulties for the Brazilian Network of Community Banks (BNCB) and the Community Development Banks (CDB) that only operate with paper social currencies, to the point of hampering the very existence of these highly innovative, resilient, and legitimate experiences since their inception.

From now on, this article is structured into four main sections. Firstly, for reasons of didacticism and coherence, we present the research process leading to the information collection and its analysis. We opted not to separate the theoretical approach to Social Technology from the empirical approach - the Palmas currency case - since both derive from a literature review and because of their direct connections. Next, we show the centrality of joint construction and reapplication in understanding Social Technologies. We also present the necessary precautions for their reapplication process, emphasizing their main features and discussing their inclusion in public policy processes. The final considerations suggest how to interpret the *E-dinheiro* Social Technology and other digital social currencies, indicating that its reapplication process, not its intrinsic value or technological format, characterizes it as a Social Technology.

Research and information sources

This study arose while developing a research project (2022-2024) and from the authors' social currency and social technology trajectories. During the first half of 2023, based on studies and discussions with the project team, questions were asked about the losses and gains of digitalizing social currencies (Edme-Sanjurjo *et al.*, 2020; Fois Duclerc, 2023; Lung & Montalban, 2020), especially about the social currency aspects that allow them to be understood as Social Technologies (Rigo & Ventura, 2019; Sanches *et al.*, 2022). In short, the question was: Are social currencies still

Social Technologies when they become digitalized? What remains and what is gained and lost from Social Technologies? These questions led us to look at the most notorious (and perhaps the only) Brazilian case of digitalization of social currencies, the *E-dinheiro* platform, which has been the subject of investigation by some Brazilian scholars (Cernev & Diniz, 2020; Faria *et al.*, 2019).

Given the data and aligned with Vieira's (2006) guidelines, we performed a qualitative data analysis while the research project was still underway. Therefore, although some data have been expressed numerically, they do not qualify the method as quantitative, given the predominance of qualitative analysis. The number of respondents and different types of responses were not considered. The approach focused on the content of the answers and their direct or indirect relationship with the theory underpinning this study.

The research project is nationwide and has provided most of the information on the *E-dinheiro* platform presented here. It consists of two phases: a survey of Community Development Banks in Brazil over three years (2022, 2023, and 2024) and in-depth case studies starting in 2024. This article only has information from the first phase, the survey, considering what could be obtained up to October 2023. According to Freitas *et al.* (2000), a survey is an appropriate research method when it focuses on what is happening or how it is happening. The national survey aims to map Community Development Banks (CDBs) and obtain detailed and current information on how they operate, including those related to social currencies and using the *E-dinheiro* platform. In addition, the survey was designed to examine a wide range of issues and is assumed to be the research strategy that guided the construction of this article.

The survey phase, a source of information for this study, occurred from November 2022 to October 2023, when 167 Community Development Bank (CDB) experiences were identified in Brazil. This identification process built on contact lists of Community Development Banks (CDBs) and Support and Development Entities (SDEs) that work directly with these experiences, such as *Instituto E-dinheiro Brasil* (CE), *Instituto Tupinambá* (PA), *Ateliê de Ideias* (ES), and *ITES* (BA). These lists were combined with lists from two previous surveys by Rigo (2014) and Pupo (2022). By October 2023, 79 Community Development Banks (CDBs) had responded to the questionnaire. The questionnaire was administered via videoconference, in which the researcher asked the respondent (or respondents, as more than one Community Development Bank (CDB) representative could take part) and the researcher himself filled in the form in two formats. On paper, during the interview, and then on Google Forms. Using these two formats facilitated completion of the information during the interview, providing greater security in storing information and ease prior analysis during the survey. The survey instrument was completed, on average, in 1.5 hours, and conducted by six previously trained research team members individually or in pairs. Each questionnaire answered was given a sequential alphanumeric code, starting with the acronym "BCD" Community Development Bank (BCD1, BCD2,..., BCD79).

The complete questionnaire form included six dimensions, namely, Identification and General Aspects (D1), Territory and Scope (D2), Democratic Management and People (D3), Financial Inclusion, Microcredit and Social Currency (D4), Sustainability and Partnerships (D5), and Challenges and Perspectives (D6). Only two of these dimensions in the survey's data collection instrument (D4 and D6) contributed to the preparation of this article. Both dimensions contain questions about using the *E-dinheiro* platform by Community Development Banks (CDBs), its advantages and disadvantages, and finally, its challenges. Notably, data obtained in D4 are objective, as the

questions are structured. The data obtained in D6, the last dimension, are qualitative, as it is a semi-structured script applied at the end of the questionnaire. At this point, the respondent could freely answer the proposed questions and add and comment on issues not foreseen in the script and the questionnaire. In addition, the researchers-interviewers could write down their impressions and *insights* at the end of each dimension, making it relevant material to support the analysis.

As part of the project, interviews and *online* meetings were held throughout 2023 with leaders of the Brazilian Network of Community Banks and specific Community Development Banks (CDBs): three meetings lasting an average of one hour with the leadership of the *Instituto E-dinheiro Brasil*, which today manages the *E-dinheiro* platform; a 3-hour meeting with the three leaders of the Brazilian Network of Community Banks (BNCB) (the coordinator of this Network and the *Instituto Tupinambá*, Belém (PA), the coordinator of *Banco Bem*, in Vitória (ES) and the coordinator of the *Instituto E-dinheiro Brasil* Fortaleza (CE); a meeting with a leader representing Banco Mumbuca, Maricá (RJ). Notably, the meetings were not recorded and transcribed due to the informal relationship between the project team and the BNCB members, which has been following and directly supporting the research work. These meetings were fundamental for obtaining up-to-date contextual information on innovations and changes in the BNCB and helping to increase engagement between researchers and stakeholders in the field.

Although the study focuses on the Palmas case, it is not characterized here as a case study strategy in methodological terms. We opted to focus on the Palmas because of its relevance and particularities, but mainly because it influenced the formation of the BNCB, which was translated by Rigo and Ventura (2019) as a fundamental reapplication process to characterize it as Social Technology. Furthermore, because it is emblematic in Brazil, there is abundant literature narrating this trajectory, which facilitated the retelling of the story by associating its phases with Social Technology aspects that highlight its potential for reapplication. In other words, we emphasize the first Brazilian social currency's changes, its reapplication in other territories, and its transformation into a digital format.

Data analysis differs from what was obtained in D4 and D6. As we have seen, the D4 data, which are objective, enabled us to summarize the quantitative (absolute and percentage) responses to characterize all the respondents concerning their use of the *E-dinheiro* platform. The D6 data are qualitative and were analyzed following three content analysis stages under Dellagnelo and Silva (2006): (a) pre-analysis, which consisted of organizing the 79 answers in the D6 dimension and a "floating" reading of the organized information; (b) exploring and analyzing the material, highlighting the excerpts without them losing their meaning in the speech context, and separating the most pertinent and direct ones, which would serve for direct and long quotes. There was no need to categorize the excerpts at this stage, as it was easy to identify and separate the relevant passages.

Furthermore, categorization, although common in content analysis of several kinds, is not a mandatory technique (Bardin, 2008; Dellagnelo and Silva, 2006). In this phase, we selected excerpts from nine Community Development Banks (CDBs): 4, 10, 11, 27, 32, 42, 48, 52, and 76, as they were more direct in terms of the gains and losses they identified when using the *E-dinheiro* platform. (c) Finally, the interpretation or analysis relates the findings to the theoretical framework used to understand the event. In this last phase, we highlight the information produced by the analysis,

focusing on what allows us to understand better the gains and losses of using the *E-dinheiro* digital platform as a Social Technology.

Theoretical background

Social technologies: concepts, joint construction, and reapplication

Many works, such as the exponent text by Dagnino, Brandão, and Novaes (2004), have already discussed the initial development of the Social Technology concept. This concept is anchored in the criticism of so-called "appropriate technologies", most of which are brought from developed countries to be applied in developing countries. The fact is that the development models of advanced countries do not work in less economically developed countries, which Narvaez (1996) defines as a technology transfer error. As such, they would be insufficient to solve the Brazilian social and environmental problems, guided by the influences and perceptions of First World groups of researchers. Most attempts to transfer these technologies to developing countries have failed (Dagnino, Novaes & Brandão, 2004).

It is precisely in an attempt to confront this reality that, at a time marked by the substantial impact of the neoliberal system in Latin America and the consequent increase in social and environmental problems, concern is spreading about technological bases that allow for more sustainable development, grounded on the knowledge of the social stakeholders involved in the problem. Pozzebon and Fontenelle (2018) view this movement as a post-colonial reflection on the role of technology in society, which began in India in the early 20th century and followed different trajectories in Europe from the 1960s to the 1990s. These movements involved not only so-called appropriate technologies but also names such as intermediate, alternative, and appropriate technologies. They reflected the need for more appropriate technologies to solve the problems of developing countries. This debate between researchers and practitioners culminated in the early 2000s in devising a theoretical framework for Latin American Social Technologies. This movement sought to identify and, where necessary, develop technologies linked to democracy, socio-economic development, and effective social inclusion in Latin America.

The denomination "technologies", which are "social", represents the result of critical reflections on how so-called conventional technologies were strongly responsible for generating inequalities and poverty (Pozzebon & Fontenelle, 2018). In Dagnino's (2004) view, conventional technologies are segmented, do not allow control by those who produce them, maximize productivity concerning the workforce employed, do not enhance the producer's capacities, and are monopolized by companies in rich countries, among other aspects. The author states that these technologies cannot promote social inclusion, highlighting the need to design technologies effectively geared towards this inclusion based on discussions within the Science and Technology Social Studies.

Dagnino (2013) argues that Social Technologies are the opposite of conventional technology, which is highly profit-focused and promotes social exclusion. The author is one of the co-creators and creators of the Social Technologies Network, a network of researchers and other stakeholders linked to Brazilian science and technology, and emphasizes that Social Technologies are aimed at social inclusion, participation, and social emancipation. The Social Technology Institute, one of the pioneers in discussions about Social Technologies in Brazil, considers them to be a set of

transformative techniques and methodologies developed or applied in interaction with a population and appropriated by them, which represent solutions for social inclusion and improved living conditions (ITS, 2007). The Social Technology Institute affirms that they attempt to provide answers to social problems through a technological solution that establishes a bridge between social demands and solutions consistently through local knowledge.

In the opinion of Dagnino, Brandão, and Novaes (2004), this attention to local knowledge and reality makes Social Technologies so different from "appropriate technologies". It would be essential to consider the adjustments for each reality when spreading technologies to solve the Brazilian social and environmental problems to achieve effective social transformation needed in the country. Issues such as the relative price of capital and labor, the availability of raw materials, spare parts and skilled labor, size, purchasing capacity, the level of market demand, geography, and climate, among others, will always affect how a technology is perceived or used. Thomas (2009) points out that, reflecting on the technological model Brazil should adopt, the Social Technology Network understood the relevance of the socio-technical adaptation of technologies to local particularities, including reapplication as a fundamental element.

This concept incorporates critical discussions of technology and its relationship with society, considering collective participation in organizing, developing, and implementing technologies; in other words, in their joint construction. For the Social Technology Network, each new use of technology is an innovative process, given the need to adjust to the specific environment in which it will be used, the so-called socio-technical adaptation. In this sense, a method or artifact cannot be seen as a ready-made product to be transferred to new users. There will always be a need to incorporate, redefine, or exclude elements (Dagnino, Brandão & Novaes, 2004; Thomas, 2009). Dagnino, Brandão, and Novaes (2009) point out that these adjustments depend on the empirical observation of social, political, and economic interests and the needs of the relevant social groups involved in each case. They, therefore, represent a social and political construction whose final operationalization will depend on the joint construction by all those involved. Thomas (2009) argues that Social Technologies are community arrangements aimed at solving social, economic, and environmental problems, which enable the social inclusion of those involved in their joint construction.

Nevertheless, the initial history of the definition, creation, and search for dissemination of Social Technologies in bibliometrics by Dutra and Valadão (2017), analyzing the most cited articles on the subject of Social Technologies published between 2002 and 2015, found that there were, at that time, two Social Technology visions: (a) "Vision 1", which understands technology as a practice that provides social transformations, based on the community's actions, treating "Social Technologies as social constructions that can be reapplied through socio-technical adequacy" (Dutra & Valadão, 2017, p. 8), a line of discussion whose exponents are researcher Renato Dagnino's ideas, already mentioned, and (b) "Vision 2", which sees technology as an artifact that generates social change, or even as "technologies for the social", meaning "articulations, programs, and artifacts that can improve the societal life once introduced into the social environment". (Dutra & Valadão, 2017, p. 8-9), ideas defended by authors such as Silvio Caccia Bava.

Thus, although the authors use the term "Social Technology" (ST) in Vision 2, they focus solely on conventional techniques, methodologies, or technologies used for social purposes in

communities and territories. Therefore, the authors of this second vision refer to technologies for social purposes but not to "Social Technologies" as understood in Vision 1 and this study.

Thus, the main difference between the two visions in recent articles is the attention given to reapplication (Vision 1) instead of the mere replication of technologies for social purposes (Vision 2). The differentiation between these two conceptualizations, reapplication and replication, deserves a closer look.

Take care when reapplying social technologies to avoid simple replication

Although Social Technologies have emerged on the Brazilian scene *bottom-up* through non-traditional organizations in the Brazilian Science, Technology, and Innovation System, they are still being recognized as relevant tools to be incorporated into development strategies (Melchiori & Aogui, 2022). They are recognized for their "capacity to promote a new model for the production of science and the application of technology in favor of social development" (Maciel, 2010, p. 25). Souza (2010) affirms that they are now occupying a strategic place in this system due to two main characteristics: (a) they are mostly cheap, and (b) they have a strong capacity to adapt so that they can be reapplied and used on a large scale. Again, we should stress that, when discussing reapplication, we are considering Vision 1 of Social Technology, as presented above. In Vision 2, which sees technology as a simple artifact for social improvement, there is no need to talk about reapplication but only about adopting a given technology in a given reality (replication).

From now on, we will attempt to differentiate between reapplication and replication by presenting the four main features of these concepts in the understanding of this study: (a) The application type, (b) Socio-technical suitability, (c) Social relations involved, and (d) Knowledge sharing. The definition of these features is not intended to be unique, and the boundaries between them are not clearly defined. However, they assist us to present reapplication and guide the analysis conducted here.

In order to represent effective development strategies for a region or even a country, Social Technologies need to be scaled up and reapplied in different places with similar problems, considering their peculiarities. We should underscore that reapplication involves much more than copying (replicating) a given Social Technology in another location. It is about recreating a given technology in new places, making it appropriate for their reality and bringing new knowledge and meanings (application type).

The idea of reapplication carries with it the realization that when a solution is implemented in places other than the one in which it was developed, it will necessarily be recreated and adapted to the new reality (RTS, 2009; Fernández *et al.*, 2016) and add new values and meanings (RTS, 2009; Baumgarten, 2008). This view reinforces the Social Technology Institute's (2007) discussions when it states that it is impossible to promote social transformations without respecting local identities and their values (socio-technical adequacy).

As Fabri, Freitas, and Poletto (2020, p. 93) point out, there is great concern about how Social Technology can be disseminated to avoid the simple "replication of experiences as a static and standardized technology". Returning to the principles put forward by the Social Technology Institute (2007), the authors state that the community involved with a given Social Technology "must be

involved in the development or application process in order to know and master the technology" (Fabri, Freitas & Poletto, 2020, p. 94), and maintain it by their means after it has started operating (social relations involved).

A study by Ventura, Andrade, and Fernández (2014), which involved the analysis of ten case studies of Social Technologies reapplied in a specific Brazilian territory, highlighted aspects that should be considered in the process of reapplying Social Technologies, namely (a) using existing local resources; (b) rescuing/valuing local knowledge; (c) providing training for users; and (d) integrating them into public policies. The same study identified the following aspects as weaknesses of the Social Technologies analyzed: (a) lack of specific emphasis on strengthening the capacities of the community to participate in decision-making processes and (b) insufficient endogenous capacity to maintain the technology (socio-technical adequacy / social relations involved / knowledge sharing). Most of the points highlighted by the authors are directly linked to a good process for reapplying the technology and, therefore, its appropriation by users.

Souza and Pozzebon (2020, p. 234) believe the process is crucial for Social Technologies, as they "stem from a political socio-technical reconfiguration process, through which social practices mobilize methods and tools developed to promote social transformations". Social Technologies are conceived and implemented to promote transformations based on the interaction and political struggle between different groups seeking to meet the interests and needs of local communities (Dagnino, 2009). At the heart of the political processes from which Social Technologies emerge are the social practices of each group involved in their development or implementation (Souza & Pozzebon, 2020) (social relations involved).

Social Technologies will only be successful if the people involved understand their role and have an active voice in their development (Schwab & Freitas, 2016) (social relationships involved / knowledge sharing). Attention must be paid to Social Technology as a social construction involving values and interests, which occurs through reapplication (Fabri, Freitas & Poletto (2020). In this reapplication process, social emancipation occurs through technology (socio-technical adequacy / social relations involved / knowledge sharing).

Alluding to the terms replicable or reapplicable about Social Technology is not simply a 'question of semantics'. However, it involves understanding a process of social construction and denying the belief that technology is a neutral element (Fabri, Freitas & Poletto, 2020, p. 97).

Although the Social Technology Network (2009, 2010) highlights the need for reapplication rather than replication, few authors detail the differences between the two terms. As such, the main differences are presented in Table 1 below, using the four characteristics defined above.

Table 1
Summary of the Replication and Reapplication Characteristics

Features	Replication	Reapplication
Application type	Copy or imitation	Act of recreating
Socio-technical suitability	- Do not occur - Standardized technology - Imposed procedures that do not consider each community's particularities and needs - Emphasis on the technological artifact	- Possibility of adjusting to the values, interests, and needs of the community involved - Adaptation (to a greater or lesser degree) to local conditions, with the possibility of including new elements - Emphasis on the technology development and deployment process
Social relations involved	- Tendency to reproduce pre-existing social and power relations and their imbalances	- Participation of recipients as stakeholders in their new application - Attention to the process, building relationships of trust
Sharing knowledge	- Do not occur - Idealized and finished product	- The importance of people in the implementation process - Participatory construction process - Possibility of generating new knowledge

Source: prepared by the authors based especially on Baumgarten (2004), Dagnino, Brandão and Novaes (2009), Fabri, Freitas and Poleto (2020), ITS (2007b), Souza & Pozzebom (2020) and Thomas (2009).

We can conclude by affirming that disseminating a Social Technology requires looking at the territory and its relevant social groups. As Thomas (2009) points out, there are no universally valid Social Technologies. Each local Social Technology implementation process implies new technological development actions, new knowledge operations, and new user-technology producer relationships. The reapplication of Social Technology in other environments and locations must guarantee local populations the appropriation of processes and products that effectively represent the production of local solutions. Therefore, great care must be taken as to how this is achieved, whether through the strategies of researchers and supporters committed to the issue, such as the Social Technology Network or what the Banco do Brasil Foundation for Social Technologies currently represents, or through public policies, as will be discussed below.

The importance of reapplying social technologies through public policies

Dutra and Valadão (2017) highlight the growing interest in Social Technologies and, therefore, the search for knowledge to meet the persistent demands for development in the country. This search culminated in the creation of the Brazilian Association for Research, Education, and Extension in Social Technologies (AbepeTS) in 2021, a body with more than 250 participants representing all Brazilian regions at its first assembly (AbepeTS, 2023). The association places Social Technologies as a relevant theme in Latin America Science, Technology, and Innovation, opposing

"conventional and hegemonic" socio-economic and scientific-technological development models. Just as the Social Technology Network, active until 2011, has always strived to incorporate Social Technologies into public policies related to science and technology in Brazil (RTS, 2010), AbepeTS also points to this need. Creating a working group evidences this focus on public policies (AbepeTS, 2023). Social Technologies are expected to be more widely disseminated through their reapplicability through these policies.

The importance of seeking reapplicability is because the lack of integrated solutions, which build on the links between stakeholders and continue over time, wastes much of the efforts and resources invested in developing a given locality. The need for a territorialized approach to innovation systems is also defended by Ribeiro and Faria (2013), who stress the need for a solidary understanding between the stakeholders in a given territory so that public actions can acquire the necessary scale, expanding opportunities for local populations.

In order to guarantee this scale and exploit their character as promoters of development, many authors stress the importance of converting Social Technologies into public policies and, to this end, formally integrating them into the National Innovation System in favor of social inclusion (RTS, 2004). As Fonseca (2009) suggests, technological development should be viewed as a political process, with public policy formulation as a process of technological choices based on specific socio-environmental problems.

The concern to find solutions to national development challenges can also be seen in the solidarity economy, which includes social currencies. Silva and Faria (2009) highlight the need to build public science and technology policies appropriate to the realities and characteristics of this field. The authors state that these policies must consider the use of Social Technologies and are concerned with sustainable and solidarity principles, such as free knowledge and democratized information. Access to knowledge and technologies is fundamental for all socio-economic organization forms and strategies. However, the authors reinforce that this access is unequal, reproducing society's very pattern of socio-economic inequality.

One of the best-known examples of the dissemination of Social Technologies through public policies is that of water storage cisterns. Melchiori, Rodrigues, and Aoqui (2022) discuss the federal government's distinctions in disseminating the "One Million Cisterns Program - P1MC". The authors report on the process of disseminating plate cisterns through the reapplication of this Social Technology, involving the use of local raw materials and labor, a participatory training process for their construction and the choice of the installation site, and the replication of polyethylene cisterns, a simple technological artifact for meeting part of local needs.

This fact shows how important it is that any public policy that aims to scale up Social Technologies to help transform realities should include concrete concerns about reapplication in its implementation principles and forms. Only then will the community using the technology be able to see their values and interests included in the process; in other words, reapplication guarantees actual technological appropriation and social emancipation for the use of Social Technology.

With this in mind, we will now analyze the dissemination of the Palmas social currency, telling its story and transformations in three phases: (a) its origin in the 2000s, with the Palmares currency in the exchange club, (b) its best-known phase, the Palmas, when it became part of the operating methodology of the Community Development Banks, reapplied in several other

communities throughout Brazil since 2005 and (c) its current phase, after the Palmas started circulating on the *E-dinheiro* platform, along with several other social currencies in the country. In its *E-dinheiro* phase, we present a general outlook of the social currencies of Community Development Banks in Brazil and specifically discuss the potential gains and losses of the digitalization process, focusing on the Social Technology's reapplication.

Results and discussions

From palmares to palmas: the reapplication of an Argentine ST and the joint construction of a Brazilian ST

The methodology for using social currency as it is known today in the work of Community Development Banks was conceived in a collective process of searching for social innovations that matched the proposals of Banco Palmas and the Association of Residents of Conjunto Palmeiras (ASMOCONP). As such, it was created as part of the development of Banco Palmas' methodology, which later became the methodology of the Community Development Banks, in other words, one Social Technology (social currency) within another (CDB). Notably, according to Rigo and Ventura (2019), Banco Palmas was certified as a Social Technology by FINEP (Financier of Studies and Projects) in 2008, and its social currency was understood as a Social Technology in the authors' study.

The first version of the best-known Brazilian social currency, Palmares, was used in an exchange club organized by Banco Palmas for seven months, working the same way as the social currencies commonly worked in Argentine barter clubs. In a nutshell, the residents brought their products - produced or second-hand - to be exchanged at the fair and received a specific amount of Palmares. They would then move around the fair using the Palmares they had received to buy other products brought by other residents. At the end of each meeting, the producers and consumers returned the Palmares they had received, and the whole process was repeated at the next meeting, every fortnight, with the same Palmares notes that were kept at Banco Palmas (Rigo, 2014; Rigo & Ventura, 2019).

The methodology of using social currencies in exchange clubs is well known in Argentina (and now in other countries). Notably, the creation of Palmares to boost the activities proposed by Banco Palmas was directly supported by Heloísa Primavera, an activist in the solidarity economy movement in that country, who did some training for the community in Conjunto Palmeiras at the time. At this early stage, we can see a straightforward process of reapplying the Argentinian exchange clubs in Conjunto Palmeiras, adapting them to the community and being appropriated by it, aligned with what Fabri, Freitas, and Poletto (2020), RTS (2009), and others advocate.

Although swap clubs facilitate the exchange of surplus between participating members, after a few months, the Conjunto Palmeiras swap club began to see a "mismatch" between supply and demand for the products exchanged during the fair. On the supply side, most residents brought clothes and handicraft products. On the demand side, they were looking for food products. Another difficulty was defining the price - or exchange value - of the items brought (Rigo, 2014; Rigo & Ventura, 2019). How many Palmares was a used T-shirt worth, and how many a kilo of flour? Some exchange clubs define one-to-one equivalence (one item equals one social currency), but this was not the case with the Conjunto Palmeiras exchange club.

The mismatch between supply and demand and questions about the equivalence levels established led one resident, during a meeting of the Conjunto Palmeiras Residents' Association (ASMOCONP), to comment: "*It would be nice if the whole neighborhood were one big exchange club*". That way, the currency could be used in local markets and among all the residents. It did not take long for the Palmas to be created in 2002, with security mechanisms² to make it easier for traders in the neighborhood to accept them. The name "Palmas" was chosen to compose several local development projects and instruments that used the name "Palmas" (such as the Palmatech project and the Palmacard paper credit card³), thus representing the local identities and values already in place in the community. The Institute of Social Technologies (2007) stresses that the valorization of local identities is fundamental to the proper functioning of a Social Technology, making up its framework of characteristics.

While creating the Palmas, the community once again sought support from Argentina and its experience with some barter clubs that exceeded neighborhood boundaries. The paper used in Argentinian social currencies already had security mechanisms printed by specific printers. The first batch of Palmas was printed there, amounting to 51,000 reais in 1, 2, 5, and 10 Palmas notes, which began circulating in 2002.

In addition to the security mechanisms, the Palmas circulated in national currency ballast, meaning there was a corresponding amount in Brazilian Reals in a bank account (or in the Banco Palmas safe) for every amount of Palmas circulating in the community. This fact was crucial because not everything merchants needed for their businesses could be bought in the neighborhood, forcing them to make most of their purchases outside the neighborhood in national currency. In addition, the Central Bank of Brazil also requires these social currencies to be backed by national currency (Technical Note PGBC-387/2011 and Legal Note PGBC-5927/2011).

We believe that the community's appropriation of the Palmares during the exchange club contributed to their transformation, or rather, the joint construction of the Palmas, when the residents themselves, in assembly, suggested changes that incorporate their needs and values, giving rise to a unique Social Technology different from the first (Rigo & Ventura, 2019). This incorporation of values, interests, knowledge, and needs is fundamental to reapplying a Social Technology, as highlighted by authors such as Baumgarten (2008), ITS (2007), and Fabri, Freitas, and Poletto (2020). Without this, the appropriation of the technology by the community would not be complete or would have failed, as Dagnino, Novaes, and Brandão (2004) point out. As Melo (2023, p. 32) underscores, "Everything was done with much emotion. The names were chosen for the projects, the colors, the brands, and the way of doing things and organizing overflowed with lightness and humor. The identity with the place could be read in each development: Banco Palmas, PalmaCard, PalmoRico, PalmaNatus, PalmaFashion, PalmaTur, Palma Art, Palma Limpe" and, of course, in the Palmas.

From palmas to BNCB: the process of reapplying social currencies across Brazil

The security mechanisms and the ballast were essential for the community to accept the Palmas, especially the shopkeepers, but they were insufficient. At first, there was resistance, and only two traders in the neighborhood accepted them more readily. The residents' association and Banco Palmas used several tools and means to encourage the acceptance and circulation of Palmas in the neighborhood, constantly explaining how and why to use the social currency. The reasons

were firmly anchored in the ultimate goal of Social Technology to contribute to social inclusion and emancipation, as Dagnino (2013) points out. At this point, some materials were produced by the community members, such as videos, booklets, songs, and plays. The idea was to sensitize merchants and residents not yet involved in the process to accept the currency and buy in the neighborhood in a straightforward community involvement process (ITS, 2007; Fabri, Freitas & Poletto, 2020) and knowledge sharing (RTS, 2009). The slogan "Buy in the neighborhood, it offers more jobs" summed up the potential of using social currency for the whole community.

Gradually, with constant communication and sensitization, almost all traders, producers, and consumers began to use the social currency alongside the Real, keeping a large part of the resources within the neighborhood and thus bringing significant potential for social transformation (Baumgarten, 2008; Dagnino, 2004). Between 1997 and 2009, studies showed that purchases made within Conjunto Palmeiras increased from 20% to over 90% (Silva Junior, 2008; Cernev & Diniz, 2020). In 2011, the estimated wealth circulating in the neighborhood was around R\$68 million (Cernev & Diniz, 2020).

The 2012 Banco Palmas Institute data show that the volume of Palmas in the neighborhood increased progressively between 2005 and 2009. In 2009 alone, R\$36,000 were granted through social currency loans. Silva Júnior's evaluation research (2008) showed that traders and residents were clear about the role of social currency and its positive effects on the territory, giving legitimacy to the use of Palmas. This evolution shows the community's technology appropriation, as discussed by Dagnino, Brandão, and Novaes (2004).

The circulation of the Palmas in Conjunto Palmeiras attracted the attention of researchers, government agencies, and other communities. In 2005, the methodology of the Community Development Banks and the use of the Palmas in Conjunto Palmeiras began to spread throughout Brazil in a dynamic reapplication led by the Support and Promotion Entities, such as solidarity economy incubators and civil society organizations, and by the Banco Palmas Institute itself, which acted (and acts) as the main Support and Promotion Entity, multiplying the number of Community Development Banks and social currencies across the country. This reapplication movement is supported by government bodies and aligned with the Social Technology Network's proposals (2004, 2009), which highlights the crucial participation of governments in this process, involving, whenever possible, the proposition and drafting of public policies.

During this expansion, the Community Development Banks' methodology of action and their social currencies were already on the public policy agenda of the National Secretariat for Solidarity Economy (SENAES). They received financial and institutional support for reapplication in over a hundred Brazilian territories. This legitimacy contributed to the formalization of the Brazilian Network of Community Banks in 2007. "In early 2019, 117 community development banks were found in 20 Brazilian states and 80 municipalities" (Cernev & Diniz, 2020, p. 489).

Table 2 below gives an overview of the reapplication process through the number of Community Development Banks and social currencies created in Brazil per year (or period). By 2012, 78 Community Development Banks had been created, reaching 103 in 2013 (Rigo, 2014). In 2021, Pupo (2022) identified 148, and the current national survey has compiled a list of 167 experiences, although it is not yet known precisely how many are still active.

Table 2
Creation of CDBs and their social currencies in Brazil (1998 to 2023)

Year	No. of CDBs created	Year	No. of CDBs created
1998	1	2009	12
1999-2003	0	2010	2
2004	1	2011	16
2005	1	2012	11
2006	5	2013	25
2007	7	2021-2023*	22
2008	22	2014-2020*	45
Total		167	

*Approximate figures based on studies by Rigo (2014), Pupo (2022) and ongoing research (2022-2024).

Source: Prepared by the authors based on data from the Banco Palmas Institute (2012), Rigo (2014), Pupo (2022), and the ongoing national survey (2023-24).

This widespread expansion reinforces the capacity for reapplication in the social technologies of Community Development Banks and social currencies, which scholars on the subject require to achieve effective social transformation in the territories. The Community Development Banks and their social currencies were created in a collective participation process backed by the Support and Promotion Entities, aligned with the principles set out by the Social Technology Network (2010). In this reapplication phase, two notable examples show how the social currency has been reapplied and adapted to each reality and its potential for social transformation.

In 2004, the municipality played an important role in creating the bank and the Par social currency in Paracuru, Ceará. In this experience, the Par social currency was adapted to local needs and linked to a municipal cash transfer program in the Riacho Doce district. Families who had previously received a basic food basket now received 50 Pars that could be used to buy products in the neighborhood markets (Melo, 2023). This was the first experience of using social currency to transfer income.

The second example shows how the Social Technology social currency can be territorialized. The paper currency notes can be made per the territory's characteristics and the residents' needs, as defined in the principles presented by the Social Technology Institute (2007) and defended by authors such as Baumgarten (2008) and Ribeiro and Faria (2013). In 2011, in the district of Duque de Caxias, in Rio de Janeiro, social currencies were made with larger denominations - 5, 10, 20, and 50 Saracunas - given the volume and size of local businesses. The Palmas and most Brazilian social currencies were primarily made in 1, 2, 5, and 10 denominations. Once again, the Social Technology social currency revealed its adaptive potential under the terms of Souza (2010).

In each community, the creation and use of social currencies in the Community Development Banks' methodology received special attention, which aligns with what Souza and Pozzebon (2020) advocate when they emphasize the relevance of the processes. The name, the volume, the credit

lines offered in social currency, the ways of introducing it into the territory, and the construction of the local acceptance network were discussed and undertaken while setting up the Community Development Bank and the first few months of its operation. We can see here the concern with socio-technical adequacy, emphasized by authors such as Dagnino, Brandão, and Novaes (2004) and Thomas (2009). Thus, the aspects of the territory associated with constant communication and community awareness by the local leading figures are decisive in characterizing the alternative monetary circuit. Rigo and França Filho (2017a) show that the population size does not determine how the social currency will work but rather the ability to build an acceptance and legitimization network for the currency and the Community Development Bank.

As we have seen, generating and disseminating technology must involve using and respecting local knowledge and the participation of local stakeholders (Dagnino, Brandão & Novaes, 2004). This does not come without challenges, notably the lack of resources to support and pay local leaders dedicated to the work (Rigo, 2020). Per their capacities and partnerships, each community created ways of managing "their currency and their bank" to improve living conditions and bring about the social changes they dreamed of.

Regarding the reapplicability of social currencies in the public policy of solidarity finance, this was developed mainly between 2005 and 2015, when, as briefly mentioned above, SENAES played a leading role in setting up new Community Development Banks and, consequently, the Brazilian Network of Community Banks. Rigo and Silva Júnior (2022) affirm that, during this period, some Community Development Banks received direct support from local public authorities and came to be seen as potential public policy instruments. The authors underscore the case of the Cacaos Community Development Bank in 2007, located São João do Arraial, inland region of Piauí. More recently, Banco Mumbuca's case marked the Community Development Banks field and the local government's use of social currencies in Brazil. Located in Maricá (RJ), the Mumbuca bank and currency have attracted the attention of scholars and municipalities interested in understanding its specificities and potential for local development. Gonzales *et al.* (2020) discuss the potential of local public authorities to use the Mumbuca social currency in tackling the COVID-19 pandemic crisis.

Returning to Conjunto Palmeiras and the Palmas, from 2012 onwards, *on-site* studies started to indicate a progressive disuse of the currency, despite the significant importance and visibility that Banco Palmas and the neighborhood were gaining in the media and among academics (Meyer, 2012; Rigo & França Filho, 2017b). The network of 240 local businesses previously receiving Palmas was reduced to 43, with a mean circulation volume of less than R\$400 per month. This meant a total monetary mass of no more than 14,000 Palmas instead of the 40,000 circulated just a few years earlier. Moreover, the money circuit was short, with half the funds concentrated in four local businesses (three grocery stores and the only gas station). However, the conclusion reached by Rigo and França Filho (2017b) is that the acceptance network was still considerable despite the low volume and flow. Thus, although they no longer used the Palmas frequently, residents and traders understood their importance. This understanding may be linked to the realization that this currency served local interests, reiterated by the Social Technologies Network (2009).

Faced with this outlook, at the end of 2013, the Banco Palmas Institute coordinator pointed to the possibility of replacing the Palmas with a digital format, given their still wide acceptance in the neighborhood. He believed that this would facilitate and expand the use of the currency and make it more transparent and easier to manage. In November 2015, during a meeting of the

Brazilian Network of Community Banks in Fortaleza (CE), the possible digitalization of the social currencies of the network's Community Development Banks was debated. Although opinions were not unanimous, most agreed with the acquisition of the *E-dinheiro* platform, where each Community Development Bank was free to join or not, keeping the paper format if it deemed it more appropriate for its reality, in a clear demonstration of care for socio-technical adequacy, highlighted by Dagnino, Brandão, and Novaes (2004).

The e-dinheiro platform and the digitalization of social currencies in Brazil

From the perspective of this study, in Brazil, social currencies can be seen as a Social Technology closely linked to another, the Community Development Banks. However, they are distinct, as they can operate separately. Although the social technology social currency is an important part of the Community Development Bank Social Technology methodology, Rigo (2020) showed that 18 of the 78 Community Development Banks the author mapped had no social currency in operation. In these cases, the Community Development Banks operated credit lines in Reals and developed projects, which are also pillars of their methodology of action in the territory. Similarly, a community can create and use a social currency without a Community Development Bank. This is the case of some municipalities in Brazil which, inspired by the Community Development Banks methodology and guided by the Banco Palmas Institute and the E-dinheiro Brasil Institute, have created social currencies – which have been called municipal social currencies – to transfer primary income to the population while keeping these funds within the municipality (Melo, 2023). The case of Mumbucas, mentioned earlier, is exemplary. The Mumbuca social currency was created in 2013 to transfer primary income to the more impoverished population in the municipality. Although it was provided for in the municipal legislation that created the currency, the Community Bank was created to operate credit lines and develop other projects only in 2017. The Mumbucas were the first digital social currencies of the Brazilian Network of Community Banks. They were created using magnetic cards, a step that the Palmas currency "skipped" since it went from paper currency directly to its digital form via a mobile application: the *E-dinheiro* platform.

About public policy, it should also be noted that the history of the *E-dinheiro* platform was only possible after the enactment of Law No. 12.865/2013 (Brazil, 2013), which enabled the emergence of Brazilian *fintechs* (technology companies that provide financial services). In addition, the protagonists of the Conjunto Palmeiras' experience believed that, given the consolidation and legitimacy already acquired by the Palmas in the territory, their digitalization process would be an important step. Thus, in April 2015, Palmas E-dinheiro was born, based on a partnership with the Brasilia technology company *MoneyClip*, which was already developing an application for mobile payments. The technology company would be responsible for the platform's development, maintenance, and technological support in this partnership. Banco Palmas would manage it with the community (publicizing, registering participants, financial management, and expansion). The idea was to combine this digital payment tool with the social purpose of social currencies (Cernev & Diniz, 2020; Sanches *et al.*, 2022).

While still in the testing phase, transforming the paper Palmas into something digital proved fruitful. Around 200 subscriptions to the service and more than 12,000 transactions in the neighborhood (Cernev & Diniz, 2020) were identified. However, the E-dinheiro Brasil Institute and some of the network's Community Development Banks perceived their dependence on technical

knowledge and ownership of the platform, hindering the appropriation of the new social technology format by the Community Development Banks.

Then, in late 2016, the Brazilian Network of Community Banks, through the E-dinheiro Brasil Institute, bought the *E-dinheiro* platform from the technology company. From then on, its use began to expand to other locations, replacing many social currencies of Community Development Banks that circulated only in paper form. In some cases, these currencies have been completely replaced; in others, they work together, referring to the possibility of technological choices needed by society (Dagnino, Brandão & Novaes, 2004; Silva & Faria, 2009). Cernev and Diniz (2020) argue that, at the start of this process, 2,477 people had already used the platform in 166 accredited businesses, generating around R\$10.5 million. In December 2022, Melo (2023, p. 43) stated there were already 226,565 digital accounts open on the platform and 29,778 accredited businesses. "All this meant an approximate turnover of 50 million per month". However, most of this volume is associated with municipal social currencies for basic income transfer, which also use the Brazilian Network of Community Banks platform and are managed by the E-dinheiro Brasil Institute, created by Banco Palmas, to manage the platform's issues.

As we have seen, knowledge about Social Technology allows it to be appropriated by users, which is a fundamental aspect in the process of reapplying Social Technologies (ITS, 2007; RTS, 2009, 2010; Dagnino, Brandão & Novaes, 2004; Thomas, 2009). Therefore, at this point in the history of Palmas, we can question whether, operating within the digital platform, the social currency is not just a conventional technology (under the terms of Dagnino, 2004) that would keep its users, in this case, the Community Development Banks, dependent on its developers, even though it maintains its focus on social improvements as its primary purpose. One could ask whether, in digital format, Palmas can still be seen as Social Technologies or conventional technologies, albeit at the service of the social.

When the platform is acquired, the Social Technology is appropriated by the Banco Palmas Institute and E-dinheiro Brasil, its managers. However, how would its reapplication occur in other Community Development Banks throughout Brazil? The following section shows the gains and losses of using the *E-dinheiro* platform in Community Development Banks in several territories. Although we do not have more in-depth information on how this reapplication occurs *in loco*, data show the difficulties in appropriating the Social Technology observed by the Community Development Banks when implementing and using the platform in their communities.

Gains and losses of CDBs reapplication of digital social currencies in Brazil

The ongoing national survey (2022-2024) has indicated that many Community Development Banks struggle with using the platform. Thirty-two of the 79 Community Development Banks participating in the survey declared that their social currencies are circulating (40.5%). Among these, we identified seventeen cases that use paper social currency (ten cases that use only paper social currency and seven that use both paper and digital currency) and 22 cases that use the platform (seven cases that use both, five cases that have migrated from paper to digital format and ten that have already started using the digital format). The analyses refer to the 32 Community Development Banks indicating their social currencies in circulation.

Table 2 shows the difference in circulation volume between the two social currency types and the limited resources available for backing the 323,500 Reals paper currency, considering all seventeen paper currencies in circulation. This analysis is due to the user-friendly feature of the platform via cell phone and because there is no need for a specific fund for backing, as in the case of circulating paper social currencies. In the case of the platform, the deposits made by the users themselves in their digital accounts are the "ballast" and guarantee the volume of resources per each user's needs. This helps to keep the volume of social currency relatively stable in the territory until new launches are made (via direct deposits, credit line loans, income transfers, and other forms). Also noteworthy is the difference between the minimum and maximum values in circulation of the cases researched. In the paper format, some Community Development Banks have no resources available to increase the volume in circulation, while in other communities, R\$ 100,000 circulate. In the E-dinheiro format, we have a community in which this currency is still being tested with R\$100, and in just one case, the maximum volume is R\$80,000.

Table 3

Summaries of the volumes of resources available and in the circulation of social currencies on paper and on the E-dinheiro platform among the NCBs surveyed (December 2023)

Social currency type	CDB	Current Fund available	Min.	Max.	Volume in circulation Current	Min.	Max.
Paper	17	323,500	0	100,000	242,792	500	100,000
E-dinheiro	21	-	-	-	342,800 per month	100	80,000
E-dinheiro Mumbuca	1	-	-	-	40,000,000 per month	-	-

Source: Survey data (2022-23)

Based on the survey, we should explain two cases that are different regarding the use of currency. The first mentioned above and shown in Table 2 are the Community Development Banks and the Mumbuca social currency in Maricá (RJ). Despite being inspired by and organizationally similar to the Community Development Banks, the Mumbuca currency is an integral part of the local public income transfer policy, significantly increasing the volume of funds circulating. This can be considered a "point outside the curve" in the Community Development Banks interviewed universe.

The case of the Cocaís currency is one in which the Community Development Bank has kept both social currencies in operation simultaneously. This is the Cocaís Community Development Bank in Piauí. The currency's acceptance network comprises all the residents and businesses in São João do Arraial (7,337 inhabitants, according to IBGE, 2022). The respondent states that using the E-dinheiro platform is limited to the role of banking correspondent and does not replace the paper social currency. There, the paper social currency remains the option of the Community Development Bank and the residents, given its suitability to the local reality. As a result, the community maintains its mastery and ownership of the paper social currency. It uses the E-dinheiro platform technology as a tool that contributes to managing the Community Development Bank. This is a case in which the Social Technology integrating the territory's social transformation strategies (Vision 1) and the

conventional technology for social purposes (Vision 2), presented in Dutra and Valadão (2017), are identified.

The gains of adopting the e-dinheiro platform and the spread of social currency as a technology for the social

Analyzing the data collected through the questionnaires applied to the 22 Community Development Banks with digital currencies in operation revealed gains in the respondents' opinion. Using the platform is an opportunity to offer several services. The responses obtained reveal that these services are bill payments (70.6%), bank transfers (67.6%), loans and microcredits (44.1%), cell phone top-ups (41.2%), purchases from local businesses (38.2%) and deposits (38.2%).

Moreover, regarding the principal results of using the platform, Community Development Banks point out that it offers greater autonomy for banking services (54.5%), facilitates operational management (51.5%), helps attract new beneficiaries (45.5%), and offers greater security in transactions (51.5%).

During the interviews, when asked about the impact of the *E-dinheiro* platform for the Community Development Bank in particular and the Brazilian Network of Community Banks, the respondents highlighted other positive gains and impacts, such as: (a) it offers visibility for the Brazilian Network of Community Banks, (b) it helps with the sustainability of Community Development Banks, (c) it makes it easier to use, (d) it is more attractive because it is a global trend, (e) it is available 24 hours a day, (f) it was important during the pandemic, (g) it avoids queues, (h) it allows you to compete with other platforms, banks, and the PIX (instant free bank-to-bank transfer). For one of the respondents, *E-dinheiro* brings "positive impacts of digitalization and scaling of social technology" (BCD71, 2023). Two credit agents from different Community Development Banks say it is "*a great project. Because you can do everything digitally, securely, against fraud. As it is sustainable, it will be the economy of the future*" (BCD42, 2023).

I am passionate about the idea. E-dinheiro makes a network connection. Besides payment and receipt services. I have followed other banks, and E-dinheiro allows us to move into the modern age. We need to tell merchants what the platform is all about. Today, it is easier than before. However, in other CDBs, the money does not rotate; it just stays at the fair, and the currency could rotate (BCD27, 2023).

In summary, despite the difficulties, the Community Development Banks were interviewed to understand the technological potential of the *E-dinheiro* platform for the Brazilian Network of Community Banks. They see it as a platform for the solidarity economy, contributing to access to financial services for a population excluded by traditional banks. This aspect could justify its characterization as a technology for social purposes, as Bava (2004) points out. Thus, within Vision 2 of Social Technology, it would be a technology for the social.

Losses of adopting the e-dinheiro platform and the potential mischaracterization of social currency as a reapplicable social technology

Throughout the interviews, the Community Development Banks identified many difficulties in adopting and using the platform, especially for the smaller ones, who fear they will never be able to adopt it. *"We even tried to use it, but in the territory where we operate, paper currency works better. People do not know how to use their cell phones for this, nor do they have the technology to do so"* (BCD32, 2023). A credit agent from a Community Development Bank working in a quilombola community says

It is an excellent, satisfactory project that makes the money circulate more, but each place has its situation. For example, not everyone has a cell phone, the internet signal is terrible, it is a quilombola community, and everything is harder for us (BCD4, 2022).

The comments above evidence the Community Development Banks operating in territories' difficulty in using the platform with specific "barriers" imposed by local aspects, such as problems with the use of cell phones (the equipment on which the platform works), access to the internet and even knowledge about its use. In these cases, the paper-based social currency is more suited to reality. Although desirable, the *E-dinheiro* platform is seen as a technology that is still far removed from local reality. In these cases, local aspects prevent the platform from being used even before it is reapplied. This shows the difficulty of socio-technical adequacy highlighted, for example, by Dagnino, Brandão, and Novaes (2004), and knowledge sharing, defended by Ventura, Andrade, and Fernández (2014), Schwab & Freitas (2016) and others.

What draws attention to the issue raised in this article is the potential loss of the characteristics surrounding the reapplication of social currency in digital format, highlighting the need to look at technological choices as a political process, as Silva and Faria (2009) point out. Some of the statements made by the Community Development Banks interviewed are emblematic, as they call the characteristics of the reapplication process into question. For some, the issue of democracy is lost in the process, even though it is fundamental: *"The appropriation of the application by the CDBs is lacking; access needs to be more democratized"* (BCD10, 2023). For another, *"E-dinheiro has a very centralizing and undemocratic impact, with no space to listen and talk, [...] we do not feel like we are participating in E-dinheiro"* (BCD11, 2023).

The *E-dinheiro* platform has gained notoriety in the Brazilian Network of Community Banks, although half of the Community Development Banks are unable or unwilling to use it. The centralization to which the respondent refers is related to the control of the technology by the *E-dinheiro* Institute, which has managed, not without difficulty, to maintain a team of *experts* to manage and improve it, a discussion strongly brought up by Dagnino (2004).

Another important issue that points to losses in reapplying social currency on the *E-dinheiro* platform concerns the "individualism" it arouses. Some Community Development Banks believe that users miss out on opportunities for interaction because they make transactions via cell phones, and there is no longer any exchange using paper currency. There would then be a possible loss in the constant construction of local identity. As we have seen, reapplication processes must involve participation and the building of relationships of trust, which does not seem to be happening in the

adoption of the E-dinheiro platform, based on the reflections of authors such as Baumgarten (2008) and Thomas (2009). *"I think it is an important strategy at this time of new technologies and E-dinheiro broadens access. However, at the same time, it breaks the idea of the local and the community"* (BCD52, 2023).

For example, some social currencies already born within the platform in more recently established Community Development Banks are only called "E-dinheiro", and the name of the local social currency has not even been chosen. The implementation involves training the Community Development Bank's credit agents on using the platform, selecting some of the functionalities most suitable for the community, and publicizing, explaining, and convincing traders and residents to use the platform. Thus, reapplication would lose its importance since incorporating local identity and values is harder (see Souza and Pozzebon, 2020, ITS, 2007, among others), and it would be closer to a more straightforward replication process.

We should also point out that some Community Development Banks characterize the losses as negative impacts. *"Honestly, I do not see any impact on the small CDBs, and I think it has even made it harder. The impact was negative"* (BCD48, 2023). Here, the E-dinheiro platform is seen as a conventional technology that, by ignoring local aspects in its implementation, can have a negative impact, reducing the use of social currency and demobilizing the community around the Community Development Bank, among others.

The coordinator of a Community Development Bank, which still only uses paper social currency, believes the platform should be at a later stage because the methodology for creating and using paper social currency contains fundamental elements, such as community participation in the process.

[...] This is a stage, you know. I would not jump straight to the platform. It is very nice that this is happening, you know. You take ownership and look at the coin with a symbol of yours, of the community. The residents chose ours, the names of the streets. So, what is on the coins are street names, you know, as well as others; other symbols signify your community, the name [...] This is something of belonging, you know. So, you need to experience this to feel this other stage [...] (BCD76, 2023).

Although almost all of the Community Development Banks interviewed agree that using the E-dinheiro platform is positive, the problems related to the appropriation of the platform by the smaller Community Development Banks and, consequently, by the communities in which these banks operate, call into question the social technology nature of the E-dinheiro social currency. Using E-dinheiro could bring about the dissemination necessary for Brazil to have an effective support technology for transforming the socio-economic reality of communities. However, a significant degree of technological dependence persists without adequate reapplication, which prevents the community from taking ownership and is essential for a genuine Social Technology with the potential for social transformation.

Reflections on the gains and losses of disseminating the E-dinheiro platform

In short, social currency in the E-dinheiro format is better understood regarding final results, i.e., all the advantages and ways of using it that the Community Development Banks pointed out as gains. There is concern about providing improvements to localities. However, its users' direct and adequate involvement would be closer to Vision 2, identified by Dutra & Valadão (2017). In this sense, regarding the process, i.e., the characteristics of reapplication (creation, socio-technical adequacy, social relations involved, and knowledge sharing), it loses aspects that draw it closer to an emancipatory Social Technology (Dagnino, 2013).

How should a possible E-dinheiro social currency spread occur without its dissemination becoming just a process of replicating a technology? An important reflection emerges from this question that contributes to understanding the event and can guide future studies: social currency only "is" a Social Technology when it happens somewhere and through a reapplication process.

Based on the case and the analysis, social currency or any other Social Technology cannot be understood as something in itself. If a Social Technology has intrinsic value, reapplication, with all its characteristics, would not be important and replication would be enough to characterize it as such. Therefore, because it is digital does not de-characterize a social currency as a Social Technology as long as it is reapplicable. In this study, the potential de-characterization of E-dinheiro as a Social Technology results from what is known as "losses", which have occurred in its reapplication process in other Community Development Banks.

The socio-technical suitability question helps explain why a social currency is not automatically characterized as a Social Technology. Indeed, digital social currency technology brings social gains. However, it has hindered the transformation and effective social inclusion expected in the territory. This study clearly shows that paper social currency and the E-dinheiro platform coexist in the same Community Development Bank, each suitable for specific social functions. Despite the smaller flow compared to the platform, the community appropriates the paper-based social currency in a participatory process, building trust and valuing local identity, among other fundamental aspects that guarantee the desired transformation. The E-dinheiro platform, as a conventional technology, is used by the Community Development Bank to manage some credit lines and offer other services to residents, enhancing the social transformations sought by the Community Development Bank and its community. We emphasize from this study that socio-technical suitability, participation, the incorporation of local values and identities, and the guarantee of knowledge sharing, among others, must not be lost sight of in reapplication processes, regardless of the format of the social currencies.

Conclusions

This study stems from a concern about the possibility of social currencies being mischaracterized as reapplicable Social Technologies due to their undergoing digitalization because, as we have seen, reapplication is a fundamental characteristic of Social Technologies. The case under analysis, the Palmas social currency, the forerunner of social currencies as a Brazilian Social Technology, has been digitalized and circulating on the *E-dinheiro* platform since 2015.

This study indicates that the *E-dinheiro* platform, despite gains such as scale, user-friendly format and easy management, and the incorporation of new banking services, should be interpreted as part of the set of technologies attributed in Vision 2 of Social Technology, i.e., a conventional technology used by communities for their needs and social transformation. Regarding the social currency on the *E-dinheiro* platform, the funds in users' accounts are spent within the territory, boosting the local economy and keeping wealth in the user network, improving the local reality.

The Conjunto Palmeiras case is unique because the residents have only replaced the paper Palmas with the platform. The Social Technology has only changed format and continues to be appropriated by the community there. Moreover, the platform's management is the E-dinheiro Brasil Institute's domain (in this case, created by Banco Palmas for this purpose). Although it is essential to reflect on the ownership of the digital platform's source code, which still leaves the E-dinheiro Institute dependent on costly *expertise*, the Institute also belongs to the community, which is represented in its institution that controls the currency in digital form.

However, the difficulties of appropriating the platform in the reapplication processes identified in other communities show that it takes the form of a Social Technology not built and discussed by the community in a participatory process, as was the case with the reapplication of Palmas for the Brazilian Network of Community Banks. In this initial reapplication, the Support and Promotion Entities developed methodologies for social organization and the creation of Community Development Banks and social currency to adapt how Palmas worked in other locations.

Furthermore, the issue of technological dependence is the most significant challenge of the Brazilian Network of Community Banks. The fact that the E-dinheiro Institute has its team of *experts* does not guarantee that the Community Development Banks in each community will associate their local knowledge in the development or use of the technology due to the question of the expertise involved in this type of technological tool, data security, and price. Some scholars argue that it is interesting for Social Technology to be cheap to reapply and gain scale, which does not apply to the maintenance and constant updates required for this platform. Some believe that even if the price were affordable, it would be challenging for the community to make the necessary adaptations without having sufficient training. Thus, the digital format associated with specific contexts in which social currency is used (communities where there is no easy Internet access, where people do not know how to use it, or do not have suitable cell phones) makes it difficult or impossible to share knowledge in the reapplication processes.

As one can see, the idea of reapplication implies the addition of new values and meanings. The social currency's purpose, with or without the platform, is maintained: improving social conditions in the territories. What is unclear is what social, cultural, and community values are associated with expanding the platform on the web. What possibilities are there for socio-technical adjustments? What degree of social emancipation has been established? What technological model and type of knowledge generation is being produced? What user profile is being supported by the digitalization of social currencies? These, among many other questions, indicate the importance of studies in the communities, among the users of the Community Development Banks, and the currencies that circulate on the platform.

As a social process and practice, change is always in progress. New community dynamics can mean other innovations, such as when Conjunto Palmeiras created Palmas from Palmares in a

participatory and emancipatory process. So, although the results of this research indicate the losses and potential mischaracterization of the *E-dinheiro* platform as a reapplicable Social Technology, further studies, especially those focused on the processes of reapplying the platform, are essential. These studies can help the Support and Promotion Entities develop reapplication methodologies more suitable for the *E-dinheiro* platform and point out the necessary technological adjustments. New studies and activism in social currencies are even more important in the current context and in light of Bill N° 4476/23, which aims to regulate social currencies in the country. As we have seen, the Bill's content shows a lack of knowledge about a social currency, its history in Brazil, the context where they are established, and the stakeholders involved.

Finally, while recognizing this work's limitations in proposing a discussion with data still being collected in a rapidly changing context, our study can contribute to the gradual consolidation of the Social Technology concept by demarcating the recognition of a Social Technology in the reapplication, with Technology and Social in capital letters, differentiating them from technology for the social. Future studies should include those related to so-called municipal currencies, observing how they are implemented and how they are reapplied (or simply replicated?); longitudinal studies assessing the longevity of implemented digital currencies and associating them with the reapplication process; and studies discussing the progress of the recently proposed national legal framework and the municipal laws that create social currencies. These studies should not overlook the origin of social currencies in Brazil and the numerous community experiences involved. Some research is already underway points to adopting *blockchain* technology in social currencies. There are countless other research possibilities here, but we can already infer that new difficulties in the reapplication will arise.

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Notes

1. *Blockchain as a service* (BASS). It is the provision of *blockchain* functions through the contracting of services so that organizations that cannot develop *blockchain* software can contract specialized suppliers, without the need to buy software (Diniz *et al.* (2021).
2. There are generally four security mechanisms in paper-based social currencies: a) the serial number, by which they are registered; b) the watermark, which prevents printing; c) the barcode; and d) an ultraviolet mark for reading. All these mechanisms were essential to prevent counterfeiting and for merchants to accept the currency.
3. Melo (2023) attributed the origin of the Palmas to the Palmacard and does not consider the Palmares to be social currencies because they do not circulate throughout the territory. However, the study is anchored in the literature on social currencies at the international level, in which exchange club currencies are recognized as social currencies, according to Gómez (2019).

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Conflict of interest

The authors state that there is no conflict of interest.

Inclusive language

The authors use inclusive language that recognizes diversity, shows respect for all people, is sensitive to differences and promotes equal opportunities.

Authors' contribution

First author: conception (equal), data curation (lead), formal analysis (equal/lead/support), acquisition of funding (lead), research (lead), methodology (lead), project administration (lead), resources (lead), supervision (lead), writing - original draft (equal), writing - proofreading and editing (equal).

Second author: conception (same), data curation (support), formal analysis (support), research (support), methodology (support), project administration (support), writing - original draft (same), writing - revision and editing (same).

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