

Association for Information Systems

AIS Electronic Library (AISeL)

GlobDev 2021

Proceedings Annual Workshop of the AIS
Special Interest Group for ICT in Global
Development

12-12-2021

Basic Income with Digital Community Currency: Digital Platforms for Public Policies Implementation During Pandemic Crisis

Eduardo Henrique Diniz

FGV/EAESP - Fundação Getulio Vargas/Esc de Admin de Empresas de São Paulo, eduardo.diniz@fgv.br

Marcelo Henrique de Araujo

FEA/USP (aluno de doutorado), marcelo.haraujo@gmail.com

Lauro Gonzalez

EAESP - FGV, lauro.gonzalez@fgv.br

Luiz Arthur S. Faria

EAESP-FGV, UFRJ, luizart@gmail.com

Adrian Kemmer Cernev

FGV, Adrian.Cernev@fgv.br

Follow this and additional works at: <https://aisel.aisnet.org/globdev2021>

Recommended Citation

Diniz, Eduardo Henrique; Araujo, Marcelo Henrique de; Gonzalez, Lauro; Faria, Luiz Arthur S.; and Cernev, Adrian Kemmer, "Basic Income with Digital Community Currency: Digital Platforms for Public Policies Implementation During Pandemic Crisis" (2021). *GlobDev 2021*. 8.

<https://aisel.aisnet.org/globdev2021/8>

This material is brought to you by the Proceedings Annual Workshop of the AIS Special Interest Group for ICT in Global Development at AIS Electronic Library (AISeL). It has been accepted for inclusion in GlobDev 2021 by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Basic Income with Digital Community Currency: Digital Platforms for Public Policies Implementation During Pandemic Crisis

Eduardo H. Diniz
EAESP-FGV
eduardo.diniz@fgv.br

Marcelo Henrique de Araujo
EAESP – FGV, FECAP
marcelo.haraujo@gmail.com

Lauro Gonzalez
EAESP - FGV
lauro.gonzalez@fgv.br

Luiz Arthur S. Faria
EAESP-FGV, UFRJ
luizart@gmail.com

Adrian Kemmer Cernev
EAESP - FGV
adrian.cernev@fgv.br

Paper Category: Research-in-progress

ABSTRACT

This short paper presents a research-in-progress that discusses how basic income policies can be implemented using digital currency platforms and the implications of this approach in the context of the pandemic. We analyze the case of Banco Mumbuca, a non-profit organization that uses a community currency on a digital payment platform, E-Dinheiro, to deliver the basic income program of the Brazilian town of Maricá. This city program became one of the largest in the world during the COVID-19 pandemic, considering both the amount of money transferred to municipal beneficiaries and the adoption rate of a community currency by citizens and the local commerce. We adopt the Design Science Research (DSR) approach to analyze the case, considering this implementation as two entangled sub-artifacts: the public policy and the digital community currency. These sub-artifacts will be analyzed from the perspective of the problems they intend to solve, the particular aspects of the designed solution, the evaluation of the solution by actors involved, and the discussion of the achieved outcomes. This study intends to contribute to the basic income discussion that emerged as a solution for economic recovery from the COVID-19, the strategies for scaling up community currencies, and the DSR as a strategy for producing impactful research in the ICT4D field.

Keywords: Public Policies, Digital Community Currency, pandemics, Design Science Research

1. INTRODUCTION

The COVID-19 pandemic caused several health and economic challenges, requiring a rapid and effective response to mitigate such problems. Among numerous initiatives to mitigate the social and economic damages caused by the pandemics, the basic income programs to assist the most affected population are of particular interest for at least three main reasons. First, it gives an immediate response to the lack of resources to buy food and other needs, providing essential support to those in vulnerable situations (Thompson, 2020). Second, it injects money into small businesses close to vulnerable citizens, helping the recovery of local economies (Taylor, Thome & Filipski, 2016). Third, it allows beneficiaries to choose how to use the money transfers so that it is expected that the use will properly address beneficiaries' needs (Bidadanure, 2019).

Other potential basic income benefits would be improving gender equality (Schulz, 2017), stimulating sustainable practices (Coote, 2021; Pinto, 2020), promoting solidarity and strengthening community bonds (Bauler et al., 2017), which is aligned with the Sustainable Development Goals (SDGs). Although there are many issues under inquiry surrounding the subject of basic income programs, such as levels of universality, conditionality, and regularity (Bidadanure, 2019), it is a fact that the number of initiatives related to basic income has grown considerably after the Covid-19 pandemic. Gentilini et al. (2020) identified more than 3,000 social protection initiatives in more than 200 countries between March 2020 and May 2021. Considering that basic income programs are among potential tools for combating recession, mass unemployment, and widespread business closures within the context of the COVID-19 (Johnson & Roberto, 2020), deepening the knowledge on the ways such programs are implemented may contribute to the post-pandemic economic recovery.

Regardless of the model to be adopted, there are many challenges to setting up a successful basic income program. The first and most obvious is the need for financial resources to support the income transfer, which may be challenging considering the fiscal damages of the pandemics (Green, Kesselman & Tedds, 2020). The second is to implement efficient identification, analysis, and monitoring of eligible beneficiaries (Gonzalez et al. 2020). The third is to guarantee that benefits have a positive externality beyond the benefited segments, usually low-income citizens (Ghatak & Maniquet, 2019).

In this paper, we investigate the basic income implementation based on the use of Digital Community Currencies (DCC) that potentially addresses the above challenges. The city of Maricá, in Brazil, implemented a comprehensive emergency program to deal with economic effects caused by the coronavirus pandemic based on a partnership between the city government and a community development bank (CDB), a social organization that issues a local currency called Mumbuca. The whole operation is managed through a DCC platform named E-Dinheiro that was essential for the municipality to implement an emergency cash transfer program. This existing technological environment enabled the municipality to overcome challenges related to register/eligibility analysis and money disbursement logistics to effectively assist low-income families, informal workers, and local businesses, strengthening community resilience and turning up one-third of the city population into users of the Mumbuca currency.

We adopt the Design Science Research (DSR) approach to evaluate the artifact that articulates public policies with digital community currencies in the process of delivering the basic income program implemented in Maricá. DSR provides conceptual instruments to create design theories (Jones & Gregor, 2007) aiming to explain how artifacts can be designed to achieve an expected set of goals (Hevner, vom Brocke & Maedche, 2019). We follow De Leoz & Petter (2018) suggestion to perform a DSR socio-technical study considering the artifact composed by sub-artifacts examined within a larger social context. In our case, we evaluate the sub-artifact public policy and the sub-artifact DCC articulated together in this particular case of basic income implementation.

As a result, we intend, first, to contribute to the assessment of the basic income implementation based on DCC, providing a comprehensive analysis of the investigated case study. Second, we aim to use the DSR approach to foster the replicability of such a type of artifact by producing knowledge that could encourage its application to other contexts (Brendel et al., 2021).

The following sections of this paper are structured as follows: Section 2 presents the literature review describing Digital Community Currencies (DCC) and its use to deliver social benefits as well the use of DCC in basic income policies. Section 3 states the methodological design employed in this research. Section 4 presents the basic income artifact implemented in Maricá and its sub-artifacts: public policy and DCC, as well as describes the evaluation of this socio-

technical artifact. Section 5 shows the preliminary results from data analysis. Finally, section 6 presents the final comments of this paper.

2 LITERATURE REVIEW

2.1 Digital community currency and Social Benefits

The community currencies (CC) can be described as a monetary system that supplements official national or transnational currencies (Lietaer, 2001). This alternative form of money can be conceived and issued by citizens, Non-Government Organizations (NGOs), and companies as well as public administrations (Meyer & Hudon, 2019; Gómez & Demmler, 2018; Ingham, 2004). Usually, CCs are characterized by being born in local communities aiming to promote local development and achieve progress aligned with sustainable goals. This type of currency is, in essence, used to trade goods and services which sometimes are not valued by the market-driven pricing system (Meyer & Hudon, 2019; Gomez & Helmsing, 2008).

Community currencies tend to be adopted in times of economic crisis when there is unemployment and restricted access to the mainstream financial systems for the most vulnerable population, thereby reducing their adoption rate when the economic cycle improves (Place et al., 2018). Other findings have shown that community currency initiatives have continued to expand over the past ten years (Blanc & Lakócai, 2020). Articulations between civil society organizations and local governments emphasized the potential of community currencies as a means of alleviating social problems. Kobayashi, Miyazaki & Yoshida (2017) found community currencies that help in promoting recycling, protection of the natural environment, civic activity, and other social benefits.

Advances in the field of digital payments have allowed the transformation of these community-led initiatives of community currencies through the implementation of digital platforms and the creation of digital community currencies (DCCs) (Diniz et al., 2019). Some examples demonstrate that DCCs can become a tool for promoting social benefits. Fureai Kippu (meaning ‘ticket for a caring relationship’), in Japan, is a scheme that rewards citizens for helping elderly people in the community (Diprose, 2020). ‘Moeda Verde’ is a community currency in Santa Cruz da Esperança (state of São Paulo, Brazil) that provides earnings to low-income families and educates youngsters in the benefits of the proper use of solid waste (França et al., 2020).

Projects designed to help economic recovery after the Covid-19 crisis using DCC and cryptocurrencies started to appear. One example comes from the impoverished communities of Mukuru, Kenya, where people who have run out of official fiat currency because of the epidemiological crisis still have access to basic goods using Sarafu, a blockchain-based community currency (Chibwara, 2020; Barinaga, 2020).

In fact, cryptocurrency platforms are becoming important for the discussion on basic income implementation programs (Howson, 2021). In particular, blockchain-based solutions enable rapid and efficient distribution of financial resources, as well as transparency in the executed transactions, in addition to offering a great potential to scale this type of platform (Labazova, 2019; Dierksmeier & Seele, 2018). Given the evolution of community currencies towards the adoption of cryptocurrency platforms (Barinaga & Ocampo, 2019), the technological aspects of this technology must be considered in the further analysis of this study.

2.2 Basic Income through DCCs in the context of COVID-19 pandemic

With the advent of the Covid-19 pandemic, a set of economic measures specifically aims to minimize the financial impacts for the most affected population, especially the low-income segment, including the unemployed, small merchants, informal workers, and other people in vulnerable situations. Basic income schemes directing financial resources to citizens have been adopted worldwide (Jacob & Boyd, 2020).

As the COVID-19 crisis escalated in Brazil, the Federal Government announced a basic income paying an amount of 600 Brazilian reais (approximately US\$ 120) initially for three months and subsequently renewed. The implementation of this scheme involved two stages, namely register and eligibility analysis and money disbursement logistics. Potential recipients had to fulfill predefined criteria for benefiting from the assistance, such as household income caps. The eligibility analysis was challenging since only a small fraction of the potential beneficiaries was registered in the Federal Government's database. This caused failures in eligibility analysis as some received unduly while others were wrongly excluded (Torrente, 2020). The effective disbursement or payment logistics was another challenge because, in addition to the limitations of the government database, the access and use of bank accounts was limited (Demirgüç-Kunt, Klapper, Singer, Ansar & Hess, 2018). For this emergency basic income implemented in Brazil

the solution to this challenge was to promote a fast expansion of bank usage, opening bank accounts exclusively at Caixa, a federal government bank (Torrente,2020).

In Brazil, policies involving social assistance are decentralized to municipalities that are induced to engage through federal government funding. In this sense, the collaboration between levels of government is crucial for mitigating the pandemic effects and enhancing the resilience of local economies (Grin & Fernandes, 2019). The difficulties for collaboration to provide a coordinated response to the current crisis may be explained by limited capacities at the local level (Grin & Abrucio, 2018). An additional obstacle in Latin American countries is the high level of transaction costs created by social and political cleavages between national and subnational governments (Ramírez de la Cruz et al., 2020).

Partnering with local non-government actors may prove useful to deal with both the eligibility analysis and payment disbursement (Gonzalez et al., 2020). Partnerships are also in line with the new logistics paradigm of the financial system that demands a closer approach to the final customer (Bader & Savoya, 2013). This proximity with the local community can be exemplified in Brazil by the case of community development banks.

The municipality of Maricá has implemented a set of emergency measures aimed at mitigating the negative effects of the COVID-19 pandemic (City Hall Municipality of Maricá, 2020). This emergency program focused on assisting low-income families through the strengthening of the established Basic Income program, as well as initiatives focused on informal workers. Considering the relevance of this initiative, in this paper, we focus on evaluating the business income in the city of Maricá, a socio-technical artifact composed by the municipal public policy and the Digital community currency.

3. DESIGN SCIENCE RESEARCH AND METHODS

Design Science Research provides conceptual instruments to create design theories (Jones & Gregor, 2007) aiming to explain how artifacts can be designed to achieve an expected set of goals (Hevner, vom Brocke & Maedche, 2019). Through the analysis of the DCC Mumbuca case and the application of the DSR, we seek to identify and propose design transformations to the sociomaterial artifact existing in the city of Maricá in the post-pandemic period.

Although there are many different versions of the DSR approach, combining guidelines from Peffers et al. (2007), March e Storey (2008), we found several steps in common: description of the problem to be solved, description of the artifact designed to be a solution for the problem, evaluation of artifact and finally the discussion on the artifact contributions.

As the concept of “artifact” is central in any DSR approach, two main particularities of the artifact considered in this study must be highlighted. First, besides its technological aspects, an artifact designed for delivering basic income must take into account its social implications and, thus, its social aspects should be considered along with the DSR steps (De Leoz & Petter, 2018). Second, this is the case of a co-designed artifact (Jacobs, Rivett & Chemisto, 2019) since it is developed throughout the articulation between a local government (municipal public policy) and a civil society organization.

In their consideration of the social factors that influence the artifact’s IT design, De Leoz & Petter (2018:156) suggest that the IS artifact to be created and evaluated in a DSR study should include sub-artifacts to be examined within a larger social context. “Each sub-artifact in the IS artifact holds properties, attributes, and meanings within the IS design and is presupposed to enmesh well with the other sub-artifacts as well as the IS artifact as a whole”. Thus, in this study investigating the articulation of a public policy with a digital community currency, we understand that the basic income in the city of Maricá is a socio-technical artifact comprising two main sub-artifacts: the public policy and the digital community currency. This perspective is also in line with Goldkhul (2016) proposition of a “policy-ingrained IT artifact” to study implementations of government policies considering civil society participation.

This type of co-designed artifact improves the municipal capacity to deliver services using ICT in the sectors of “governance, engagement, human resource management, institutional memory, and access to information” (Jacobs, Rivett & Chemisto, 2019). The dual view of the artifact embedding public administration and civil society in a single project also contributes to balance the interaction and knowledge exchange between technocratic aspects of public governance with democratic elements of the civil society organization (Androutsopoulou, Karacapilidis, Loukis & Charalabidis, 2018) for the development of effective and socially acceptable public policies. Gilley (2017) points out that this co-design approach contributes to overcoming the

‘technocracy’ limited understanding of “diverse needs, values and concerns of different stakeholder groups on particular social problems the experts analyze”.

Aiming to assess the IS artifact in the delivering process of Basic Income program we used two sources of data collection: semi-structured interviews and secondary data such as legal documents and data available at municipality and community bank webpage. These interviews have been conducted with key actors classified into four groups: (i) beneficiaries and users of DCC Mumbuca; (ii) local merchants; (iii) local government representatives (city hall and city council); and (iv) community bank representatives. At the time this short paper was written, in September 2021, six interviews were conducted with two beneficiaries, two local government representatives, and two community bank representatives (one of them collected in an online webinar conducted by the authors of this paper). Table 1 summarizes the interviews.

This corpus of qualitative data from the interviews and secondary data was analyzed using coding techniques to understand the underlying characteristics of the artifact evaluated through DSR (Milles, Huberman & Saldaña, 2020). Next, we will detail the analytical elements considered in this study concerning the public policy sub-artifact and the digital sub-artifact that are entangled in an integrated solution for the social problem of delivering basic emergency income during the Covid-19 crisis.

<i>Group</i>	<i>Interviewees (first round)</i>	<i>Planned Interviews</i>
Beneficiaries and users of DCC Mumbuca	Beneficiary of cash transfer program (1); Beneficiary of cash transfer and emergency programs (1)	20
Local Merchants;	-	30
Local Government Representatives (city hall and city council)	Head of Solidarity Economy Secretary (1); Research Coordinator at the Public Policy Observatory of Solidarity Economy Secretary (1).	5
Community bank representatives	Financial Director (1); Leader of Brazilian Network Community Development Bank (1)	5
Technology support team	-	2
Total		62

Table 1. Interviews (planned and first round)

4. THE MUMBUCA CASE

In Brazil, one of the pioneering initiatives to use digital community currency to enable a basic income program, aiming to serve the most vulnerable population and stimulate local development, is the case of DCC Mumbuca, created in 2013 in the city of Maricá (state of Rio de Janeiro, Brazil).

All the cash transfer benefits in Maricá are paid in Mumbucas, the local currency that circulates within the city. This alternative currency has a 1:1 parity with Brazilian Real (national fiat currency) and can be used in local commerce, thus promoting currency circulation within the municipality and boosting the region's economy and development (Gonzalez et al., 2020). The operation is based on a digital platform called E-Dinheiro, being managed by Banco Mumbuca, the Community Development Bank (CDB) of the city of Maricá. This basic income program is a partnership between the local city hall and Banco Mumbuca, and the DCC Mumbuca is a technological artifact with a social component that is established through the articulation via public policy between the community bank and the local government.

The use of Mumbuca gained special relevance during the Covid-19 crisis as the transfer of resources and payments between people, and local business entities can be done remotely or at least without physical contact, via mobile application or contactless NFC card. Unlike the Federal Government initiative, municipal payments through DCC have reached out to beneficiaries in a timely fashion and without the need for human agglomeration and additional risks to public health. The primary reason for this success involves the same dimensions previously described: prior knowledge of the beneficiaries' eligibility (citizens and small business owners), and the availability of an electronic payment instrument for citizens, both because of the previous existence and circulation of the digital community currency Mumbuca E-Dinheiro.

It should be noted that the contribution to coping with eligibility problems stems from proximity to the target audience (Gonzalez et al., 2020). Such proximity, intrinsic to the social technology of community banks, is strengthened by the use of DCC. In addition, the digital payment system of DCCs contributes to logistics (Bader & Savoya, 2013), and the mechanism of territorial action of DCCs contributes to local development. In essence, DCC, digital by definition, is directly related to logistics, although it also contributes to registration and eligibility.

The municipality of Maricá has implemented a set of emergency measures aimed at mitigating the negative effects of the pandemics (City Hall Municipality of Maricá, 2020). The first of these measures sought to strengthen the established Basic Income program (in Portuguese, Renda Básica de Cidadania) by temporarily increasing this assistance benefit from 130 to 300 Mumbuca (equivalent to 300 Brazilian Real). Additionally, the city created a program focused on informal workers called PAT (in Portuguese, Programa de Amparo ao Trabalhador) that provides financial support to citizens who were prevented from carrying out their activities as informal, self-employed professionals or micro-entrepreneurs due to the COVID-19 crisis (Municipality of Maricá, 2020). Through PAT, these professionals received the value of 1045 Mumbucas (equivalent to 1 minimum wage). Originally designed for three months, these emergency initiatives were renewed until March 2021 (City Hall Municipality of Maricá, 2021).

The results of these emergency initiatives can be reflected in the city's socioeconomic indicators. After all, by November 2020, the city had registered the creation of 967 new jobs, while the State of Rio de Janeiro, in the same period, recorded a drop of 133,754 formal jobs. It is estimated that PAT has benefited about 23,500 people, including professionals, self-employed and informal workers. It should be noted that in addition to the generation of formal jobs, during the pandemic period, the city showed an increase in the collection of municipal taxes (City Hall Municipality of Maricá, 2021).

This set of emergency measures was essential to ensure the effectiveness of social isolation actions, essential to prevent the collapse of the municipality's health system, as well as to reduce the negative economic impact.

4.1 Digital sub-artifact

The digital artifact of Mumbuca is the E-Dinheiro platform, which essentially contains three main components: (i) the smartphone app; (ii) the NFC card; (iii) the digital platform for managing this service.

At first, during the initial phase of the Mumbuca project in Maricá, the technology was based exclusively on magnetic cards for users and on card reading devices (POS) for merchants, whose information system was maintained by a partner company (Faria et al., 2020).

From the first semester of 2018 onwards, the Mumbuca project migrated to the E-Dinheiro platform, developed by Banco Palmas and a technology partner, launching an Android or IOS mobile app for both users and merchants. The old magnetic cards technology was replaced by digital accounts maintained by Banco Mumbuca, and some new contactless NFC cards were distributed to users who had difficulty adopting the app (Gonzalez et al., 2020). Along with the migration to the E-Dinheiro platform, there was an increase in registered businesses, in the collection of fees by the bank, and a consequent greater autonomy for the community bank, which started a microcredit program that year (Faria et al., 2020).

With this app, users can access their digital accounts and check their current balance and account statement, charge customers, make face-to-face and remote payments, make transfers (including P2P) and even buy prepaid mobile airtime (top-up credits).

Up to today, the E-Dinheiro platform allows three types of user accounts for the Mumbuca DCC: beneficiary, salary, and checking. The beneficiary account is restricted to basic and emergency income programs implemented by the municipality, and users can only spend their account balances to consume in the registered local merchants. The salary account, also used by employees of Banco Mumbuca, allows users to: (i) perform P2P transfers; (ii) pay bills; (iii) top-up credits to their prepaid mobile phones; (iv) exchange the Mumbuca DCC for Real (Brazilian fiat currency) with no additional fee. As for the checking account, the user can perform all the above-mentioned actions for the salary account, but the exchange from Mumbuca to Real has a 1% fee. For local merchants, all transactions have a 2% fee (discount rate) and an additional 1% if the local merchant wants to transfer the money to a traditional bank account

The digital platform of the E-Dinheiro service covers the transactional system, databases, information security structure, and exclusive dashboards for community bank managers and for merchants. To ensure data integrity and confidentiality, it was conceived centrally on servers made available by the technology partner company in a closed system, and its governance is shared with managers of community banks participating in the Brazilian Network of Community Banks (REDE). Access to data, in addition to those obtained directly via a dashboard, needs to be requested ad-hoc to the partner company by community bank managers, with low external interoperability with this platform.

4.2 Public policy sub-artifact

Although created within the realm of IS research, Peffers et al. (2018) demonstrate the use of DSR to solve a public policy problem by applying it retroactively in a published IS research project describing the development of a data warehousing solution to support data gathering and analysis necessary for public health policy (Berndt, Hevner, and Studnicki, 2002). Przeybilowicz, Cunha & Póvoa (2017) also presents a case of monitoring the achievement of public policy goals of transparency websites by using the Design Science Research approach.

For Goldkhul (2016), studies using DSR for investigating public policies should include explicit work practice analysis in order to ensure artifacts fit into institutions and business processes co-design in order to be able to create a policy-ingrained artifact. This author also recommends scholars to adopt the policy principle in DSR applied to the public sector by carrying information about legal acts, content concerning clients, security mechanisms, and identity management, particularly in handling social welfare cases.

Applying DSR principles to the public sector domain results in theoretical analyses when the study is based on cases conducted prior to the formulation of the model. This means that being a practical theory about socio-technical design, DSR is an appropriate instrument to be used as an inspirational source for the formulation of new models to conduct practical inquiries as well as an instrument for practitioners struggling to manage and improve their in-operation practices (Ågerfalk, 2018).

One of the key elements for institutionalizing the DCC Mumbuca, materialized through the technological platform E-Dinheiro, is the Solidarity Economy program of Maricá. This program results from several evolutions in the city's cash transfer policy started with the law n. 2,448/13 of the city of Maricá. This subnational regulatory framework established the conditions for creating DCC Mumbuca and the community development bank of Maricá (Banco Mumbuca), institutionalizing the structure for public income transfer policy in the municipality. The focus of this program was to face poverty and promote economic and social development in the municipality, through the distribution of 70 Mumbucas (R\$ 70) to families with an income of up to one minimum wage per month. The resources invested in this initiative come mainly from royalties that the municipality receives for oil exploration in its territory (Silva et al., 2021).

In 2015, with the approval of municipal laws n. 2.652/2015 and 2.662/2015, the Basic Citizenship Income program (RBC) was designed to serve all municipality citizens, offering a supplement of 10 Mumbucas per month. Such a program initially sought to serve families in greatest need. Later that year, the cash transfer programs were replaced by three minimum income programs targeting (i) low-income families and individuals (up to 3 minimum wages); (ii) pregnant women; and (iii) for youngsters aged between 14 and 29 years (Silva et al., 2021).

In 2019, with the institution of law n. 2.869/2019, these three minimum income programs were incorporated into the Basic Citizenship Income (RBC) program. This change increased the number of beneficiaries and the value of the benefit, which was readjusted to 130 Mumbucas. In addition, the benefit was no longer paid to just one family member and started to be paid to each individual in the family (Silva et al., 2021). These small evolutions in the policy combined with the use of the DCC Mumbuca became essential for the consolidation of the use of this community currency in the city of Maricá. In summary, the local legislation institutionalized the basic income using the Mumbuca and the DCC was essential for operationalizing this policy, allowing to serve both the population in a situation of social vulnerability and new groups, such as informal workers in the municipality.

4.3 Evaluating the Artifact Solution

The use of the E-Dinheiro platform to operationalize DCC Mumbuca's transactions has proven efficient in relation to the objective of transferring income to low-income individuals and specific groups affected by the COVID-19 crisis. In addition, in the face of the pandemics, the digital community currency has been widely used in the city of Maricá, mainly among the beneficiaries of the emergency programs implemented in the municipality.

Currently, more than 40,000 beneficiaries use the DCC Mumbuca, which is accepted as payment by a wide variety of local businesses. Besides, with the pandemic, the use of the digital currency Mumbuca has been intensified. The success of this initiative occurs on a local scale – aligning with the goals of the policy to promote local development – but it could be replicated in other locations in the country, which have similar needs. In this sense, although the E-Dinheiro platform can be adopted in other municipalities, it is understood that expanding the use of digital community currencies could hinder the scalability of this platform efficiently and at a financially sustainable transaction cost in this ecosystem.

In addition, another difficulty perceived by the beneficiaries is in the management and control of the different types of benefits that a person can receive. Through the E-Dinheiro platform, a person can have an account in which she/he will receive the benefit of the basic income program. In addition to this account, the same person may have a checking account at Banco Mumbuca, as well as a payroll account. However, this diversity of accounts can make it difficult for the beneficiary to use and manage the monetary resource, since the monetary resource derived from the basic income program has restrictions regarding what can be purchased or paid for, unlike the resource in Mumbuca that is in a checking account or payroll account. Although all these resources are accessible through the E-Dinheiro mobile app, many of the beneficiaries end up not using it and prefer to use the physical card to make purchases of products with the resource of the basic income. In addition to the difficulty of managing this benefit portfolio, the lack of usability in the application to control this variety of digital accounts, can become an additional barrier to carrying out transactions involving DCC Mumbuca via the E-Dinheiro application.

On the side of the City Hall, another challenge in relation to the E-Dinheiro platform is accountability to the Court of Audit. Since the public policy of cash transfer, as well as the emergency programs, involve the use of public resources, it is mandatory to control the monetary amount invested in the program, the number of beneficiaries, the amount received, and other information that improves the transparency in the use of DCC Mumbuca in the municipality. Therefore, one of the challenges faced by the technical staff of the city hall is the limitation of the platform in terms of control and traceability of the transactions carried out through the platform, making accountability difficult to the Court of Audit.

5. PRELIMINARY DATA ANALYSIS

Based on preliminary interviews made online in 2020, when the pandemics avoided the researchers to visit Maricá in loco, we could discuss how the business income initiative implemented in the city of Maricá was able to address the three main barriers related to the success of this type of program: (i) financial resources (Green, Kesselman & Tedds, 2020); (ii) eligibility (Gonzalez et al. 2020); and (iii) positive externalities (Ghatak & Maniquet, 2019).

Regarding the first challenge, as mentioned above, the city of Maricá has an advantage in this regard as it receives royalties from oil exploration in its territory. Part of this resource is intended to finance the municipality's income transfer programs via the Community Development Bank,

using the DCC Mumbuca, providing greater stability in the provision of resources for this type of initiative.

It should be noted that the use of royalties resources for the benefit of the local population is part of the city's vision of royalties as commons, as expressed by the secretary of solidarity economy of Maricá:

“What we believe, since wealth is in the underground of the municipality, we defend that the wealth of the soil does not belong only to the government, but belongs to all the inhabitants of the municipality. And nothing is fairer than the creation of a program that covers all the inhabitants of the city, like this money from oil royalties and which does not belong to the government, it belongs to all the inhabitants of the city.”

Regarding the eligibility challenge, Maricá has initiatives aimed at different audiences, such as people in social vulnerability conditions (RBC) and informal workers (PAT), groups with different eligibility requirements. This challenge can be overcome due to the proximity to the target audience (local community) and the role the community bank plays in the interface between city hall and citizens, which is strengthened by the use of the DCC Mumbuca.

However, it should be noted that the city hall is responsible for the analysis and approval of those enrolled in the program, with the community bank being responsible for the payment logistics, as highlighted by a representative of the CDB Mumbuca:

(...) Everything that concerns the registration of beneficiaries is done directly with the secretariat of the solidarity economy [city hall]. We are more in charge of the financial part after everything is approved. (...).

Finally, a variety of positive results can also be highlighted, which reach beyond the target audiences of the programs analyzed in this paper. The use of the DCC Mumbuca as a means of payment for the different emergency programs allowed for the increased circulation of this alternative currency, making money ‘stay in the city’, as highlighted in the speech of one of the CDB's representatives:

“With Mumbuca, we know it [the money] stays inside the city, so it is propelling commerce inside the city. It is an incentive for the currency to continue circulating within the city so that this wealth does not leave.”

This currency circulation is also reflected in commerce, especially in the growth of the number of local merchants who started accepting DCC Mumbuca, something also perceived by Mumbuca users:

“It’s much better like this, several establishments are now accepting it, it’s better for everyone. Because they [merchants] accept it because it’s money [...] and it’s better for the cardholder because we can use it at any establishment.”

Even in the face of the pandemic scenario, the initiatives implemented in Maricá were essential for the local economy to remain active – through the community currency circulation in the city – as highlighted by the secretary of solidarity economy:

“There is job generation, taxes that merchants end up passing on to the city hall. It’s an economic cycle, the wheel turns and increases the economic vitality of the municipality”.

This scenario also increased the number of users of DCC Mumbuca, making this means of payment used by different groups (in addition to beneficiaries of city hall programs), being even accepted by informal commerce, as highlighted in the speech of a beneficiary:

“My daughter does my nails, so I transfer it to her. Not the benefit, but because I have a checking account and she does too. Then I make a deposit in the checking account, then I do my nails with her and transfer it to her application.”

6. EXPECTED CONTRIBUTIONS AND FINAL COMMENTS

The discussions carried in this paper can shed light on the potential contributions of the use of digital community currencies platforms to implement basic income policies in a fast and effective way to assist low-income people, especially during the economic recovery post-COVID-19 crisis. Although the evaluation of the socio-technical artifact (basic income) and its sub-artifacts (public policy and digital community currency) may evidence particular aspects of this local context of Maricá, the evaluation and analysis will point out relevant solution design features that could improve the performance of DCC platforms and could contribute to the scalability of this platform efficiently and at a financially sustainable transaction cost in this ecosystem.

Due to the pandemics, the fieldwork planned to collect data for this research was delayed for more than one year, from August 2020 to September 2021. This way, in 2020, we could only

collect six online interviews. Hence, this is the only empirical data we used in the research-in-progress presented in this short paper, in the previous section.

The research team is currently in the field, collecting data from interviews and in loco observations in Maricá until theoretical saturation is reached. All this new data is still to be organized and analyzed and will be presented in the final version of this paper. As discussed in section 3, DSR is the approach adopted in this study, in particular considering the main artifact as composed of two sub-artifacts, following De Leoz & Petter (2018) suggestion to reinforce the socio-technical characteristics of a study based on DSR.

Thus, our analysis will be organized, for each sub-artifact, the public policy, and the digital community currency, in four steps: 1) the problems that each sub-artifact is expected to solve, 2) the detailed description of the solutions adopted, 3) the evaluation of the solutions based on opinions of all parts involved (city officers, Banco Mumbuca managers, local merchants, beneficiaries and users of the artifact), and 4) the discussion based on the analysis of all data collected, with suggestions of possible improvements to be implemented in both sub-artifacts.

In line with Ram & Goes (2021) arguments, we believe that the DSR can produce relevant and impactful research outcomes. With this research, we intend to contribute, first, with the practice by analyzing the basic income implementation based on DCCs and thus providing elements for policymakers and practitioners in the field to evaluate the potential and limits of this strategy to develop solutions for post-pandemic social and economic recovery.

Second, we believe we will also produce a valuable contribution to IS researchers involved with the ICT4D field by presenting an original adaptation of De Leoz & Petter (2018) proposition that understands the socio-technical artifact in DSR composed by distinct sub-artifacts. In particular, in cases of public policies implemented through digital platforms, when the sub-artifacts can be analyzed separately according to their public policy and technical elements. We see that this approach can help the analysis of a number of other socio-technical implementations based on public policies and, at the same time to discuss their potential for replication in other contexts (Brendel et al., 2021).

REFERENCES

- Ågerfalk, P. J. (2018). Whither design science research? *European Journal of Information Systems*, 27(2), 127–128.
- Androutsopoulou, A., Karacapilidis, N., Loukis, E., & Charalabidis, Y. (2018). Combining Technocrats' Expertise with Public Opinion through an Innovative e-Participation platform. *IEEE Transactions on Emerging Topics in Computing*.
- Bader, M., & Savoia, J. (2013). Logística da distribuição bancária: tendências, oportunidades e fatores para inclusão financeira. *Revista de Administração de Empresas*, 53(2), 208-215
- Barinaga, E., & Ocampo, J. (2019). FairCoop: The global cooperative and its collaborative cryptocurrency.
- Barinaga, E. (2020). A route to commons-based democratic monies? Embedding the governance of money in traditional communal institutions. *Frontiers in Blockchain*, 3, 50.
- Bauler, T., Pel, B., & Backhaus, J. (2017). Institutionalization processes in transformative social innovation: Capture dynamics in the social solidarity economy and basic income initiatives. In *Social Change and the Coming of Post-Consumer Society* (pp. 78-94). Routledge.
- Berndt, D.J.; Hevner, A.R.; and Studnicki, J. The CATCH data warehouse: Support for community health care decision-making. *Decision Support Systems*, 35, 3 (2002), 367–384
- Bidananure, J. U. (2019). The political theory of universal basic income. *Annual Review of Political Science*, 22, 481-501
- Blanc, J., & Lakócai, C. (2020). Toward spatial analyses of local currencies: the case of France. *International Journal of Community Currency Research*, 24(1), 11-29.
- Brendel, A. B., Lembcke, T. B., Muntermann, J., & Kolbe, L. M. (2021). Toward replication study types for design science research. *Journal of Information Technology*, 02683962211006429.
- City Hall Municipality of Maricá (2020). Maricá terá pacote social e econômico contra efeitos do coronavírus de R\$80 milhões. Retrieved from: <https://www.marica.rj.gov.br/2020/03/21/marica-tera-pacote-social-e-economico-contra-efeitos-do-coronavirus-de-r-80-milhoes/>
- City Hall Municipality of Maricá (2021). PAE, PAT e Mumbuca são prorrogados até 2021. Retrieved from: <https://www.marica.rj.gov.br/2020/12/14/pae-pat-e-mumbuca-sao-prorrogados-ate-2021/>
- Chibwara, W. (2020, 25 de março). Rural villages coping with COVID-19. *Grassroots Economics Blog*. Recuperado de <https://www.grassrootseconomics.org/post/rural-villages-coping-with-covid-19>
- Coote, A. (2021). Universal basic services and sustainable consumption. *Sustainability: Science, Practice and Policy*, 17(1), 32-46
- De Leoz, G., & Petter, S. (2018). Considering the social impacts of artefacts in information systems design science research. *European Journal of Information Systems*, 27(2), 154-170.

- Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). The Global Findex Database 2017: measuring financial inclusion and the fintech revolution. Washington, DC: World Bank.
- Dierksmeier, C., & Seele, P. (2018). Cryptocurrencies and business ethics. *Journal of Business Ethics*, 152(1), 1-14.
- Diniz, E. H., Siqueira, E. S., & van Heck, E. (2019). Taxonomy of digital community currency platforms. *Information Technology for Development*, 25(1), 69-91.
- Diprose, G. (2020). Transacting services through time banking: renegotiating equality and reshaping work. In J. K. Gibson-Graham, & K. Dombroski (Eds.), *The Handbook of Diverse Economies* (Chapter. 26, pp. 238-245). Cheltenham, UK: Edward Elgar Publishing.
- Faria, L., Severo, F., Cukierman, H. and Diniz, E. (2020). Mumbuca E-dinheiro and the challenges of a digital community currency governance: requirements, codes and data. *International Journal of Community Currency Research*, 25, 77-88. DOI <http://dx.doi.org/10.15133/j.ijccr.2020.013>.
- França, A. S. L., Neto, J. A., Gonçalves, R. F., & Almeida, C. M. V. B. (2020). Proposing the use of blockchain to improve the solid waste management in small municipalities. *Journal of Cleaner Production*, 244, 118529.
- Gentilini, U., Almenfi, M., Orton, I., & Dale, P. (2020). Social protection and jobs responses to COVID-19. World Bank, Washington, DC. World Bank. <https://openknowledge.worldbank.org/handle/10986/33635>
- Ghatak, M., & Maniquet, F. (2019). Universal basic income: some theoretical aspects. *Annual Review of Economics*, 11, 895-928.
- Gómez, G. L., & Demmler, M. (2018). Social currencies and cryptocurrencies: characteristics, risks and comparative analysis. CIRIEC-España, *Revista de Economía Pública, Social y Cooperativa*, 93, 265-291.
- Gomez, G., & Helmsing, A. (2008). Selective spatial closure and local economic development: what do we learn from the Argentine local currency systems? *World Development*, 36(11), 2489-2511
- Gonzalez, L., Cernev, A. K., Araujo, M. H. de, & Diniz, E. H. (2020). Digital Complementary Currencies and Public Policies during the COVID-19 pandemic. *Brazilian Journal of Public Administration*, 54(4), 1146-1160
- Green, D. A., Kesselman, J. R., & Tedds, L. M. (2020). Considerations for basic income as a COVID-19 response. The School of Public Policy Publications.
- Grin, E. J., & Abrucio, F. (2018). The Federative Articulation Committee in Lula's Government: Obstacles in Territorial Cooperation. *Revista Brasileira de Ciências Sociais*, 33(97). <https://doi.org/10.1590/339703/2018>.
- Grin, E. J., & Fernandes, G. (2019). Capacidades Estatales en los Municipios Brasileños: Resultados Tímidos en un Contexto de Autonomía Política Local y un Escenario de Dependencia

Financiera. *Capacidades Estatales en Gobiernos Locales Iberoamericanos: Actualidad, Brechas Y Perspectivas*, 92-148.

Hevner, A., vom Brocke, J. & Maedche, A. (2019). Roles of Digital Innovation in Design Science Research. *Bus Inf Syst Eng* **61**, 3–8. DOI: <https://doi.org/10.1007/s12599-018-0571-z>

Howson, P. (2021). Distributed degrowth technology: Challenges for blockchain beyond the green economy. *Ecological Economics*, 184, 107020.

Ingham, G. (2004). *The nature of money*. Cambridge, UK: Polity Press

Jacob, A., & Boyd, R. (2020). Addressing economic vulnerability among low-income families in America: is the basic income approach a viable policy option? *Journal of Children and Poverty*, 26(1), 85-99.

Jacobs, C., Rivett, U., & Chemisto, M. (2019). Developing capacity through co-design: the case of two municipalities in rural South Africa. *Information Technology for Development*, 25(2), 204-226.

Johnson, A. F., & Roberto, K. J. (2020). The COVID-19 pandemic: Time for a universal basic income?. *Public Administration and Development*.

Jones, D., & Gregor, S. (2007). The anatomy of a design theory. *Journal of the Association for Information Systems*, 8(5), 1.

Kobayashi, S., Yoshihisa, M., & Yoshida, M. (2017). Historical transition of community currencies in Japan (Paper). In 4th International Conference on Social and Complementary Currencies, Barcelona, Spain.

Labazova, O. (2019). Towards a Framework for Evaluation of Blockchain Implementations. In International Conference on Information Systems, 40, Munich, Germany;

Lietaer, B. (2001). *The future of money: creating new wealth, work and a wiser world*. London, UK: Random House Business.

March, S. T., & Storey, V. C. (2008). Design science in the information systems discipline: an introduction to the special issue on design science research. *MIS quarterly*, 725-730.

Meyer, C., & Hudon, M. (2019). Money and the commons: an investigation of complementary currencies and their ethical implications. *Journal of Business Ethics*, 160, 277-292.

Milles, M., Huberman, A. M. & Saldaña, J. (2020). *Qualitative Data Analysis*. London: SAGE.

Peffer, K., Tuunanen, T., & Niehaves, B. (2018). Design science research genres: introduction to the special issue on exemplars and criteria for applicable design science research.

Peffer, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of management information systems*, 24(3), 45-77.

Pinto, J. (2020). Environmentalism, ecologism, and basic income. *Basic Income Studies*, 15(1).

Place, C., Calderon, A., Stodder, J., & Wallimann, I. (2018, Summer). Swiss Currency Systems: Atlas, Compendium and Chronicle of legal aspects. *International Journal of Community Currency Research*, 22, 85-104.

- Przebyłowicz, E., Cunha, M. A., & Póvoa, A. (2017, May). Budget transparency for monitoring public policies: Limits of technology and context. In *International Conference on Design Science Research in Information System and Technology* (pp. 282-295). Springer, Cham.
- Ramírez de la Cruz, E. E., Grin, E. J., Sanabria-Pulido, P., Cravacuore, D., & Orellana, A. (2020). The Transaction Costs of the Governments' Response to the COVID-19 Emergency in Latin America. *Public Administration Review*, 2020.
- Ram, S., & Goes, P. (2021). Focusing on Programmatic High Impact Information Systems Research, Not Theory, to Address Grand Challenges. *MIS Quarterly*, 45(1), 479-483.
- Schulz, P. (2017). Universal basic income in a feminist perspective and gender analysis. *Global social policy*, 17(1), 89-92.
- Silva, J. L., Silva, R. C., Freitas, F., & Waltenberg, F. (July, 2020). Políticas socioeconômicas de reação à crise da covid-19 no município de maricá, rio de janeiro. *Mercado de Trabalho*, 153-163
- Taylor, J. E., Thome, K., & Filipski, J. (2016). Local economy-wide impact evaluation of social cash transfer programmes. *From Evidence to Action: The Story of Cash Transfers and Impact Evaluation in Sub Saharan Africa*, 94-116.
- Thompson, M. (2020). Universal Basic Income: A Necessary but not Sufficient Response to Crisis. Responding to COVID-19 in the Liverpool City Region. Policy Briefing 006. University of Liverpool
- Torrente, A. (2020). Ele ganhou os R\$ 600, mas não precisa; ela precisa, mas não tem direito. UOL Notícias. Recuperado de <https://economia.uol.com.br/noticias/redacao/2020/04/18/auxilio-emergencial-r-600-quem-tem-direito-quem-precisa-distorcoes.htm?cmpid=copiaecol>
- Uzureau, C., Furlonger D., & Merji, A. (2019, 14 de junho). Expand your token universe to create new business models. Stamford, Connecticut: Gartner Research.