

PIX, Open Finance, and DREX: Cases of digital public infrastructure in Brazil

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Abstract. Digital Public Infrastructure (DPI) is a new concept that garnered significant attention during the 2023 G20 discussions. DPIs can help advance all United Nations Sustainable Development Goals, making research in this area critically important. Despite its significance, academic literature on DPI is still scarce. To help cover this gap, this poster proposes a DPI evaluation framework based on the United Nations' definition of DPI. The evaluation framework was applied to three potential DPI cases that emerged from the Brazilian finance sector. The selected cases include PIX, an instant payment solution; Open Finance Brazil, a consent-based data exchange solution; and DREX, the Brazilian central bank digital currency. Using the proposed evaluation framework, it was demonstrated that the first two cases can be considered DPIs, and the last one has the potential to become a DPI.

Keywords. Digital Public Infrastructure (DPI), PIX, Open Finance, DREX, Central Bank Digital Currency (CBDC).

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1. Introduction

During G20 India's presidency in 2023, the concept of Digital Public Infrastructure (DPI) got much attention (G20 Global Partnership for Financial Inclusion, 2023). In partnership with G20 India's presidency, the United Nations published a report connecting DPI's examples with the challenges of the Sustainable Development Goals (SDGs). The United Nations considers that the DPI approach has the potential to accelerate all the SDGs (United Nations, 2023).

Academic literature on this concept remains scarce. Researchers are trying to cover this gap. A DPI Map (Eaves et al., 2024) was recently published, identifying more than 250 cases of DPIs. However, these cases were not analyzed in depth. This poster addresses the following research question: what are the cases of DPI emerging in the Brazilian finance sector?

United Nations defines DPIs as: "a set of shared digital systems that should be secure and interoperable and can be built on open standards and specifications to deliver and provide equitable access to public and/or private services at societal scale and are governed by applicable legal frameworks and enabling rules to drive development, inclusion, innovation, trust, and competition and respect human rights and fundamental freedoms" (United Nations, 2023). Considering this concept of DPI, we identified three possible DPI cases in the Brazilian finance sector: PIX, Open Finance Brazil (OFB), and DREX. We proposed a framework to evaluate whether a case is a DPI and applied it to the three identified cases. After that, we discussed the implications of our findings for the DPI

scenario.

The remainder of this poster is organized into seven sections. Section 1 introduces the subject and the research. Section 2 presents the research method. Section 3 presents the DPI evaluation framework. Section 4 presents the three cases identified and evaluates them using the proposed framework. Section 5 discusses the implications of the findings and proposes future research. Section 6 presents the references.

2. Method

After conducting an exploratory review of the bibliography, the authors found that the concept of DPI is not well-established in the academic literature. Unsurprisingly, finding an evaluation framework for potential DPI cases was impossible. The authors focused on the United Nations definition of DPI and developed a DPI Evaluation Framework. This framework aims to support evaluating a case to determine whether it is a DPI, has the potential to scale as a DPI, or is not a DPI.

Some case studies of potential DPIs were performed, and the framework was applied. A case study is a research strategy that focuses on understanding particular situations. The research can involve single or multiple cases and collect different data types, like documents, interviews, questionnaires, and observations. Case studies are suitable for emergent study fields (Eisenhardt, 1989). Although the triangulation of multiple data collection methods is recommended (Eisenhardt, 1989), it is not mandatory. Case studies can be applied and used in many ways. Multiple cases may not yield the same rich descriptions as single cases, but they enable cross-data analysis (Cavaye, 1996).

The authors conducted a multiple-case study, selecting three cases from the Brazilian finance sector. It is essential to note that the finance sector was selected for scrutiny due to its direct connection to financial inclusion. Financial inclusion has been reported as an expected benefit of the DPI approach (G20 Global Partnership for Financial Inclusion, 2023). The cases identified were analyzed using secondary source data from official websites and online press. Then, the proposed DPI Evaluation Framework was applied to the cases. The retrieved data was sufficient to perform the evaluation using the evaluation framework. The cases and the evaluation results were compared and discussed.

3. DPI Evaluation Framework: a proposal

Based on the United Nations definition (United Nations, 2023), we proposed an evaluation framework for potential DPIs that can be in use, under implementation, or in conception. To develop the framework, the concept of DPI was broken into twelve characteristics that a potential DPI can have. These characteristics are respect for human rights, respect for fundamental rights, security, interoperability, open standards and specifications, access to public or private services, societal scale, legal frameworks, inclusion, innovation, trust, and competition.

Then, the characteristics were grouped into five topics, considering their similarities- and these topics were added to the framework. The five topics are (a) the qualifying conditions, (b) the technical aspects, (c) the value proposition, (d) the legal support, and (e) the enablers.

The qualifying conditions are the first to be analyzed, as cases without them cannot be considered potential DPIs. Technical aspects relate to a DPI's intrinsic characteristics, while the value proposition is related to how the DPI will be used. Legal support is closely tied to the enforcement of DPI and is essential to its legitimacy. The enabler aspect addresses what the DPI does not deliver but can enable through its use and dissemination.

Each characteristic of the evaluation framework can be evaluated in one of the proposed classifications: confirmed, planned, not considered, or missing information. The status "confirmed" will be used for potential DPIs that are in use and have the characteristic. The status "planned" will be used for potential DPIs under implementation/concept that plan to release the characteristic. The status "not considered" will be used for potential DPIs that do not (or will not) deliver the characteristic. The status "missing information" will be used when the researcher does not have sufficient information to analyze a characteristic.

4. Results

The case studies were based on secondary source data, including documents, websites, press media, videos, and norms. The authors collected four documents about PIX, five documents about OFB, and five documents about DREX. Table 1 summarizes the PIX, OFB, and DREX evaluations using the proposed framework. Sections 4.1, 4.2, and 4.3 describe the main characteristics and benefits of each infrastructure.

Table 1: Summary of PIX, OFB, and DREX evaluation using proposed framework

PIX	OFB	DREX
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Qualifying conditions	Respects human rights	Confirmed	Confirmed	Planned
	Respects fundamental freedoms	Confirmed	Confirmed	Planned
Technical aspects	Secure	Confirmed	Confirmed	Planned
	Interoperable	Confirmed	Confirmed	Planned
	Open standards and specifications	Confirmed	Confirmed	Planned
Value proposition	Access to public or private services	Confirmed	Confirmed	Planned
	Societal scale	Confirmed	Confirmed	Planned
Legal	Governed by legal frameworks	Confirmed	Confirmed	Planned
Enabler	Of inclusion	Confirmed	Confirmed	Missing information
	Of innovation	Confirmed	Confirmed	Planned
	Of trust	Confirmed	Confirmed	Planned
	Of competition	Confirmed	Confirmed	Planned

5.1 Case 1: PIX

PIX is an instant payment solution created by the Brazilian Central Bank (BCB) and launched in 2020. The significant benefits of PIX are its availability, cost, and ease of use. A person or business can make a payment 24 hours a day and 7 days a week, including holidays. People who use PIX do not incur transaction fees. Businesses that use PIX may incur lower fees compared to other payment methods. To make a transfer with PIX, it is not necessary to know the bank account of the recipient because the transfer uses a key that can be an email address, telephone number, Brazilian identifier (CPF or CNPJ), a random number, or a QR code.

PIX brought democratization and financial inclusion. It is a versatile solution that can handle various use cases. It is secure because banks have invested in ensuring robustness and security. Additionally, it is open and integrated, allowing for seamless engagement with both the traditional financial ecosystem and new entrants. The financial ecosystem has benefited from the launch of PIX. It helped increase digital payment, reducing the cost of using cash. It also stimulates competition between payment methods and the entry of fintech and big tech companies into this market.

5.2 Case 2: Open Finance Brazil

Open Finance Brazil (OFB) is a solution that enables the sharing of clients' data between authorized agents, as specified by the BCB, with the client's consent. OFB supports the sharing of data about each participant institution's products and services, the sharing of transactional client data, the starting of instant payments from interfaces that are not owned by the institution that has custody of funds and plans to connect with the insurance market.

The significant benefits for clients are easier control of their financial lives and ownership of their financial data. With OFB, clients can visualize multiple accounts using a single interface, making it easier to manage savings and debts. Data ownership enables clients to leverage their history to establish a relationship with other financial institutions, secure better rates, and gain access to credit. OFB can benefit the financial services ecosystem by enabling competition among financial institutions and fostering a more dynamic market.

5.3 Case 3: DREX

DREX is digital Real (Brazilian currency), a central bank digital currency (CBDC) for Brazil. A central bank digital currency (CBDC) is a digital liability of a central bank or other competent authority representing a jurisdiction's sovereign currency available to the private sector (Dionysopoulos et al., 2023). More than a solution, DREX intends to be a platform for tokenization.

DREX aims to address the issue of delivery versus payment, where individuals must trust intermediaries to facilitate secure exchanges of expensive goods, such as cars or apartments. DREX may also address the challenges of international remittances and trade. Additionally, DREX can bring innovation to the financial market, generating benefits that cannot be accurately measured in advance.

5. Discussions and Future Research

The evaluation showed that considering the United Nations' definition of DPI (United Nations, 2023) and the evaluation framework proposed in this poster, PIX and OFB can be considered a DPI. On the other hand, DREX should be considered a potential DPI. The project is under implementation, but from the outset, it considers important characteristics of DPI as foundations for the platform it intends to deliver. The characteristic enabler of inclusion was identified as missing information, as it was not possible to find consistent references to inclusion in the retrieved documents. Hence, it is desirable to gather more information to determine whether or not it is a planned characteristic that was not well communicated.

DPIs in use must be continually evaluated, particularly in how they enable development, inclusion, innovation, trust, and competition. Although it is important to be an enabler of such actions to be considered a DPI, it is not guaranteed that these actions will happen. The creation of key indicators to measure the impact of DPIs on the entire ecosystem can help inform decisions about investments in the evolution and growth of DPIs.

This evaluation must be accompanied by a governance established for each project (implementation phase) or product (usage phase). Technical governance can evaluate the technical aspects and supervise the implementation and evolutions to guarantee that security, interoperability, open standards, and specifications are delivered and continually updated. Institutional governance can evaluate the value proposition, legal support, and enablers, make decisions about how to implement them, how to expand the usage of the infrastructure, and which partnerships need to be developed. All the cases analyzed use collaborative governance strategies (Olvik, 2024). These strategies are crucial to managing wicked problems that traditional methods cannot easily solve. Collaborative strategies try to create value for all parties involved, transforming the problem-solving process into a win-win game.

Unsurprisingly, the BCB led all the cases analyzed. BCB is a regulator of the Brazilian finance sector, aiming to make the market more efficient and promote financial inclusion. In a public report, BCB recognizes the difficulty of articulation of the private sector to create PIX infrastructure and the essential role of a public sector institution in coordinating the project (Banco Central do Brasil, 2022). It is important to study and theorize the role of public and private institutions in creating and promoting DPIs. Mazzucato and Ryan-Collins (2022) propose that the public sector needs to set a direction and public purpose for private and public actors to collaborate and innovate in solving societal problems, which they refer to as a “market-shaping” perspective. BCB may act in a “market-shaping” perspective, considering their coordination role in the three cases studied.

Considering that DREX is currently under implementation, further research is needed to investigate DREX in more detail. Future work can explore the relationship between CBDCs and DPIs. Another aspect that could be investigated in future studies is the issues related to the collaboration governance established for the project and how they connect to governance literature.

Contributor Statement

Vanessa da R. S. Almeida was responsible for conceptualization, data curation, methodology, and writing – original draft. Marie Moron Macadar was responsible for supervision, methodology and writing – review and editing.

Use of AI

During the preparation of this work, the author(s) used Grammarly in order to correct grammatical errors. After using this tool/service, the author(s) reviewed, edited, made the content their own and validated the outcome as needed, and take(s) full responsibility for the content of the publication.

Conflict Of Interest (COI)

There is no conflict of interest.

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