



Task Force 05

**INCLUSIVE DIGITAL TRANSFORMATION**

## A Consumer-centric Approach to Digital Public Infrastructure for Sustainable Financial Inclusion

**Hannah Draper**, Digital Rights Advisor, Consumers International (United Kingdom)

**Luca Belli**, Professor and Coordinator, Center for Technology and Society (CTS/FGV-Rio) (Brazil)

**Marina Meira**, G20 Policy Advisor, Consumers International (Brazil)

**Camila Leite Contri**, Coordinator, IDEC - Institute for Consumers Protection (Brazil)

**Larissa Magalhães**, Research Associate, United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV) (Portugal)

**Luã Cruz**, Coordinator, IDEC - Institute for Consumers Protection (Brazil)



**TF05**

## Abstract

Governments increasingly recognize the value of digital public infrastructure (DPI) in promoting sovereign societies and empowering individuals through the democratization of financial services.

This paper expands on existing G20 recommendations for consumer protection in the context of DPI, and builds on research conducted by the Center for Technology and Society at FGV, the United Nations University EGOV Unit, Consumers International, and the Brazilian Institute for Consumers Protection (IDEC), to offer a critical approach to DPI with specific regard to its impact on financial inclusion and consumer welfare. The paper is aimed at policymakers, financial regulators, private financial and IT companies, as well as academics, civil society and consumer rights advocates. It will have a threefold structure, as follows:

The first part will describe the evolution of financial DPI and its impact on consumers in the context of three concrete case studies: the Brazilian Pix, the Indian UPI, and the Chinese e-CNY.

The second part will draw from the case studies to identify best practices in DPI with regards to data governance and interoperability, transparency, anti-discrimination, cybersecurity, and data protection. Further, we discuss the importance of these elements to ensuring sustainable DPI.

Lastly, we will offer actionable and evidence-based recommendations that should be adopted by governments to ensure safe and inclusive DPI. In particular, we will discuss the regulation of financial services, the prioritization of public infrastructure, the importance of meaningful internet connectivity, as well as digital and financial literacy policies.



**Keywords:** Digital Public Infrastructure (DPI), Financial Inclusion, Consumer Protection, Interoperability, Cybersecurity, Data Protection, Digital Transformation, Public-Private Partnerships, Digital and Financial Literacy, Internet Access



Governments increasingly recognize the value of digital public infrastructure (DPI) in promoting sovereign societies and empowering individuals. This paper expands on G20 recommendations for consumer protection in DPI and research from the Center for Technology and Society at FGV, the United Nations University EGOV Unit, Consumers International, and the Institute for Consumers Protection to offer a critical approach to DPI with specific regard to financial inclusion and consumer welfare.

The first part describes the evolution of financial DPI and its impact on consumers in the context of three case studies: Brazilian Pix, Indian UPI, and Chinese e-CNY. Subsequently, we discuss the importance of interoperability, transparency, anti-discrimination, cybersecurity, and data protection in ensuring sustainable DPI, and highlight examples of best practices. Lastly, we offer evidence-based recommendations regarding regulation of financial services, prioritization of public infrastructure, and the importance of meaningful internet connectivity, and digital and financial literacy policies.

The implementation of financial DPI promises advantages across stakeholders: low transaction fees benefit SMEs; governments can use these services to support “good digital sovereignty” (Belli, 2021)<sup>1</sup> and increased economic circulation; while the democratization of efficient financial services is increasingly recognized as integral to the empowerment of individuals. However, in accessing such services the consumer becomes

---

<sup>1</sup> Luca Belli. “Structural power as a critical element of digital platforms’ private sovereignty.” in *Constitutionalising social media*, eds. Edoardo Celeste, Amélie Heldt, Clara Iglesias Keller. (2021). <https://tinyurl.com/yeensmr7>.

vulnerable to suppliers acquiring private sovereignty<sup>2</sup> over them through informational, technical, and economic influence.

While DPI can foster inclusive and sustainable digital transformation, it can also have harmful impacts. These risks are disproportionately present in the Global South, where significant populations lack meaningful connectivity,<sup>3</sup> and regulatory frameworks and institutional capacities may be incipient. For example, digital payment methods that only function online can deepen financial disenfranchisement for those without internet. Additionally, scams, fraud, and data malpractice are ongoing risks, especially to women, low-income and rural populations, and other communities with lower rates of digital and financial literacy.<sup>4</sup>

It is concerning that large-scale DPI has been implemented in countries without prior regulation of financial services nor information communication technologies. Abuses of DPI-dependent identification, payment and data-sharing mechanisms that can arise without comprehensive frameworks of standards and protections are dangerous to consumers.

---

<sup>2</sup> Belli, "Structural power".

<sup>3</sup> A safe, satisfying, enriching and productive online experience, enabled by fast and reliable infrastructure; affordable access to connection, mobile and fixed devices; digital skills; security and navigation safety.

ITU UN. "Achieving universal and meaningful digital connectivity: a baseline and targets for 2030". <https://tinyurl.com/3m2p4jd8>.

<sup>4</sup> Majorie Chalwe-Mulenga, Eric Duflos, and Gerhard Coetzee, "The Evolution of the Nature and Scale of DFS Consumer Risks: A Review of Evidence" (CGAP, 2022). <https://tinyurl.com/yck3h2wj>

## Case studies

Consumer-centric digital transformation requires technological layers of data interoperability and standardization complemented by non-technological layers of regulation and governance. Digital payment services in Brazil, India, and China illustrate how these layers combine to support sustainable digital transformation and financial DPI.

### *Brazilian Pix*

Before the launch of Pix, the Brazilian Central Bank (BCB)<sup>5</sup> established a national financial education program, standardized rates, simplified payment systems, and created multiple customer service channels. The BCB also updated laws and regulatory standards to reflect the technological interests of Brazilian consumers, such as mobile-based payments, and sought input from private entities to develop a financial citizenship and digital inclusion agenda. The agenda is based on three elements that support Brazil's open financial ecosystem: standardization of interoperability protocols that reduce barriers to financial institutions created by traditional systems; modularization of protocols to support data sharing and new business models; and, circulation of data to reduce information asymmetries, foster new business models, and promote participation in financial markets.

---

<sup>5</sup> Banco Central do Brasil, *Relatório de Cidadania Financeira* (2021).  
<https://tinyurl.com/2ebwrymd>.

Since its launch<sup>6</sup> in 2020<sup>7</sup> – the same year the Brazilian *General Data Protection Law* came into force, Pix has become the country’s most used payment method.<sup>8</sup> Pix enables free money transfers, 24 hours-a-day, to any Brazilian bank – democratizing access to online payments by requiring only a smartphone, a bank account, and internet access. Significantly, however, none of these elements is universally accessible in Brazil, as in most Global South countries: It is not a coincidence that the 70 percent of Brazilians who use Pix are the same percentage as the connected population.<sup>9</sup> (Notably, the Brazilian government is currently assessing options for an offline version of Pix.)

Despite rhetoric of financial citizenship, efforts for inclusivity can lack genuine public participation and transparency, while failure to inform consumers of risks leaves them vulnerable to exploitation: Brazilian civil society has criticized the BCB for prioritizing the interests of financial institutions over those of consumers;<sup>10</sup> for example, by adopting mobile payments without sufficient consumer protection, nor cybersecurity protocols.

---

<sup>6</sup> Banco Central do Brasil, *Pix*. <https://tinyurl.com/4wcf9zfw>

<sup>7</sup> Banco Central do Brasil, *Resolução BCB nº 1*, 12/8/2020. (*BCB Regulation 1* of 12 August 2020). <https://tinyurl.com/mvn99c2f>.

<sup>8</sup> Luca Belli, "Building Good Digital Sovereignty through Digital Public Infrastructures and Digital Commons in India and Brazil," *G20's Think20 (T20)*, June 2023. <https://tinyurl.com/2fyvf298>

<sup>9</sup> CETIC.br. "TIC Domicílios, Publicações". <https://tinyurl.com/4xd7dtct>

<sup>10</sup> Idec - Instituto de Defesa de Consumidores, "Balanço mostra que bancos desprezam a lei", March 15, 2010. <https://tinyurl.com/bdzjd99x>

## *Indian UPI*

India's approach to DPI has evolved over the last decade in the context of the broader Digital India strategy.<sup>11</sup> The plan supports the establishment of multiple DPIs, of which three have emerged as cornerstones: the digital identity system, Aadhaar;<sup>12</sup> the electronic payment system, the Unified Payment Interface (UPI); and the personal data consent management system, Data Empowerment and Protection Architecture.<sup>13</sup>

None of these pillars is exempt from criticism.<sup>14</sup> Despite being called public, DPIs are neither established nor provided by public bodies, but rather by adhoc NGOs, which can be private or not-for-profit. Therefore, while publicly accessible, DPIs are not required to meet the same transparency and accountability standards as public entities. Discrimination is also a concern within the Indian structure.<sup>15</sup> Low digital literacy,

---

<sup>11</sup> Min Jiang, and Luca Belli, eds., *Digital Sovereignty from the BRICS Countries* (Cambridge: Cambridge University Press, 2024).

<sup>12</sup> "Get Aadhaar", Unique Identification Authority of India, Government of India, accessed May 29th, 2024, <https://uidai.gov.in/en/my-aadhaar/get-aadhaar>.

<sup>13</sup> Luca Belli, Danilo Doneda, Data protection in the BRICS countries: legal interoperability through innovative practices and convergence, *International Data Privacy Law*, Volume 13, Issue 1, February 2023, Pages 1–24, <https://doi.org/10.1093/idpl/ipac019>

<sup>14</sup> Smriti Parsheera. "Stack is the New Black?: Evolution and Outcomes of the 'India-Stackification' Process", *Computer Law & Security Review*, vol 52. (2024). <https://tinyurl.com/4yn2msbn>.

<sup>15</sup> "Exclusion by design: how national ID systems make social protection inaccessible to vulnerable populations", Privacy International, last modified in June 2021.



inability to access devices, and security concerns have precluded consumers from using financial DPI.<sup>16</sup>

Despite legitimate criticisms, India's approach to digital transformation represents one of the most ambitious and successful efforts to date – providing digital identity, payments, and personal data management to almost 1.5 billion people.<sup>17</sup>

Established by the Reserve Bank of India and Indian Banks' Association in 2007<sup>18</sup> UPI is operated by the National Payments Corporation of India, a non-profit entity. Introduced in 2016, seven years before the country passed a data protection law, UPI had reached 1.2 trillion transactions by the end of 2023.<sup>19</sup> Its openly accessible API is designed for use on smartphones, thus democratizing online payments while allowing opportunities for innovation. UPI is considered to have the potential to revolutionize the financial sector, while simultaneously helping the country to transition to a low-carbon economy.<sup>20</sup> Significantly, UPI's success was enabled by the massive extension of internet connectivity following the adoption of strong net neutrality rules in 2016.<sup>21 22</sup> The

---

<sup>16</sup> Soumithra M S, "Fair-Digital Finances: a case study on digital financial services: A case study on digital financial services", *Citizen Consumer Civic Action Group* (2023). <https://tinyurl.com/yyauhz8b>.

<sup>17</sup> Luca Belli. "Building Good Digital Sovereignty"

<sup>18</sup> India, *Payment and Settlement Systems Act, 2007*. <https://tinyurl.com/e5usm3k3>.

<sup>19</sup> "UPI Product Statistics", NPCI. <https://tinyurl.com/y9u93uz2>

<sup>20</sup> Soumithra M S, "Fair-Digital Finances"

<sup>21</sup> Luca Belli. "Building Good Digital Sovereignty"

<sup>22</sup> Smriti Parsheera. "Net Neutrality in India: From Rules to Enforcement" in *The Value of Internet Openness in Times of Crisis: Official Outcome of the UN IGF Coalitions on*

Network Neutrality Rules<sup>23</sup> guarantee non-discriminatory mobile internet access – prohibiting zero rating models, promoting innovation, and allowing Indians to be amongst the few users in the Global South to freely choose which online services to use.

### *Chinese e-CNY*

After issuing its first license for third-party payment systems to Alipay in 2011, online payments have become a strategic pillar of China’s digital ecosystem. In 2014 the People's Bank of China (PBoC) started developing a digital currency;<sup>24</sup> in 2016, the PBoC established the Digital Currency Research Institute; and in 2017, it began developing the Chinese Central Bank Digital Currency, e-CNY. The project strives to establish a new DPI while creating a state-backed alternative to cryptocurrencies, after the PBoC stopped domestic Bitcoin transactions and Initial Coin Offerings in 2017. E-CNY and associated infrastructure have been regulated by a national framework for digital safeguards since 2021, after the Chinese *Data Security Law*<sup>25</sup> and *Personal Information Protection Law*<sup>26</sup> came into force.

---

*Net Neutrality and on Community Connectivity*, ed. Luca Belli, Nikhil Pahwa and Osama Manzar (Rio de Janeiro: FGV, 2020), 61-68. <https://tinyurl.com/2tsmc456>.

<sup>23</sup> India, “Prohibition of Discriminatory Tariffs for Data Services Regulations”. 2016. <https://tinyurl.com/mrxanhry>

<sup>24</sup> Luca Belli. "Digital Payments in the BRICS Countries: How Brazil, Russia, India, China, South Africa Are Shaping Their Digital Payments", *CyberBRICS*, (forthcoming).

<sup>25</sup> People’s Republic of China, "*Data Security Law*", 2021. <https://tinyurl.com/vcn27vpw>.

<sup>26</sup> People’s Republic of China. *Personal Information Protection Law*, 2021. <https://tinyurl.com/y77cubfb>

Notably, in addition to fostering domestic electronic money transfers, e-CNY has wider geopolitical dimensions, such as facilitating international payments in Yuan and ultimately, de-dollarizing the global economy.<sup>27</sup> In 2020, the PBoC began piloting e-CNY in four Chinese cities. By the end of 2022, the value of circulating digital currency reached a staggering 13.61 billion Yuan, and by April 2023, the pilot had expanded to 26 regions.<sup>28</sup> Today, the competitive Chinese market offers consumers a broad spectrum of payment products.

---

<sup>27</sup> Michael A. Peters, Benjamin Green, and Haiyang (Melissa) Yang. 2020. "Cryptocurrencies, China's Sovereign Digital Currency (DCEP) and the US Dollar System." *Educational Philosophy and Theory* 54 (11): 1713–19. <https://doi.org/10.1080/00131857.2020.1801146>.

<sup>28</sup> Luca Belli. "Digital Payments in the BRICS Countries: How Brazil, Russia, India, China, South Africa Are Shaping Their Digital Payments." *CyberBRICS*.

As the case studies illustrate, public bodies must have capacity to address a number of factors integral to achieving consumer-centric DPI.<sup>29</sup> These factors include: interoperability; transparency; anti-discrimination; cybersecurity; and data protection. Moreover, states should possess the dynamic capabilities<sup>30</sup> necessary to uphold consumer-centric financial services reliant on evolving DPI, including in times of upheaval and unanticipated change, like the Covid pandemic.

### *Interoperability*

Standardization of interoperability protocols (eg. Brazil) can reduce barriers to entry for financial institutions, and foster an open financial ecosystem. Establishing openly accessible APIs facilitates integration of DPI with financial institutions' systems (eg. India). The Chinese model further demonstrates how emphasizing interoperability for domestic and international payments can have wider geopolitical implications.

---

<sup>29</sup> Rainer Kattel, Mariana Mazzucato, Rosie Collington, Fernando Fernandez-Monge, Iacopo Gronchi, Ruth Puttick, "Public sector capacity matters, but what is it?" *UCL Institute for Innovation and Public Purpose*, March 1, 2024. <https://tinyurl.com/yc5dcauc>.

<sup>30</sup> Larissa Galdino de Magalhães Santos. "Dynamic Capabilities and Digital Transformation in Public Sector: Evidence from Brazilian Case Study". *International Conference on Electronic Government*, pp. 365-380. Springer Nature Switzerland, 2023. <https://tinyurl.com/2ck4satz>.

### *Transparency*

The purpose, or “directionality,” of financial DPI, should be explicitly communicated to all stakeholders, especially consumers. DPI, like all infrastructure, is not neutral – it is designed, deployed and governed to achieve particular outcomes, which may have unintended consequences for some communities.<sup>31</sup> The Brazilian example shows that transparency and input from the populations most dependent on DPI to access financial services are imperative to protecting consumers from exploitation. The involvement of stakeholders, especially consumers, in design choices, governance mechanisms, and decision-making processes is integral to consumer-centric DPI. It is also crucial that implementing bodies are transparent about the intentions, availability, and functions of services, as well as associated risks and remedies. The implementation and enforcement of regulatory frameworks (eg. China), and the use of openly accessible APIs and oversight mechanisms (eg. India) are further important to ensure transparency.

### *Anti-discrimination*

DPI has the potential to dramatically expand financial inclusion; however, if anti-discrimination considerations are not addressed it can also exacerbate the existing disenfranchisement it seeks to mitigate. For example, financial DPI in Brazil is not universally accessible due to internet connectivity challenges, further complicated by gender exclusion. Meanwhile, in India low digital literacy rates and inequal internet

---

<sup>31</sup> David Eaves, Mariana Mazzucato, and Beatriz Vasconcellos. "Digital public infrastructure and public value: What is ‘public’ about DPI?", *UCL Institute for Innovation and Public Purpose*, Working Paper Series (IIPP WP 2024-05). <https://tinyurl.com/2r7pc9e5>.

access have excluded millions— especially groups most in need of public-service delivery and financial inclusion (eg. the elderly, the disabled). To ensure widespread accessibility of digital payment systems, they should be designed with meaningful input from affected communities. Implementing bodies must be cognizant that new public service-provision technologies can widen the very socio-economic gaps they intend to address. Further, offline functionalities must be maintained, and scalability considerations carefully addressed. For example, India launched UPI strictly for smartphones; however, subsequently making it available for more accessible feature phones dramatically increased uptake in new demographics. Lastly, it is necessary to regularly assess and mitigate emerging discriminatory impacts of financial DPI.

### *Cybersecurity*

Effective cybersecurity regulation and governance is fundamental to consumer-centric DPI and promoting innovation. The case studies demonstrate that inadequate cybersecurity protocols and communication with stakeholders can result in consumer exploitation (Brazil), and undermine consumer confidence (India). They also show that enshrining strong cybersecurity rules in regulatory frameworks can promote uptake.

### *Data Protection*

Data protection laws are essential to safeguarding personal information processed within digital payment systems. However, oversight bodies often fail to enforce regulations due to lack of institutional capacity and political capture. Therefore, implementation and adherence to consumer/user-centric data protection laws, accompanied by appropriate oversight, are integral to sustainable and inclusive DPI.

## Policy recommendations for the G20

The G20 can play a key role in setting consumer-focused government and business standards for financial DPI by establishing a framework for an interoperable, open-source and consumer-centric payment method, based on learnings from existing systems. To further support inclusive financial DPI and digital transformation, the G20 can build on the *2022 G20/OECD High-Level Principles on Financial Consumer Protection*.<sup>32</sup> in the following areas:

### *Regulation of Financial Services*

It is recommended that consumer-centric regulation of DPI is established within the G20 framework to ensure DPI policies and software engineering prioritize consumer interests, such as transparency,<sup>33</sup> access to redress, safety, and privacy. Regular risk assessments and software audits, facilitated by open-source code, should be conducted, alongside the establishment of safeguards for consumer rights and strategies for economic growth.

In jurisdictions with existing regulations, robust oversight of financial service providers, as well as transparent enforcement and accountability mechanisms, are essential. For countries with less institutional maturity, we recommend establishing rule-

---

<sup>32</sup> OECD. "High-level principles on financial consumer protection". *G20/OECD*, 2022.

<https://tinyurl.com/4v98y9xp>

<sup>33</sup> Luca Belli et al, "Towards Meaningful and Interoperable Transparency for Digital Platforms: 2022 Outcome of the UN IGF Coalition on Platform Responsibility", *UN IGF* (2022). <https://tinyurl.com/bdz4h9y3>

of-law based regulations and independent regulators before widespread adoption of digital payment methods.

Furthermore, social participation in national regulatory processes should be encouraged; for example, by formation of multi-stakeholder advisory committees with representation from consumer protection bodies, civil society, and the public and private sectors.

Governments should also facilitate open innovation laboratories to engage consumers and civil society in collaborative design and experimentation for regulatory improvements.

#### *Consumer-centric Public Infrastructure*

Truly public digital infrastructure – by which we mean publicly-managed, with consumer rights embedded in its design – should be prioritized. Governments should assess existing financial technical infrastructures to inform DPI design, and collaborate with technical and rights experts to ensure the infrastructure is fit-for-purpose for maximizing inclusion in G20 nations.

It should be clear to consumers which entities are liable for the design, deployment and maintenance of the varying elements of evolving DPI. This is especially important for open-source software, which fosters opportunity for collaborative developments, yet can create uncertainty about legal responsibility unless proactively addressed. Moreover, businesses operating in the digital payment ecosystem should be mandated to establish accessible complaint and redress mechanisms, which are critical to protecting consumer rights and personal data.



To nurture coordinated investment between governments and service providers, public infrastructure priorities within the G20 framework should include collaborations between Public-Private Partnerships and consumer associations.

### *Meaningful Internet Connectivity & Digital and Financial Literacy*

To realize meaningful internet connectivity across demographics, it is essential to adopt non-discriminatory mobile internet access measures; such as replacing zero-rating policies with expanded infrastructure and community networks incentivized by regulatory and financial measures. It is also important to consider offline payment alternatives, such as proximity technologies like NFC, RFID, Bluetooth.

To provide convenient, accessible alternatives to traditional banking services, mobile money platforms must ensure cyber-secure transactions across devices, including basic mobile phones.

The G20 must strengthen support for the development of community-owned and operated internet networks, which can be particularly effective in regions where traditional broadband providers may not invest.

Finally, to expand digital and financial literacy, it is necessary to equip schools, libraries, and other community institutions that serve as vital hubs of internet access for low-income consumers with reliable high-speed connectivity and devices.



# Let's **rethink** the world

