

Public service innovation in Brazil after covid-19: digital platforms across the levels of public administration

ABSTRACT

The COVID-19 pandemic has made sociability even more dependent on digital technologies. In this context, this paper explores evidence of this trend towards accelerating digitization in the public sector and what are the differences in terms of response and capabilities across the levels of Brazilian public administration. This inquiry is based on the literature on innovation in the public sector and digital innovation/digital platforms. It uses a multiple-case approach, based on document analysis and interviews to investigate three Public Services Platforms (PSP): 'gov.br' at the federal government (Digital Government Secretariat); 'EPI-Match' from autonomous social services (Brazilian Industrial Development Agency - ABDI) and 'FiquenoLar' at the local government (project by the Jaguaribe City Hall and the Federal Institute of Ceará). It finds evidence that public service providers have turned to PSP as one of the solutions to respond to a growing demand for digitization.

KEYWORDS: Public innovation. Public service platforms. COVID-19. Digital government.

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INTRODUCTION

The COVID-19 pandemic has made sociability even more dependent on digital technologies (CEPAL & CAF, 2020; UN, 2020). In Brazil, the State had already taken on a project for the digital transformation of the economy and the public sector (MCTIC, 2018; BRASIL, 2020). The pandemic can have a catalytic effect on the digital transformation of society and public services more specifically. In a way, the technology-push vector of this trend has been reinforced by a demand-pull impetus. Quoting a recently published report: "At a time when social distancing is one of the practices recommended by WHO in the fight against COVID-19, it is essential to provide online services that do not require citizens to leave their homes." (NIC.br, 2020, p. 221). Still, it can be argued that the transition to digitization has been going more slowly than expected (Mendonça & Dantas, 2020). In this context, this paper explores evidence of this trend towards accelerating digitization in the public sector and what are the differences in terms of response and capabilities across the levels of Brazilian public administration.

It should be noted that e-government initiatives are not the result of the pandemic. In Brazil, electronic government as a federal public policy took shape in the 2000s, in the second term of Fernando Henrique Cardoso (Diniz et al, 2009). State governments were already experimenting with web portals in the mid-1990s (Freire, Castro and Fortes, 2009). E-government policies have gone through several phases, with greater or lesser emphasis on technology or governance (e.g., Digital Governance Strategy). During these phases, there was also variation in the degree of institutionalization of the policy (ordinances, decrees, laws) and the type of entity executing the policy¹ (Interministerial Committees, Special Secretariats, Ministries). Nevertheless, the pandemic emerges as a watershed moment in this historic trajectory of e-government in Brazil and the world.

States relied on information assets to respond to the pandemic. One of the functions of these information assets was to develop innovative responses to the effects of the pandemic (MEIJER et al., 2020), such as digital platforms. This article focuses on digital public service platforms (PSP) that were developed or transformed during the COVID-19 pandemic period. Following convenience and diversity criteria, it investigates the development of three PSP during the COVID-19 pandemic, their business model, and value proposition. At the level of direct federal administration, it analyzes the changes that have occurred in the gov.br platform and the actions taken by the Secretariat of Digital Government, its maintainer. At the level of indirect administration, it investigates the EPI Match platform and the development process that was in charge of the Brazilian Industrial Development Agency (ABDI). Finally, at the level of local/municipal administration, it observes the partnership between the city of Jaguaribe (CE) and the Federal Institute of Ceará for the development of a platform that came to be called FiqueNoLar.

This investigation found evidence that public service providers have turned to PSP as one of the solutions to respond to a growing demand for digitization. It was also possible to generate hypotheses that can be further investigated: (i) that there is certain emergent governance of PSP among the levels of public administration; (ii) that there are risks of technological dependence in the face of private suppliers; and (iii) that the analyzed PSP are but a first step towards deploying the full potential of public/state platforms.

In addition to this introductory section, the second section of this article outlines a brief review of the theoretical references that underpinned this research: public innovation in the context of e-government/digital government and digital platform studies. The third section describes the methodology. The fourth section presents the results and discussion. Finally, the fifth section presents a synthesis and a brief discussion on the evidence found and future developments in this area.

THEORETICAL REFERENCES

This research is based on two streams of literature: innovation in the context of e-government/digital government; and studies of digital platforms. The present work, by combining both these currents of research, is both a testament to their convergence and an attempt to advance a little further along this path.

The literature on innovation in the public sector has been gaining traction lately (De Vries et al., 2016; Cavalcante et al., 2017; Cavalcante, 2019). Not only the academic literature has been growing, but international organizations have also developed studies on the theme to guide practitioners (Acevedo & Dassen, 2016; Organização para a Cooperação e Desenvolvimento Econômico (OCDE), 2018). These studies stress the relevance of political support, external vision, user-centered design, use of data, collaboration, and experimentation as elements of public sector innovation.

In parallel, there has also been a movement around open government, as a new governance model for public organizations. Supported by the pillars of transparency, participation, and accountability, the open government also approaches innovation in the public sector within its actions. Open data initiatives, for instance, foster open innovation practices by which external actors can build on government data to develop new products or ways to display information that generate public value. We can locate the trend towards open innovation in government as part of the third generation public governance agenda, which would involve, more broadly, "political decentralization strategy, adoption of managers' accountability mechanisms (responsiveness and responsibility), increased control social, in addition to social participation devices that aim to call citizens and civic organizations to act as political actors in public management" (Moreira et al., 2016, p. 67). On top of that, some also argue for the importance of the use of open source technologies (Campagnucci, 2016).

Some cases illustrate these service innovations in big government organizations. The United Kingdom is an interesting case of innovation with digital technology with the creation of the Government Digital Services (GDS) in 2010 (Greenway et al., 2018). The GDS team has been a reference for taking the UK to the leadership position of e-Government rankings and for doing so together with an important cultural change for government organizations. Their main contribution was providing digital services with a focus on user research, multidisciplinary teams, and frequent delivery. The GDS has been serving as a model for the digital government unit (GDU), a recent phenomenon in public administration that, in addition to promoting the digital transformation of governments, do so through a new culture of innovation over which all its planning and performance are grounded (Clarke, 2020).

All the trends mentioned above are part of the latest wave of "digital government", a term that overlaps with traditional "e-government". According to Barcevicius et al (2019), it is possible to identify four generations of e-gov policies since the 1990s. Electronic government 1.0, in force in the 1990s, emphasized paperless government, the role of government, and a one-way view of transformation. From the 2000s onwards, e-Government 2.0 inaugurated a digital government trend, which differs from its predecessor by emphasizing the active role of users/citizens (OECD, 2014). The following generations of e-government 3.0 and 4.0 would bring new technologies and organizational paradigms (e.g. cloud computing, IoT, data-based decision making), but remain focused on the paradigm of active user/citizen participation (Barcevicius et al, 2019).

The second stream of literature this paper draws from is the platform studies. "In recent decades, two emergent phenomena have jointly transformed the nature and pursuit of entrepreneurship across industries and sectors: open innovation and platformization." (Nambisan, Siegel, Kenney, 2018, p. 355). These authors stress that open innovation is the result of leveraging resources (such as data or human resources) that are outside the company's limits, *i.e.*, on the network. Platforms emerge as a "friction point" on networks and enable the control, to a certain extent, over the flow of resources in the network (Cohen, 2019). Digital platforms definitions usually emphasize their intermediate function and/or technical nature: "a site of encounter where interactions are materially and algorithmically intermediated." (Cohen, 2019, p. 37); "a software-based product or service that serves as a foundation on which outside parties can build complementary products or services" (Tiwana, 2013, p. 5). It is worth noting the definition that includes social relationships between participants on a platform: "a platform is fueled by data, automated and organized through algorithms and interfaces, formalized through ownership relations driven by business models, and governed through user agreements" (Van Dijck, Poell, Waal, 2018, p. 9).

In addition, the definitions emphasize the role of the intermediary that the platform plays in the digital innovation landscape. It fulfills this function well because, in the process, it eliminates pre-existing market frictions, reducing transaction costs (search, transport, tracking costs). In addition, it employs autonomous tools, such as artificial intelligence, to provide services, inserting a component of technological advancement in a sector that has long been seen as unsuitable for technical advances. And what is perhaps the most important feature of the logic of platforms, they incur powerful network effects, *i.e.*, they become more valuable the more people adhere to them (Katz, Shapiro, 1985). To sum up (i) intermediating groups and (ii) leveraging network effects are the minimum criteria that we consider essential to configure a digital platform².

Quickly, academics and public managers realized the potential of platforms beyond the private sector. Platforms have been reinterpreted as a general organizational model, far beyond a business model (Gawer, 2021; Kenney, Zysman, 2020). Thus, the first transpositions of the concept of platforms for the public sector emerged. O'Reilly (2010) argued about the benefits of thinking of public organizations as platforms, opening their data to citizen participation, and private entrepreneurship co-building value. This vision of opening up public institutions is valuable but limited. It understands the State as a deposit of data that can be exploited by individuals and organizations outside the State itself. In this sense, it has more to do with open innovation than with the platforms

themselves. There is also a tendency to create digital platforms just to reproduce what was done in an analog way. This generation of platforms for government differs from the vision of Government as a Platform because it does not imply substantial changes in the distribution of responsibilities and the role of actors outside government to co-build public goods (Brown et al, 2017).

More recently, case studies of public platforms have emerged. Platforms can organize and host a refugee information market (Schrieck, Wiesche, Krcmar, 2017), or a biometric-based digital identity system for citizens of a developing country (Mukhopadhyay, Bouwman and Jaiswal., 2019). In short, there is a perception that the State can be the developer and user of digital platforms as much as the private sector (Van Dijck, Poell, Waal, 2018).

However, the transposition of the platform's logic to the public sector does not happen automatically. Hautamaki and Oksanem (2018) warn of the fact that the logic and objectives of the two sectors differ, so the architecture and operation of the platforms will also be different. This adaptation period is reflected in the literature itself. Researchers often have different interpretations of what the governance of digital platforms in the public sector means (Zulfa et al, 2016; Janowsky, Estevez, Baguma, 2018; Ansell, Miura, 2019; Brown et al, 2017).

Still, according to Thompson and Venters (2021), "confusion remains as to what 'platforms' are when associated with government, and about the different roles that might be available to government in harnessing this phenomenon for public benefit". While different platform versions are tested and the literature advances, Hautamaki and Oksanem (2018) emphasize that the full deployment of digital platforms in the public sector may be the great transformation of the State in the decade to follow.

METHOD

Given the context of wide technical and organizational disparity among municipal, state, and federal government, this research uses a multiple case study approach (Yin, 2017). The first phase of the research was exploratory. The scanning for PSP started with searching the Internet for digital platform initiatives in the Brazilian public sector (or partnerships with the public sector) that were being developed due to the pandemic, or that had been pressured by the pandemic to adapt quickly. The sources used were media portals and government portals, as well as social networks. Initially, it found a total of nine PSP. The first stage of filtering occurred excluding platforms that, although focused on areas traditionally served by public institutions, had no connection with public organizations. In a second step, open interviews were conducted with five managers from different PSP. This initial approach was important to identify initiatives that, in addition to being generated within public organizations, were solid and had potential beyond the pandemic. We used two criteria for the selection of digital platforms analyzed in this work: first, convenience, which concerns (i) availability of online information, such as documents, media material, platform terms of service, (ii) open access to the platform, and (iii) availability to collaborate on the part of managers and developers.

The second criterion was diversity in terms of the level of public administration. Brazilian public administration entities are quite different, both by

the regional criterion and by the administration level criterion. There is a higher percentage of information technologies management processes (infrastructure, contract, risk management) in administrative units at the federal level when compared to the state level. At the municipal level, inequalities are more pronounced. While more than 95% of the municipalities with more than 100,000 inhabitants have an information technology department or sector, only 58% of those between 20,000 and 50,000 inhabitants have this kind of sector. In municipalities with less than 5,000 inhabitants, the percentage drops to 22%. This brief description suffices to assert that the roles of each entity of the Brazilian public administration will be different in the digitization process of the Brazilian State: "public policies with general recommendations for the public sector cannot be effective, given the different needs and levels of technology use among the country's government organizations." (NIC.br, 2020, p. 223). Therefore, three PSP led by different types of public organizations and levels of government were selected: the (i) federal direct administration, (ii) autonomous social service of the federal level, and (iii) municipal levels were considered.

Based on document analysis (such as platform's terms of services – ToS - and media coverage) and interviews, it was also analyzed the interfaces of the platforms, visiting and using their websites when possible, to have a good approximation of the user experience. The semi-structured interviews were based on the interview protocol of Ranerup et al. (2016). The protocol is available in appendix A. Interviews were conducted with public managers and platform developers from the Brazilian federal government (digital government secretariat), autonomous social services (Brazilian Industrial Development Agency - ABDI), and local government (project by the Jaguaribe City Hall and the Federal Institute of Ceará). Table 1 shows the profile of the interviewees. In terms of platforms, this research focuses on the federal platform 'gov.br', the ABDI 'EPI-Match' platform, and the IFCE platform, 'Fique no Lar'.

Table 1 - Profile of interviewees

Interviewee	Case	Role
Interviewee 1	Gov.br	Manager
Interviewee 2	Gov.br	Manager
Interviewee 3	EPI Match	Manager
Interviewee 4	FiquenoLar	Manager/Developer
Interviewee 5	FiquenoLar	Manager/Developer

Source: author's own.

RESULTS AND DISCUSSION

Public platforms as a COVID-19 response

The platforms object of this study are: the Secretariat of Digital Government (SGD) "Gov.br", the ABDI "EPIMatch" and the IFCE "FiquenoLar". Gov.br (Figure 4) provides digital identity and digital services to citizens, EPI Match (Figure 5) facilitates the connection among demand and supply of personal protective equipment (PPE, which's acronym in Portuguese is EPI) and FiquenoLar (Figure 6) displays information about the local business to consumers that were advised to shelter in place in the context of the pandemic.

Figure 4 - Home page of Gov.br



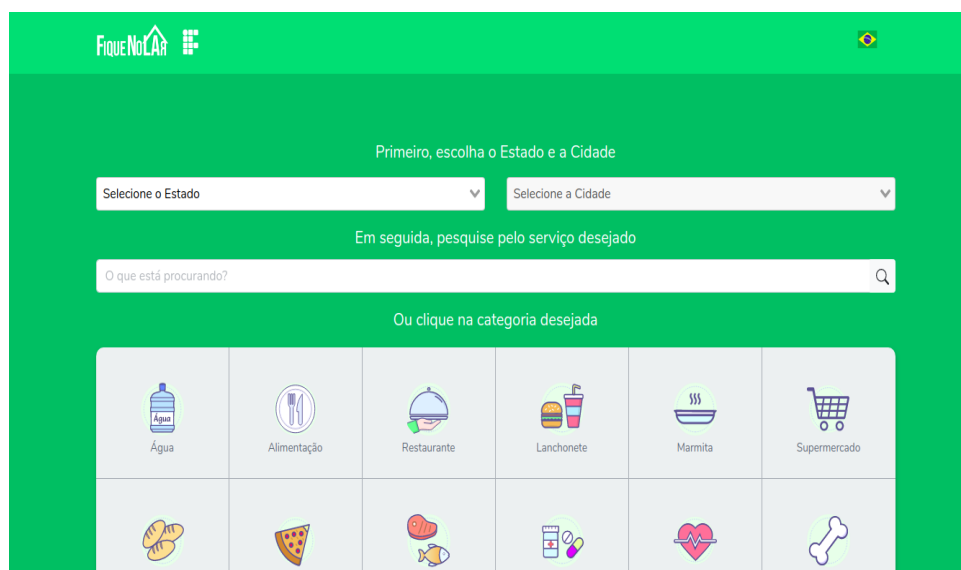
Source: <https://gov.br>

Figure 5 - Home page of EPI Match



Source: <https://epimatch.abdi.com.br>

Figure 6 - Home page of Fiquenolar



Source: <https://www.fiquenolar.ifce.edu.br>

It is important to note the descriptive features of each platform, in terms of the number of sides, scope, relationships involved and types (summarized in Table 2). They can be multi-sided, two-sided, or one-sided. As for the scope, they can be infrastructural or sectorial. Infrastructure services include "search engines and browsers, data servers and cloud computing, email and instant messaging, social networking, advertising networks, app stores, pay systems, identification services, data analytics, video hosting, geospatial and navigation services" (Dijck et al., 2018, p. 13) among others. On the other hand, sectorial platforms "serve a particular sector or niche, such as news, transportation, food, education, health, finance or hospitality" (Dijck et al., 2018, p. 13). Its network of relationships is the result of the "sides" in contact thanks to the platform.

To what concerns relationships, they can involve from just peers, in terms of ordinary citizens (P2P), to relationships involving business and consumers (B2C), business and business (B2B), governments and business (G2B), governments and citizens (G2C) and governments and governments (G2G). Amazon, for instance, is a B2C platform when it connects suppliers with consumers; and [Compras.gov.br](https://www.compras.gov.br)³ (former [Comprasnet](https://www.comprasnet.gov.br)), the federal platform for electronic public procurement, is a G2B platform, connecting governments and suppliers.

Moreover, we classify platforms into four types: transactional, innovative, informational, and hybrids. Transaction platforms are very close to a marketplace: they connect sellers and buyers. Innovative ones allow third parties to build on their code, generating new unpredictable service offerings, co-building value. That characteristic is what Zittrain (2006) dubbed generativity. Informational platforms channel searches and information, allowing users to match and exchange relevant information (Cennamo, 2019; Cusumano et al., 2019). Hybrids merge two or more of these archetypes.

Finally, the three PSP are led by different types of public organizations and levels of government: the (i) federal direct administration, (ii) autonomous social service of the federal level, and (iii) municipal level. Gov.br is a platform of the Secretariat of Digital Government (SGD) of the Ministry of Economy; EPIMatch is a

platform developed by the Brazilian Agency for Industrial Development (ABDI), an organization of the autonomous social service at the federal level; and FiquenoLar is a digital platform developed by the Federal Institute of Ceará, in response to a request from the municipalities of Aracati and Jaguaribe, both local governments at the state of Ceara.

Table 2 - Platform characteristics

	Gov.br	EPIMatch	FiqueNoLar
Sides	Multi-sided market	Two-sided market	Two-sided market
Scope	Infrastructural	Sectorial	Sectorial
Relationships	G2C/G2G	G2B/B2B	B2C
Type	Hybrid (Transactional/ Innovative)	Transactional	Informational
Level of government	Direct administration of the federal level (SGD)	Autonomous social service of the federal level (ABDI)	Municipal level (municipalities of Aracati and Jaguaribe)

Source: author's own.

Table 2 demonstrates how varied our sample of cases is. It also demonstrates that the public sector has already realized that its role in the platform economy can go far beyond regulating private platforms. The next subsections will detail each platform and categorize them according to the business model of each platform.

'Gov.br'

Gov.br is a platform of the Secretariat of Digital Government (SGD) of the Ministry of Economy that provides digital identity and digital services to citizens on the one hand, and tools for public organizations at the federal government that are willing to add a digital channel to their public services on the other hand. It is composed of a few components, such as an identity manager, processes automation software and SMS notifications, that were institutionalized by the presidential decree n. 8.936/2016.

It is worth remembering that this is not the first initiative that aims to build a virtual space for the provision of federal public services. This process began with the launch of the Rede Governo portal, in 1999⁴. In later iterations, the portal would be renamed and improved: Portal Brasil, Portal de Serviços, Plataforma de Cidadania Digital, until finally taking its current, centralized form, named Portal Gov.br. The gov.br platform was launched in 2019, as part of the effort to modernize the state and centralize public services in a single channel. Its objectives were defined by decree 9,756 of 2019. In March 2022, Gov.br has 122 million

registered users⁵ and hosts approximately 3600 digital services⁶ (73,4% of all federal public services).

Gov.br's value proposition is to provide to citizens a one-stop-shop Web portal for government digital services and to facilitate citizens' access to these services through a unique identity manager. On the other side, it also provides value to public organizations that are willing to accelerate digital transformation either using the central identity from the federal government or adopting the process automation tool to provide their digital services on the web. Therefore, the federal government is capable of simplifying access to services and reducing costs both for citizens and for the government. These economies are measured in hours saved to go to public organizations, transport costs among others. On the government side, the unit cost to provide the service is also reduced with economies from standardizations, human resources, etc. (Secretaria de Governo Digital, 2019). Thus, SGD is capable of accelerating the digital transformations of the federal government achieving the benefits of the diffusion of digital technologies.

The platform value architecture is supported mainly by the SGD, but not only. In the secretariat, all their human resources and suppliers are focused on accelerating digital transformation in government. But other public organizations also join resources in this effort. This is why only around one-third of all digital services available are provided through their process automation tool, while the remaining are provided directly by decentralized public organizations. Apart from their present human resources, it is important to note that the SDG also hired 350 temporary contractors to be distributed in federal public organizations to further accelerate the digital transformation process⁷. On the side of public service users, they are only required to provide the personal information needed to process each digital service.

The platform value network is led by the SGD coordination role. With the sponsorship of the Secretariat of Modernization of the State of the General Secretary of the Presidency, SGD negotiates with ministries and other public bodies digital transformation plans in which they commit to goals and resource allocation. These plans are carried out over close monitoring through formal meetings with the presence of the SGD and the high administration of organizations that own the public services that are being transformed to digital⁸. These governance arrangements have been able to set a fast rhythm to the implementation of digital transformation initiatives.

Finally, the platform value finance is mainly financed by the public budget of SGD. As told before, these resources are complemented by those of public organizations that make their services available through the platform. The suppliers are a combination of public and private companies, from the traditional IT state-owned enterprises, such as Serpro and Dataprev, to private suppliers such as software houses and SaaS (Software as a Service) providers. In our view, as a reflection of this complex architecture, the ownership of the platform is not clear, with different components about a diverse set of actors. The process automation tool, for instance, is from a private supplier, but all the information related to the process of the service is owned by the public organization in case there is a need to migrate it to other platforms.

Among the characteristics of the platform, its infrastructure character stands out. Gov.br is thought of as the "platform for platforms": it provides blocks of functionalities (such as identity management or SMS messaging) so that other public institutions can use them and combine them according to their needs to provide better digital services. Another point that we must emphasize is how important the network effects remain when we talk about public platforms. Interviewee 1 told us about the difficulty of getting other public agencies to adopt the solutions proposed by gov.br in its beginning, when there were still few citizens registered as users: "When I arrived here there were 40,000 [citizens with login]. We had to go after public agencies [...] now we don't have to go [with 70 million citizens with login], they come knocking on our door". The platform exhibits a traditional cross-positive network effect: more logged-in citizens mean that adopting public agencies will achieve cost savings if they develop services based on the platform; more public agencies with services on the platform mean more value for adopting citizens.

'EPIMatch'

EPIMatch is a platform developed by the Brazilian Agency for Industrial Development (ABDI), capable of connecting producers of personal protective equipment⁹ and hospitals and public institutions that need them. It is a transactional platform that reduces the friction that exists in the PPEs market, facilitating matches between producers of PPEs and users of PPEs (G2B/B2B). It is a platform created for a very specific niche and is therefore classified as sectorial. In its four months of activity until August 2020, the platform had already registered more than 450 suppliers, 114 claimants and enabled more than 1300 matches, which characterize the real offer of more than 3,403,430.00 equipment.

EPIMatch's value proposition is to provide a virtual environment in which "institutions register their needs and find suppliers who can meet [their] demand" (ABDI, 2020). In other words, its value proposition is to reduce the search cost (Goldfarb and Tucker, 2019) between providers and applicants for PPEs. The reduction in search costs occurs in an automated way in this virtual environment, since algorithms match the quantities offered and demands by region, sending automatic notifications to users (ABDI, 2020b). Its motivation is social: finding a way to mitigate the effects of the crisis, in a scenario of lack of supplies at the beginning of the pandemic. The purpose of the platform is to increase "efficiency in local production and the supply of these materials [PPEs]" (ABDI, 2020), through the aforementioned reduction in search costs, facilitating from distribution to decisions of manufacturing shifting to PPEs. Its users are public and private hospitals, firefighters, state and municipal secretaries (claimants), and private companies and associations of private producers (suppliers).

The platform's value architecture is supported by a technological solution donated by Microsoft Brazil, based on PowerApps, a "cloud-based Microsoft development platform that aims to facilitate the creation of applications and process automation" (ABDI, 2020b). The development of the solution depended on the donation of working hours by developers from Radix, a company associated with Microsoft Brazil. In terms of human resources, six ABDI professionals comprise a technical and managerial team responsible for the platform design and

operation. On the user side, there is a low need for data provision to minimize friction to adhesion.

The platform's value network was built through the participation of different actors. Microsoft Brazil donated the base technology for its creation; Radix, together with ABDI, was responsible for the design of the solution and its implementation. ABDI internalized the costs of the solution and became responsible for its maintenance. ABDI's partner associations have dedicated themselves to publicity with the private/public sector, to leverage adherence. The platform's management core is still the responsibility of Microsoft Brazil and ABDI. We emphasize ABDI's capacity for institutional articulation, concentrating an extensive cooperation network that makes the platform viable.

For the last axis, related to the platform's value finance, we found a lean cost structure for providing the solution, costs that are borne by ABDI: maintenance and monitoring of user requests, such as questions, support, and operation (eg.: logins and passwords). Although managed by ABDI, there is still a gray area of uncertainty in two points: (i) regarding the future development of the platform and (ii) concerning who owns the platform.

In general, the speed of development stands out as a response to the pandemic. According to interviewee 3, this is due to the rapid mobilization of the agency in the pandemic context, which ultimately led to the EPIMatch project: "the biggest motivation was social motivation [...] ABDI sought to adjust their projects and initiatives [...] to generate solutions to the chaos scenario that had been established [with the pandemic]." The importance of effective publicity of the platform, capable of promoting engagement, is also remarkable. As platforms are based on network effects, their value depends on adherence and daily use by users. At this point, the network of institutions and associations in close cooperation with the agency was essential. This is initial evidence that may perhaps indicate a path for public institutions willing to launch their PSP: in addition to technical skills, it is necessary to have a certain influence on the network of target users of the platform. Therefore, public bodies are more likely to develop successful platforms for the network in which they constitute a relevant node.

'FiquenoLar'

FiquenoLar is a digital platform developed by the Federal Institute of Ceará, in response to a request from the municipalities of Aracati and Jaguaribe that did not have digital tools capable of connecting buyers and sellers in the context of the pandemic. It is an informational platform that mediates a two-sided market, enabling matching between sellers and consumers (B2C) of essential goods. It is, therefore, characterized as a sectorial, niche platform (Table 2). Originally developed to meet local demand, its use quickly escalated to three hundred and ninety cities in twenty-one Brazilian states. With a mobile version and a web-based version, the platform already offers more than six thousand services and registers more than twenty-one thousand accesses.

In terms of value proposition, FiquenoLar fulfills the function of a virtual showcase equipped with dynamic search filters. Its objective is "to facilitate the disclosure of establishments/businesses (formal and informal) that provide

services at home, deliver at home and/or offer product withdrawal services". The platform, which is free for users, was developed by the Federal Institute of Ceará in a kind of 'informal public procurement' by the local governments. This demand from the local government sought to mitigate the effects of the COVID-19 pandemic by generating a tool that would take the first steps towards the inclusion of merchants and consumers in the digital economy. Thus, the most important beneficiaries of the platform are traders (formal and informal) and consumers. There is also a third group of beneficiaries: partner governments. Partner governments have access to a special login on the platform, which allows them to monitor in real-time, via dashboards, variations in use, service registration and most searched categories providing a source of knowledge for city halls.

As for the platform's value architecture, the actors involved found a creative way to mobilize their resources. The Federal Institute of Ceará had its technological infrastructure: cloud computing services, local servers. In addition, it provided technological competencies of its professors, students, and alumni, through man-hours for the development and maintenance of the platform. Partner local governments acted as disseminators, encouraging adherence to the platform via campaigns on social networks and television. To this end, they provided marketing teams and outreach teams. Users provide basic data. This is due to the objective of minimizing friction to user adhesion. As we will see, there is an important tradeoff to be considered on this point.

The platform's value network reflects the distribution of resources mobilized. IFCE remained at the forefront of development, while partner governments acted as disseminators. In this case, it is important to highlight the Government of the State of Ceará, through the Secretariat of Economic Development and Labor (SEDET) and Secretary of Science, Technology and Higher Education (SECITECE) and the Government of the State of Bahia, through the Secretariat of Science, Technology and Innovation (SECTI). The decisions concerning the platform are made by a management group of professors and researchers belonging to IFCE.

Finally, the platform's value finance is quite simple. Its costs can be summarized in hosting the system; maintenance; work hours; developer domain (annual payment) / developer certificate for app stores (mobile) (annual payment). Costs are borne by IFCE itself, whether in terms of the infrastructure provided or in terms of human resources involved in the project. Communication and engagement costs are shared with partners. In addition, IFCE is also the owner of the solution.

In general, the *sui generis* character of the public platform (B2C) stands out, acting as a true substitute for commercial platforms that do not cover the target region. It is worth highlighting the importance of a knowledge center such as the Federal Institute in the region: in its absence, there would be no other body capable of providing the technical knowledge necessary for the development of the platform so quickly and efficiently. One point that FiquenoLar illustrates is the rapid scalability of platforms when their adoption exceeds a certain threshold. According to interviewee 4: "it had a very fast evolution [...] I like to remember that when we launched the platform, we were like" wow, are we going to have a lot of access? Will we have three hundred accesses? [...] and today we have over twenty thousand accesses". This rapid scalability calls attention to the crucial role of dissemination and adoption. If in the universe of private digital platforms, the challenge of the chicken-and-egg¹⁰ stands in the way of self-sustained growth, on

public platforms the importance of publicity also appears. Again, as in the case of EPIMatch, in the case of FiquenoLar, it was partnerships with other public bodies (state and municipal governments) that ensured the efficient dissemination of the solution.

Table 3 - Value proposition, value architecture, value networks and value finance

Value Proposition		
Gov.br	EPI Match	FiqueNoLar
<p>Simplifying and expanding access to digital public services by citizens</p> <p>Reduce service delivery costs for both government and citizens</p>	<p>Reduce friction in the protective equipment market, especially related to COVID-19</p> <p>Companies and associations request solutions during the pandemic</p> <p>Users: companies, public agencies, associations</p>	<p>Provide information between merchants and consumers via dynamic filters in a virtual showcase</p> <p>Demand from local power to mitigate lockdown effects and include merchants and consumers in the digital economy</p>
Value Architecture		
<p>Digital Government Secretariat of the Ministry of Economy allocates human resources, technology, contracts with public and private suppliers.</p> <p>Citizen provides identification data and information necessary to provide each type of service.</p> <p>Public agencies, information for digitizing the service.</p>	<p>ABDI designed the product, mobilized supplier companies for PSP registration and communication.</p> <p>Supplier companies register the production of PPE. Public and private organizations register demand for PPE.</p>	<p>IFCE infra: online servers; a cloud; HR: students and alumni; Adopting governments provide outreach teams</p> <p>Merchants provide basic data (no formality is required); the consumer does not need to provide data</p>
Value Network		
<p>SGD: articulation and management; Civil House: political sponsorship; Federal public service providers: service management and execution of digitized</p>	<p>ABDI: institutional articulation and project management, maintenance of the platform; Microsoft and Radix (supplier): technological solution;</p>	<p>Collaborating actors: IFCE (LAR / LIT); Government of the State of CE / BA; Local governments (Aracati / Jaguaribe) / MPT</p> <p>Decision making: IFCE</p>

services; Public and private companies: implementation and supply of technology tools.	Support from companies and industry associations	teacher management team
Value Finance		
Costs: own teams, outsourced services, software as a service. Owner: Federal government and supplier company	Costs: Microsoft provides technology and hours of programming through Radix. Owner: ABDI and Microsoft	Costs: hosting the system; maintenance; work hours; developer domain/certificate (mobile) Owner: IFCE

Source: author's own.

Table 3 summarizes value proposition, value architecture, value networks and value finance to each one of the platforms analyzed in this study.

Discussion

This study found evidence that there was a strong demand component towards the digitalization of public services. It was also possible to map cases in which public institutions responded proactively to this demand, redesigning solutions, expanding their capacities, or generating completely new services. In other words, "the pandemic served as an accelerator for several projects and enabled the creation and execution of platforms in record time" (ABDI, 2020b). This study also supports Clarke's (2020) view that digital government has platform-based solutions as one of its principles (as part of its orthodoxy). It is necessary to emphasize the limitations regarding the sample universe of the research. However, the cases are representative given their variety and scope. The research takes a small step towards studies of public platforms and collects evidence that points to the growing importance of the digital government, the relationship between the pandemic and digitalization, the potential for innovation in the public sector, and the potential for generating value via public platforms.

Governance of PSP between levels of public administration

This research found initial evidence that there may be distinctive governance of PSP at the level of public administration in formation. We understand governance¹¹ as "formal and informal arrangements that determine how political decisions are put into practice, from the perspective of maintaining constitutional values of a country against problems, actors and changing environment." (Braga et al., 2008, p. 6). At the federal level, in direct public administration, where there is a greater concentration of resources, the infrastructure platform is developed. It is fundamental for the creation of new digital enterprises, public and private. Its scope has been the digital transformation of the government, but there are spaces

for future interaction with the private sector, through interoperability and APIs. Autonomous social services looking for a case to inspire their platform ventures can follow ABDI: develop a platform in the sector of their expertise, so that they can not only tackle the real problems of the sector but also articulate the institutions of the sector to promote the diffusion of the solution. Having a degree of influence over the network seems to be a fundamental complementary competence for the success of PSP. At the local level, from city halls and research institutes, there is the possibility of forming partnerships to solve local problems via sectoral platforms. These problems can be related to a "market failure" as in the case of FiquenoLar, *i.e.*, the absence of commercial platforms in a given sector, but not necessarily. The public sector can actively engage to offer solutions that are even superior to commercial solutions if there is the potential to do so. The most diverse sectors can receive local initiatives, but we highlight some that are closer to the management of city halls: education, transport, safety, and health.

Public-sector capacity and the risk of technology lock-in

Digital government projects need to be aware of the need to develop public-sector capacity (Mazzucato & Kattel, 2020) and the risk of possible technology lock-in. In Brazil, even public organizations that have technology sectors, most often have difficulties scaling up fast and adapting to changes due to the rigidity of public procurement and hiring personnel regulation. This can lead to adopting technologies without a thoughtful technical decision, creating path dependencies that can become future obstacles to interoperability or generate excessive costs.

The case of the UK Government Digital Services (GDS), for instance, was highly critical of big IT projects using traditional proprietary technologies (Greenway et al., 2018). GDS was able to improve its services and reduce public spending using diffused and easily available digital technologies, mostly open-source, and focusing on solving user needs with fast delivery, instead of outsourcing big and costly IT projects. The Federal Institute of Ceará acted likewise when it developed FiqueNoLar, building on its technological competencies. On the other hand, EPI Match worked with a donated proprietary technology, which has the potential to present limitations to future developments. Other than that, the ownership of technology was less clear in the cases of EPI Match and Gov.br, also pointing to possible uncertainties for future developments. In this matter, the European Commission suggested the "active and fair consideration of using open source software", among other benefits, for easier interoperability, avoiding lock-in, and permitting reusability (European Commission, 2017). Thus, it is fundamental that public organizations develop and sustain capabilities to take these technology decisions, which could be happening in the Gov.br with the new hiring announcement of 350 in-house temporary contractors.

Moreover, in all three cases, interviewees have declared to use some kind of cloud computing technologies, from Software as a Service (SaaS) to Infrastructure as a Service (IaaS). This is the case of the SaaS process automation tool of Gov.br, or the SaaS Microsoft PowerApps of EPI Match, or IaaS Amazon Web Services to host FiqueNoLar. These cloud services have to be adopted with careful technical analysis on how hard it would be to migrate services to other platforms, access data, provide interoperability with other systems and guarantee the protection and security of personal data. The US federal government, for instance, developed

technical standards for the "secure and effective adoption of the Cloud Computing model to reduce costs and improve services" (Badger et al., 2014). In sum, public organizations need to develop technological competencies to be able to develop PSP based on sound technical decisions that avoid technology lock-in.

Touching the surface

The analyzed PSP are practical solutions to real problems. Therefore, they tell success stories. However, if we look at the value generated by platforms in the private sector, we believe that there is still a large field to be explored by PSP. The analyzed PSP leveraged network effects. This in itself demonstrates a maturation of public logic, historically aimed at offering services whose value depended entirely on internal resources. The logic of network effects is a first step towards opening public services to the logic of co-construction of value. The second step would be to embrace generativity.

Generativity is the hallmark of digital innovation platforms. These platforms offer a technological base on which third parties will extend their functionality, unpredictably generating more value. Even in the private sector, most platforms remain at the level of basic network effects, without entering the sphere of generativity. This is because these innovation platforms require the management of a complex third-party ecosystem, as well as very advanced technological skills. Even so, we believe that it is possible and desirable for PSP to move along this path.

This study finds that PSP leveraged network effects, but neglected important reinforcement mechanisms based on the collection of data from users (except for Gov.br that has recently incorporated an algorithm for customized suggestions based on user's data). To minimize user adhesion resistance, platforms have eliminated almost all data provisioning requirements by users. The tradeoff is that, if this decision favors greater adherence, it also deprives platform maintainers of users' data flow, perhaps the most important asset for recalibrating the platform's services and even thinking about new PSP.

CONCLUSION

The cases investigated in this study demonstrate that public bodies and public servants have played a fundamental role in responding to the demand for digital services, especially during the COVID-19 pandemic. As the cases of 'gov.br', 'EPI-Match' and 'FiqueNoLar' showed us, the deployment of public platforms has to be considered as a possible strategy to face public problems. And the pandemic highlighted the value of platforms for the Brazilian public service.

Nevertheless, there are also important challenges for the public sector to provide increasingly valuable public service platforms in Brazil. Especially if we consider the great heterogeneity in digital government across the different levels of public administration - federal, state, and local. Public service platforms have the potential to be a turning point in the public administration's relations with society. However, achieving this potential depends on how governments will address challenges around governance and public-sector capacity to further explore the full potential of digital platforms.

Inovação no serviço público no Brasil pós covid-19: plataformas digitais ao longo dos níveis da administração pública

RESUMO

A pandemia da COVID-19 tornou a sociabilidade ainda mais dependente das tecnologias digitais. Nesse contexto, esta pesquisa explora evidências dessa tendência de aceleração da digitalização no setor público e as diferenças em termos de níveis no estado brasileiro. Baseamos esta investigação na literatura de inovação no setor público e inovação digital/plataformas digitais. Optou-se por uma abordagem de casos múltiplos com base na análise de documentos e entrevistas para explorar três Plataformas de Serviços Públicos (PSP): 'gov.br' no governo federal (Secretaria de Governo Digital); 'EPIMatch' do serviço social autônomo (Agência Brasileira de Desenvolvimento Industrial - ABDI) e 'FiquenoLar' ao nível do governo local (projeto da Prefeitura de Jaguaribe e Instituto Federal do Ceará). Esta investigação encontrou evidências de que os provedores de serviço público se voltaram para PSP como uma das soluções para responder a uma demanda crescente por digitalização.

PALAVRAS-CHAVE: Inovação pública. Plataformas de serviço público. COVID-19. Governo digital.

NOTAS

¹ This is the official narrative published in the government website: <https://www.gov.br/governodigital/pt-br/estrategia-de-governanca-digital/do-eletronico-ao-digital>.

² These criteria differentiate digital platforms in the public sector from electronic portals, common in the first generation of e-government.

³ The URL to access Compras.gov.br is: <https://www.gov.br/compras/pt-br>.

⁴ This is the official narrative published in the government website: <https://www.gov.br/governodigital/pt-br/estrategia-de-governanca-digital/do-eletronico-ao-digital>.

⁵ The dashboard used to monitor the registered users is available at: <https://www.gov.br/pt-br/noticias/financas-impostos-e-gestao-publica/2022/03/em-tres-anos-mais-de-1600-servicos-publicos-foram-digitalizados>.

⁶ The dashboard used to monitor the digital services is available at: <https://painelservicos.servicos.gov.br/>.

⁷ Special-Secretary of debureaucratization, management, and digital government order nº 16.017/2020, order nº 2.496/2021 and call nº 7/2020. Available at: https://www.in.gov.br/en/web/dou/-/portaria-n-16.017-de-6-de-julho-de-2020*-266200340, <https://www.in.gov.br/web/dou/-/portaria-sgd/me-n-2.496-de-2-de-marco-de-2021-306217522> and <https://www.in.gov.br/en/web/dou/-/edital-n-7-de-19-de-agosto-de-2020processo-seletivo-simplificado-para-a-contratacao-por-tempo-determinado-de-profissionais-de-tecnologia-da-informacao-273498859>.

⁸ Interministerial order SEME/SGPR SGD/SEDGG/ME nº 1, DE 7 DE AGOSTO DE 2020. Available at: <https://www.in.gov.br/web/dou/-/portaria-interministerial-seme/sgpr-sgd/sedgg/me-n-1-de-7-de-agosto-de-2020-271236050>.

⁹ Such as “masks, goggles, caps, propé (covers to prevent shoes from contaminating environments), aprons and alcohol gel.” (<https://sebraeseunegocio.com.br/artigo/plataforma-aproxima-vendedores-e-compradores-de-epis/>).

¹⁰ The dilemma of chicken and egg in two-sided markets concerns how to get users on one side to join the platform, since the platform's attractiveness depends exactly on the pre-existence of users on the other side.

¹¹ As can be seen from the following quote, public electronic governance is related to the division of responsibilities and tasks between the bodies and levels of public administration, in terms of the scope of their digital transformation. On the other hand, e-government or digital government refers, more generally, to the digital transformation that enables new ways of government to execute and deliver its core functions both physically and digitally (Janowski, 2015).

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APPENDIX A - INTERVIEW QUESTIONS

Value Proposition

What kind of electronic services are the basis for the PSP?

What are the general and specific motivations behind the PSP?

What aims are the PSP intended to attain?

Who is considered as its most important users and beneficiaries?

Value Architecture

What types of resources are used to provide the PSP from your side?

Technology? Other resources?

What resources must be provided by its users?

Value Network

What actors are involved in providing the PSP?

What roles do these actors have? (Providers of the PSP? Being part of the PSP?

Using the PSP? etcetera)

Who manages the PSP and how are the important decisions made?

Value Finance

What types of costs are there in providing the PSP?

Who finances the PSP and how is it financed?

Who "owns" the PSP?

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