Dossier

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Public Development Banks and fintech in a business environment that advances digital financial inclusion for micro and small businesses: a conceptual framework based on Brazilian context

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Abstract

This work aims to study how Public Development Banks (PDBs) and fintech can amplify digital financial inclusion for micro and small businesses, companies that suffer worldwide from credit restrictions to grow their business and even to survive during times of crisis. PDBs, which are key actors in the development finance, are partnering with fintech, companies that bring the promise to advance digital financial inclusion. Brazil has about 17 million small businesses, a strong fintech business environment, and one of the major PDBs, the Brazilian Development Bank (BNDES). Thus, driving on Brazilian context, based on a fintech business environment literature review, and selected PDBs and Brazilian small businesses secondary data analysis, we propose a theoretical framework that can help to advance digital financial inclusion for small businesses, contributing to scholars, policymakers, and other Global South economies to reduce social inequalities acting as a shortcut to achieve Sustainable Development Goals.

Keywords: Digital Financial Inclusion. Fintech. Public Development Banks. Micro and Small Business. SDGs.

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1. Introduction

This article aims to study how to advance digital financial inclusion, mediated by Public Development Banks (PDBs) and fintech, for micro and small businesses as it is a key factor in achieving sustainable development and reducing social inequalities

Digital financial inclusion is the digital access to and use of formal financial services by the underserved segments of society, like poor individuals and small business companies (Cgap, 2022b, Gallego-Losada *et al*., 2023), in terms of access, use, and quality (Roa, 2015). Relationships have been identified between digital financial inclusion and Sustainable Development Goals (SDGs), which take part of the 2030 Agenda for Sustainable Development that includes environmental, social, and economic dimensions and were adopted in 2015 by 195 countries members of the United Nations, including Brazil (UNSGSA, 2018).

Digital transformation for well-being, which is related to digital financial inclusion and sustainable development (Mavlutova *et al*., 2023), is listed as one of the priority goals in eLAC 2024, the Digital agenda for Latin America and the Caribbean (ECLAC, 2022).

The emergence of digital technologies and the transformation of financial markets (Gabor; Brooks, 2017) bring the promise of financial inclusion induced by fintech, companies that use innovative business models and make use of digital financial services (Gálvez-Sánchez *et al*., 2021; Zachariadis; Ozcan, 2017; Milian *et al*., 2019). Brazil has a strong fintech business environment, the largest one in Latin America (Findexable Limited, 2021), and credit fintech represent near 18% of these companies (Distrito, 2023).

One of the underserved segments that can receive potential benefits, including digital financial inclusion improvements, from fintech companies is the Micro and small and medium (MSME) businesses (Zhiqiang *et al*., 2021) that generate on average 67% of the jobs worldwide and are responsible for half of the global Gross Domestic Product (GDP). More than 130 million of these businesses, 41% on average across the globe, have unmet financial needs (SME Forum, 2022). In Brazil, these MSMEs contribute an average of 30% of the Brazilian GDP (SEBRAE, 2020).

Credit is one of the tools that allows for financial inclusion and growth of small business companies (SME Forum, 2022). According to the MSME finance gap study, USD 5,2 trillion is the estimated credit gap for the millions of formal and informal Small and Medium Enterprises (SMEs) in developing countries. It is around 19% of the Gross Domestic Product (GDP) of the 128 economies studied (Khanna *et al*., 2017). The majority of the 17,3 million Brazilian MSMEs have difficulties when accessing credit and quality banking services (Paula, 2017; Boligan; Montani, 2023; Gonzalez *et al*., 2021).

Public Development Banks (PDBs) and Development Financing Institutions (DFIs) are public financial institutions that have a proactive public policy long-term mission and, in their vast majority, are initiated by governments (INSE, 2023). They span more than 150 economies, and most of them have MSME support in their long-term mission and are committed to sustainability and to achieve SDGs (Finance in Common, 2022).

Illustrative studies such as Paula (2017), Boligan and Montani (2023), Barboza *et al*. (2023), and ABDE (2020), present the Brazilian context of financial inclusion needs and credit difficulties for micro and small businesses, and especially the key role of the major PDB in Latin America, the Brazilian Development Bank (BNDES), in this scenario. BNDES is one of the PDBs that is partnering with fintech using a digital platform to grant credit loans for those small entrepreneurs (BNDES, 2023b).

Beyond that, several innovations in financial systems are occurring worldwide and in Brazil (Melo *et al*., 2021). The Brazilian Central Bank (BCB) is the leading bank system regulator of the National Financial System and the main promoter of financial inclusion in Brazil (Sela *et al*., 2020). It initiated in the year 2016 a series of innovative procedures and policy rules, revisited in 2019 at Agenda BC#, focused on five key aspects: inclusion, competition, transparency, education, and sustainability.

As described by Gomber *et al.* (2018a, p. 227):

> Financial services are created and delivered through

> complex systems in business with processes, organizational and operational structures, human capital and talent, and a variety of choice behaviours, subject to ethical, regulatory, and legal restrictions.

Given the above digital financial inclusion context for micro and small businesses in Brazil and the complexity of the related business environment, comprising several actors like PDBs and fintech, as well as components from the technology, financial market and regulations, we have found a research gap that the conceptual framework proposed in our study aims to address and to give a contribution to advance not only the Information Systems and Development Finance fields opening new research avenues, but also to be used as a tool to advance that helps to guide scholars, practitioners, policymakers, micro and small business, public development banks, fintech and their associations, and other Global South economies to reduce social inequalities acting as a shortcut to achieve Sustainable Development Goals.

This study is structured as follows: in the next section, we propose a theoretical background on fintech and the business environment of digital financial inclusion. The digital financial inclusion context for micro and small businesses is presented next, followed by the role of Public Development Banks as actors on the financial inclusion agenda and micro and small businesses support. The research methodology, data analysis, and the proposed conceptual framework are presented in the following sections. Discussion on the main contributions of the research, its implications, future works, and final remarks, closes the article.

2. Theoretical background

2.1 The need for a business environment with fintech that amplifies digital financial inclusion

Information and communication technologies (ICTs) have been used as a tool for international development, mainly in emerging economies and studied under the field of Information and Communication Technologies for Development, or ICT4D, which also considers the social context and the political and economic aspects of development that may affect the underlying technology (Heeks, 2009; Avgerou, 2008). With the augmented complexity of the development finance field, ICTs became an imbricated part of the development agenda, where one must consider a broader social context, an increased number of market actors that includes the state, multilateral institutions, and societal organizations, and also ICTs policies and regulations (Singh, 2019).

Lagna and Ravishankar (2022) have presented a literature review that uses the Information Systems research on fintech, and the ICT4D research on financial inclusion themes to propose a new research agenda, named fintech and the promise of financial inclusion. One of the research opportunities identified in the Lagna and Ravishankar (2022) study is the Business environment of fintech-led financial inclusion, as evidence shows that there are multiple and diverse stakeholders, ranging from traditional financial market actors like banks, passing through fintech and the organized civil society, and reaching government and public policy regulators, as well as political and technological elements involved in the context of financial inclusion.

The complexity of the business environment related to financial services, which comprises the technology, the financial market, and the regulations is presented in studies such as Leonardi *et al.* (2016), which depicts the complexity of Brazilian corresponding banking system where technology is just a piece in a broader network of banks, retail stores, regulators, and customers, and Senyo *et al.* (2022) that describes the digital financial inclusion ecosystem in Ghana, comprised by banks, mobile phone telecommunication operators, policy makers and fintech.

According to the Global Fintech Report (Findexable Limited, 2021), a study based on an index that considers about 11,000 fintech spanned through more than 80 countries and 264 cities in the world, the Brazilian fintech environment represents the largest one in Latin America and it is in the 14th position among the countries studied. This strong fintech ecosystem has São

Paulo, the largest city of Brazil located in the Southeast region, figuring in the 4th place of cities with a more developed business environment for fintech.

Another report indicates there are 658 fintech startups in Brazil, which 17,8% are credit fintech companies (Distrito, 2023). Filho *et al.* (2023) argues that, although these numbers seem to be higher than the official registered fintech institutions at Brazilian Central Bank and the financial assets of these institutions is less than 5% of the incumbent banks, the number of customers serviced by the new financial institutions in Brazil is growing fast, reaching more than 30 million, which is equivalent to more than 20% of the customers of the incumbent banks.

Arner *et al.* (2020) point that at least five SDGs are directly linked with fintech for financial inclusion: SDG 5- Gender Equality, SDG 8- Decent Work and Economic Growth, SDG 9- Industry, Innovation, and Infrastructure, SDG 10- Reduced inequalities, and SDG 17 – Partnerships for the Goals.

Although the financial inclusion business environment is sometimes referred to as "ecosystem" in several studies such as Senyo *et al*. (2022), Bongomin *et al*. (2021) and Leong *et al*. (2017), in this article we will adopt the terminology presented in the Lagna and Ravishankar (2022) study, as we believe that it allows encompassing not only the diversity of actors involved but also the particular characteristics of the financial inclusion environment.

2.2 The digital financial inclusion context for micro and small businesses in Brazil

Credit is an important tool of financial inclusion to allow the growth and flourishing of small business companies (SME Forum, 2022). According to the MSME finance gap study (Khanna *et al*., 2017), USD 5,2 trillion is the estimated credit gap for the millions of formal and informal Small and Medium Enterprises (SMEs) in developing countries. It is around 19% of the Gross Domestic Product (GDP) of the 128 economies comprised by the study.

Evidence shows relationships with digital financial inclusion, SMEs and sustainability. On SDG 5- Gender Equality, the small business owned by women faces an estimated credit gap of USD 1,7 trillion globally. Considering

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SDG 8- Decent Work and Economic Growth, projections show that, by 2030, 470 million employments are needed. Also, the unmet SME credit gap, until 2015, was around USD 5 trillion. At SDG 9- Industry, Innovation, and Infrastructure, SMEs have constrained access to finance, especially in emerging economies (UNSGSA, 2018).

Brazil has about 17,3 million small businesses, classified as individual microentrepreneurs (MEI) and micro, small, and medium companies. Those small businesses contribute approximately 30% of the Brazilian GDP, representing around USD 430 billion (SEBRAE, 2020).

However, Brazilian small entrepreneurs have difficulties accessing credit and quality banking services (Paula, 2017; Boligan; Montani, 2023). A study of the credit for these small businesses (Gonzalez *et al*., 2021) pointed out that the credit demand overtakes the offers up to USD 33 billion, and the credit gap for those small enterprises, considering the first quarter of 2021, is USD 10 billion, on average.

Boligan and Montani (2023) argue that Brazilian micro and small businesses are a very diverse segment in terms of the credit market and, although the impact on Brazilian small firm caused by financial instability brought by Covid-19 was moderated by government regular and emergencies credit guarantee programs, the credit demand for this segment was not reduced, even in the significant decline of the economic activity caused by the pandemic.

The study from Boligan and Montani (2023) also reveals that micro and small businesses in Brazil have the highest average interest rates and default rates in comparison with medium and large-sized companies, which generates a vicious circle as the default rates are partially explained by the high interest rates, and these rates are kept in high levels by financial institutions as they have a higher risk perception of these small entrepreneurs, because of their higher default rates.

Netto *et al.* (2021) argue that these Brazilian small companies are a very diverse segment mainly in terms of revenue classification and point to the countercyclical role of the national system of development to support this diversity of SMEs, especially during the economic downturns caused by the

Covid-19 pandemic.[1]

2.3 Public development banks in the context of micro and small businesses financial inclusion

Public Development Banks (PDBs) and Development Financing Institutions (DFIs) are public financial institutions that play a relevant role worldwide regarding socioeconomic development, have a proactive public policy long-term mission, and, in their vast majority, are initiated by governments acting in the public interest (Xu *et al*., 2021). There are more than 500 PDBs and DFIs across the globe with about USD 23 trillion in assets, spanning all five continents in more than 150 economies (INSE, 2023).

To be classified as a PDB or DFI, an institution must be a stand-alone entity, have its main products and services seeking for fund and reflow, find other sources of funding that are not only periodical transfers, have a proactive public policy long-term mission, and must participate as a government representative of corporate strategies. Some of these institutions are not banks, but agencies, and then they are classified as a DFI (Xu *et al*., 2021).

PDBs are also committed to sustainability by aligning their mandates and strategies to accomplish the 2030 Agenda and SDGs (Finance in Common, 2022; Chan; Freitas, 2021). They also have been recognized for its role in addressing market failures acting as a government arm of economic policy in helping the recovery after the financial global crisis of 2008 (Feil; Feijó, 2021; Barboza *et al*., 2023; Xu *et al*., 2021) and, more recently, in sustaining several economies during the Covid-19 pandemic (Finance in Common, 2022). They have been classified in terms of ownership (as National, Subnational, or Multinational), in terms of their mandate (ranging from a Flexible mandate - not restricted to a specific mission -, passing

1 In Brazil it is named SNF [*Sistema Nacional de Fomento*]. The Brazilian Development Association (*ABDE*) unites national and subnational PDBs, DFIs, and development partners institutions. (Além *et al*., 2017).

through foreign trade, and reaching the MSME support), and also in terms of their total asset size (Xu *et al*., 2021).[2]

More than 80% of PDBs and DFIs worldwide have the mission to support MSMEs (Finance in Common, 2022). Although some of these have a specific mandate to support MSMEs, others have a general mandate that also encompasses MSME support.

Some studies have identified the relevance of PDBs and DFIs on the financial inclusion agenda. Gabor and Brooks (2017) cite that DFIs should take a part in a fintech financial inclusion business environment. Sela *et al*. (2020) pointed out that BNDES is one of the key actors in the Brazilian financial inclusion agenda.

BNDES is the major PDB in Brazil, a government-owned bank, classified as National with a Flexible mandate – which includes the support for Brazilian MSMEs –, and with a large size (more than USD 100 billion and up to USD 500 billion assets) with about 149 billion dollars assets in 2020. Founded in 1952, BNDES is also the largest PDB in the Latin America and the 22nd-largest PDB in the world (INSE, 2023).

When granting loans to micro and small business companies, BNDES acts in a second-tier credit model. In this indirect model of operation, money resources are passed along to accredited financial agents, including fintech, which then deals loans with SMEs and entrepreneurs' customers (Borça Júnior *et al*., 2020). BNDES disbursement for MSMEs in the first semester of 2023 has raised around 53% in comparison with the same period of 2022, reaching USD 8,6 billion (BNDES, 2023a).

As will be shown in the next section of this study, relationships with financial inclusion, fintech, and sustainability were identified in several selected PDBs that deal with MSMEs. Some of these PDBs are also partnering with fintechs to support MSMEs and to promote financial inclusion, such as

2 PDBs were classified by size in terms of their assets as Micro (less than USD 500 million assets), Small (from USD 500 million to USD 20 billion), Medium (from USD 20 billion to USD 100 billion), Large (more than USD 100 billion and up to USD 500 billion), and Mega (more than USD 500 billion assets) (INSE, 2023).

KfW in Germany (KFW, 2017) and BNDES in Brazil (Melo *et al*., 2021).

3. Methodology, data collection and analysis

The theoretical framework proposed in our study aims to help answer the following research question, “What is the business environment, comprising PDBs and fintech, that amplifies the sustainable digital financial inclusion of Brazilian micro and small business companies?”.

The method conducted in our study is composed of three steps that will be depicted in next sections. First, as a starting point for our conceptual model we have considered categories from two models, Zalan and Toufaily (2017) and Sela *et al*. (2020), obtaining initial themes and focus themes.

Second, in line with the provisional coding strategy approach, applicable for qualitative studies that are based on previous research (Saldaña, 2015), we performed a literature review on fintech and financial inclusion business environment using the concept-driven approach proposed by Webster and Watson (2002) to verify and adapt the themes and focus themes.

Third, in line with Glass (1976), we conducted two secondary data collections. The first one was on Brazilian MSMEs to identify aspects related to digital transformation and financial services use of these small companies. The second one was based on reports and websites of selected PDBs that support MSMEs, to investigate the adherence of these institutions to key themes of our study, namely financial inclusion, fintech, and sustainability.

3.1 Models selected as starting point for our theoretical framework

Zalan and Toufaily (2017) proposed a hybrid digital platform in a broader business environment. Sela *et al.* (2020) used an Actor-Network Theory approach (Latour, 1999) to map the process of collective construction of the Brazilian financial inclusion agenda. We have decided to use these models as a starting point for our conceptual framework for a number of reasons.

First, Zalan and Toufaily (2017) argued that fintech in emerging markets does not always disrupt the whole financial market but aims to partner with traditional financial institutions as they can benefit each other from a collaboration strategy to achieve complementarity of capabilities between these actors. Other studies also point in that direction and agree that mutual benefits exist in relationships between banks and fintech (Senyo *et al*., 2022; Suryono *et al*., 2020; Ng *et al*., 2023).

Second, Open Application Programming Interfaces (APIs), located at the centre of the hybrid digital platform model and widely used by digital financial services like mobile money, allow data exchange and communications between different organizations such as banks and fintech (Zachariadis; Ozcan, 2017). Moreover, OpenAPIs have shown the potential to amplify digital financial inclusion (Pazarbasioglu *et al*., 2020) and to unveil new business models (CGAP, 2022a).

Third, the broader business environment proposed by Zalan and Toufaily (2017) surrounds the hybrid digital platform and includes several financial services actors and social groups and presents elements from technology, from the market and from policy regulations.

Last, although Zalan and Toufaily (2017) model was not specifically designed to address financial inclusion, we have chosen the study from Sela *et al*. (2020) to enrich the model and to include the particular context of the financial inclusion aspects in Brazil, including social groups and actors, from the government, from the market, promoters and scholars, and international actors.

3.2 Literature review on fintech and financial inclusion business environment

The search for the literature review was performed using Web of Science and Scopus databases. On data collection we have combined a set of keywords with the main objective to systematize and categorize the theoretical framework of the research domain.

The first step was to do a search to identify references to the business environment for financial inclusion mediated by fintech. To do this, we planned to use a query with the "financial inclusion" and "business environment" keywords using the additional search phrases: "ecosystem", "business model" and "social context". We then added to the search string the keyword "fintech" and the additional phrases: "financial technology", "financial technologies" and "digital finance". This procedure it is in line with the keywords used in other literature review studies on fintech, such as Lagna and Ravishankar (2022) and Ng *et al*. (2023), to get earlier studies that did not mention the keyword "fintech".

The search string, that returned 87 records, then becomes: ("financial inclusion" AND ("ecosystem" OR "business environment" OR "business model" OR "social context")) AND ("Fintech" OR "Financial Technology" OR Financial Technologies OR Digital Finance).

In the second phase, we have included articles related to business environment of financial inclusion identified on Lagna and Ravishankar (2022) literature review study.

Given those records, the next step on the selection was to remove duplicated records identified from WoS and Scopus searches and one duplicated article from Lagna and Ravinshankar (2022) literature review that was already identified on our search. We also removed records from conference proceedings and from book chapters, in order to have a database with journal peer reviewed articles only. This led us to 73 articles.

After reviewing those articles, we removed six articles that just mentioned fintech and financial inclusion and were not related to business environment of digital financial inclusion mediated by fintech. We also have manually identified three others redundant articles.

The whole process, detailed in Figure 1, led us to the final sample dataset of 64 articles to be analyzed, with no time span, which resulted on articles ranging from 2009 to 2022.

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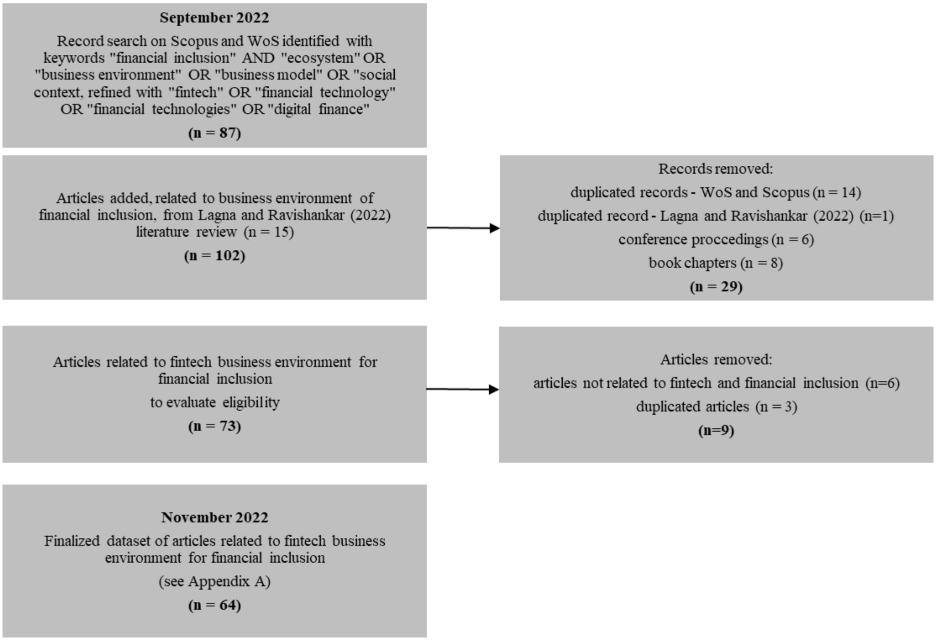
3 The complete list of articles included in literature review is available at: http://bit.ly/3r7HiNJ. Access: July 2023.

Figure 1 – Steps of the literature review



Source: The author's, 2023.

The literature review helped to unveil a major theme of the conceptual framework, Sustainability, as well as some focus themes into the implications to micro and small businesses major theme, such as data protection and privacy, lower financial transaction costs, bureaucracy, collaterals and improved credit scores, Information Technology (IT) infrastructure restrictions, digital and financial literacy and sustainability consciousness, as it will be discussed in the Data analysis and conceptual framework section of this study.

3.2 Data collection from digital financial inclusion aspects of Brazilian micro and small businesses

We collected secondary data from two reports of DataSebrae database, built by SEBRAE, namely Digital transformation on Small Businesses (SEBRAE, 2022a) and Small Business financing in Brazil (SEBRAE, 2022b). The DataSebrae reports were based on surveys and had interviewed individual entrepreneurs, and companies of micro and small sizes spanned in all regions of the country.[4] We analyzed the reports and selected main aspects regarding digital transformation, sustainability and financial services knowledge and use These results are summarized on Table 1.

Table 1 – Brazilian micro and small businesses aspects related to digital transformation, sustainability, and financial services knowledge and use

Resource / service aspect	2019	2022
Access to mobile phones with Internet	75%*	99%
Have a medium or high use of basic financial services on the Internet	N/A	86%
Have an account in a digital bank	N/A	53%
Request a loan by the Internet	9%	15%
Have denied a credit loan	29%	59%
Have difficulties to achieve a loan	70%	84%
Have a low knowledge of the ESG agenda	N/A	92%
Have a low knowledge of Open Banking	N/A	73%

Source: DataSebrae. The author's, 2023.

***** Data available only from year 2018.

4 Individual entrepreneurs are named MEIs in Brazil and can have revenues up to R$ 81.000,00 per year. Micro size companies' revenue limit per year is R$ 360.000,00. Small size limit is up to R$ 4,8 million. Source: SEBRAE. Available: https://bit.ly/42rvvqq. Access: July 2023.

Although almost 100% of the entrepreneurs interviewed have access to mobile phones with Internet and 86% have reported to have a high or medium use of basic financial services on the Internet, in the other hand the percentage of entrepreneurs with an account on a digital bank is little higher than 50%, and only 15% requested a loan from the Internet. Also, for the remaining 85% ones that did not request an online loan, not to trust online platforms was the reason for 14% of the respondents.

A credit loan was denied for almost 60% of the respondents, and even between those micro and small businesses that manage to get credit, 84% reported difficulties to achieve the loans, especially because of high interest rates and lack of real guarantees. These numbers help to confirm the findings on the literature review that are related to the focus theme to lower financial transaction costs, bureaucracy, collaterals, and to improve credit scores for micro and small businesses.

The analysis also revealed that the vast majority of the Brazilian micro and small entrepreneurs have reported a low level of knowledge regarding the ESG (Environmental, Social, Governance) agenda, which is linked with sustainability and SDGs (Khaled *et al*., 2021) and more than 70% have a low knowledge of Open Banking, showing that sustainability consciousness and digital financial literacy are aspects that need to be considered in our conceptual framework.

3.3 Data collection and analysis from selected PDBs

In order to get a sample of PDBs, we have chosen the study from Além (2020) which selected the following public national PDBs, with similar characteristics and historic relevance on socio-economic development in their respective countries and with a general mandate, that support MSMEs: China Development Bank (CDB), KfW Development Bank, BNDES, Cassa Depositi and Prestiti (CDP), Caisse des Dépôts et Consignations (CDC), Japan Finance Corporation (JFC), Instituto de Crédito Oficial (ICO), and Korea Development Bank (KDB).

When investigating the adherence of these institutions to key themes of our study, namely financial inclusion, fintech and sustainability, we performed a detailed search on annual reports and websites of those PDBs that support MSMEs. These data collection results are summarized on Table 2.

Table 2 – PDBs and their relationships with fintech, financial inclusion and sustainability

PDB/DFI	Country	Size	Fintech partnerships	Financial Inclusion references	Sustainability references
CDB	China	Mega	N/I	X	X
KfW	Germany	Mega	X	X	X
BNDES	Brazil	Large	X	X	X
CDP	Italy	Mega	X	X	X
CDC*	France	Mega	X	X	X
JFC	Japan	Large	N/I	N/I	X
ICO	Spain	Medium	N/I	X	X
KDB	South Korea	Large	X	N/I	X

Source: PDBs annual reports. The author’s, 2023.

Subtitles: N/I = Not identified.

* We also verified the records from BPI France, a PDB classified with a large size, focused on MPME support, and that is a part of CDC group.

In all the analyzed PDBs we have identified references to sustainability in their annual reports or in their sustainability reports, confirming their commitment to ESG, 2030 Agenda, and SDGs. ICO mentions in its Integrated *Report 2022* (p. 5) the compromise to support SMEs transition in terms of sustainability.

Financial inclusion references were identified in the vast majority of PDBs, although not explicitly on financial inclusion to SMEs, but all of the PDBs studied mention the support SME credit. CDP has the InclusiveFI program to enhance access to finance for African MSMEs. At CDB Sustainability *Report 2021* (p. 26), there is a specific section dedicated to financial inclusion that mentions elderly care, well-being, affordable houses and student financing programs.

Fintech partnerships were identified in KfW and BNDES to promote SME credit loans and finance, and in CDP, KDB and BNDES to support SMEs by the means of venture capital funds and startup accelerator programs, like BNDES Garagem that fosters the growth of social impact startups (BNDES, 2023c). BPI France, a PDB of the CDC Group, has been identified to partner with the French fintech association to publish the French Fintech 2022 panorama.

As our conceptual framework is founded on the Brazilian context, we performed further investigation on the BNDES partnership with fintech to support SME loans. One of the tools used by BNDES is a digital platform named Canal MPME (BNDES, 2023b).[6] Since its launch in 2017, the digital platform has helped to contract more than USD 600 million in credit and has approved more than 20,000 proposals. Brazilian micro and small business companies represent 98% of these operations (Melo *et al*., 2021).

BNDES Canal MPME digital platform started on 2019 to partner with two accredited credit fintech companies (Gestiona, 2019). Since then, the number has grown, reaching seventeen accredited credit fintech companies in 2023 (BNDES, 2023b). Also, the platform offers MPMEs the option to

5 The detailed searches are available at: https://bit.ly/3r7HiNJ. Access: July 2023.

6 MPME stands for Micro, Pequenas e Médias Empresas.

contract services from accredited finance management fintech companies, and integrates with SEBRAE e-learning platform, to offer free entrepreneurship courses (BNDES, 2023b).

Another example from BNDES is its partnering with fintech to support SMEs by the means of credit rights investment funds, namely FDICs. In this model of operation, occurring since 2021, the development bank is one of the shareholders of the FDIC. Then, the fund is managed by fintech companies that are also responsible to grant loans to SMEs (BNDES, 2023d).

4. Conceptual framework

The present section summarizes the aspects of the proposed conceptual framework, namely the themes and focus themes, the conceptual framework and its layers.

4.1 Main Themes and Focus themes

After applying the previously discussed method, we have identified the themes and focus themes for the proposed theoretical framework. Main themes are Implications to PDBs, Implications to fintech and Implications to micro and small businesses. We also identified as other themes: Technology, Market, Regulations and Sustainability.

The main themes and focus themes, that comprise the centre of the conceptual framework, as well as illustrative articles from literature review and secondary data analysis are presented on Table 3.

7 FDIC stands for *Fundo de Investimentos em Diretos Creditórios*, an instrument used in Brazilian credit market. It is being used by fintech companies to get future installments of SME´s customers to convert them in receivables that can be sold to a FDIC as credit rights.

8 A complete list of themes and focus themes of the conceptual framework is available at https://bit.ly/3r7HiNJ. Access: July 2023.

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Table 3 – Main themes and focus themes of the conceptual framework

Themes/Coming from	Focus themes	Illustrative studies
Implications to PDBs		
ZT	Fintech enabler	Moro-Visconti *et al.* (2020); Jayo *et al.* (2012); Joia and Dos Santos (2019), Iheanachor and Umukoro (2022).
ZT	Customer centric experience	Bongomin, Yosa and Ntayi (2021); Abdulquadri *et al.* (2021); Leong *et al.* (2017).
ZT	Targeting new customers	Kangwa *et al.* (2021); Abdulquadri *et al*. (2021).
SL / SD	Mission fulfillment – digital financial inclusion for SMEs	Paula (2017); Além (2020); Finance in Common (2022).
Implications to Fintech		
ZT	Trust	Bongomin and Ntayi (2020b); Dawood *et al*. (2022); Pramani and Iyer (2022).
ZT	Cybersecurity	Nguimkeu and Okou (2021); Wenner *et al.* (2018); Gupta *et al*. (2017).
ZT	Comprehensive Data	Ekpo *et al*. (2022); Gabor and Brooks (2017); Gupta *et al*. (2017).
ZT	Access to customers	Mwangi and Brown (2015); Pal *et al*. (2020); Potnis *et al.* (2020).
ZT	Compliance with regulations	Jonker and Kosse (2022), Yakubi *et al.* (2022); Paglietti and Rabitti (2022); Ezechukwu (2021).

Themes/Coming from	**Focus themes**	**Illustrative studies**
Implications to micro and small businesses		
ZT	Access to alternative offerings	Arslan *et al*. (2022); Leong *et al.* (2017).
ZT	Enhanced user experience	Bongomin, Yosa and Ntayi (2021); Dawood *et al.* (2022); Pal, De´ and Herath (2020).
ZT	Understanding of digital customer journey	Kangwa *et al.* (2021); Museba *et al*. (2021); Leong *et al*. (2017); Joia and Dos Santos (2019).
LR	Data protection and privacy	Bongomin and Ntayi (2020a); Ekpo *et al*. (2022); Huang *et al*. (2020).
LR / SD	Lower financial transaction costs / bureaucracy, collaterals. Credit scores	Bongomin *et a*l. (2020); Mishra *et al.* (2022); Senyo *et al.* (2022).
LR	IT infrastructure restrictions	Jayo *et al.* (2012); Joia and Dos Santos (2019); Leonardi *et al.* (2016).
LR / SD	Digital and financial literacy	Jonker and Kosse (2022); Ekpo *et al.* (2022); Joia and Dos Santos (2019).
LR / SD	Sustainability conciousness	Yang *et al*. (2022); Schinckus (2020).

Subtitles: ZT = Zalan and Toufaily (2017); SL = Sela *et al*. (2020); LR = Literature Review; SD = Secondary Data.

4.2 A conceptual framework for a business environment, with PDBs and fintech, to advance digital financial inclusion for micro and small businesses

The seven themes of the proposed conceptual framework are disposed in a multilevel form. This multilevel approach has been used in other studies such as Pozzebon and Diniz (2012) study, and have been applied in financial

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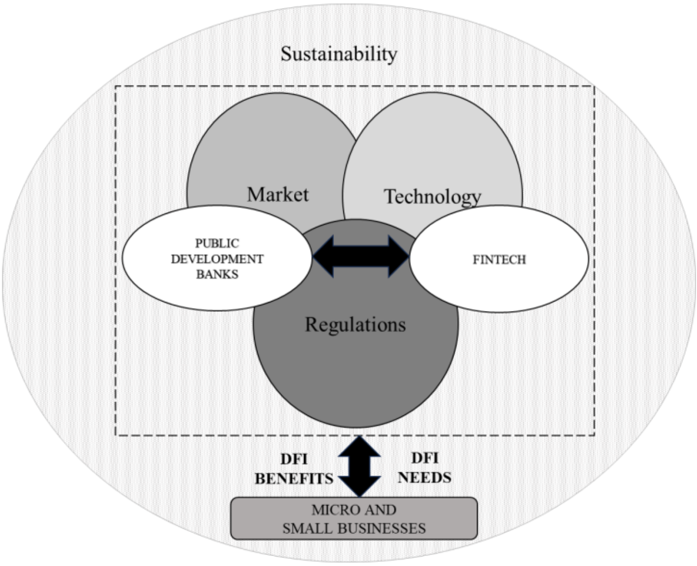
inclusion essays (Diniz *et al*., 2012).

The first framework level is composed by the main themes: Implications to PDBs, Implications to fintech, and Implications to micro and small businesses. The second level is comprised by Technology, Market, and Regulations themes. Sustainability forms the third level, as it permeates all the other themes of the conceptual framework.

The proposed components and levels of the framework are shown on Figure 2 and will be depicted in the following sections.

Figure 2 – Conceptual framework of a business environment, with PDBs and fintech, to advance digital financial inclusion for micro and small businesses.



Source: [S. n. t.].

4.2.1 Centre of the framework

In the first level and the centre of the conceptual framework, we propose a digital platform, composed of PDBs and fintech that interact with each other with interoperable technologies, like APIs, as these technologies are being used on financial services around the world, like Open Banking, to interchange financial data in a securely manner between different types of institutions like banks and fintech (Melo *et al*., 2021).

In those interactions, PDBs and fintech can get benefits from each other such as Fintech enabler and Mission fulfilment for PDBs, and Trust, Cybersecurity and Compliance from the regulations for fintech.

The digital financial inclusion needs from micro and small businesses include Data protection and privacy, IT infrastructure restrictions and Digital and financial literacy. In the other hand, we have identified focus themes benefits to these small entrepreneurs such as Access to alternative financial offerings, Understanding the customer journey, Lower financial transaction costs and bureaucracy, which includes alternative forms of collaterals and credit scores.

4.2.2 Technology, Market and Regulations themes

The second level of the framework comprises Technology, Market and Regulations themes.

In the literature review, several technologies delivered by fintech and that were shown the potential to enact digital financial inclusion were revealed. These include Blockchain / DeFi (Di Prisco and Strangio, 2021, present a case study of a startup in Africa that creates a blockchain-based financial inclusion ecosystem for populations with low economic status), Mobile money (Mwangi and Brown, 2015, investigate the decision criteria used by Kenyan SMEs to adopt or not mobile money platforms), Digital Financial Services (Leonardi *et al*., 2016, depicts the Corresponding banking system implementation in Brazil, where technology is just one piece of a broader network of financial inclusion with several actors, like technology providers, banks, retail stores, policymakers, and customers, and also show the importance of considering user needs in the financial services´ technology design) and Artificial Intelligence (Babajide *et al*., 2020, argues that digital technologies like artificial intelligence represent a possibility to amplify digital financial inclusion for Nigeria MSMEs).

Regarding the market, we have identified an Actors focus theme with some subthemes: Market actors, Promoters and Scholars, International Actors, and Investors and Incubators. A case study from Senyo *et al*. (2022) illustrates such subthemes by outlining the mobile money fintech driven ecosystem complexity that deals not only with innovative financial technologies, but also with new and diverse actors, like banks, mobile telecom operators, mobile money agents, merchants, the Central bank, and financial inclusion think tanks that poses challenges to regulators and policymakers to advance digital financial inclusion in Ghana.

Cooperation and Competition were two other subthemes identified under Actors. Iheanachor and Umukoro (2022) investigate the partnerships between Nigerian financial services providers and its importance to offer affordable digital financial services in emerging markets. Jonker and Kosse (2022) emphasizes that the potential risks of financial instability with the entry of Big Techs as competitors in the financial ecosystem needs to be more investigated.

Another subtheme identified under market theme is Influences in financial inclusion agenda. This subtheme was brought to the attention from Sela *et al.* (2020) study and encompasses the Institutional and international contexts and Political and Economic scenarios as subthemes. Studies that help to illustrate those topics include Gabor and Brooks (2017) which points that, after the Finance for All report from World Bank in 2008, political forces have powered international development financial inclusion agenda, and Lagna and Ravishankar (2022) that points to developmental impacts of fintech as a potential avenue of research by arguing that critical research on fintech is also needed as the poor usually don’t have political voice to face the unequal power relations, for example to deal with algorithms and social media behavior patterns, that cause unexpected effects and thus amplify financial

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exclusion.

On the regulation theme, the focus theme Government and Regulators was identified and illustrative studies such as Senyo *et al*. (2022) present regulation innovations in a fintech ecosystem in Ghana.

4.2.3 Sustainability theme

On Sustainability theme framework level, four focus themes were identified: SDG enabler, sustainability on regulation, unexpected effects, and gender/age equality.

One main Theme that was identified from literature review is Sustainability, as the selected starting point models did not explicitly mention such theme. However, from references that make relationships between SDGs progress and digital financial inclusion (UNSGSA, 2018) and from literature review illustrative studies such as Yang *et al*. (2022) that finds that digital finance can reduce pollution in China, and Schinckus (2020) that argues that certain blockchain implementations and mining activities can prejudice the environment, as well as the ones classified in Sustainability.

The focus theme gender/age equality, mapped to SDG 5- Gender Equality, can be illustrated by studies such Paglietti and Rabitti (2022), Koomson *et al*. (2021), Bongomin *et al*. (2021) and Potnis *et al*. (2020) studies. DataSebrae research on Brazilian micro and small businesses (SEBRAE, 2022a) also published data related to gender, age, and race equality issues, and thus allows for further investigation in future steps of the research.

5. Final remarks

Although a literature review and secondary data analysis were conducted to fulfill the objectives of the research, every study has its own limitations and scope. First, our literature review used two databases and left out conference papers and book chapters that could be relevant to our research. Also, the academy interest on fintech research has increased significantly in recent years. So, by the time of publication of this article possibly other novel studies can be found in literature.

Second, there is evidence in literature that disrupting fintech, like Nubank in Brazil, may have lesser motivations to partnership with other institutions, but still promotes digital financial inclusion (Velazquez *et al*., 2022). This phenomenon is out of the scope of this study as the focus of our research is on collaborative partnerships between PDBs and fintech.

Third, the conceptual framework was conceived driving on Brazilian context related business environment, digital financial inclusion actors and micro and small businesses realities of Brazil. However, as it was previously discussed, digital financial inclusion for micro and small entrepreneurs is a need throughout the world. Thus, we believe the conceptual framework proposed in our research can be useful as a tool for other Global South economies, and even for those developed economies that have actors like PDBs with potential to foster fintech companies, and to build a business environment that amplifies SME digital financial inclusion.

The findings from literature review and from secondary data analysis also raised questions that aim be addressed on the next steps of our study and open new avenues of research.

First, the FDIC initiative from BNDES to partner with fintech to give credit loans to SMEs needs further investigation for its effectiveness. Considering that some fintech companies are partnering with the development bank by the means of Canal MPME and also with FDICs, a preliminary analysis may lead to believe that it can take a part on the digital platform placed at the center of our conceptual framework.

Second, financial systems innovations, like instant payments such as PIX in Brazil (BCB, 2023), are promoting digital financial inclusion for individual citizens, but their effects on amplifying digital financial inclusion for SMEs must be more deeply discussed. Open Finance is also a new ecosystem that is emerging in Brazil but, as the DataSebrae research reveals, it is still barely known by small entrepreneurs. These evidences point to the need of improvements not only in digital financial literacy for SMEs but also in regulations of the financial inclusion business environment in order to avoid unexpected and adverse effects of digital innovations, such as the ones depicted on Heeks (2022) study, as well as to achieve the benefits of those innovations.

Third, we agree that fintech has the potential to amplify digital financial inclusion for micro and small businesses by unveiling new businesses models, and thus dealing with the diversity of small entrepreneurs' and addressing their specific needs. However, it is a complex task to be conducted only by these financial innovative companies. This allows for a partnership with PDBs, institutions that are government arms of social and economic development, have demonstrate the ability to navigate throughout different institutional, political, economic, and international contexts aggregating actors from the public and the private market sector, and are committed with sustainability. These development institutions agree that is necessary to have a common sense of urgency and to move faster, in a more coordinated way, to meet the objectives of the 2030 Agenda. We also agree on that and have evidence to believe that partnerships with fintech in a digital platform, placed in an adequate business environment, allows for the fulfillment of PDBs mission related to SMEs and helps to achieve the SDGs related to digital financial inclusion.

Last, we aim the proposed conceptual framework can be a tool to contribute to IS and development finance scholars, policymakers, practitioners, PDBs, fintech companies, small businesses and their associations, and other Global South economies and help to build a high impact research, where information technology for development and development finance can unite efforts to advance a sustainable digital financial inclusion for micro and small businesses, and to build a better world, to leave no one behind.

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