FULL REPORT

CHARACTERIZING THE AFRO-BRAZILIAN DIGITAL INCLUSION GAP and Assessing Investment Opportunities

DIMA DEVELOPMENT IMPACT MANAGERS & ADVISORS

THE EQUITY INDEX

IDB

IDB | Invest

Prepared by: DIMA – Development Impact Managers and Advisors, The Equity Index, and the IDB Group.

Contributing authors: Synthia Santana – DIMA; Jimena Serrano Pardo – IDB Invest Advisory Lead Gender, Diversity and Inclusion Officer; Irene Irazábal Briceño – IDB Invest Gender, Diversity and Inclusion Consultant.

Acknowledgments: The authors would like to thank Paula Peláez – IDB Invest Director a.i. Gender, Diversity and Inclusion; María Alejandra Barrientos Chávez - IDB Invest Development Effectiveness Consultant; María Isabel Palomer – IDB Operations Specialist, Southern Cone; Karina Azar Barros – IDB Financial Markets Sr. Specialist; Pau Puig Gabarro – IDB Telecommunications Sr. Specialist; Santiago Fretes - IDB Operations Specialist, Southern Cone; for their contributions, suggestions, and active participation throughout the preparation of this publication; Edgar Cabañas - IDB Invest Digital Economy Principal Officer; Gonzalo Arauz - IDB Invest Invest Digital Economy Principal Officer; Juan Parodi - IDB Invest Lead Manufacturing Officer; Laisa Rachter - IDB Gender, Diversity, and Inclusion Specialist; Luana Moraes - IDB Lab Consultant; Liliam Vasconcelos - Specialist in Digital Law and Racism; Igor Silva - Owner of Small-scale Internet Service Provider in Rio de Janeiro; Rafael Moreira - SEBRAE Coordinator of the Intelligence Center of the Competitiveness Unit; Ivan Tonet - SEBRAE Leader of Digital Initiatives and Startup Mentor; Rhian Duarte - Abrint (Brazilian Association of Internet and Telecommunications Providers); Eduardo Paiva - Softex (Association of ICT Companies); Felipe Mendoza Holguín - Editorial Assistance and Duare Pinto with the design and layout.

About the IDB

The Inter-American Development Bank is devoted to improving lives. Established in 1959, the IDB is a leading source of long-term financing for economic, social and institutional development in Latin America and the Caribbean. The IDB also conducts cutting-edge research and provides policy advice, technical assistance and training to public- and private-sector clients throughout the region.

About IDB Invest

IDB Invest, a member of the Inter-American Development Bank Group, is a multilateral development bank committed to promoting the economic development of its member countries in Latin America and the Caribbean through the private sector. IDB Invest finances sustainable companies and projects to achieve financial results and maximize economic, social, and environmental development in the region. With a portfolio of $21 billion in assets under management and over 394 clients in 25 countries, IDB Invest provides innovative financial solutions and advisory services that meet the needs of its clients in a variety of industries. Visit our website www.idbinvest.org/en.

Table of Contents

Executive Summary

Social inequality, especially racial inequality, is an important driver of the digital divide in Brazil.[1] Afro-Brazilians are key players as both customers and business owners, representing 56.1% of the population and hold a participation rate in the labor force of 53.7%.[2] However, 10.6 million of Afro-Brazilians have no internet coverage.[3] The majority of the Afro-Brazilian population uses the internet exclusively through their mobile phones, relies on data packages, and does not have jobs that can be performed remotely, thus limiting their full digital inclusion. Digital equity is now clearly understood as a crucial component of combating racism and racial divides in Brazil, as acknowledged recently by the Committee on the Elimination of Racial Discrimination.[4]

This study assesses the extent of digital inclusion among Afro-Brazilian populations and businesses, and the market opportunity that improved digital inclusion represents. It aims to understand how investments in digital infrastructure, business transformation, and skills can effectively reduce the digital divide and empower Afro-Brazilians, thereby contributing to broader socio-economic development. To do so, the study examines the current status of digital inclusion among Afro-Brazilian individuals and businesses, the current state of the telecommunications infrastructure, and the state of digital literacy and labor market requirements for digital skills.

The business opportunities associated with closing the digital divide among Afro-Brazilian individuals and businesses represent a profitable bet. This study identifies three distinct pathways to impact that contribute to closing said divide, and which also translate into market opportunities for telecommunications operators, hardware providers, and e-commerce, among others. The private sector has, therefore, a role to play in accelerating the digital inclusion of Afro-Brazilian individuals and businesses in Brazil.

1 Leibioda, L.; Ostrovski Cabral, G.; Tezza, R. (2019) 'Homogeneidade da Inclusão Digital no Brasil: Sonho ou Realidade?. Revista Informação na Sociedade Contemporânea,' *[S. l.]*, v. 3, p. 1–18

2 IBGE: Brazilian Institute of Geography and Statistics (2021).

3 Source: PNADC Household survey - 2021, Q4. The total number of Afro-Brazilians disconnected from the internet was computed by summing up Afro-Brazilian individuals with no 3G/4G, dial-up connection, or broadband connections.

4 United Nations (2022), "Experts of the Committee on the Elimination of Racial Discrimination Commend Brazil on Measures to Protect Migrants, Ask Questions on Police Violence against Racial Minorities and the Impact of Illegal Mining and Logging on Indigenous Communities", available at: https://www.ungeneva.org/en/news-media/meeting-summary/2022/11/examen-du-rapport-du-bresil-devant-le-cerd-les-experts-relevent (Accessed on May 2023).

Pathways to impact and their market opportunities

In 2021, approximately 25% of Afro-Brazilians were excluded from broadband Internet due to lack of connectivity and prohibitive costs.[5] In fact, digital exclusion is particularly pronounced within households in economically disadvantaged regions of the country. **Considering the lack of internet access coverage in areas where the Afro-Brazilian population is more prevalent, this study indicates that increasing broadband density in Brazil represents a potential additional income opportunity of BRL 361.76 million per year for Afro-Brazilians. This could translate into opportunities for internet providers to expand their services and trigger a multiplier effect in other ICT dependent sectors.**

Digital inclusion goes beyond ensuring internet coverage. It includes owning the right devices, the ability to perform online activities such as e-shopping, e-banking, e-learning, teleworking, and telemedicine consultations, as well as using public digital services like income transfers or requesting school enrollment. For companies, embracing digital transformation enables greater efficiency, global reach, and improved customer experience.

Data from the 2021 ICT survey showed that out of the 68.3 million individuals who participated in online commerce, 38.2 million were Afro-Brazilians, representing 55.9% of the online consumer base. The surge in online commerce during the pandemic significantly boosted the number of individuals in this market, especially Afro-Brazilians, who accounted for 61.5% of new online shoppers between 2019 and 2021.[6] Based on the characteristics of this new consumer base, closing the digital gap of Afro-Brazilian consumers **could increase companies' revenue by BRL 9.76 billion per year.**

Modern and accessible telecommunications infrastructure is essential for businesses' digital transformation and for the population's digital inclusion. However, organizations should pay attention to factors other than infrastructure availability, such as employee training, cybersecurity, and adopting efficient technologies, if they wish to leverage the opportunities the digital era offers, and address the challenges posed by a constantly evolving landscape.

5 Calculated using microdata from the Continuous National Household Sample Survey PNADC - Household Survey, 2021. Hereafter, PNADC Household survey.

6 Calculated using data from ICT Household Survey 2019 and 2021. Source: CGI.br/NIC.br, Regional Center for Studies on the Development of the Information Society (Cetic.br), Survey on the use of information and communication technologies in Brazilian households - ICT Households 2019/2021.

Despite the Internet's expansion in recent years, even in rural areas, the cost of Internet access remains a significant barrier for Afro-Brazilian digital inclusion that goes beyond infrastructure. In 2021, 84.8% of the population accessed the Internet through mobile devices. Afro-Brazilians represented 51.6% of this mobile market, 40.9% with a pre-paid phone.[7] Although items like mobile phones, TV, and internet packages contribute to digital literacy and form the consumer base for online products, the 2018 Household Budget Survey showed that individuals from the North and Northeast regions registered the lowest expenditures in this regard, signaling the potential digital exclusion of these populations and, consequently, an investment opportunity. Private sector investment could contribute to lowering the cost of internet access and/or support Afro-Brazilian individuals and businesses in accessing the internet through more robust devices.

Regional providers outperform the leading companies in most Brazilian municipalities,[8] holding a market share of 51.2% of total access in 2022.[9] Thus, solutions to expand and improve broadband internet could involve regional providers. Leveraging the reach of regional providers and paving the way for improving broadband connection quality — such as fiber optic, for example—in regions with poor access, becomes crucial to closing the digital divide. Indeed, relying exclusively on 3G or 4G connections does not equip individuals with the necessary infrastructure to use the internet to study or work, for instance. In most cases, it constrains users to data package limitations. **The investments from the telecommunication sector, including regional providers, represent a market opportunity of BRL 39.04 billion.**

In recent years, the growth of digital transactions has brought ease and agility to perform money transfers, investments, insurance contracts, and checking one's personal financial status at any time. These tasks have become simple and seamless thanks to technological innovation and available digital platforms. **The rapid advancements in payment methods, the implementation of 5G technology, and the thriving software market underscore the importance of investing in digital security and anti-fraud mechanisms. Companies engaged in financial-related services are expected to invest BRL 6.13 billion to comply with security standards in the next year.** These developments have the significant potential not only to protect companies but also to promote digital skills for consumers—an essential competence to navigate the dynamic landscape of emerging industries, such as edtechs, healthtechs, and e-government, for instance. From a labor market standpoint, there is a need to train employees in the digital skills required by the market, which drives demand for university and vocational training programs. Conversely, to navigate applications requiring high data flow—now instrumental in social inclusion and citizenship—**the industry must keep pace with creating a new consumer base by offering affordable devices for daily application.**

7 Source: ICT Household Survey (2021).

8 Regional providers (or Small Internet Providers – SIP) comprehends the group holding less than five percent national market share in each retail market it operates (ANATEL Resolution 694/2018). According to ANATEL Act 6.539/2019, they are considered providers not belonging to the Telefônica, Claro, TIM, Oi, and Sky/AT&T economic groups.

9 Data source: https://www.teleco.com.br/operadoras/grupos.asp

This study finds that digital inclusion of Afro-Brazilians could result in

an estimated yearly income increase of BRL 361.76 million

for the Afro-Brazilian population,

and it is expected to generate

BRL 9.76 billion per year in revenues for companies.

Furthermore, the study estimates

BRL 45.17 billion in business opportunities

for investments in cybersecurity and the telecommunications sector.[10]

Investing in initiatives that overcome digital exclusion and empower Afro-Brazilian individuals and businesses can lead to further growth and development. Afro-Brazilian digital inclusion is a strategic decision with wide-ranging benefits for individuals, communities, businesses, and society as a whole. It helps bridge the digital divide, promote diversity, and unlock the immense potential of Afro-descendant populations, contributing to a more inclusive, prosperous, and sustainable future for all.

10 Annex 1 details the calculations of these figures.

Definitions

Afro-Brazilian-owned or led MSME: means a business an MSMEs owned by at least one Afro-Brazilian person, or any business whose high-level management is comprised of at least 50% Afro-Brazilians, respectively.

Afro-Brazilian population: means Brazilians who self-identify as black or mixed race.

Digital inclusion: means the access of both Afro-Brazilian persons and Afro-Brazilian businesses to different sets of services including, but not limited to, internet, cellphones, smartphones, computers, tablets, software and the ability to use digital technologies. It also means "digital inclusion" as defined by the United Nations as "equitable, meaningful, and safe access to use, lead, and design of digital technologies, services, and associated opportunities for everyone, everywhere."

Meaningful connectivity: means, as defined by the Alliance for Affordable Internet, "a condition that is met when people have daily use of their own smartphone with at least a 4G internet connection and unlimited broadband connection at home or a place of work or study".

MSMEs: Micro, small and medium-sized enterprises.

List of Acronyms

ANATEL: Agência Nacional de Telecomunicações

B2B: Business to business

BRL: Brazilian Real

CAF: Corporación Andina de Fomento

CETIC: Brazil's Regional Center for Studies on the Development of the Information Society

CRM: Customer relationship management

ECLAC: United Nations Economic Commission for Latin America and the Caribbean

EMBRAPII: Empresa Brasileira de Pesquisa e Inovação Industrial

ERP: Enterprise resource planning

GSMA: Groupe Speciale Mobile Association

IDC: International Data Corporation

ICTs: Information and communication technologies

INEP: Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira

ITU: International Telecommunications Union

IFF: Federal Fluminense Institute

IBEBrasil: Instituto Bem-Estar Brasil

IFC: International Finance Corporation

IoT: Internet of Things

KPI: Key performance indicator

LAC: Latin America and the Caribbean

MCTI: Ministério da Ciência, Tecnologia e Inovações,

MSMEs: Micro, small and medium-sized enterprises

OECD: Organisation for Economic Co-operation and Development

PNADC: Pesquisa Nacional por Amostra de Domicílios Contínua

POF: Pesquisa de Orçamentos Familiares

RAIS: Relação Anual de Informações Sociais (Annual Report of Social Information)

SEAF: Small Enterprise Assistance Funds

SEBRAE: Brazilian Micro and Small Business Support Service

SMEs: Small and midsize enterprises

UNDP: UN Development Program

WEF: World Economic Forum

1. Introduction: What is the scope of this study?

1. Introduction: What is the scope of this study?

1.1 Project Objective

This study assesses the digital inclusion gap for Afro-Brazilian populations and businesses and the market opportunity it represents. The broader question of digital equity and the digital divide in Brazil has been studied from a broad and comparative perspective.[11] In contrast, this study aims to focus on **targeted information** regarding the size of the market opportunity with respect to businesses in Latin America and the Caribbean.

The study also identifies areas where private sector investments can drive impact, while exploring the market opportunity that Afro-Brazilians and businesses represent in accessing digital services. The study's overall goal is to surface opportunities for private sector capital mobilization that promote digital inclusion for Afro-Brazilian populations and businesses.

There is a clear research gap on the link between digital inclusion and racial equity, in the Brazilian context and beyond. Therefore, this study also aims to contribute to the evidence base on how to address Afro-Brazilian digital exclusion, particularly from a private sector perspective, since much of the existing research focuses on the role of government.[12]

1.2 Justification

There is both a business case and a development impact case for investing in Afro-Brazilian digital inclusion. Promoting digital inclusion is aligned with the IDB Group's commitments under the 2019-2022 strategy to "continue to support initiatives targeted to vulnerable groups".[13] The same strategy also states that "Gender and racial equality will be promoted in access to financing and in entrepreneurial activities led by women and Afro-Brazilians." **The relative lack of sources specifically on race and ethnicity concerning digital inclusion in Brazil makes it clear that traditional approaches will not suffice – financing will need to be deployed creatively and boldly in order to balance the business and development impact case.**

11 See for instance: i) Randolph Leigh, P. (2011) "Digital Equity and Black Brazilians: Honoring History and Culture," in International Exploration of Technology Equity and the Digital Divide: Critical Historical and Social Perspectives; ii) Almeida, V. and Gaetani, F. (2019), "New meanings of the term 'digital divide'", Berkman Klein Center for Internet & Society at Harvard University.

12 McKinsey & Company. 2023. 'Closing the digital divide in Black America.' Available at: https://www.mckinsey.com/industries/public-sector/our-insights/closing-the-digital-divide-in-black-america (Accessed on July 2023).

13 Inter-American Development Bank. IDB Group Strategy with Brazil, 2019-2022. p.25. Available at: https://www.idbinvest.org/sites/default/files/2020-04/IDB%20Group%20Strategy%20with%20Brazil%20%282019-2022%29.pdf (Accessed on June 2023).

Business Case:

According to 2023 data from the International Telecommunications Union (**ITU**), 32.6% of the world's population was still offline, mainly in low income countries (72.9%). This exacerbates existing inequalities and limits participation in the digital economy (now more important than ever).[14] The World Economic Forum (WEF) estimates that the challenge to enable affordable digital services for billions of people sits at $2.1 trillion.[15] This includes teaching digital skills, enhancing trust in technology, and developing digital solutions in key areas such as health, education, and financial services. Widening equitable access to quality digital services for the Afro-Brazilian population and Afro-Brazilian businesses presents a business opportunity to be **seized** by local players. Roughly 56% of Brazilians self-identify as Afro-Brazilians, making them the majority population group in the country. Afro-Brazilians are also consuming digital services at a fast rate, and this is projected to grow further over time.[16] 2021 ICT Household Survey data showed a significant increase among Brazilian middle-income users:[17] 13.8 million more users in 2021 than in 2019. This implies a larger presence of Afro-Brazilians as consumers of digital products and services. Likewise, high-tech-related startups have grown significantly in the LAC region, with 9 out of 10 being based on digital technologies. In addition, 57% of digital startups in the region are concentrated in Brazil.[18] Therefore, seizing the opportunity for Afro-Brazilian digital inclusion is a strategically sound investment for businesses, which could position them to thrive in an evolving digital landscape, capturing new consumer segments, and fostering innovation.

Rise of digital entrepreneurship in Brazil: According to the Brazilian Startup Association (Abstartups), in 2022, almost 90% of startups in Brazil were small and medium-sized businesses. Regarding the founder's identity, data showed that 19.7% of founders are women and 22.6% self-identify as Afro-Brazilians.[19] Brazil ranked as the fourth-largest producer of mobile applications globally, fourth in terms of Internet users worldwide, and sixth in the smartphone market worldwide. The success of these companies can be largely attributed to a growing pool of talented entrepreneurs, a supportive ecosystem that fosters collaboration and innovation, and increased availability of venture capital funding. We present further information on the specific market size of this opportunity in Section 4.

14 ITU World Telecommunication/ICT Indicators database, Version November 2023, for Facts and Figures 2023.

15 BCG and WEF reports. Source: https://www.weforum.org/publications/accelerating-digital-inclusion-in-the-new-normal/ (Accessed on June 2023) and https://web-assets.bcg.com/5f/6b/0e4a89ba4b3ab751cba5134935bc/bcg-a-2-trillion-plan-to-bring-two-billion-more-people-into-the-digital-age-sep-2020.pdf (Accessed on June 2023).

16 According to the Instituto Locomotiva, consumption driven by the black population in Brazil currently injects US $380 million into the local economy. Source: "A Voz e a Vez - Diversidade no Mercado de Consumo e Empreendedorismo" (2019), available at: https://ilocomotiva.com.br/estudos/ (Accessed on May 2023).

17 The economic classification is based on the Brazilian Economic Classification Criterion (CCEB), as defined by the Brazilian Association of Research Companies (Abep). The entity uses the possession of certain durable household consumer items, along with the educational level of the declared head of household, for this classification. The possession of these items establishes a scoring system, where the sum for each household results in the following classification: economic classes A1, A2, B1, B2, C, D, and E. ICT Household follows the Brazil 2015 Criterion.

18 Economic Commission for Latin America and the Caribbean (ECLAC), A digital path for sustainable development in Latin America and the Caribbean (LC/CMSI. 8/3), Santiago, 2022.

19 Mapeamento de Ecossistema de Startups 2022 - Abstartups.

Development Impact Case:

A recent IDB study[20] investigates the relationship between access to and/or ownership of certain technologies and the levels of total and labor income in population subgroups. Although the study's results incorporate data from several countries, it was found that trends are consistent across the analyzed countries, including Brazil. The study concludes that **greater internet coverage and access to computers are linked to higher incomes for Afro-descendants, both in urban and rural areas.** Specifically, the study finds that internet access for Afro-descendants is associated with an increase in labor income compared to those who are not of African descent. This effect is more prominent in rural areas than in urban contexts. These results suggest that Internet access may be providing Afro-descendant individuals with greater opportunities for employment, digital skills development, entrepreneurship, and access to informational resources in rural settings, where economic options are limited.

The impact of computer access on labor income is proportionally greater for Afro-descendants compared to non-Afro-descendant and non-indigenous populations, in both rural and urban areas. This suggests that computer ownership may provide better job opportunities and access to informational resources, promoting labor participation and economic development.[21]

Digital inclusion and social inclusion are inextricably linked strategies required to achieve sustainable development and growth in Brazil, with implications at the individual, household, and business levels. Digital inclusion is now clearly understood as a crucial component of combating racism and racial divides in Brazil, as acknowledged recently by the Committee on the Elimination of Racial Discrimination.[22]

During the COVID-19 pandemic outbreak, digital inclusion became a key topic of discussion in Brazil, particularly in the context of recovery for workers and businesses across the country. Emergency Aid (established under Law 13982 of 2020), for instance, was paid through a Digital Social Savings Account (Poupança Social Digital), posing new challenges for financial inclusion. Employees and employers also faced challenges in accommodating teleworking, new marketing methods such as social media, websites, instant messaging apps, etc.; and the overall pressure for connectivity required to meet the needs of rapidly growing information and communication technologies (ICTs).

20 Katz, R., Callorda, F., Puig Gabarró, P., García Zaballos, A., Iglesias Rodriguez, E., Dalio, M., (2024) *Impacto de la conectividad digital en hogares liderados por mujeres, individuos pertenecientes a pueblos indígenas o afrodescendientes en América Latina y el Caribe*. Inter-American Development Bank (IDB). Available at: https://publications.iadb.org/es/impacto-de-la-conectividad-digital-en-hogares-liderados-por-mujeres-individuos-pertenecientes.

21 Katz, R., Callorda, F., Puig Gabarró, P., García Zaballos, A., Iglesias Rodriguez, E., Dalio, M., (2024) *Impacto de la conectividad digital en hogares liderados por mujeres, individuos pertenecientes a pueblos indígenas o afrodescendientes en América Latina y el Caribe*. Inter-American Development Bank (IDB). Available at: https://publications.iadb.org/es/impacto-de-la-conectividad-digital-en-hogares-liderados-por-mujeres-individuos-pertenecientes

22 United Nations (2022), "Experts of the Committee on the Elimination of Racial Discrimination Commend Brazil on Measures to Protect Migrants, Ask Questions on Police Violence against Racial Minorities and the Impact of Illegal Mining and Logging on Indigenous Communities", available at: https://www.ungeneva.org/en/news-media/meeting-summary/2022/11/examen-du-rapport-du-bresil-devant-le-cerd-les-experts-relevent (Accessed on May 2023).

The unequal access to ICTs in Brazil is widely recognized, especially in rural areas. According to the 2021 ICT Household Survey, managed by the Brazilian Network Information Center NIC.br, overall Internet access shows similar patterns between Afro-Brazilians and the non-Afro-Brazilian population (81% versus 82%). Internet access is also comparable between genders, with 82% of males and 80% of females having access. However, there is a large difference in access according to income distribution and schooling. Adopting an intersectional lens is therefore of the utmost importance in understanding the digital gap in Brazil.

Sixty-four percent of overall Internet access in Brazil comes exclusively from smartphones, which presents technological barriers in geographical areas with low mobile broadband coverage. **Of those who access the Internet exclusively from cell phones, 54% identified as Afro-Brazilians and 65% as Afro-Brazilian.** Regarding income, 89% of internet users in the D and E income classes (where Afro-Brazilians are overrepresented) use smartphones as their main device. As for education level, 84% of those with elementary schooling and 70% of those with high school education said they access the Internet exclusively from smartphones, while 22% of those with an undergraduate level of education claimed to do so. Since 2014, Cetic.br data shows a shift from the computer to the smartphone as the main device used to access the Internet. This can be attributed not only to easier access to mobile devices but also to the low skills required to use them, as well as the rise of social media.

1.3 Target markets and pathways to impact

The study's target market consists of two groups: consumers in the digital goods and services market, specifically the Afro-Brazilian population, and businesses, particularly Afro-Brazilian owned or led MSMEs.

Theory of change for Afro-Brazilian digital inclusion:

Digital inclusion for Afro-Brazilians provides critical access to services and employment opportunities for underserved populations, particularly in rural and urban lower-income areas, addressing one of the region's key social development challenges. This study identified three pathways to impact digital inclusion for Afro-Brazilians: **1. Connectivity & Affordability**, **2. Access & Digital Transformation**, and **3. Enhancing Digital Skills**. These pathways operate interdependently through a mix of investment and advisory services. They are designed to close the digital divide through direct impacts or via intermediaries.

The Connectivity & Affordability pathway is the most direct and essential, focusing on **investing in expanding the telecommunications network and improving connection quality** for individuals and businesses. The Access & Transformation pathway **enables the digital development of startups and companies** across various sectors, including technology. The effectiveness of these two pathways fundamentally depends on the **population's digital literacy**, as addressed by the Advisory on Skills pathway. This third and last pathway is crucial for developing a consumer base for digital services and training a workforce capable of thriving in a digitally transformed economy.

Three Pathways to Impact:

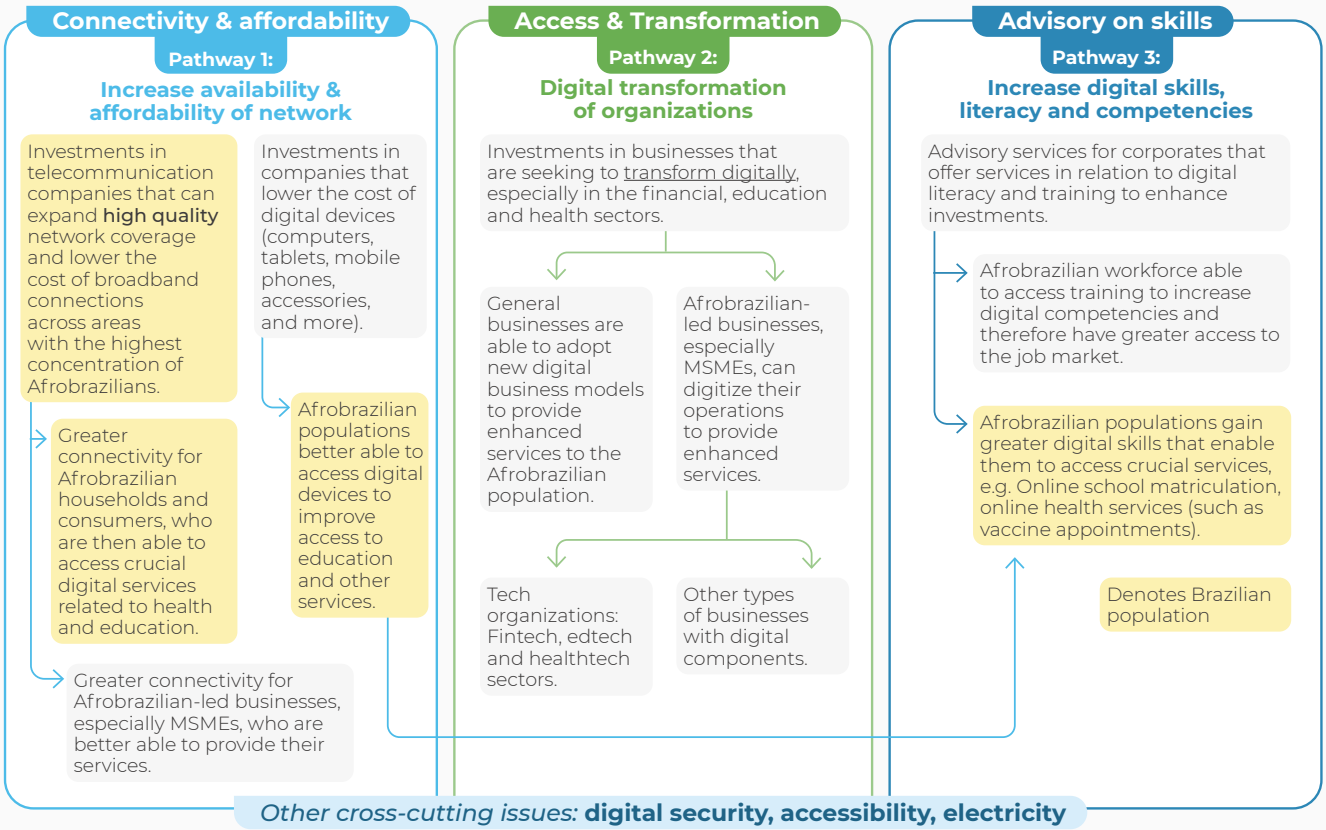
The **first pathway** operates by increasing **connectivity** and **affordability** of internet access and digital devices, impacting both individuals and businesses. This is the most straightforward channel through which the expansion of connectivity enables people and families to access digital services such as e-commerce, social media, health, education, finance, and more.

This expansion also affects the ability of businesses to expand their presence through the Internet and digital services, such as using e-commerce and mobile applications, accessing new suppliers, allowing remote work, social media marketing, and implementing digital accounting.

The **second pathway**, **access** to the digital market and **digital transformation**, empowers small businesses to rethink their decision-making processes and technology applications, even if they do not operate in the tech industry. The use of big data, robots, artificial intelligence, 3D printing and other technologies can facilitate access to markets and increase productivity for large companies, in turn affecting the digital ecosystem that indirectly impacts MSMEs/startups that provide services.

Finally, these first two pathways are most effective when combined with initiatives that focus on enhancing **digital skills**, for both individuals and businesses, as the **third pathway**. This approach can directly benefit companies through investments in services related to digital competencies and literacy, such as training, online security, and accessibility. As a result, Afro-Brazilian populations gain digital skills enabling them to access public and private services as consumers (online school matriculation, online health services such as vaccine and medical appointments, e-commerce, etc.) but also as workforce suppliers, allowing them to gain greater access to the job market, especially post-pandemic.

Figure 1: Pathways to impact Afro-Brazilian digital inclusion[23]



Source: Own graph

23 The agenda and pathways to impact are based on: https://www.weforum.org/agenda/2021/06/the-private-sector-is-taking-the-lead-on-enabling-digital-inclusion-here-s-how/

1.4 Research questions

Based on this background, the following core research questions and calculations were identified:

Pathway	Research question	Pathway/ More details	Pathway calculations
1. Connectivity and affordability (digital infrastructure and devices)	1a. How would targeted (potentially geographically) investments in physical digital infrastructure create opportunities to enhance digital inclusion for Afro-Brazilian populations and businesses? 1b. What investment opportunities can enable Afro-Brazilian populations to access better economic opportunities, given the overrepresentation of Afro-Brazilians in the population who access the Internet directly from their smartphones?	• Invest in telecom companies to enhance network infrastructure and expand mobile broadband, benefiting the Afro-Brazilian population. This will boost business operations for entrepreneurs, facilitate distance learning, and impact the labor market. It is crucial to assess the network's stability (quality) and connection speed, not just its presence. • Invest in firms manufacturing electronic devices like laptops, tablets, and smartphones with higher-end configurations, ensuring digital inclusion for the Afro-Brazilian community and entrepreneurs.	Quantifies the additional income of Afro-Brazilian population resulting from expanding coverage to the 29.69 million digitally excluded Afro-Brazilians, estimated at BRL 361.76 million.
2. Digital transformation of Afro-Brazilian and other businesses	2a. What opportunities would arise from the digital transformation of Afro-Brazilian businesses? 2b. How are Afro-Brazilian businesses benefiting from e-commerce? Why and what are they missing out on by not accessing e-commerce opportunities?	• Support the adoption of CRM and ERP software to enhance business operations, increase market access, and improve financial performance. Partner with financial intermediaries to bridge essential financing gaps and enhance credit access for MSMEs. • Ensure these MSMEs can navigate legal and regulatory challenges and access dedicated support through collaborations with marketplace platforms and big tech companies. Coordinate efforts between private and public sectors to enhance networking and capacity building for these businesses. This strategic focus is key to boost business operations, facilitate market access, and potentially generate significant economic impacts.	Adds the estimated investment from telecommunications companies of BRL 39.04 billion and the expansion of online commerce to new Afro-Brazilian consumers, that would lead to an increase in revenues for businesses estimated at BRL 9.76 billion

3. Increasing digital skills and competencies through investments and advisory services	3a. How will the anticipated automation and technological developments in Brazil impact Afro-Brazilians, and how can these impacts be mitigated? 3b. What advisory services are needed to support Afro-Brazilian digital literacy and competencies?	• Invest in retraining programs for Afro-Brazilian workers in automation-prone sectors to enhance their skills and employability as technology evolves. Prioritize improving working conditions in the telecommunications industry to ensure fair and safe employment practices. Integrate inclusive KPIs into impact-linked products to promote diversity in digital skills and leadership roles. Focus on high-potential digitalization sectors like healthcare to benefit Afro-Brazilians as both employees and end users. • Invest in e-learning and fintech platforms to improve educational and financial opportunities for Afro-Brazilians. Enhance digital literacy and inclusion initiatives to align with labor market needs and protect against online fraud, boosting overall participation in the digital economy.	Estimates potential investments of BRL 6.13 billion in cybersecurity.

In the following sections of this study, you will find a comprehensive exploration of the digital inclusion gap for Afro-Brazilian populations and businesses, and the market opportunities this context presents. Having set the stage, defined key concepts, and highlighted the research gap in the link between digital inclusion and racial equity in Brazil, particularly from a private sector perspective, the study proceeds to build a sound case for investment, both from a business and development impact standpoint, emphasizing the need for creative and bold approaches due to the scarcity of race and ethnicity-focused sources in digital inclusion.

Section 2 delves into the specific context of digital access and inclusion for Afro-Brazilians, presenting an overall picture of digital exclusion in Brazil and a closer look at the Afro-Brazilian population and businesses. This section is rich in data and insights, and it reveals the correlation between broadband coverage and Afro-Brazilian populations and the digital divide's implications for the labor market and digital literacy.

Section 3 presents the study's core findings and business case for investment in each of the identified pathways to impact: 1. Connectivity and Affordability – quantifying the additional income of Afro-Brazilian population resulting from expanding coverage to the 29.69 million digitally excluded Afro-Brazilian, estimated at BRL 361.76 million; 2. Digital Transformation of Afro-Brazilian Businesses – based on the estimated investment from telecommunications companies of BRL 39.04 billion and the expansion of online commerce to new Afro-Brazilian consumers, estimated at BRL 9.76 billion; and 3. Increasing Digital Skills and Competencies – with estimated investments of BRL

6.13 billion in cybersecurity. Other advisory opportunities toward upskilling and initiatives that empower people for the digital world, closing the digital divide, were framed as recommendations. Each pathway is thoroughly examined, offering a global, regional, and Brazil-specific context, and they each culminate in key takeaways.

Section 4 offers a detailed look at the size of the market opportunity for Afro-Brazilian populations and businesses, breaking down the potential impact and revenues across the three pathways. Section 5 outlines how impact investors can leverage innovative financing mechanisms and strategic partnerships to support digital inclusion initiatives, considering innovative financial instruments and synergies with ongoing IDB Group work. Finally, Section 6 wraps up with conclusions and recommendations, summarizing the study's findings and the estimated market opportunity.

1.5. Limitations

- The research questions cover a broad range of topics, while the available data only supports certain calculations. For example, Pathway 3 encompasses more than just investments in cybersecurity, but the calculations only account for that aspect, due to the lack of race-disaggregated data. Consequently, a more conservative approach was adopted where it was not possible to accurately measure the impact. This methodological limitation means that the pathway likely underestimates the potential benefits of enhancing digital literacy among Afro-Brazilians.
- Pathway 1 focuses exclusively on the impact on Afro-Brazilian populations by considering only broadband internet and excluding 3G and 4G connections. 3G and 4G connections are excluded because the data did not allow for disaggregating Afro-descendants from non-Afro-descendants and also, because relying exclusively on 3G and 4G connections does not equip individuals with the necessary equipment to use the Internet to study or work, for instance. In most cases, it constrains users to data package limitations or dependence on public Wi-Fi infrastructure, thereby increasing vulnerability to security issues. Therefore, it is assumed that Pathway 1 significantly underestimates the gains for both Afro-Brazilians and the general population. However, Pathway 2 and Pathway 3 include both Afro and non-Afro-led companies in their analyses.

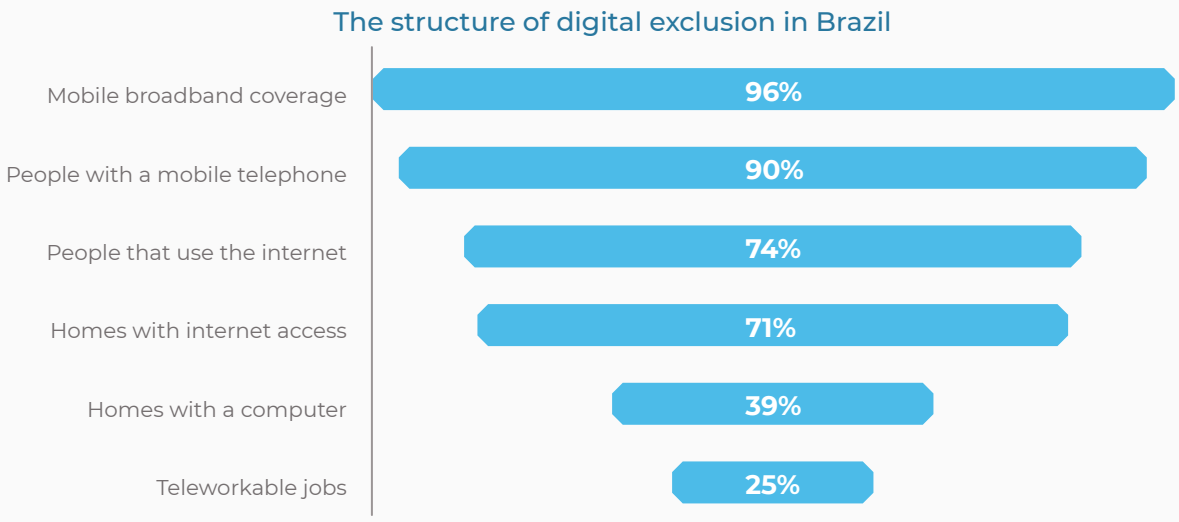
2. Context: Overview of digital access and inclusion for Afro-Brazilians

2. Context: Overview of digital access and inclusion for Afro-Brazilians

2.1 Overall picture of digital exclusion in Brazil

Data gathered by the International Telecommunications Union (ITU) and reported by the United Nations Development Program (UNDP) paints the overall picture of digital exclusion across Latin America and the Caribbean, a region with a 96% mobile broadband coverage. As Figure 2 below shows, data relating to digital exclusion in Brazil takes the shape of an inverted pyramid. While mobile phone ownership and broadband coverage are at the top, far fewer homes have access to a computer.

Figure 2: Key indicators on digital inclusion

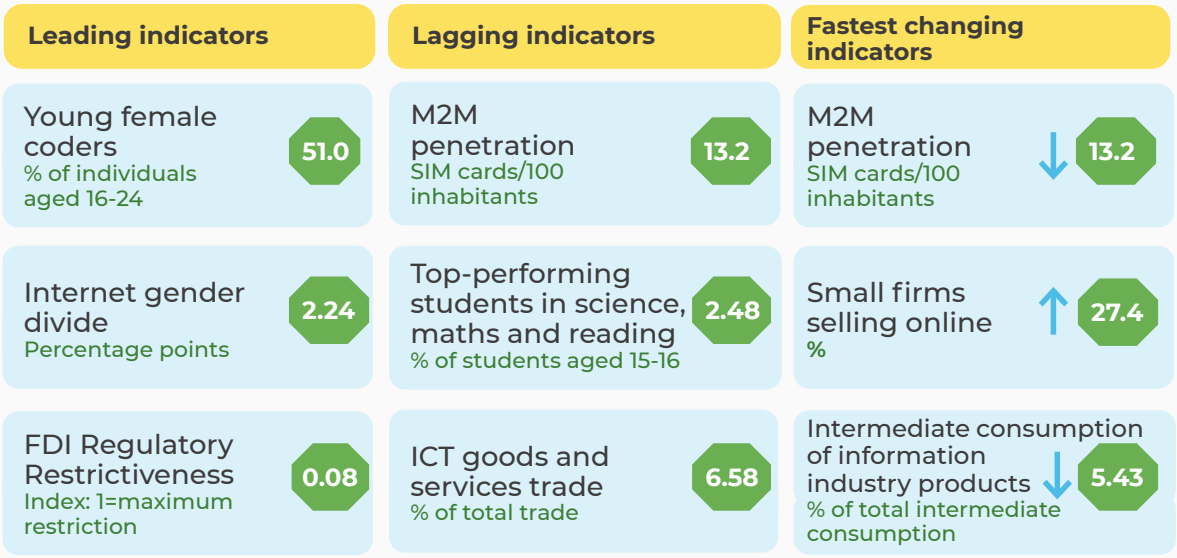


Source: UNDP based on data from ITU World Telecommunication/ ICT Indicators Database (2021).[24]

24 https://www.undp.org/latin-america/blog/graph-for-thought/you-are-mute%E2%80%9D-why-internet-access-not-enough-ensuring-inclusive-digitalization-latin-america-and-caribbean (Accessed on July 2023).

The OECD's Going Digital data portal outlines Brazil's key leading, lagging, and fastest-changing indicators (see Figure 3 below).

Figure 3: Brazilian Indicators on digital inclusion



Source: Graph extracted from the OECD – Going digital database.[25]

How does this general, non-disaggregated data apply to Afro-Brazilian digital exclusion? The sections below delve into this, but from a general perspective, studies have shown that social inequality, including racial inequality, in Brazil, is a key driver of the digital inclusion gap.[26] Research has also suggested the importance of creating intersectional social indicators capable of measuring all aspects of digital inclusion in the Brazilian context, including with a focus on economic exclusion, workforce exclusion, educational exclusion, and more.[27]

2.2 Afro-Brazilian population

Although 90.9% of Brazilians enjoy mobile broadband connections,[28] a closer look at infrastructure data reveals a quite large and negative correlation (-0,58) between broadband coverage and the Afro-Brazilian population, which means that the states with the highest rate of Afro-Brazilians also have the lowest mobile coverage, implying greater digital exclusion. Following the Brazilian racial categories, Figure 4 below shows the proportion of Afro-Brazilians across states.[29] The highest shares are found in the Brazilian North and Northeast states, such as Amapá, Acre, Amazonas, Pará, and Maranhão. On the other hand, the lowest rates are found in southern states, such as

25 https://goingdigital.oecd.org/countries/bra (Accessed on July 2023).

26 Leibioda, L.; Ostrovski Cabral, G.; Tezza, R.(2019) 'Homogeneidade da Inclusão Digital no Brasil: Sonho ou Realidade?. Revista Informação na Sociedade Contemporânea,' [S. l.], v. 3, p. 1–18.

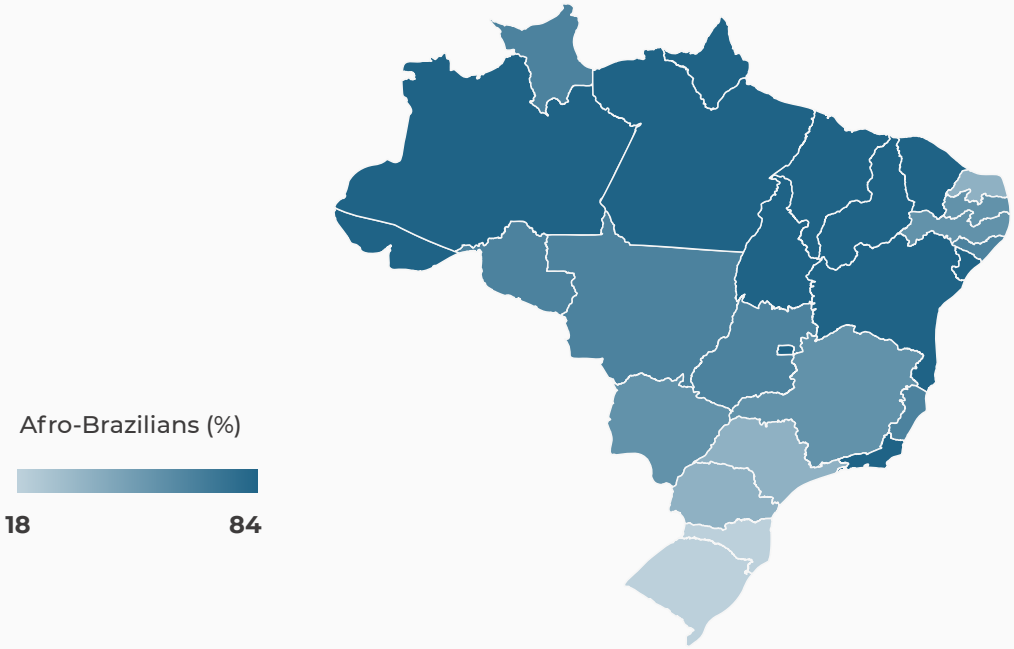
27 Marina Cajaíba da Silva Horta; Oliveira, Marlene (2019). A construção de indicadores sociais aptos a medir a inclusão digital no Brasil. Informação & Sociedade; João Pessoa Vol. 29, Iss. 3.

28 Brazilian National Telecommunications Agency database – Available at https://informacoes.anatel.gov.br/paineis/infraestrutura/panorama (Accessed on March 2023).

29 Multiracial and black Brazilians. Refer to the definitions in "Características Étnico-raciais da População - Classificações e identidades". Available at https://biblioteca.ibge.gov.br/visualizacao/livros/liv63405.pdf (Accessed on April 2023).

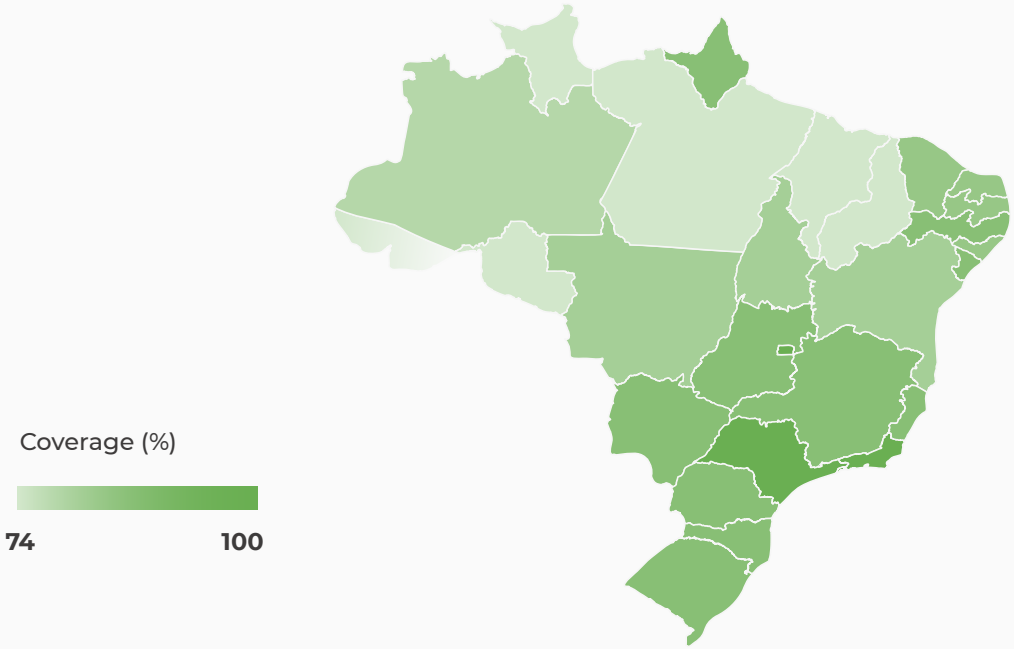
Santa Catarina and Rio Grande do Sul. The mobile broadband coverage is higher in the South/Southeast, compared to the North/Northeast states as shown in Figure 5.

Figure 4: Percentage of Afro-Brazilians across states - 2021



Source: Own Graph using data from the Continuous National Household Sample Survey PNADC – annual (2021).

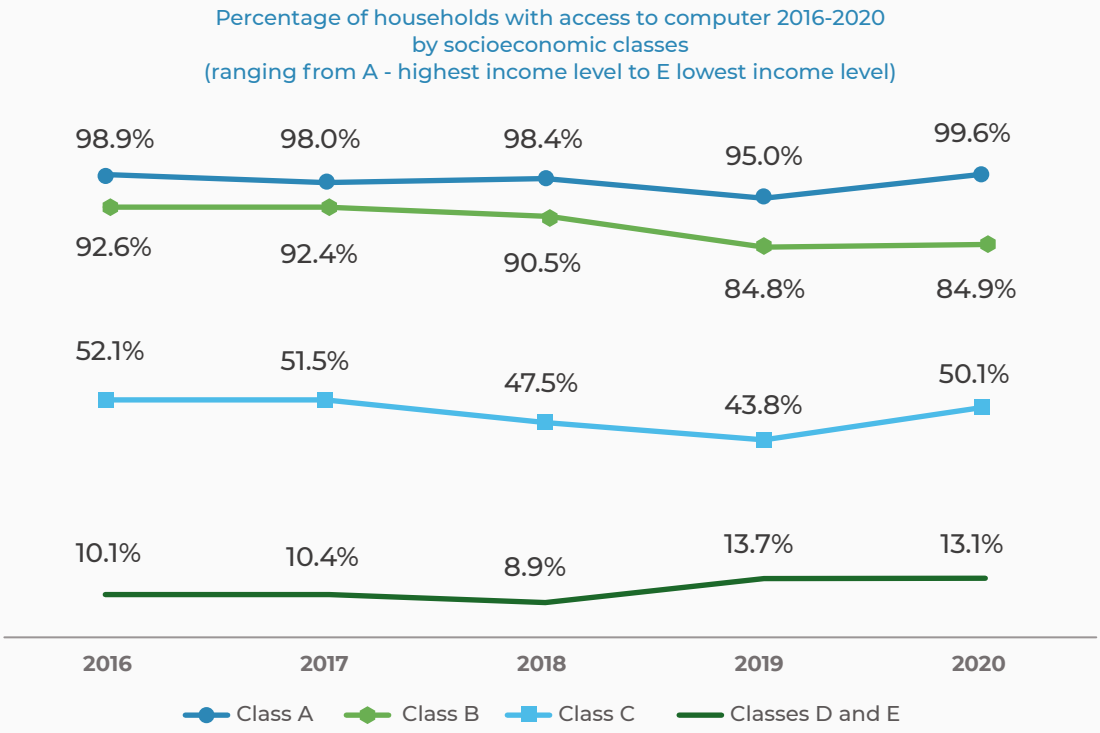
Figure 5: Mobile broadband coverage - 2021



Source: Own graph with data from ANATEL - Brazilian National Telecommunications Agency (2021).

It is important to highlight that the poverty rate among Afro-Brazilians is twice that of non-Afro-Brazilians. In 2021, for instance, Afro-Brazilians accounted for 74.8% of the population within the lowest 10% income bracket.[30] Figure 6 below presents the proportion of households with access to desktops, laptops, or tablets for each social class category. In 2020, almost 50% of those in social class C did not have access to such devices, as well as 13.1% of classes D and E. Internet speed also varies significantly according to income in Brazil, as outlined in Figure 7 . Although people can access the Internet through smartphones, for example, the lack of broader digital skills such as the use of text editors, spreadsheets, and operational systems knowledge may affect the possibility of access to the labor market, even in non-tech industries. This ultimately imposes extra costs for businesses in training their workforce. Among Afro-Brazilians who do not have Internet at home, the National Household Survey points to Internet affordability as the main reason (40.0%), followed by a lack of interest in accessing the Internet (20.8%), and digital illiteracy (16.9%). Although device affordability is not the main reason for not accessing the Internet (5.1% of the total population), 83.6% of this share is represented by Afro-Brazilians, making it the most representative justification for digital exclusion among Afro-Brazilian individuals.

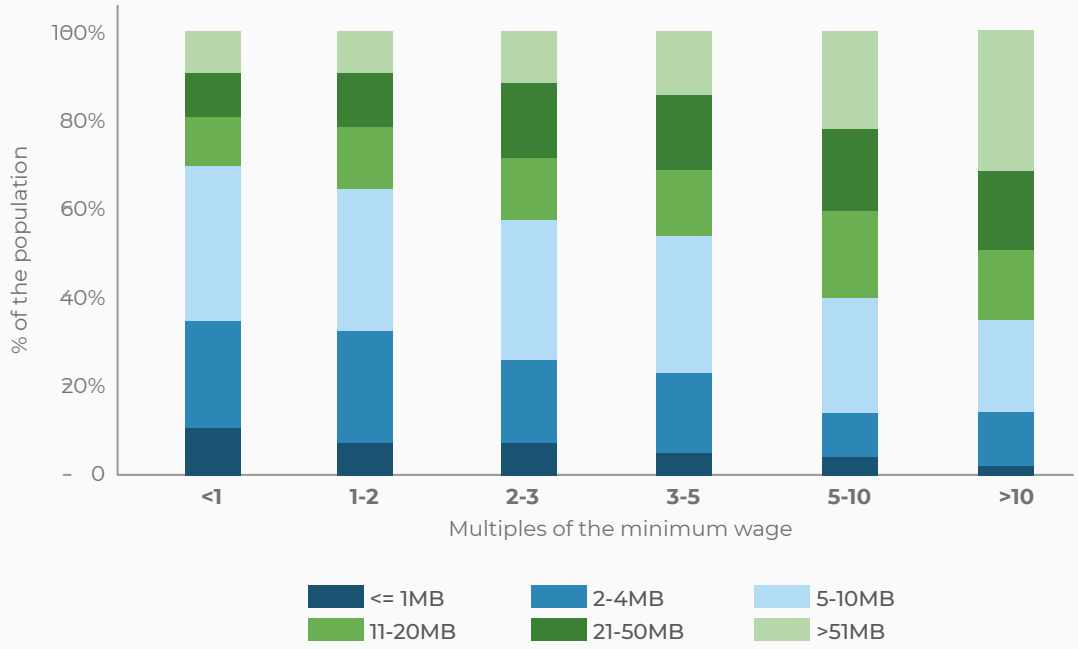
Figure 6: Households with access to a computer - 2016 -2020



Source: Own graph Prepared with data from the Regional Center for Studies on the Development of the Information Society (Cetic.br) – ICT Household Survey: Research on the Use of Information and Communication Technologies in Brazilian households.

30 Social Inequalities by Color or Race in Brazil. Source: IBGE. Desigualdades sociais por cor ou raça no Brasil. Estudos e Pesquisas – Informação Demográfica e Socioeconômica, v. 48, 2022. Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101972_informativo.pdf (Accessed on June 2023).

Figure 7: Reported internet speeds in Brazil broken down by multiples of the minimum wage



Source: ICT Household Survey - CETIC 2017/2018[31]

The digital divide for Afro-Brazilians also represents a significant challenge for the labor market, as digital literacy is increasingly required. For instance, among those who declared to have access to any source of Internet connections, 32.2% have not accessed email in the previous three months. Afro-Brazilians had twice the number of non-Afro-Brazilians respondents who said they did not engage in standard activities in the previous three months, such as transferring files between computers and other devices or equipment, using spreadsheets, attaching files to emails, and other similar tasks.

Since the COVID-19 pandemic, research has increasingly focused on households' digital resilience to shocks. The Household Digital Resilience Index produced by CAF, combines four indicators in its overall calculation: health app downloads, educational app downloads, the density of fintech platforms, and the intensity of e-commerce. **Brazil scores 40.6**, which is below the OECD average of 53.8.[32]

→ **Key overall finding: 29.69 million Afro-Brazilians are digitally excluded from broadband connections.[33]**

31 Extracted from: Sharp, M. 2022. 'Revisiting Digital Inclusion: A survey of theory, measurement and recent research.' University of Oxford. The ICT Household Survey - CETIC data refers to internet speed in income brackets determined by multiples of the minimum wage of 2018 as defined by the Brazilian Federal Government. The first bracket represents the total household income of up to one minimum wage (BRL 954.00), while the sixth bracket represents family incomes exceeding ten minimum wages (BRL 9,540.00). Household income is calculated by summing the income of all household members, including the respondent, and may include the possibility of no household income.

32 Katz, R., Jung, J., & Callorda, F. (2020). El estado de la digitalización de América Latina frente a la pandemia del COVID-19. Caracas: CAF.

33 Source: PNADC Household survey - 2021, Q4. The total amount of excluded Afro-Brazilian population was calculated summing those who reported not be able to access to the broadband internet at home (18.1 million); who do not know if has access to the internet (1.2 million); and those who reported do not having internet in the previous question during the survey (10.4 million) - which means they are not responding to this question regarding to broadband specifically.

2.3 Afro-Brazilian businesses

Understanding the profile of Brazilian companies is essential to grasp the main obstacles for investing in information technology for digital transformation. How are digital transformation, e-commerce, and business composition related?

From the perspective of overall digital transformation, the 2021 ICT Enterprise Survey outlines some characteristics of Brazilian enterprises and their levels of connectivity and digitalization.[34] For instance, in 2021, 77% of the surveyed companies purchased goods and services through the Internet (B2B), while 57% of the companies sold their products and services online. Additionally, 29% of enterprises paid for cloud services, mainly for accounting, financial, and security services — with the latter being more prevalent among large businesses, as 76% of them invested in security software. An estimated 65,7 thousand companies used at least one of the AI technologies, mainly for automating workflow processes. However, the ICT Enterprise Survey does not provide specific results for Afro-Brazilian entrepreneurs.

This broad snapshot of digital adoption contrasts with the e-commerce landscape, where challenges persist. According to the 2019 ICT Enterprise Survey, even among companies that sell online, significant barriers include security concerns, incompatible customer or supplier systems, high development and maintenance costs, and a shortage of qualified personnel. Among businesses with internet access that did not sell online, 9% cited high costs of development and maintenance as a major barrier.[35]

According to the 2021 Household Survey, there were 15.5 million Afro-Brazilian business owners, making up 52.2% of all business owners in Brazil, whether registered as employers or entrepreneurs with or without a tax identifier (CNPJ). However, only 36.6% of business owners with at least one employee were Afro-Brazilian. This discrepancy highlights a gap: while a substantial portion of businesses are owned by Afro-Brazilians, they represent a smaller proportion of those who employ others. The available data does not fully capture the structural differences and technological needs of these specific enterprises, indicating a crucial understanding gap that needs addressing.

Engaging directly with these businesses is essential for enhancing their impact and addressing their specific needs. To better support them, collaborating with organizations like the Brazilian Micro and Small Business Support Service (SEBRAE), which supports MSMEs in Brazil through programs aimed specifically at the digital transformation of micro and small businesses, could be pivotal. Such collaboration could help tailor support to the unique challenges faced by Afro-Brazilian owned/led companies.

Further insights from a survey conducted by the Brazilian Startup Association (Abstartups) and Deloitte in 2022 showed that of 14,000 companies profiled, 22.6% of founders self-identified as Afro-Brazilian; and while 60% of these companies consider supporting

34 Source: CGI.br/NIC.br, Regional Center for Studies on the Development of the Information Society (Cetic.br), Survey on the use of information and communication technologies in Brazilian enterprises - ICT Enterprises Survey 2021.

35 See Cetic: https://cetic.br/pt/tics/empresas/2019/empresas/E3/ (Accessed on April 2023).

diversity very important, only 2.6% had boards composed of at least half women. Although 70.3% have Afro-Brazilians among their employees, in 83.9% of the companies, had less than five Afro-Brazilians employees.[36] The foregoing underscores the need for more focused efforts on formalization and structural support for enterprises led by Afro-Brazilians, who currently represent only one-fifth of startup founders.

Connecting these data points reveals a broader narrative: while Brazil is making strides in digital transformation and e-commerce, Afro-Brazilian entrepreneurs face distinct challenges that require targeted interventions to ensure they can also benefit from these developments.

→ **Key overall finding: The formalization rate of enterprises led by Afro-Brazilians is low. Afro-Brazilian startup owners are only one-fifth of startup founders.**

Brazilian government strategy: E-Digital

Summary of the strategy

In 2018, the Federal Government of Brazil launched its Digital Transformation strategy, covering the period up until 2021, alongside a Digital Government Strategy for 2020-2022. In 2022, the Ministry for Science, Technology and Innovation (Ministério da Ciência, Tecnologia e Inovações, MCTI), launched the next iteration of the strategy covering the period 2022 to 2026 (known as the E-Digital strategy),[37] which presents data from the National Telecommunications Agency (Agência Nacional de Telecomunicações, ANATEL). The key themes of the strategy relevant to this study are a) the focus on infrastructure and access to ICTs, b) education and professional training in digital skills, and c) digital transformation to support new business models.

The analysis of the potential for the strategy to contribute to Afro-Brazilian digital inclusion:

- The main focus is digitization of government services rather than digital inclusion for the general population, but this is an indirect way of contributing to Afro-Brazilian digital inclusion;
- Launching a set of e-services for the population;
- Helping states, municipalities, and public agencies to be digitally transformed;
- Data from the ICT Household Survey show that Afro-Brazilians represent the majority of people who utilize e-services[38] Nonetheless, most of them are in the Southeast region, which may display some regional inequality in access to government digital services.

36 Mapeamento do Ecossistema Brasileiro de Startups 2022 (ABStartup & Deloitte). Available at: https://abstartups.com.br/wp-content/uploads/2024/01/Mapeamento-de-Startups-PT.pdf . Accessed on July 2023.

37 Ministério da Ciência, Tecnologia e Inovações (MCTI). 2022. 'Estratégia Brasileira para a Transformação Digital (E-Digital). Ciclo 2022- 2026.' Brasília.

38 Personal documents, such as ID cards, CPF (Brazilian individual taxpayer registry number), passport, or work permits (63.0%); Public health services, such as scheduling appointments, medications, or other services in the public health system (57.2%); Public education, such as Enem (Brazil's National High School Exam), Prouni (University for All Program), school or university enrollments in public institutions (61.4%); Workers' rights or social security, such as INSS (National Social Security Institute), FGTS (Guarantee Fund for Time of Service), unemployment benefits, sick leave, or retirement (57.8%); Taxes and government fees, such as income tax declaration, vehicle tax (IPVA), or property tax (IPTU) (55.1%); Police and security matters, such as police reports, criminal records, or complaints (59.1%); Public transportation or other urban services, such as road cleaning and maintenance, street lighting (58.5%).

3. Findings & business case for investment in each pathway to impact

3. Findings & business case for investment in each pathway to impact

3.1. Pathway 1: Connectivity and affordability (digital infrastructure and devices)

3.1.1. How would targeted (potentially geographically) investments in physical digital infrastructure create opportunities to enhance digital inclusion for Afro-Brazilian populations and businesses?

Global context: Global internet use reached a key milestone in 2019 when more than half of the world's population gained internet access. However, three billion people remain unconnected. And even though legacy 2G and 3G mobile services in developing countries are now on the cusp of full adoption, broadband access in these countries is still lacking.[39] In 2015 the UN Sustainable Development Goals set a target of 75% global broadband-internet user penetration by 2025, which will require innovative financing via public-private partnerships to build out last-mile connections in emerging economies.

In 2020, the McKinsey Global Institute published a study on the **evolution of connectivity** beyond the 5G revolution.[40] The report categorizes country approaches into four buckets based on investments in broadband infrastructure: 1. Pioneers (beginning to deploy high-band 5G networks in cities, taking advantage of mature fixed infrastructure and strong capital positions of providers), 2. **Leaders** (close behind the pioneers but operator investment may be constrained in these markets as price competition has reduced

39 World Economic Forum. 2023. 'The Digital Economy: Digital Infrastructure for All.' Available at https://intelligence.weforum.org/discover (Accessed on April 2023).

40 McKinsey Global Institute. 2020. 'Connected World: An evolution in connectivity beyond the 5G revolution.

margins), 3. **Followers** (starting with less adept infrastructure and providers find it hard to support the large capital investment that is needed to build more sophisticated networks. Expected to lag a few years behind in deployment, especially for frontier connectivity, which will most likely be limited to major urban cores only), and 4. **Trailing** (unlikely to gain widespread advanced or frontier connectivity in the near term). **Brazil is classified as part of the third "Followers" category, and its near to medium-term focus is expected to be on fiber and mid-band 5G, which implies it is not at the forefront of adopting cutting-edge technologies, but rather an early adopter of the latest advancements in telecommunications infrastructure.**

LAC context: Most Caribbean countries have ICT enhancement in their National Development Plans, spanning from limited mention to a fully-fledged ICT Policy, as is the case of Jamaica and Brazil. Public-private partnerships with telecommunications companies have been expanding broadband access across countries. Domestica policies and initiatives consistently focus on ensuring that, at minimum, fourth-generation wireless technology (4G) services are available in rural communities. Additionally, incentives have been frequently provided, including through Universal Service Programs, to encourage the deployment of fiber services to these communities.[41] As for Latin American countries, governments are seeking to develop public-private partnerships to deliver broadband services and close the digital divide. The region is also advancing to accelerate the arrival of 5G with solutions based on the use of technology as backhaul. From the perspective of infrastructure and connection speeds, a study by ECLAC in Latin America and the Caribbean shows that fixed and mobile speeds are comparatively similar, especially compared to more advanced regions, which might be related to fiber optics development.[42]

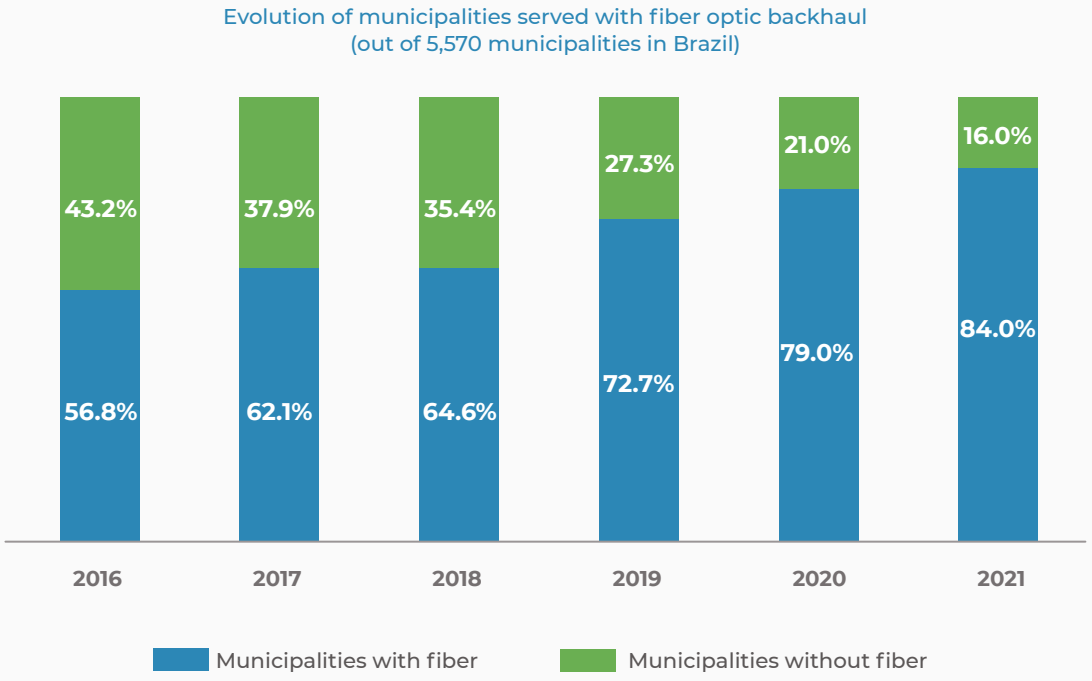
Brazil context: Broadband access is crucial for individuals to connect to the Internet and access information freely. In terms of optic fiber, data from ANATEL, the Brazilian National Telecommunications Agency, shows that although the number of municipalities covered by backhaul has increased from 2016-2021, 16% of municipalities remain unattended as shown in Figure 8 below, primarily in the North and Northeast of Brazil and the northern region of Minas Gerais state. **These subregions have a high proportion of Afro-Brazilian population.** ICT enhancements in Brazil are part of the Brazilian Digital Strategy (e-Digital) scope, highlighting 100 actions for the country's digital development, prioritizing, among other objectives, the network infrastructure and improving Internet access.[43]

41 Out of the 11 countries assessed, nine currently have an active national development plan. See more in: D. Alexander, L. Døhl Diouf and K. Prescod. 2023. 'Digital inclusion in Caribbean digital transformation frameworks and initiatives: a review.' Studies and Perspectives series-ECLAC Subregional Headquarters for the Caribbean, No. 112 (LC/TS.2022/226; LC/CAR/TS.2022/6), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).

42 Economic Commission for Latin America and the Caribbean (ECLAC), "Tracking the digital footprint in Latin America and the Caribbean: lessons learned from using big data to assess the digital economy", (LC/TS.2020/12/Rev.1), Santiago, 2020

43 Se more: https://www.gov.br/mcti/pt-br/centrais-de-conteudo/comunicados-mcti/estrategia-digital-brasileira/estrategiadigital.pdf

Figure 8: Mapping high-capacity network infrastructure used in the provision of telecommunications services (backhaul)[44]



Source: Own graph prepared with data from ANATEL - Brazilian National Telecommunications Agency.

Measures to expand access

A global study conducted by the Brookings Institution, with Brazil as a case study, highlights several measures that have been adopted to support the expansion of network access to reduce the digital divide:[45]

- 'Zero-rated programs' which improve access for poorer people by enabling people who lack the financial resources to pay for monthly plans to access some applications, without these being changed to the individual's data caps. In 2015, around 45% of mobile operators worldwide offered some level of zero-rated programs. Nonetheless, according to the Electronic Frontier Foundation, by violating net neutrality, this scheme may expose consumers to risks, even in non-pay-to-play arrangements;
- Reducing taxes on mobile operators and equipment, known as 'connectivity taxes'; Brazil has a 43.3 percent tax on mobile services which, if reduced by one percentage point, could raise the number of subscribers between 520,000 and 1,050,000, as reported in the Brookings Institution's study;
- Bring down telecommunications costs by reducing barriers to entry into the sector, for instance by working with government stakeholders to alter the rules on network sharing and allowing new firms to use the lines of established operators;

44 Data retrieved from ANATEL https://informacoes.anatel.gov.br/paineis/infraestrutura/rede-de-transporte (Accessed on April 2023).

45 West, D. 2015. 'Digital divide: Improving Internet access in the developing world through affordable services and diverse content.' Brookings Institute.

Initiative to expand broadband in underserved communities in Brazil

The Federal Fluminense Institute (IFF) and the Instituto Bem-Estar Brasil (IBEBrasil) implemented an initiative to expand internet access to underserved communities, starting in the community of Espírito Santinho in the state of Rio de Janeiro, which comprises 1,256 inhabitants.[46] The solution focused on connecting the local population to the Internet by using radio spectrum. This reaches the community in Espírito Santinho through antennas installed on nearby hills and homes. IBEBrasil brought experience in community mobilization to build community networks for the maintenance of the network, and it also provided training and technical support. Radio connectivity, however, has its limits, and the next step of the project was to move from wireless Internet to fiber optic cables, adopting a model known as "neutral networks". This model allows for Internet access infrastructure to be shared by more than one provider. For example, in Espírito Santinho, "Essa Internet", a small local provider already serving some customers in the region, joined the project to implement the last mile of fiber.

Investors should consider supporting initiatives like the one in Espírito Santinho, which demonstrates a successful model for expanding digital inclusion in underserved Afro-Brazilian communities. Investment in such projects, particularly in transitioning from radio connectivity to more robust fiber optic networks, can yield significant social and economic benefits. This approach not only enhances community access to digital resources but also fosters local entrepreneurship, as seen with Essa Internet's involvement. Collaborative efforts in infrastructure development and community training are key to replicating this model's success in other regions, especially in those where local geographical conditions, such as areas surrounded by hills, pose a significant barrier to service expansion.

Key takeaways for investors regarding targeted investments in physical digital infrastructure:

- **Strategic investments in fiber and 5G:** As a "Follower" country in terms of digital infrastructure, Brazil would benefit from targeted **investments in its fiber and mid-band 5G infrastructure, particularly in areas and municipalities with a high concentration of Afro-Brazilian populations**, such as North and Northeast. This could focus on expanding coverage in municipalities with fiber, on introducing fiber to municipalities without it, or both, depending on each locality's current infrastructure and specific needs.
- **Regional ISP capabilities:** Despite often being categorized as 'small,' regional internet providers are demonstrating considerable capabilities and investment in technology. They also outperform the main companies in 86% of Brazilian municipalities. For instance, Brisanet, which successfully acquired frequencies in the 2021 5G auction for the Northeast and Midwest regions, announced an investment of BRL 829 million in 2022. This underscores the potential of these providers to significantly impact Afro-Brazilian consumers, local business owners and the telecom sector. Investors should consider structuring transactions with these capable regional providers through intermediaries.[47] This strategy would enable the expansion of next-generation network infrastructures like fiber and mid-band 5G, particularly in areas with high concentrations of Afro-

46 Aguiar, J. 2023. 'How the Espírito Santinho Community Created Brazil's First Fiber Community Network, Internet Society'. Available at: https://www.internetsociety.org/blog/2023/03/how-the-espirito-santinho-community-created-brazils-first-fiber-community-network/ (Accessed on July 2023).

47 This means tagging the use of funds completely or partially to areas with high presence of Afro-Brazilians.

Brazilian populations. Private sector actors should also consider **working with the SEBRAE to catalyze efforts toward the expansion of the network and products designed for local entrepreneurs.**

- **Leveraging IDB Group experience:** Lessons from the IDB Group, such as the BR-L1619 'Credit Expansion Program for Investments in Telecommunications Networks', which provides loans to small internet providers through a trust in Brazil, can inform these efforts. This program includes specific goals to incorporate Quilombola[48] communities, showcasing how multilateral development banks' programs can effectively integrate diverse populations. The project improves digital connectivity in Brazil by expanding fixed broadband coverage in municipalities with less than 30,000 inhabitants and providing long-term financing to small internet service providers investing in such infrastructure.[49]
- **Collaboration and advocacy:** To reach areas with high levels of Afro-Brazilian populations and businesses, public and private sector actors should join efforts to showcase the benefits of reducing taxes and leveraging **investments towards zero-rated programs or tackling high connectivity taxes, while warranting that consumers' net neutrality is protected.**
- **Economic impact:** Expanding broadband coverage is projected to impact the Afro-Brazilian population significantly, potentially leading to a yearly additional income of **BRL 361.76 million** (see Annex 1). This is a lower bound, as local businesses could also capitalize on this new consumer base.

3.1.2. What investment opportunities can enable Afro-Brazilian populations to access better economic opportunities, given the over representation of Afro-Brazilians in the population who accesses the Internet directly from their smartphones?

LAC and Brazil context: Latin America and the Caribbean face significant challenges in closing the digital divide. The region has immense potential for widespread mobile internet access and adoption if supported by the right policy environment. Research shows that the primary barriers to mobile internet adoption include a lack of locally relevant content (less than 30% of content accessed is hosted locally in the local language), digital skills, and affordability– all likely affecting Afro-Brazilian populations.[50] Network coverage to the last mile also presents a challenge for mobile operators when connecting sparsely populated areas, such as rainforests, and unreliable network coverage in turn discourages users, affecting business and population. According to GSMA, an association of over 1000 mobile operators and businesses across the mobile ecosystem and related industries to advance innovation and reduce inequalities around the world, mobile operators have a key role to play:

- Collaborating with governments and other organizations to promote digital literacy and awareness;
- Offering flexible pricing plans to make them affordable for those at the bottom of the pyramid;
- Providing opportunities to startups and innovations by helping them incubate and scale.[51]

48 Quilombolas are "century-old settlements founded by people of African origin who escaped from slavery". Carvalho Metanias Hallack, M.; Vazquez, M.; Mejdalani, A.; López Soto, D.; Mendes e Costa, Roberta (2018). *A Brighter Future: The Impact of Rural School Electrification Programs on the Dropout Rate in Primary Education in Brazil.* Inter-American, Development Bank. Available at: https://publications.iadb.org/en/brighter-future-impact-rural-school-electrification-programs-dropout-rate-primary-education-brazil.

49 Credit Expansion Program for Investments in Telecommunications Networks (undated) Inter-American Development Bank. Available at: https://www.iadb.org/en/whats-our-impact/BR-L1619

50 GSMA. 2016. 'Connected Society: Digital Inclusion in Latin America & Caribbean', p.7.

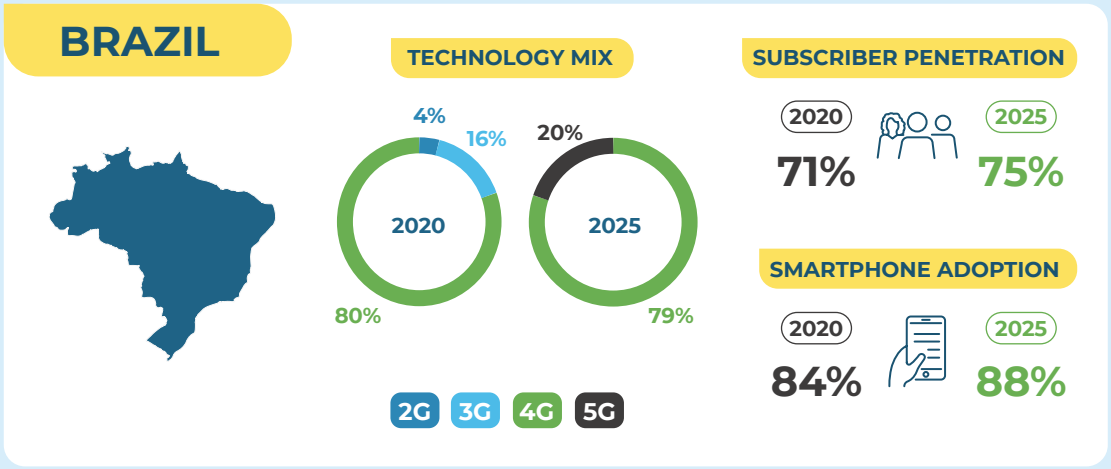
51 GSMA. 2016. 'Connected Society: Digital Inclusion in Latin America & Caribbean', p.7

Mobile operators have market-driven incentives, including expanding their customer base, fostering customer loyalty, and increasing market share. On the other hand, government intervention is necessary to reach the last mile, for instance.

The business case for investing in these opportunities in Brazil is clear – more than 30% of individual subscribers in LAC live in Brazil, the largest market in LAC. Data from 2015 shows that 87.6 million Brazilians subscribe to mobile broadband, 105.1 million are covered but do not subscribe to mobile broadband (this represents the **latent demand gap**[52]), and 11.7 million are not covered by mobile broadband (3G + 4G).[53] In 2021, the ICT Household Survey shows that 1,1 million Afro-Brazilians reported they cannot access the Internet due to coverage limitations in their neighborhood. This implies that current coverage is insufficient to meet customers' full demand potential and needs to be improved.

Private Sector Snapshot: GSMA reports that in 2011, Vivo and Ericsson formed a partnership to provide 3,000 children and teenagers in Vila Cruzeiro (Rio de Janeiro) with access to educational resources via broadband, and that by 2013, 6 million users had benefitted from a portfolio of more than 35 services culture, entertainment, languages and other training. This shows the economic opportunities derived from expanding broadband connections.

A different 2021 GSMA study on the mobile economy in Latin America has assessed that mobile technologies and services **generated 7.1% of GDP** in the region – a contribution that amounted to more than USD 340 billion of economic value added. The study further notes that "by 2025, the economic contribution of the Latin American mobile ecosystem will grow by more than USD 30 billion, as countries in the region increasingly benefit from the improvements in productivity and efficiency brought about by the increased uptake of mobile services." The report also highlights the specific subscriber and technology trends for Brazil, as follows:



These figures show fairly high levels of smartphone adoption. As noted above, **of those who access the Internet exclusively through their smartphone in Brazil, 65% are Afro-Brazilian.**

52 Covered but do not subscribe to mobile broadband.

53 GSMA. 2016. 'Connected Society: Digital Inclusion in Latin America & Caribbean', p.11.

The case of connectivity and device access: The Fund for Digital Equity works with communities to build the internet infrastructure and skills they need to participate fully in a digital society. A growing ecosystem of community networks, municipal providers, and social enterprises are connecting the unconnected — but they lack the kinds of capital they need. By investing in these **community connectivity providers (CCPs),** Connect Humanity supports underserved communities to build and operate their digital infrastructure, which is the first step toward achieving digital equity. This is partly done through an **Impact Investment Fund,** which seeks to bridge the gap between small grant funding below US$100k and larger capital investments. **The Fund invests in the US$1 to US$10 million range in the following three categories:**[54]

- Project: The network is built in a single community, secured by the network's economics, including tools like revenue-based financing as well as more traditional loans.
- Enterprise: Operators that work in multiple communities. Financing can include senior-term loans, working capital, and lines of credit. This includes digital equity covenants to ensure everyone is served.
- Innovative: Creative investment vehicles that promote, for example, device access, telehealth content, and other programs to encourage uptake and use of digital services.

→ **Supporting initiatives such as this one to reach the most digitally excluded Afro-Brazilian populations could potentially represent an opportunity for a collaborative effort between regional innovation labs and other private sector stakeholders.**

Key takeaways for investors to promote economic access, given the overrepresentation of Afro-Brazilians in Internet access via smartphone:

- **Expanding affordable smartphone access:** Smartphone adoption is already high in Brazil, including among the Afro-Brazilian population. Investment opportunities **could therefore focus on further expanding access by offering more affordable digital handsets** (especially newer-model smartphones) to Afro-Brazilian customers and supporting big-tech companies such as manufacturers and providers, in reducing mobile phone contract costs. This approach will also enable regular upgrades for Afro-Brazilians to access 5G and the latest digital applications.
- **Access to other devices:** Another route towards impact lies in enabling Afro-Brazilians to access other types of digital devices, namely **laptop computers, at a more affordable price.**
- **Household expenditure on telecommunication services:** According to data from the Brazilian Consumer Expenditure Survey, in 2018, **the average household annual expenditure on telephone services (fixed and mobile) and smartphone devices was BRL 1,767.**
- **Revenue in the telecom and manufacturing sectors:** Estimates from the Annual Services Survey point out that **the telecom sector generated revenue of BRL 213,4 billion in 2020.** On the other hand, the Annual Manufacturing Survey estimates that

54 Connect Humanity. 'What we invest in.' Available at https://connecthumanity.fund/impact-investment (Accessed on June 2023).

smartphone manufacturers had a revenue of BRL 24.9 billion in 2020. Although these companies do not directly represent an investment opportunity to reduce the digital gap, these figures suggest partnerships that could lower equipment acquisition costs through domestic production.

- **Market trends in Brazilian devices:** The IDC Worldwide Black Book Live Edition estimated that **the Brazilian devices market would generate BRL 101,08 billion in 2023.** The report suggests that the smartphone sales mix will tend to concentrate on cheaper and simpler products.[55] This raises the question of whether there is a potential for a direct influence on the Afro-Brazilian population.[56]
- **Influence of affordable smartphones on consumer behavior:** According to NielsenIQ Ebit, in 2021, 12.9 million Brazilians made an online purchase for the first time.[57] Among them, 59% used their mobile phones for the purchase. Additionally, a study by Cybersource indicates that 24% of consumers used their devices to compare prices in real time, and 23% used them to search for valid coupons and discounts. In total, they estimate that 20 million consumers in Brazil used their smartphones the last time they made in-person purchases. Therefore, **affordable phones would influence both online and in-person purchases. Investors could consider investing in manufacturing simpler and cheaper smartphones. Supporting affordable mobile phone access can enhance both online and in-person retail experiences, potentially boosting overall consumer activity and digital economic participation.**

Closing remarks for Pathway 1

Strategic investments in both physical digital infrastructure and devices could lead to expanding broadband connections in areas currently without coverage and to reducing digital services costs. The population currently lacking digital access may also benefit from a range of new digital products and services. Simultaneously, local businesses can modernize their operations and tap into a fresh consumer base. Improved digital infrastructure has the potential to attract companies and entrepreneurs, thus fostering economic opportunities in these regions.

There is significant potential for targeted investments in Brazil's digital infrastructure and economic access, especially for the Afro-Brazilian population. First, investing in fiber and mid-band 5G infrastructure, particularly in regions with high Afro-Brazilian populations like the North and Northeast, could greatly enhance connectivity. This approach should include expanding existing fiber coverage and introducing it in areas currently without, in collaboration with regional internet providers and the Brazilian government. Such

55 Brazilian Association of Software Companies: Brazilian Software Market Report - 2023 Scenario & Trends . Devices include a diverse range of electronic products such as Desktops, Notebooks, Tablets, Feature Phones, Smartphones, Printers, Multifunctional devices, Monitors, and Wearables.

56 The authors have chosen not to use these figures to estimate market opportunities due to the difficulty in accurately assessing the impact on the Afro-Brazilian population. Our conservative approach aims to prevent overestimation using imprecise data. Additionally, regular product renewal is a typical aspect of the electronic product lifecycle, and thus, we do not view this as a unique opportunity stemming solely from enhanced digital inclusion.

57 https://nielseniq.com/global/pt/landing-page/ebit/nielseniq-ebit-brasil/webshoppers/ (Accessed on June 2023).

expansion could yield an annual impact of BRL 361.76 million for the Afro-Brazilian population, when calculated conservatively.

Secondly, considering the high smartphone usage among Afro-Brazilians, there is a ripe opportunity to further expand access by providing more affordable and modern digital handsets and reducing mobile phone contract costs. This strategy could facilitate regular technology updates, including access to 5G and new digital applications, which may enhance both online and in-person retail experiences. The potential for market growth in the Brazilian mobile devices sector, which is currently estimated at BRL 101.08 billion by 2023, underscores the significant impact of such investments on the digital economic participation of Afro-Brazilians.[58]

3.2 Pathway 2: Digital transformation of Afro-Brazilian and other businesses

3.2.1 What opportunities would arise from the digital transformation of Afro-Brazilian businesses? What role can financial intermediaries play in supporting Afro-Brazilian entrepreneurs and MSMEs?

Global context: Many businesses struggle to realize a return on their investment in digital transformation. Worldwide, businesses were estimated to collectively spend nearly $1.2 trillion on digital transformation in 2019, according to an IDC Spending Guide,[59] yet research published by MIT found that only 13% of business leaders believe their organizations are truly equipped to compete in the digital age.[60] Evidence suggests that the most successful efforts do not approach transformation simply as a way to experiment or cut costs, but rather as a fundamental tool to create new value. Artificial intelligence, 5G, and autonomous vehicles have all amplified opportunities to create value; estimate showed that 80% of all emerging technologies would have foundations in AI by 2021, while the number of 5G connections in the world was expected to triple by 2023. While digital technologies have the potential to enable new value for everyone, they risk further exacerbating social exclusion, the unequal concentration of power and wealth, and social instability. Businesses should use digital infrastructure and data to collaborate, develop innovative business models, navigate disruption, and transition to a "new post-pandemic normal" -, i.e. one that is purpose-driven, sustainable,and inclusive.[61]

58 Although the importance of opportunities derived from the mobile market is recognized, which includes boosting overall consumer activity and digital economic participation, it's not possible to disentangle the impacts for the Afro-Brazilian population. Therefore, our conservative approach does not account for IDC Worldwide Black Book Live Edition estimates that the Brazilian Devices market will generate BRL 101.08 billion in 2023 (including desktop, notebook, tablet, smartphone, wearable, hardcopy peripheral, and PC monitor). In 2021, Brazilian smartphone production revenues accounted for BRL 31.8 billion (data from the Annual Industrial Survey - Product, conducted by IBGE). Given the lifecycle of these devices and the natural technological evolution of the equipment, estimating the consumption share of the Afro-Brazilian population is not trivial.

59 Business Wire (2019) "Businesses Will Spend Nearly $1.2 Trillion on Digital Transformation This Year as They Seek an Edge in the Digital Economy, According to a New IDC Spending Guide" available at: https://www.businesswire.com/news/home/20190424005113/en/Businesses-Will-Spend-Nearly-1.2-Trillion-on-Digital-Transformation-This-Year-as-They-Seek-an-Edge-in-the-zDigital-Economy-According-to-a-New-IDC-Spending-Guide.

60 Scott A. Snyder and Yulia Barnakova (2020) "Being a Digital Leader Has Never Been More Urgent" Knowledge at Wharton. Available at: https://knowledge.wharton.upenn.edu/article/theres-never-important-time-digital-leader/#:~:text=Last%20year%2C%20companies%20spent%20nearly,Enter%20the%20COVID%2D19%20crisis

61 World Economic Forum, 2023, 'The Digital Economy'.

LAC context: Over 70% of businesses in the LAC region have a website and a homepage, but they generally lack advanced digital technologies that enhance their productivity. Over 60% of women from low-income backgrounds reported that they have greater access to business and employment opportunities through having mobile services. Still, research has shown that there must be strategic intent to bridge the gender divide, as women and girls face hurdles such as digital tools affordability and other inherent biases that prevent their access.[62] As emphasized in Section 2 above, Afro-Brazilians, particularly Afro-Brazilian women, are likely to face internet access barriers.

MSME-focused case studies: MSMEs in Latin America account for 99.5% of all firms and generate close to 60% of the employment in the region. Digital technologies offer great opportunities to MSMEs, by increasing access to information, reducing traditional trade barriers, and facilitating the development of new products and services.[63] There are various digitalization initiatives for small businesses in the region that offer multiple tools. For instance, Chile has the '*Digitaliza tu Pyme*' SME Digitalization Program which provides a broad range of services, training, and tools, along with a mentorship network to support the digital transformation process. The program offers various services such as '*Ruta Digital*', an online training platform; '*Chequeo Digital*', [64] a virtual tool to determine the level of digital maturity of the iness; '*Pymes en Línea'*, a program that offers free training content about online marketing, and '*Arriba tu Pyme*', a collaborative partnerships benefits catalogue. Similarly, Brazil also has implemented policy instruments delivered through SEBRAE and the Brazilian Company of Research and Industrial Innovation (EMBRAPII)), through which firms can access various technological and innovation-related services such as technical assistance, certifications, prototyping, and audits. Unlike other LAC initiatives, Brazilian programs are decentralized, and each subnational SEBRAE office has its own sectoral targets (such as digital marketing, selling online, Afro-Brazilian businesses, rural digital inclusion, etc). Nonetheless, there is still a gap to be filled, especially through a partnership with SEBRAE and/ or similar initiatives targeting SME digitalization and software adoption.

A 2021 study by Visa showed that the pandemic increased the number of digital buyers in LAC to 38% of the region's population. Most of these new buyers consists of the younger bracket of the population who wished to acquire goods and services more conveniently 65. To take advantage of the new shifts in consumer culture as a result of digitalization, businesses should set up infrastructure that includes online payment methods, logistics and delivery, technology, and other necessary components to provide customers with a consistent and convenient experience; ensure payment platforms are safe and hassle-free; think beyond borders by viewing the world as their target

62 OECD. 2019. 'Shaping the Digital Transformation in Latin America: Strengthening Productivity, Improving Lives.' OECD Publishing. Paris.

63 United Nations ECLAC, 2022, 'A digital path for sustainable development in Latin America and the Caribbean,' Economic Commission for Latin America and the Caribbean.

64 Chequeo Digital is a tool for measuring business digital maturity, an initiative of the Inter-American Development Bank (IDB), developed by the Digital Country Foundation of Chile and managed in Ecuador by ESPOL. The tool provides companies that perform their checkup, free of charge, with a document containing recommendations to improve their technological adoption and digital skills, and the possibility of conducting periodic checkups to measure their own progress and compare themselves over time.

65 Visa Inc. (2021) 'The rise of digital commerce in Latin America & the Caribbean: Tips to tackle the shifting digital economy, Visa LAC Perspectives. Available at: https://www.visa.com.mx/dam/VCOM/regional/lac/ENG/Default/Partner%20With%20Us/Info%20for%20Partners/visa-landscape/infographics/The%20rise%20of%20digital%20commerce%20in%20LAC_ENG.pdf

market; and leverage customer relationship management (CRM) tools, customer data, and digital interfaces to better tailor to the individual needs of their customers. Digital tools enable businesses to personalize their services based on their customers' individual preferences and behaviors. Afro-Brazilian businesses would be particularly well placed to take advantage of these opportunities concerning providing better, more reliable services for the Afro-Brazilian population and as well as tailored community-specific solutions.

Gender-focused case studies, with applicability for other underserved groups such as Afro-Brazilians: Before the pandemic, women comprised 56% of people in the LAC region who were financially excluded from the digital economy; this figure has increased since 2021.[66] UNDP has implemented several initiatives across the region to narrow this gender gap. The key focus has been an effort to promote the digitalization of women owned or led MSMEs, providing support for female entrepreneurs in the digital sphere and expanding access to digital financial products and services. Examples from the region include:

- A 12-week Inclusive Digital Resilience Program in Barbados to train 187 Caribbean MSMEs, including women-owned businesses, in digital technologies, financial planning, and marketing to better adapt to COVID-19 challenges and future shocks.[67]
- El Salvador's 'Digi-Chiquihuites' initiative aided COVID-19 recovery by providing digital baskets to support vulnerable micro and small entrepreneurs in the tourism sector. The initiative led to increased positive attitudes, technology knowledge, and online promotion skills for women in the sector.[68]

To enhance digital inclusion for Afro-Brazilians, regional stakeholders could support targeted programs that mirror successful gender-focused initiatives. These programs should aim to digitalize Afro-Brazilian-owned or led MSMEs, providing essential training in digital skills, financial planning, and marketing. Tailored initiatives, akin to El Salvador's 'Digi-Chiquihuites', could support recovery and growth in key sectors, fostering a positive technological mindset and improved online capabilities among Afro-Brazilian entrepreneurs.

Digital transformation as a route to combatting low productivity: The LAC region struggles with high levels of informality, low productivity, and a poorly diversified economy, all of which negatively affects economic growth and job creation. Research by ECLAC shows that digital technologies can play a role in restructuring the productive sector.[69] Several countries have started aligning their digital agendas to incorporate emerging technologies such as AI, blockchain, Internet of Things (IoT), and advanced robotics. In Brazil, the **E-Digital strategy** involves the establishment of a National IoT Plan and the formation of a chamber composed of public organizations committed to developing solutions that use these technologies. This strategy concentrates on four areas: health, agriculture, manufacturing, and smart cities.[70]

66 UNDP, 2023, 'Towards an Inclusive Digital Revolution in LAC.

67 More information: https://www.undp.org/barbados/press-releases/undp-future-tourism-graduates-ready-go-digital

68 See more: https://www.undp.org/es/el-salvador/publicaciones/digi-chiquihuites-canasta-digital-inclusiva-10-lecciones-para-su-implementacion

69 ECLAC, 2022, 'A digital path for sustainable development in Latin America and the Caribbean'.

70 Andonova, V., Casanova, L., Finchelstein, D. & Duque, J. G. (2023) Invited Applied Article: the rise of digital entrepreneurship In Latin America. Internext, 18(1), 104-110.

The private sector stands to gain significantly from this initiative, as the integration of digital technologies into these sectors can lead to enhanced efficiency, new product offerings, and improved services, which opens up substantial market opportunities. For investors, this represents a strategic opportunity to support the digital transformation of Brazilian businesses, particularly those led by Afro-Brazilians. By facilitating access to capital for these businesses to adopt new technologies, investors would not only foster innovation and competitiveness but also contribute to broadening the economic impact of the E-Digital strategy. Investments in digital skills training and technology adoption can help bridge the digital divide and boost productivity in these critical sectors, ensuring a more inclusive economic growth trajectory.

Barriers to digital transformation for smaller businesses: According to the International Finance Corporation (IFC), a robust business ecosystem is crucial for digital transformation to succeed. Small businesses, in particular, are not able to implement a digital transition on their own. They usually require supportive services, including government regulations, technology infrastructure, technology products, service providers, networking platforms, financing options for all business stages, business clusters within the same industry, public initiatives, intermediary entities, skilled labor, and market access.[71]

There is a market opportunity to support the development and implementation of Enterprise Resource Planning (ERP) software systems in Brazilian companies. As of 2019, only 28.5% of businesses utilized ERP software packages to integrate their data and streamline processes across different departments into a unified system. The ERP market was projected to reach US$650 million in 2023, according to Statista. To capitalize on this opportunity, potential strategies include focusing on user-friendly interfaces, offering cloud-based solutions, prioritizing data protection, and providing customized solutions tailored to sector-specific needs, such as accounting, or meeting industry-specific requirements.

Additionally, according to projections from Statista, revenue in the Customer Relationship Management (CRM) Software market is projected to reach US$1.05 billion in 2023 in Brazil.[72] By building a bridge between businesses and clients, this technology adoption could enhance Afro-Brazilian entrepreneurs, who might team up with financial partners to offer payment options, for instance.

Emerging technologies might enable digital business models. Investors and other regional stakeholders may play a significant role by assisting MSMEs to develop

71 International Finance Corporation. 2021. 'Digital Entrepreneurship and Innovation in Central America'.

72 Statista Market Insights - Customer Relationship Management Software – Brazil. Available at: https://www.statista.com/outlook/tmo/software/enterprise-software/customer-relationship-management-software/brazil#revenue (Accessed on December 2023).

e-payments and e-commerce tools using artificial intelligence, machine learning, chatbots, blockchain, tactile and facial recognition, voice recognition, P2P payments, tokenization, contactless/NFC, IoT, marketplace capabilities, and other technologies.

Brazil's E-Digital Strategy for MSMEs might also involve GovTech Hubs. In Brazil, BrazilLab operates by connecting entrepreneurs with public leaders and accelerating solutions developed by startups, with a focus on improving public services. Their mission is to foster a culture of innovation within the public sector from the outside in, supporting high-impact businesses dedicated to solving complex public problems through technology.

The role of financial intermediaries in supporting the digital transformation of MSMEs: Private-sector firms in the Global South are constrained in mobilizing finances from non-foreign aid channels, and therefore are constrained in growth. Chief among these constraints is informality. According to research reported by the Centre for Strategic & International Studies (CSIS), more than 80% of the world's businesses employing 60% of the global workforce operate in the informal sector. Nearly 1.7 billion adults conduct business outside the formal banking system and have few to no mechanisms to borrow from formal and regulated lenders. In LAC, there is a 22% gap in access to financing.[73] Examples of programs that support MSMEs through intermediary bodies include:

- **IDB's SEAF Caribbean SME Growth Fund:** In 2020 IDB Invest approved an equity investment of $10 million in support of the Small Enterprise Assistance Funds (SEAF). British Investment International (BII) has also announced a $10 million commitment to SEAF Caribbean SME International LP (bringing total funds to $54 million). This will enable the fund manager – SEAF Caribbean Management LLC – to back high-growth SMEs and bolster the ability of businesses to scale their operations. Further information: https://idbinvest.org/en/news-media/idb-invest-and-seaf-promote-growth-and-productivity-sme-caribbean.
- **BII and African Guarantee Fund (AGF)**, a leading Pan-African guarantee provider, have formed a partnership of a $75 million re-guarantee agreement for Small and Medium Enterprises (SMEs) across Africa. BII and AGF will provide loan guarantees and partner with financial institutions for up to 75% of the risk on SME loans, so as to increase SMEs' access to credit and reduce lenders' collateral requirements. The partnership will particularly encourage lending to women-owned or led and climate-focused SMEs. (This partnership qualifies under the 2X Challenge, a joint commitment from a group of development finance institutions (DFIs) worldwide to mobilize finance to advance women's economic empowerment and gender equality). Further information: https://www.bii.co.uk/en/news-insight/news/british-international-investment-and-african-guarantee-fund-sign-75-million-programme-to-fund-african-smes/.

73 Center for Strategic & International Studies. 2019. 'The New Missing Middle in Development Finance.' Brief by Daniel F. Runde , Erol Yayboke , and Sundar R. Ramanujam.

Key takeaways for investors regarding digital transformation and financial intermediary roles:

- **Enhancing CRM adoption for MSMEs:** Investors and other regional stakeholders could support the digitalization of MSMEs in partnership with SEBRAE to enhance the adoption of CRM by small businesses, especially those that are starting their online sales operations.
- **Improving Afro-Brazilian-led MSMEs through digital transformation:** Empowering Afro-Brazilian-led MSMEs through digital transformation would not only allow them to benefit from government procurement and e-government services but also improve their financial performance and enhance their capacity as employers. This would trigger businesses development and add another source of revenue.
- **Bridging the software adoption gap:** Within the MSMEs software industry there is a market opportunity for investment aimed at bridging the gap in the low adoption rate of business-oriented tools, including ERP and CRM. For instance, investors could consider supporting businesses providing IT solutions for hospitals and medical offices, such as optimizing appointment routines, financial solutions and integrating systems. In essence, businesses in this sector extend their services beyond telehealth solutions and cover the entire information chain generated by the healthcare sector. Notably, enterprises like MV Solutions, ranked 3rd in the Brazilian IT market, create digital solutions for comprehensive health management, including public-managed hospitals within the Brazilian SUS (Unified Health System). MV Solutions activities directly impact the Afro-Brazilian population as they are the main beneficiaries of the Brazilian public health system.
- **Capitalizing on software development in core payment systems:** Finally, another opportunity of investment is related to software development, specifically where payments are at the core of the user experience, such as insurance, fintech, real-estate, creator-economy, fitness, healthcare, social commerce, grocery and on-demand services; and migrating towards cash-to-digital experiences, such as buying online in real-time, shopping and paying using virtual assistants, streaming services, and payments with wearables.
- **Partnering with financial intermediaries:** investors could enhance the impact of their investments by partnering with financial intermediaries that facilitate access to credit for MSMEs in Brazil, where financing gaps are significant due to high informality.

3.2.2. How are Afro-Brazilian businesses benefiting from e-commerce? Why and what are they missing out on by not accessing e-commerce opportunities?

General Brazil context: E-commerce in Brazil has not yet reached the full potential of a market of 143,2 million internet users, with only 55.7% of businesses selling online in 2019.[74] According to OECD research, the consumers cited privacy concerns (64%) and the inability to pay online (38%) as their main barriers to buy online.[75]

A 2021 study by Blackrocks, an Afro-Brazilian female-led startup accelerator and Bain, showed that approximately 70% of respondents identified 'external factors' as the main challenges within the startup ecosystem.[76] These factors include: limited support of Afro-Brazilian founders, lack of Black role models and inspirations, and geographic challenges. These factors lead to opportunity gaps for more diverse founders. For example, data by Abstartups show that 60% of founders are located outside the South-Southeast regions.[77] In addition, e-commerce operations for Afro-Brazilian businesses lack the networking capabilities to access potential customers and reach their current clients.

On the other hand, online platforms in the e-commerce sector, such as product delivery logistics, and marketplaces, food delivery, and passenger transportation, have a significant representation of Afro-Brazilian individuals as employees, leveraging the impact of digitalization and migrating to e-commerce.

Post-pandemic context and recovery: The pandemic caused GDP to fall to pre-2010 levels across the LAC region. However, it also sparked rapid digital transformation as business owners sought to adapt. Deficiencies in digital skills and adoption of digital tools persist within businesses, particularly MSMEs and more specifically women led or owned MSMEs. Throughout 2020, there was minimal progress in the regulatory and legal frameworks that facilitate digital trade, particularly concerning digital payments. Research by ECLAC shows that only those countries that had implemented an e-commerce strategy *before* the pandemic enforced measures to enhance electronic payment compatibility and to minimize implementation costs for MSMEs. A few countries revised consumer protection frameworks in order to regulate online transactions.[78]

Key takeaways for investors regarding e-commerce benefits for Afro-Brazilian businesses:

- **Impact investors** can contribute to reducing the digital inclusion gap by incentivizing their investees to acquire digital services from Afro-Brazilian MSMEs. By promoting the procurement of services from Afro-Brazilian-led MSMEs throughout different stages of the operational process, investors could significantly enhance the growth of these businesses. Examples of such digital services include mobile app creation, web platform development, graphic design, digital marketing, cloud solutions implementation, business intelligence, UX design, and employee training solutions.

74 Data from 2019 ICT Household Survey and 2019 ICT Enterprise Survey, respectively.

75 OECD. 2020. 'Going Digital in Brazil.' OECD Reviews of Digital Transformation. p.21.

76 BlackRocks- Mapa das Startups Negras and Bain (2021) Panorama do ecossistema de startups no Brasil — rumo à diversidade racial. Available at: https://blackrocks.com.br/estudos/ and https://www.bain.com/contentassets/2bff0371e2f04ee1bbf1a22d74721c2c/bain_blackrocks_panorama-do-ecossistema-de-startups-no-brasil.pdf

77 Mapeamento do Ecossistema Brasileiro de Startups – 2023: https://abstartups.com.br/pesquisas/

78 CEPAL, N., & Adenauer, F. K. (2021). Post Pandemic Covid-19 Economic Recovery: Enabling Latin America and the Caribbean to better harness e-commerce and digital trade.

- **Enhancing networking support for Afro-Brazilian businesses:** Afro-Brazilian businesses report a lack of support for networking and accessing potential customers. Therefore, the private and public sector stakeholders as well as sectoral civil society organizations should coordinate collaborative efforts to promote the development of targeted programs designed to address the specific needs for capacity building of Afro-Brazilian businesses within innovation ecosystems.
- **Leveraging e-commerce platforms for Afro-Brazilian MSMEs:** Afro-Brazilian MSMEs may benefit from marketplaces to leverage their e-commerce operations. Investors could work with marketplace platforms to support MSMEs navigate legal and regulatory requirements associated with e-commerce activities, establish customer-dedicated service channels, and encourage collaboration between MSMEs for joint ventures, cross-promotions, and shared resources. A relevant example of this is IDB Invest's transaction with Mercado Livre to strengthen financing for SMEs in Brazil.[79]
- **Market opportunities:** The telecommunications sector, including small operators, represented a market opportunity of BRL 39.04 billion through private sector investments in 2021 and 2022, based on the average capital expenditure from businesses in the Telecom sector during those years. **Economic impact of digital inclusion for Afro-Brazilians:** Based on the estimates of Afro-Brazilians that are currently excluded from e-commerce, the simulation of closing the digital gap of the population and expanding their online presence, would have an expected impact of BRL 9.76 billion per year in revenues for businesses.[80]
- **Investing in online services to boost employment among Afro-Brazilians:** Investors could support online service companies with a significant representation of Afro-Brazilians in their workforce, such as food delivery platforms and passenger transportation. Expanding their services throughout cities would potentially improve employability and develop local (small) businesses, although further studies are needed to assess the impact of the digital operations of this segment on the Afro-Brazilian population.

Closing remarks for Pathway 2

There are significant opportunities for investors seeking to foster the digital transformation of Afro-Brazilian MSMEs and enhance their participation in e-commerce. Partnering with SEBRAE, investors could play a pivotal role in digitalizing MSMEs, enabling them to access government procurement and e-government services, thereby opening new revenue streams. Investment in business-oriented tools such as ERP and CRM software, particularly in sectors like healthcare, could bridge existing adoption gaps, benefiting businesses and the broader Afro-Brazilian community. Additionally, supporting Afro-Brazilian MSMEs in e-commerce, through collaborations with large companies and marketplace platforms, could significantly boost their market presence and customer access, potentially increasing annual revenues by BRL 9.76 billion. These efforts should also extend to sectors like healthtech, edtech, and financial services, thus ensuring a comprehensive approach to digital empowerment and economic inclusion for Afro-Brazilian businesses.

79 IDB Invest (2018). *IDB Invest partners with Mercado Livre to strengthen financing for SME in Brazil.* Available at: https://idbinvest.org/en/news-media/idb-invest-partners-mercado-livre-strengthen-financing-sme-brazil

80 Detailed calculations are provided in Annex 1, under the section titled "E-commerce and Business Digital Transformation".

3.3 Pathway 3: Increasing digital skills and competencies through investments and advisory services

3.3.1 How will the anticipated automation and technological developments in Brazil impact Afro-Brazilians, and how can these impacts be mitigated?

Although 35.5% of Afro-Brazilians are employed in the formal sector, which provides them with fringe benefits, they represent a considerable portion of the workforce in sectors with low wages and low educational requirements, such as construction (63.3%) and hospitality and food services (50.8%). It has been broadly discussed that these occupations may disappear or considerably reduce their workforce with automation and technological progress. A recent study from iDados[81] suggests that 58.1% of jobs in Brazil could disappear in approximately twenty years. Based on the set of occupations with a higher probability of automation, it is important to raise awareness that this could have a considerable impact on the Afro-Brazilian population.

The city of Recife has the highest number of IT students per 100,000 inhabitants among the largest cities in Brazil.[82] The figures in Recife have steadily increased after the launch in 2021 of '*Embarque Digital*' a program that provides scholarships for students from public schools. In 2021, 67% of students were Afro-Brazilian, and 33% were women. The program is a partnership between the Porto Digital Science Park and the Municipality of Recife.

The general picture of digital skills in Brazil: Research on digital transformation in Brazil has shown that a lack of digital skills has contributed to Brazil's low productivity levels. Brazilian employers report challenges in recruiting technicians, skilled traders, and engineers, with ICT professionals representing the second largest shortage.[83]

Figure 9 below shows levels of advanced digital skills of the population over 15 years of age in 2020, among selected countries, as presented in a study conducted by the ECLAC.[84] This data has not been disaggregated by gender or race, and it shows the proportion of young people and adults, highlighting the distribution of skills, encompassing expertise in programming languages – such as data

81 Ottoni, B., Oliveira, P. R. e, Estrela, L., Santos, A. T., & Barreira, T. (2022). Automation and job loss: the Brazilian case. Nova Economia, 32(1), 157–180.

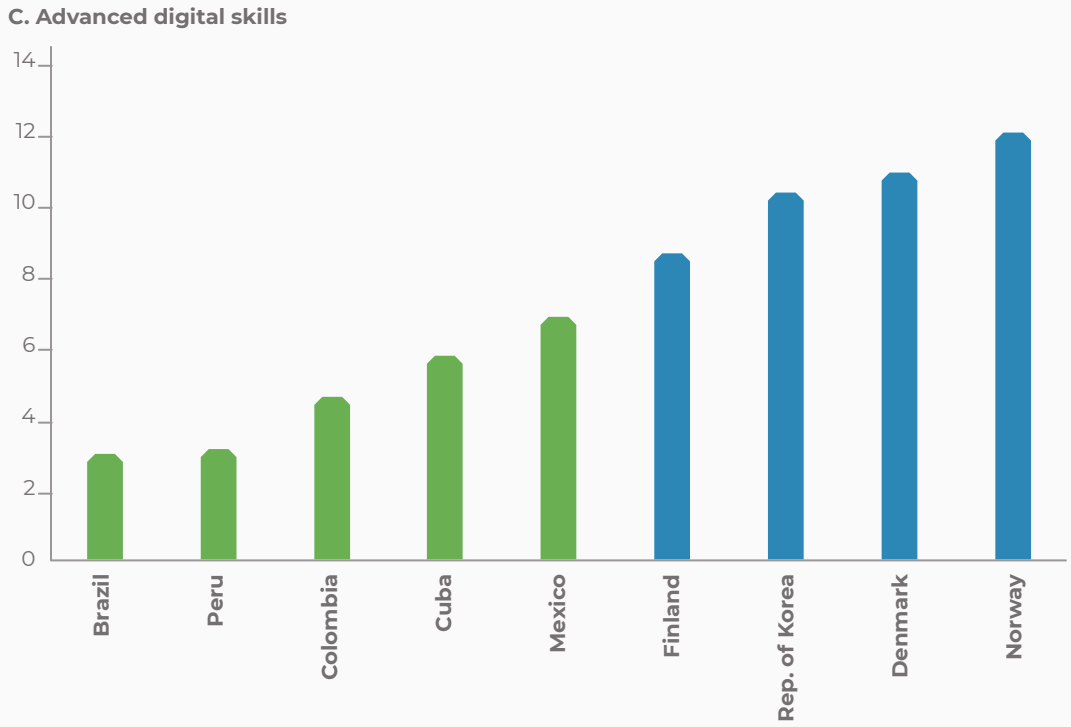
82 Data from Higher Education Census.

83 OECD (2018), Digital Government Review of Brazil: Towards the Digital Transformation of the Public Sector, OECD Digital Government Studies, OECD Publishing, Paris.

84 Source: Economic Commission for Latin America and the Caribbean (ECLAC), *A digital path for sustainable development in Latin America and the Caribbean* (LC/CMSI.8/3), Santiago, 2022. The data show the proportion of young people and adults (individuals over 15 years of age) with ICT advanced skills, considering the use made of these technologies by individuals over 15 years of age who have performed certain computer-related activities (differentiated by type of technology, application or solution) in a given period of time (for example, during the last three months).

analysis, processing and modeling skills, extensive database management, software development, and others. Although Brazil lags behind its counterparts in LAC, Figure 9 indicates that disparities between LAC countries and developed nations are not large. Still, there is a potential need for targeted interventions to enhance the digital skills of Brazil's population, namely programming, data analysis, database management, and software development skills.

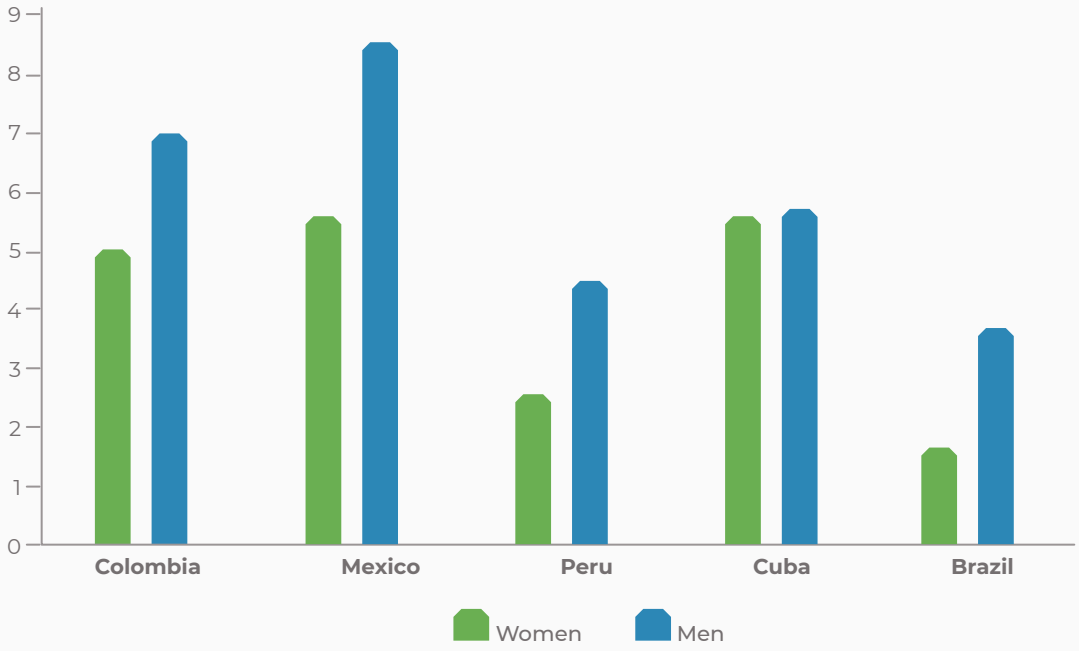
Figure 9: OECD - Latin America and the Caribbean and advanced economies (selected countries): advanced digital skills of the population over 15 years of age, 2020 (percentages)



Source: ECLAC, 2022.

Data from 2019 on youth and adults with programming skills disaggregated by gender for Brazil, shows that women have lower levels of programming skills than men – a wider gap than in some other countries in the region as Figure 10 below illustrates:

Figure 10: OECD - Latin America (selected countries): youth and adults with programming skills, by sex, 2019



Source: ECLAC, 2022.

Key takeaways for investors regarding Afro-Brazilian employment sectors and digital transformation impact:

- **Retraining workforce in automation-prone sectors:** There is a significant concentration of Afro-Brazilian individuals in low-skill and low-education sectors and which have a higher potential for automation. Investors could partner with investees in efforts to retrain their workforce and keep up with technological advancements.
- **Addressing skill shortages in the IT market:** The IT market has reported a shortage of professionals that is not being met by the Brazilian educational system, which has led companies to incur high costs for training and dealing with workforce turnover. Private and public sector investors could invest in technological parks such as The Porto Digital Science Park, located in the Northeast Region, supporting 330 tech companies who employ 11,000 workers.
- **Improving work conditions in telecommunications:** Industries like telecommunications heavily rely on outsourced labor, which has a direct impact on Afro-Brazilian jobs. Investors should ensure that their investees follow regulations guaranteeing safety, wage equality, and secure working conditions. They should also encourage investees to adhere to best practices in these areas, which will simultaneously contribute to a Just Transition and foster an equitable and sustainable economic development.
- **Incorporating inclusive KPIs in impact-linked products:** Investors can play a role in demanding impact-linked products that include social KPIs directly impacting the digital inclusion of Afro-Brazilians, particularly for issuers in the telecommunications

sector. Examples of such KPIs include the **share of Afro-Brazilian employees (including gender disaggregation) trained in digital skills, Afro-Brazilians and Afro-Brazilian women in leadership positions,** and the share of **Afro-Brazilian outsourced** employees.

- **Investing in high-potential digitalization sectors:** Investors could approach **sectors with high potential for digitalization, with a direct impact on the Afro-Brazilian population as end users.** For example: Health insurance providers are potential clients due to their high-level digitalization, including telehealth. In Brazil, many health insurance providers are affiliated with the employer, and offer benefits to employees. Hap vida is the largest health insurance company in Latin America, holding an 18.1% market share in Brazil.

3.3.2. What non-financial services will be needed to support Afro-Brazilian digital literacy and competencies?

Global context: Digital literacy is covered under Sustainable Development Goal 4 (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all)., Indicator 4.4.1 specifically addresses the proportion of youth and adults with information and communications technology (ICT) skills, by type of skill.[85]

It is worth noting that digital literacy is crucial for mitigating losses caused by scams in the digital environment. According to ClearSale's Fraud Map, Brazil recorded 5.6 million fraud attempts in 2022. Analyzing 312.2 million e-commerce transactions via credit card, the study calculated fraudulent activities amounting to BRL 5.8 billion. The emergence of digital solutions such as virtual wallets, Pix, wearables, and e-commerce on social media platforms – including WhatsApp – has assisted in promoting digital inclusion but has also increased the risk faced by a less educated population.

Multiple international development and private sector actors have developed strategies and programs to promote and increase digital literacy, including for marginalized groups. The most seminal benchmark approaches are summarized below, focusing on inputs that are relevant to digitally under-served and under-represented populations, including Afro-Brazilians.

These insights can guide investors to support investees' employees. It illustrates how investors, through technical assistance, could offer technical training and certifications focusing on Afro-Brazilian employees. In addition, Afro-Brazilian-led firms would also benefit from support to engage in e-government applications, telehealth, and e-learning solutions; and financial institution employees can receive specialized training to mentor and assist end-users. Finally, recognizing that Afro-Brazilians are more exposed to cyber risks, marketplace platforms should be incentivized to invest in antifraud solutions through specific financial programs built for this purpose, both enhancing the security of their platforms and alerting their costumers about frauds.[86]

85 United Nations, Department of Economic and Social Affairs, 'Sustainable Development Goals – Goal 4'.

86 According to the Núcleo de Informação e Coordenação do Ponto br (2024), "individuals with the poorest connectivity conditions are also the most exposed to risky situations, considering that they are also the ones with the least skills to manage their use of the digital environment". Núcleo de Informação e Coordenação do Ponto BR. (2024). Conectividade significativa: propostas para medição e o retrato da população no Brasil (Cadernos NIC.br Estudos Setoriais). São Paulo: CGI.br. Available at https://cetic.br/media/docs/publicacoes/7/20240415183307/estudos_setoriais-conectividade_significativa.pdf

Framework	Relevant points
UNESCO, Designing inclusive digital solutions and developing digital skills: guidelines, 2018[87]	• Digital skills are viewed as being on a spectrum, from basic functional digital skills to generic digital skills, to higher-level skills. • UNESCO recommends a six-step process for developing digital skills, specifically targeted at populations that are the most digitally excluded. 1. Design with all the users, focusing on their needs and context 2. Focus on users' digital skills and competencies. 3. Ensure the clarity and relevance of content for low-skilled and low-literate users. 4. Use appropriate media and tailor used interface for low-skilled and low-literate users. 5. Provide initial and ongoing training and support. 6. Constantly monitor, measure and improve.
International Telecommunications Union (ITU), Digital Skills Toolkit, 2018[88]	• Chapter 7 of the toolkit specifically focuses on how to create digital skill opportunities for under-represented populations. • Successful approaches are listed as follows: ◦ Raise awareness and address stereotypes. ◦ Conduct campaigns to provide digital skills to under-represented groups, for instance, ITU's International Girls in ICT Day campaign. ◦ Offer free or subsidized training to members of under-represented populations, for instance, private sector stakeholders could advertise scholarships funded through corporate social responsibility programs. ◦ Motivate the private sector to support equality and achieve diversity targets through apprenticeships, mentorships, fundraising, and job hiring. ◦ Develop an outreach strategy to gain trust and buy-in from digitally excluded populations. ◦ Involve and consult the target population. ◦ Bring in instructors with a shared background, who will also add value as role models, advocates, and cultural experts. ◦ Adapt curriculum and training methods to make them more attractive and accessible to under-represented populations. ◦ Leverage mobiles in contexts where mobile phone ownership is widespread – ITU has guidance on creating a mobile literacy curriculum.

87 Vosloo, S., Designing inclusive digital solutions and developing digital skills: guidelines, UNESCO: United Nations Educational, Scientific and Cultural Organisation. France. Retrieved from https://policycommons.net/artifacts/8218478/designing-inclusive-digital-solutions-and-developing-digital-skills/9132064/ (Accessed on July 2023).

88 International Telecommunication Union. 2018. 'Digital Skills Toolkit.'

Framework	Relevant points
International Telecommunications Union (ITU), Digital Skills Insights, 2021[89]	• Recommended target areas to reach underrepresented groups: 1. Micro, small, and medium-sized enterprises need free accelerated digital access to technical certification training, sharing of best practice exchange programs, and business development training. 2. Women-run businesses and girls in school deserve privileged access to technical certifications and female train-the-trainer initiatives. 3. E-government services should be leveraged as a driver and tool for digital skills learning on public safety, social and economic grounds. 4. Telehealth services and content can be used to create and/or extend communities of digital best practices and expand remote access. Digital health records management can also be used by practitioners and patients to reduce administrative burdens. 5. E-learning needs to incorporate soft digital literacy targets in areas such as communication, leadership, teamwork, and situational awareness; and free/ subsidized devices and local community platforms should be part of broadband network expansions, upgrades, and rollouts. 6. Digital financial services that cater to underrepresented segments should be promoted, and bank employees can be specifically upskilled to coach/support end users. Figure 11 below summarizes the digital skills approaches by broadband adoption targeted areas.

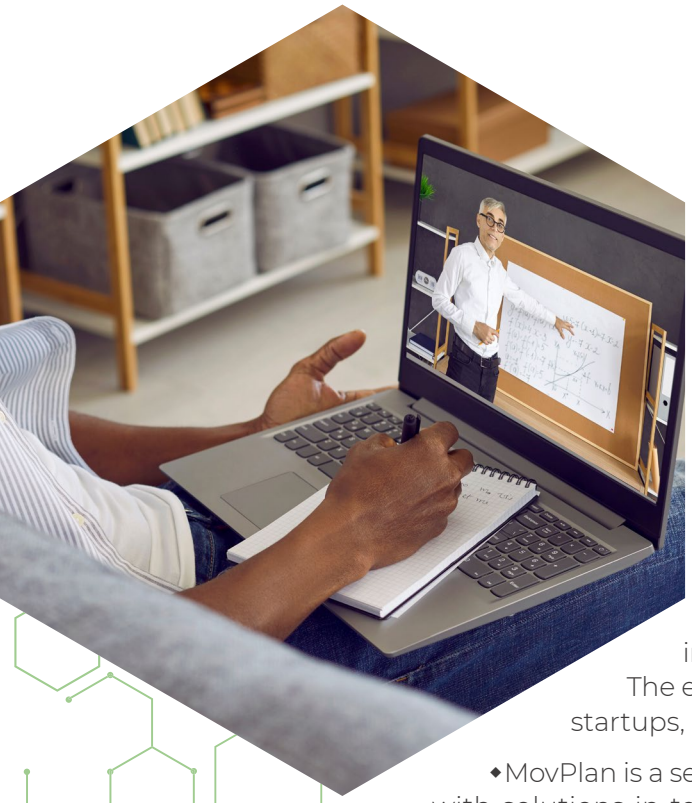
Figure 11: Digital skill approaches by broadband adoption target areas

LAST MILE CONNECTIVITY TARGET AREAS	DIGITAL SKILL APPROACHES
Internet literacy for SMEs	- Free certifications - Exchange programmes - Business development training.
Digital gender divide	- Technical certifications - Female train the trainer initiatives
E-government services	- Community engagement - Local content and context - Internet as an essential service
Telehealth	- Communities of best practice - Expand remote access - Reduce regulatory/admin burden
E-learning	- Hard & Soft digital literacy targets - Free/subsidised devices & connections - Community platforms for students/content providers/teachers
E-banking	- Target underrepresented segments - Promote financial sustainability - Upskill workers to coach/support endusers
Remote Work	- Access to learning paths and content - Low-cost/free certifications and job-seeking tools - Digital business and social interaction skills

Source: Extracted from ITU - Digital Skills Insights report – 2021, page 19.[90]

89 International Telecommunication Union (2021). Digital Skills Insights 2021. ITU Publications. Retrieved from: https://academy.itu.int/sites/default/files/media2/file/21-00668_Digital-Skill-Insight-210831_CSD%20Edits%206_Accessible-HD.pdf

90 International Telecommunication Union (2021). Digital Skills Insights 2021. ITU Publications. Retrieved from: https://academy.itu.int/sites/default/files/media2/file/21-00668_Digital-Skill-Insight-210831_CSD%20Edits%206_Accessible-HD.pdf



Existing digital skill platforms and programs for Brazilians:

- 'Brasil Mais Digital' is an online education program for capacity building in the IT sector directed at young people aged 16-25.[91] According to the OECD, while some progress has been made, there are high dropout levels, suggesting the programs could be improved.[92]

- Softex is a series of initiatives aimed at prioritizing areas of technology, information, and communication, with emphasis on Artificial Intelligence solutions and interactions with other technologies for the private sector.[93] The execution of projects takes place in collaboration with ICTs, startups, researchers, companies, and universities.

- MovPlan is a series of initiatives for both education and corporate settings with solutions in technology and innovation, such as the development of educational software and classroom digital equipment.[94]

Key takeaways for investors regarding advisory services for enhancing Afro-Brazilian digital literacy and competencies:

- **Enhancing e-learning opportunities for Afro-Brazilians:** Distance learning institutions, such as digital platforms and universities, can enhance higher education among Afro-Brazilians. In Brazil, e-learning represents 41.4% of undergraduate enrollments. **Investors could enter this market through remote-learning universities** as an investment option, directly impacting the Afro-Brazilian population, particularly those enrolled in private institutions. This approach should be paired with intentional digital inclusion initiatives for those involved with e-learning platforms (students and university employees) using tutors and labs to guarantee integration. As for non-financial services, **e-learning platforms should comply with free short courses targeting Afro-Brazilians, lower-income students, and other vulnerable groups, offering scholarships and digital skills training in line with labor market requirements.**

- **Leveraging fintech for Afro-Brazilian financial inclusion:** Fintech companies **represent an investment opportunity** driven by the rise of digital payment methods. Likewise, the potential for increased participation of Afro-Brazilian individuals in the labor market would enable them to access bank accounts. Fintech companies can tap into this population as potential clients. As a non-financial service option, investors should recommend that their fintech investees develop financial products targeted at the Afro-Brazilian population and businesses, and to create targeted marketing strategies.

91 More information at: http://portal.mec.gov.br/component/tags/tag/36372-brasil-mais-ti.
92 OECD. 2020. 'Going Digital in Brazil.' OECD Reviews of Digital Transformation. p.20
93 More information available at: https://softex.br/ppi/
94 More information available at: https://movplan.com.br/

- **Investing in anti-fraud solutions to protect vulnerable populations:** The increase in online transactions is fueling the market for anti-fraud solutions, especially in the banking sector. It is estimated that there is an **investment opportunity of BRL 6.13 billion in this sector,** as per projections from the IDC Worldwide Security Spending Guide.[95] Investors should invest in anti-fraud software solutions, given their potential to directly impact the Afro-Brazilian population. As previously explained, Afro-Brazilians are more affected by the digital divide and have fewer digital skills. Additionally, investors could require their investees, particularly software developers, to implement digital literacy initiatives so that Afro-Brazilians can be better equipped to identify fraudulent activities and scams. This approach could be supported through non-financial services. Investors can also directly support anti-fraud software and technology for both companies and financial institutions or fintechs.

Closing remarks for Pathway 3

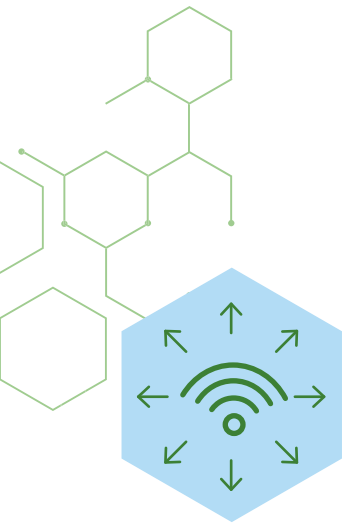
There's a notable presence of Afro-Brazilians in low-education sectors vulnerable to automation. In addressing this, investors could focus investees' non-financial services on retraining initiatives and invest in tech parks to mitigate professional shortages in the IT market. Ensuring that investees adhere to fair labor practices, particularly in outsourced sectors like telecommunications, is also crucial. Additionally, targeting sectors ripe for digitalization, such as health insurance and education, could directly benefit Afro-Brazilian end-users.

Enhancing digital literacy and competencies among Afro-Brazilians is crucial. Investors could support distance learning platforms, which would support the growing trend of e-learning in Brazil. They could also advise fintech companies to develop products catering to the Afro-Brazilian market. With the rise in online transactions, investing in anti-fraud, data protection, and cybersecurity solutions in the banking sector, estimated at BRL 6.13 billion, emerges as a significant opportunity. These efforts combined could significantly advance digital inclusion and economic empowerment for Afro-Brazilians.

95 Brazilian Association of Software Companies: Brazilian Software Market Report - 2023 Scenario& Trends. 1USD=4,72 BRL as of 31 july 2023.

4. Size of the market opportunity for Afro-Brazilian populations and businesses

4. Size of the market opportunity for Afro-Brazilian populations and businesses



The market opportunities of investing in Afro-Brazilian digital inclusion was estimated considering the size of the outreached audience demonstrated in pathways 1, 2, and 3, to be realized by local private sector companies. This includes businesses aimed at improving the infrastructure of digital services in subregions of Brazil with a greater predominance of Afro-Brazilians. In this way, investors would be encouraging ventures that offer technology solutions (such as e-commerce applications and distance-learning platforms), as well as business investments aimed at improving digital literacy and network security or investments in digitalization and automation.[96]

The results of the calculations are as follows:

- **The broadband expansion would lead to an estimated impact of BRL 361.76 million.** This results from calculating the additional income for individuals by universalizing access through infrastructure investments to the 29.69 million Afro-Brazilians who are currently digitally excluded (See Annex 1). These calculations do not consider mobile broadband expansion.[97]

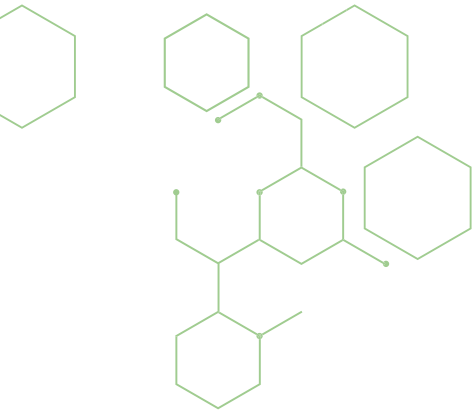
96 Limitations: i) The research questions cover a broad range of topics, while the available data only supports certain calculations. For example, Pathway 3 encompasses more than just investments in cybersecurity, but the calculations only account for that aspect. ii) Pathway 1 focuses exclusively on the impact on Afro-Brazilian populations by considering only broadband internet and excluding 3G and 4G connections. 3G and 4G connections are excluded because the data did not allow for disaggregating Afro-descendants from non-Afro-descendants and also, because relying exclusively on 3G and 4G connections does not equip individuals with the necessary infrastructure to use the internet to study and work, for instance. In most cases, it exposes users to data package limitations or dependence on public Wi-Fi infrastructure, thereby increasing vulnerability to security issues. Therefore, we assume that Pathway 1 significantly underestimates the gains for both Afro-Brazilians and the general population. However, Pathway 2 and Pathway 3 include both Afro and non-Afro-led companies in their analyses.

97 Relying exclusively on 3G and 4G connections does not equip individuals with the necessary infrastructure to use the internet to study and work, for instance. In most cases, it exposes users to data package limitations or dependence on public Wi-Fi infrastructure, thereby increasing vulnerability to security issues. Despite acknowledging the power of mobile connectivity, when addressing the reduction of the Afro-digital divide, we must also consider the quality of connections and how the internet is utilized to promote equality of opportunities.

- **Expanding businesses online presence through e-commerce represents BRL 9.76 billion from Afro-Brazilian consumers who are currently excluded from online services** (mobile and broadband). This assumes that the proportion of those who are now connected, and currently purchasing online remains the same.[98]

- **The Telecommunications sector represents a business opportunity for investments in the private sector of BRL 39.04 billion,** according to reports from Telecom sector representatives such as Conexis.[99] This encompasses the expansion of services, quality improvement, security enhancements, network infrastructure, and other related areas.

- **The cybersecurity anti-fraud solutions sector** are expected to be driven by the IT market, the advancement of 5G technology, and the expansion of online payment methods, all of which has a significant potential to impact the Afro-Brazilian population. According to IDC, **the required estimated investments to fulfill demand requirements would reach BRL 6.13 billion.**



98 Zero-rated programs involve providing free access to specific applications and websites without consuming users' data plans. For example, if an internet access service does not charge a user for the data used to access a specific music streaming application or all music streaming applications, then the ISP is zero-rating those applications.. On the other hand, the non-charging is usually associated with specific advertisements based on the consumer's consumption profile, which potentially can increase the volume of online transactions for goods and services. However, this was not considered in the calculation due to the difficulty in estimating the potential of this traffic. If we assume that the consumption pattern of this targeted traffic is identical between new and existing consumers, then the final result is not affected. However, in reality, it is expected that newly included individuals in e-commerce may adopt a more conservative approach to online purchases in the short term.

99 https://conexis.org.br/numeros/estatisticas/

5. Leveraging Innovative Finance and Partnerships for Digital Inclusion

5. Leveraging Innovative Finance and Partnerships for Digital Inclusion

World Economic Forum: Spotlight on Digital Inclusion Bond Financing and other innovating financing arrangements

The World Economic Forum (WEF) launched the 'EDISON Alliance' in January 2021 as a platform to accelerate unprecedented collaboration between the ICT community and other critical sectors of the economy, specifically in three focus areas: health, education, and financial inclusion. In September 2021, the Alliance launched the '1 Billion Lives Challenge' to advance digital inclusion around the world. Partners are asked to commit to the number of lives they aim to positively impact by 2025, backed by credible initiatives, and must tackle one of three key structural barriers: access, affordability, and usability.[100]

In 2021, the Alliance launched a guidebook on sustainable financing frameworks for supporting digital inclusion. The guidebook emphasizes that "digital inclusion is not only an altruistic goal but a smart investment."[101]

Digital inclusion financing arrangements: These are innovative financing arrangements that provide incentives and funding to support digital inclusion. Through this type of financing, **"an issuer raises funds while supporting digital inclusion efforts by designating the use of proceeds to specific digital inclusion projects, tying the coupon to the achievement of digital inclusion key performance indicators (KPIs), or structuring the financing to provide a rebate on the principal tied to the achievement of digital inclusion KPIs."**[102] Digital inclusion financing arrangements complement existing forms of social finance innovations that support social and environmental goals, including social impact bonds, impact investing, innovation funds, and sustainability-linked loans.

100 World Economic Forum, Jan. 2023. 'EDISON Alliance: 1 Billion Lives Challenge'.

101 World Economic Forum, Sep. 2021. Guidebook to Digital Inclusion Bond Financing. White Paper, p.5

102 World Economic Forum, Sep. 2021. Guidebook to Digital Inclusion Bond Financing. White Paper, p.6

The EDISON Alliance's guidebook outlines two types of arrangements:

- **Digital inclusion bond financing** – may facilitate project-specific or non-recourse debt structures (for example, social bonds can be organized as social revenue bonds, which are issued through a special purpose vehicle);
- **Digital inclusion bank financing** – allows the borrower to raise capital through a loan agreement with a banking entity or lender.

Whichever route is adopted, **digital inclusion financing arrangements should adhere to applicable market frameworks for sustainable and social financing,** for instance, the Social Bond Principles and Sustainability-Linked Bond Principles, published by the International Capital Market Association.[103] It is important to include how progress in digital inclusion will be measured, whether by tracking the use of proceeds or tracking performance against KPIs.

Examples of digital inclusion KPIs and use of proceeds projects provided by the WEF include the following:

Area	Examples of KPIs	Examples of projects (use of proceeds)	Applicability to Afro-Brazilian context
Broadband access	• Within five years, improve the speed of broadband services available to individuals in a designated developing country or a designated rural area.	• Develop new telecommunications networks specifically designed to reach previously underserved communities, such as rural communities. • Case study: The African Development Bank's Social Bond Framework used to finance projects that fund last-mile connectivity for rural communities.[104]	• Improve the access and speed of Internet within municipalities with the highest proportion of Afro-Brazilians;

103 More information at: https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/.

104 African Development Bank 2017, 'Social Bond Framework'. Retrieved from https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/AfDB_Social_Bond_Framework.pdf. Accessed on June 2023

Area	Examples of KPIs	Examples of projects (use of proceeds)	Applicability to Afro-Brazilian context
Financial inclusion	• Within five years, support and empower a specified number of small businesses with access to e-commerce capabilities, online products, and digital educational resources.	• Develop digital tools to enable access to financial services. • Case study: Bank of America Equality Progress Sustainability Bonds, used for investments in Black and Hispanic Minority Depository Institutions, Black- and Hispanic-certified minority businesses, and venture capital funds and private equity funds that have a focus on investing in Black- and Hispanic-owned and operated businesses.[105]	• Support the adoption of ERP and CRM software for Afro-Brazilian-led MSMEs; • Support the population's knowledge and awareness of cybersecurity best practices and risks associated with digital activities.
Education	• Within three years, provide digital learning tools to a specified number of students or teachers in under-resourced primary and secondary schools.	• Provide technological devices that facilitate learning, such as tablets, laptops, or computers, to under-resourced schools or under-served students.	• Increase the number of individuals who have received formal training in digital skills, such as coding, digital marketing, or data analysis; • Improve the infrastructure for students participating in online educational programs or e-learning initiatives. •

As described above, there are sizeable investment opportunities in the telecommunications, IT education, and health sectors that could benefit from this sort of KPIs. As for applicability to the Afro-Brazilian context, there is room for improving digital skills and training for employees, increasing the number of IT students, offering an innovative environment for IT enterprises, and empowering micro and small enterprises in e-commerce through marketplace platforms.

105 See more: https://investor.bankofamerica.com/fixed-income/esg-themed-issuances

6. Conclusions and final recommendations

6. Conclusions and final recommendations

This comprehensive study described the significant digital inclusion gaps affecting Afro-Brazilian populations and businesses, while underlining the critical intersection between digital access and racial equality in Brazil. The evidence gathered demonstrates a stark digital divide that correlates strongly with race and socio-economic status, disproportionately affecting Afro-Brazilians in both urban and rural settings. Despite the widespread availability of mobile broadband Internet services, discrepancies in access to higher-quality connectivity and digital literacy present substantial barriers that perpetuate economic and social inequalities.

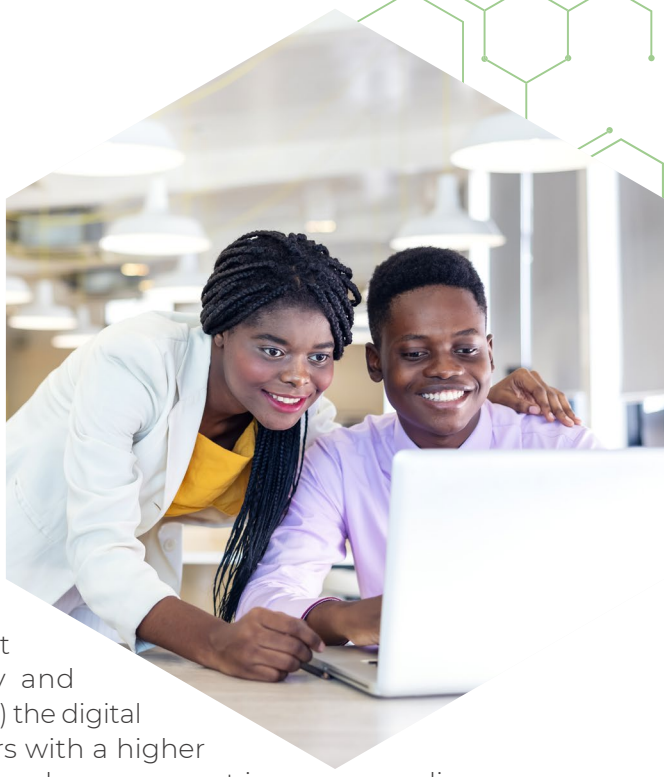
The study submits that strategic investments in digital infrastructure, particularly in under-served regions with high Afro-Brazilian populations, are not only necessary but also present substantial market opportunities.

The study's findings suggest that enhancing connectivity and affordability could significantly improve economic and social outcomes for Afro-Brazilian communities by providing better access to digital services, fostering greater participation in the digital economy, and enabling Afro-Brazilian businesses to reach new markets and improve operational efficiencies.

Pathway 1 – Increase availability & affordability of the network, argues that investments in infrastructure to promote broadband expansion would lead to an estimated impact of BRL 361.76 million in yearly income for the Afro-Brazilian population. This is a conservative estimate, which disregarded potential spillover effects that might arise from providing digital products and services to the current digitally excluded population.

Pathway 2- Digital transformation of organizations advances that there would be an: (i) an estimated impact of BRL 9.76 billion for businesses selling online, derived from Afro-Brazilian consumers who are currently excluded from the online marketplace; and (ii) BRL 39.04 billion in business opportunities for investments in companies in the telecommunications sector, encompassing the expansion of services, improvement of current coverage, security enhancements, etc.

Finally, by supporting Afro-Brazilian-led MSMEs through targeted digital upskilling and



transformation initiatives, investors can catalyze broader socio-economic benefits, including increased employment opportunities, higher business competitiveness, and improved access to digital services. This opportunity comes with an increasing requirement for safety, adherence to data protection regulations, and cybersecurity practices. The demand to fulfill the IT market would reach BRL 6.13 billion, which lies on Pathway 3 - Increasing digital skills and competencies through investments and advisory services.

Indeed, many opportunities lie in (i) the improvement of infrastructure through network availability and affordability for currently unserved Afro-Brazilians, (ii) the digital transformation of companies, especially in sectors with a higher proportion of Afro-Brazilian individuals, (iii) increased engagement in online business, and (iv) enhancement of digital literacy and cybersecurity. Furthermore, specific investment opportunities were highlighted in segments with significant potential to impact the Afro-Brazilian population, especially in healthtechs and edtechs.

Private and public sector stakeholders should continue to leverage its influence and resources to foster partnerships that emphasize both technological and social advancements. Collaborative efforts with local governments, private sector stakeholders, and community organizations will be essential in implementing the recommendations from this study. Such partnerships should aim to expand digital literacy, develop supportive infrastructure, and ensure that digital transformation initiatives are inclusive and equitable, particularly for marginalized communities.

In conclusion, addressing the digital inclusion gap for Afro-Brazilians is not merely a matter of connectivity but also of ensuring equitable access to the opportunities afforded by the digital age. Investors and private sector stakeholders, if intentional, are positioned to lead these efforts by creating lasting impacts that go beyond digital access and foster comprehensive social and economic inclusion.

Annex 1: Methodology details

Primary and Secondary Data Sources

To size the market opportunity for Afro-Brazilian populations and businesses, the following data sources were used:

Category	Data
Entrepreneurs and business owners	PNADC microdata
Digital inclusion – households	PNADC- ICT microdata
Digital inclusion - enterprises/ households	Cetic.br
Employers' and Employees administrative records	RAIS
City-level indicators on digital inclusion	Índice de Cidades Empreendedoras (Index of Entrepreneurial Cities): https://ice.enap.gov.br/opendata
Afro-Brazilian tech-talent	INEP: Registered courses; number of graduates, schools, and universities related to tech; Infrastructure
Fintechs, Edtech, HealthTech, and technology hubs	Secondary data from sectoral reports
Afro-Brazilian consumers	POF and Qualitative data
Connectivity indicators	ANATEL

Data sources and calculation methodology

This section details the calculations for the market opportunity in each pathway, clarifying the methodology adopted and the data sources used.

I - Pathway 1: Connectivity and affordability (digital infrastructure and devices)

Pathway 1 aimed to estimate the opportunities arising from the expansion of connectivity and the availability of broadband connections in areas where the Afro-Brazilian population is currently underserved. To estimate the contribution to income, derived from expanding connectivity, the following model using PNADC PNADC- ICT microdata Survey microdata for 2021 was used:

(Equation 1)

$$\ln(\text{income})_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_v X_{iv} + \varepsilon_{it}$$

Where "β" represents the estimated parameters for the "v" variables that affect the remuneration of each "i" individual conditional on the internet infrastructure in the district where they reside. Therefore, the monthly income depends on age, age squared, educational level (in years), gender, urban area dummy, the density of accesses in the district, and the baseline percentage of Afro-Brazilians in the district. **The coefficient of interest is the mean density of internet access in the district.**[106] All data sources come from PNADC ICT Survey microdata, except for the density of internet access, which comes from ANATEL.

A 1-unit increase in the density (internet points of access) in the district where the Afro-Brazilians live is associated with a 1.54% increase in the Afro-Brazilians' income level. The average density in Brazil is 16.13 accesses per 100 households, and the average income level of Afro-Brazilians is BRL 1,761.65 (as a reference, the minimum wage in 2023 = BRL 1,320). Therefore, *ceteris paribus*, universalizing internet access for every 29,685,299 underserved Afro-Brazilians would be associated with BRL 30,146,286,23 per month (29,685,299 * exp (0.0154096)). In one year, this would lead to an increase in BRL 361,755,363 (therefore BRL 361,76 million).

Total underserved Afro-Brazilians account for the total number of individuals who answered they had no access to the Internet at home through broadband (ADSL, VDSL, cable TV, fiber optic cable, satellite, or some type of radio, such as Wi-Fi)[107]. This includes those who answered "No", "Does not know," and "Not applicable" in the PNADC – Household survey, 2021 Q4, which includes an ICT Supplement survey. The district is a group of municipalities. PNADC provides valid statistics only for the population at the district level or more aggregate geographic levels, following technical notes for statistical inference from the Brazilian Institute of Geography and Statistics, who conducted the survey.[108]

Table 1: Econometric results from Equation 1.

	ln(income): Afro-Brazilian	ln(income): Non-Afro Brazilian
Level of education	0.175***	0.193***
	(78.49)	(66.84)
Age	0.269***	0.290***
	(145.86)	(118.26)
Age squared	-0.00307***	-0.00337***
	(-134.24)	(-116.37)
Dummy woman==1	-1.505***	-1.317***
	(-90.86)	(-63.42)

106 It was also tested to summarize the results for subpopulations depending on connection density quartiles. However, this approach should be avoided in order to prevent biases not controlled by the variables added to the model.

107 The question in the Household Survey is "Is the connection used by the resident to access the Internet at home broadband? (ADSL, VDSL, cable TV, fiber optic cable, satellite, or some type of radio, such as Wi-Fi)?" which does include Wi-Fi, but excludes 3G, 4G, 5G mobile-only internet.

108 More information regarding strata (districts) at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101933.pdf

	ln(income): Afro-Brazilian	ln(income): Non-Afro Brazilian
Density of access in the district	**0.0154*** **	**0.00815*** **
	(10.48)	**(4.78)**
Dummy if a resident in an urban neighborhood ==1	-0.463***	-0.430***
	(-19.04)	(-13.67)
Share of afrobrazilian in the district	-1.112***	-0.917***
	(-15.37)	(-14.23)
Constant	-1.052***	-1.490***
	(-13.75)	(-18.32)
N	446.043	451.03
Sub-population size	115,918,411	90,857,951
R-squared	0.3525	0.3816

Note: * p<.05; ** p<.01; *** p<.001. Robust standard errors are reported in parentheses.
Results of interest highlighted in bold.

The hypothesis that investment in connectivity has a greater impact on the Afro-Brazilian population can be demonstrated by the fact that in the non-Afro-Brazilian subpopulation, the estimated effect is lower. The observed difference in the estimated effect between the two subpopulations supports the idea that improving connectivity may play a more critical role in addressing disparities and promoting economic opportunities among Afro-Brazilian communities.

As for devices and manufacturing, although there is a potential market growth in the Brazilian devices sector, estimated at BRL 101.08 billion by 2023 (estimates from IDC Worldwide Black Book Live Edition), authors decided not to count this amount as a market opportunity, because it incorporates inaccuracies arising from the lifecycle of electronic equipment and technological innovations inherent in this process. It is not simple to attribute how much the Afro-Brazilian population could benefit from the introduction of new products. In this definition, electronic products include items such as desktops, laptops, tablets, feature phones, smartphones, printers, multifunctional devices, monitors, and wearables.

II - Pathway 2: Digital transformation of Afro-Brazilian and other businesses

Pathway 2 investigated the market opportunities arising from the digital transformation of organizations. First, the study estimated the amount that online commerce companies could potentially sell to the new consumer base of Afro-Brazilians. Then, the estimated investments by telecommunications companies in improving connections, technological upgrades, service expansion, transmission security, and others was calculated.

The investment opportunities in the Telecommunications sector were estimated at BRL 39.04 billion. The result was obtained by projecting the average capital expenditure of companies in the sector for the years 2021 and 2022, based on data from the reports of service providers. However, it is not possible to disaggregate the results for the Afro-Brazilian owned or led businesses.

To estimate investment opportunities in digital transformation for companies that sell online, the study used sector revenue projections and calculated the average spending on online purchases by Afro-Brazilian individuals. Based on this, the study computed the additional gain if the Afro-Brazilian people currently excluded from e-commerce were to start buying online.

The market sizing for Afro-Brazilian e-commerce clients was determined by considering the total number of individuals completely disconnected from the Internet, amounting to 10,644,976 Afro-Brazilian individuals (considering 3G/4G, dial-up connection, broadband – data from Household Survey 2021). Using the total e-commerce revenue for 2021 of BRL 150 billion, obtained from the Brazilian Association of E-commerce, the average annual spending on online purchases to be BRL 2,197.21 per person per year was calculated, based on the number of internet users who declared making online purchases in 2021.[109] The share of people with internet connections who made online purchases was calculated to be 41.7%. By multiplying this proportion (using accurate percentages with more decimal places) by the total number of disconnected individuals, we arrived at the quantity of currently disconnected Afro-Brazilians projected to make online purchases, which is 4,441,579. Further multiplying this quantity by the calculated annual spending per person, the potential market size for Afro-Brazilian e-commerce was estimated at BRL 9,759,104,064 (therefore BRL 9.76 billion). This estimation assumes a consistent proportion of internet users making online purchases and assumes no distinction in behavior between Afro-Brazilian and non-Afro-Brazilian individuals.

Due to the lack of data availability, as well as disaggregation for Afro-Brazilians, the calculation excludes other market opportunities derived from businesses' digital transformation, such as supporting the adoption of CRM and ERP software; new markets embraced by MSMEs in collaboration with marketplace platforms and big techs; software development in payment systems; and investments toward e-government procurement, for instance. Therefore, the estimates should be interpreted as a lower bound to the market sizing opportunities for bridging the digital divide in Brazil.

III - Pathway 3 - Increasing digital skills and competencies through investments and advisory services.

Finally, the transmission channels related to digital skills were concentrated in Pathway 3 - Increasing digital skills and competencies through investments and advisory services. This includes the opportunities derived from recognizing that closing the digital gap requires enhancing online transmission security, investing in digital skills, and providing training for people. This includes requalifying professions that will become obsolete in the medium term, as well as those emerging from the digital transformation of companies, among other competencies required to achieve the effective digital inclusion of Afro-Brazilians.

109 Data source: https://dados.abcomm.org/

However, it is necessary to recognize that estimating such a recent phenomenon in a rapidly changing scenario is challenging, especially considering that data collection through surveys is still being adapted to the new dynamics of the digital world. Thus, among the factors listed, the study quantified those that are directly measurable: IT companies' investments in cybersecurity. For the rest of the opportunities not included in the calculations of this pathway, various recommendations to follow the new developments closely were included, which could potentially also be used as monitoring indicators.

The investment opportunity to improve digital skills for Afro-Brazilians lies in the rapid expansion of the IT market, instant payment technologies, expansion of 5G, etc, which also heightens the risk of fraud and other online security breaches for the unskilled population. The projections of BRL 6.13 billion in investment opportunity in the IT sector comprises Cybersecurity Analytics, Intelligence, Response, and Orchestration (CAIRO), as projected by the IDC Worldwide Security Spending Guide.

It is essential to note, however, that this pathway does not account for other sources of impact for digital literacy and skills, such as fintechs, e-learning universities, or partnerships with government agencies. These sources were not included in the calculations primarily due to the lack of race-disaggregated data on both general population and business owners. Consequently, a more conservative approach was adopted where it was not possible to accurately measure the impact. This methodological limitation means that the current investment pathway likely underestimates the broader scope and potential benefits of enhancing digital literacy among Afro-Brazilians, overlooking significant avenues that could contribute to this goal.

Annex 2: Brazilian Government initiatives focused on digital inclusion

1. **ProInfo (Programa Nacional de Tecnologia Educacional):** an educational program aimed at promoting the pedagogical use of computers in the public basic education system.
2. **Programa Governo Eletrônico: Serviço de Atendimento ao Cidadão (Gesac):** a digital government program primarily targeted at vulnerable communities with no access to ICTs. The program seeks to offer free internet connections to these communities.
3. **Programa Cidades Digitais:** a program that promotes greater ICT inclusion across municipal governments, with the objectives of modernizing management, expanding access to public services, and promoting the development of Brazilian municipalities through technology. Initiatives include the contribution of fiber optic networks to connect government institutions and offers free internet access points in public spaces (such as parks or bus stations).
4. **Computadores para Inclusão:** an initiative that supports the creation of physical spaces to refurbish electronic devices and to hold courses and workshops, focused on training young professionals in socially vulnerable situations. After refurbishment, the equipment is donated to Digital Inclusion Points, such as telecentres, public schools, and libraries.

DIMA DEVELOPMENT IMPACT MANAGERS & ADVISORS

THE EQUITY INDEX

IDB

IDB | Invest