From Cash to Code: Governing by Transactions in the Urban Economy of Rio de Janeiro

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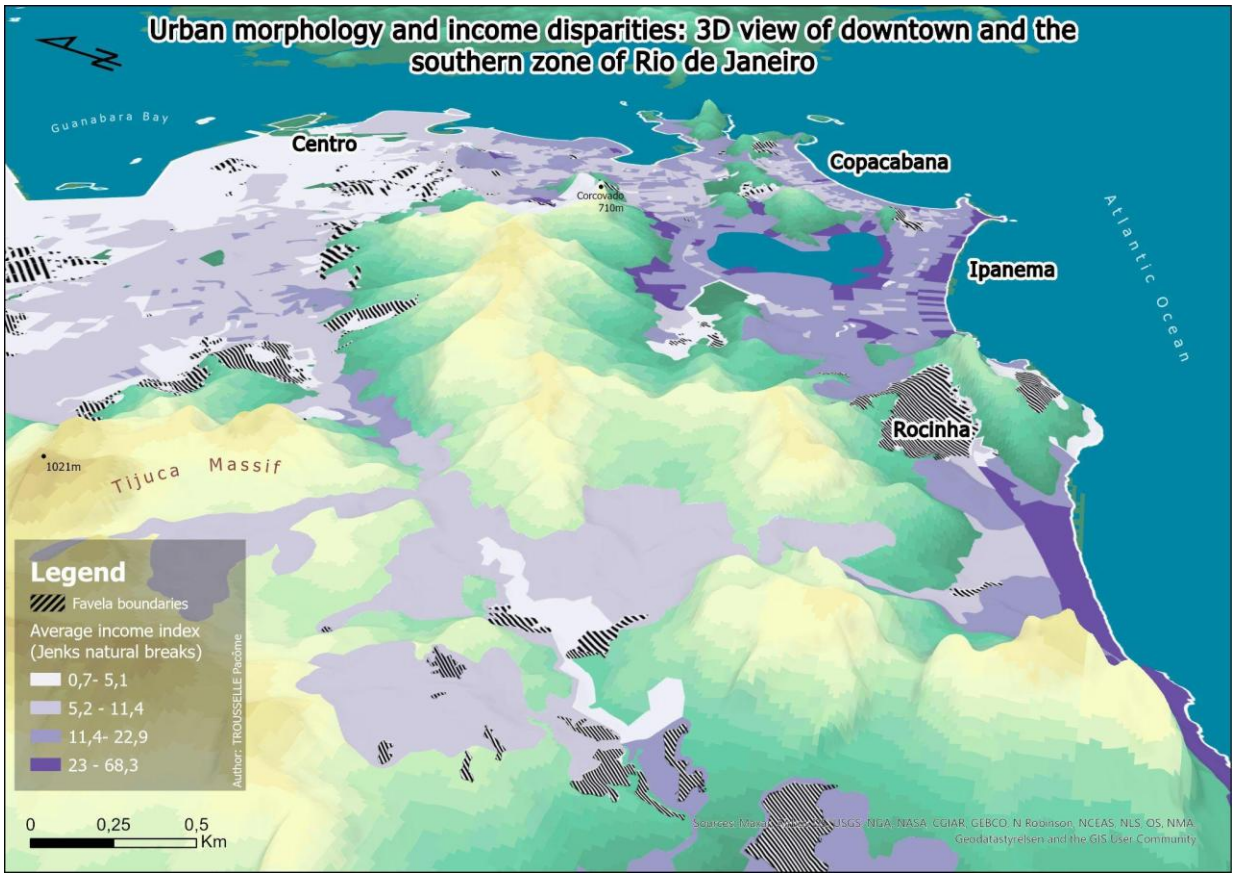

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Abstract

Digital payments, particularly Pix, launched by the Central Bank of Brazil (BCB), have spread rapidly across Rio de Janeiro, transforming everyday financial practices and access to banking services. This brief synthesizes the main findings of recent research on Pix appropriation in Rio and offers recommendations to strengthen digital inclusion in Brazilian cities.

Despite Pix's massive uptake (46% of retail payments in Brazil in 2023, compared with 22% for cash)[1] usage remains uneven across territories and social groups. Rio illustrates how these innovations create new economic opportunities while reconfiguring urban inequalities. In well-connected districts, instant payments reinforce financial inclusion, whereas in low-income areas (peripheral zones and informal settlements commonly called favelas) the digital divide constrains appropriation. In parallel, Pix's expansion has generated new dependencies (mobile networks, data, platforms) and raises urban governance issues: the Central Bank, banks, fintechs, and tech giants now co-manage monetary flows, striking a delicate balance between inclusion and surveillance.

Context and Challenges in Rio de Janeiro

The mobile phone is the main device for Internet access, mentioned by 99% of users. However, this dependency is highly asymmetrical, 30% of Internet users access the connection solely via mobile phone. This dependency increases significantly by socio-economic class, reaching 50% in classes D/E. However, relying solely on an entry-level smartphone seldom fosters true digital appropriation: small screens, limited processing power, and poorly adapted interfaces increase cognitive load and make financial operations slower and less appealing.[2] That is, households whose monthly family income is generally below R$ 2,700 (roughly US $500-550 at the current exchange rate, variable), and they represented, according to recent estimates by IBGE, about 40% to 50% of the roughly 12 million inhabitants of the Rio de Janeiro metropolitan area.[3]

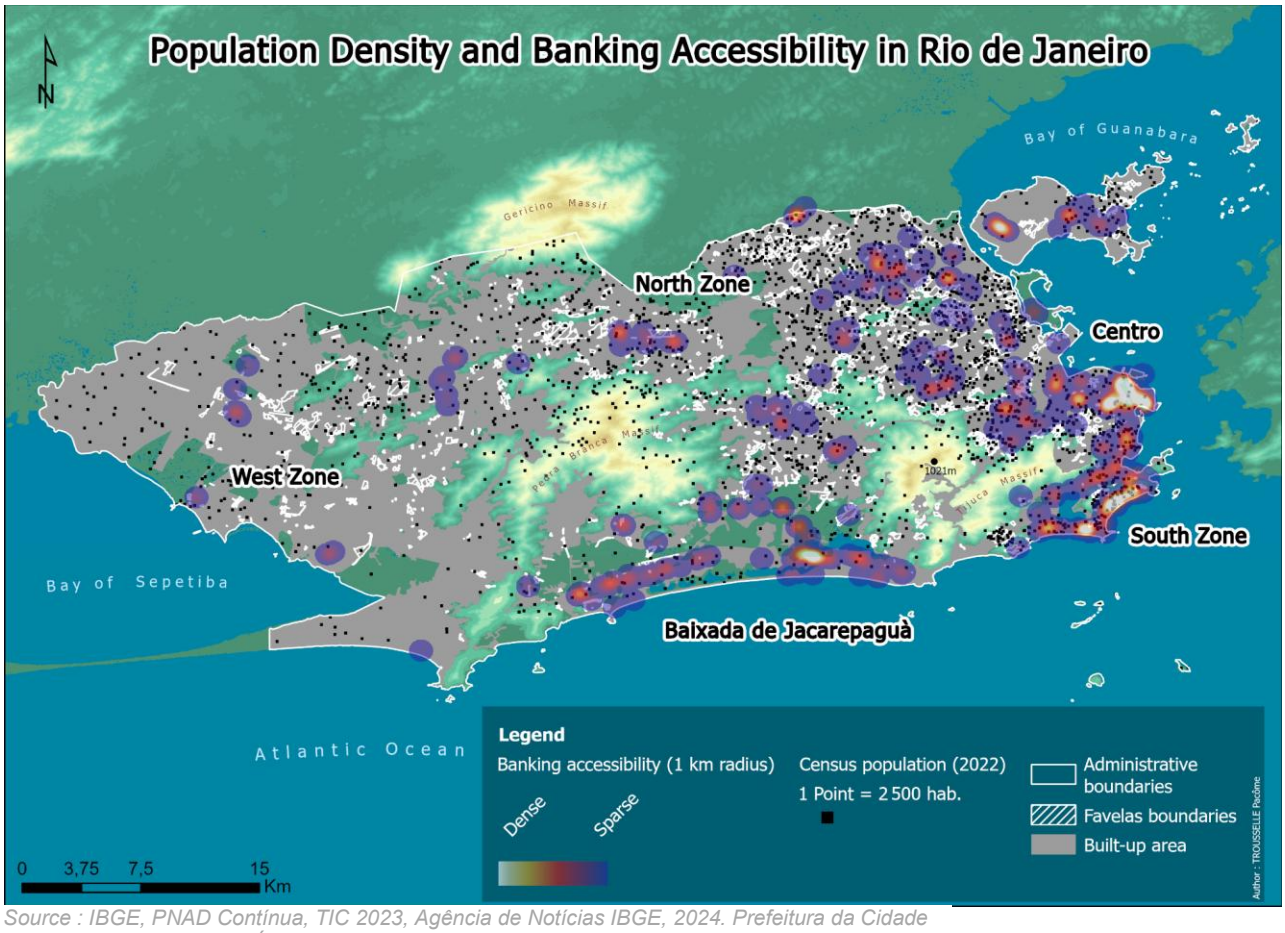
The presence of a computer and home Internet is strongly associated with socio-economic class, ranging from 10% in classes D/E to 97% in class A. That is, households whose monthly family income is generally above R$ 22,000 (roughly US $4,400 at the current exchange rate, variable), representing a minority of about 3% to 5% of the population of the Rio de Janeiro metropolitan area.[4]

Rio de Janeiro juxtaposes affluent neighborhoods and hillside communities. This socio-spatial fragmentation has historically resulted in unequal access to services: the South and Central

[1] Banco Central do Brasil. (2025). *Relatório Pix, Indicadores de uso 2024.* Brasília: BCB.
[2] Poiret, M. J. P., Sié, A., & Grépin, K. A. (2021). *Is the lack of smartphone data skewing wealth indices in low-income settings?* Population Health Metrics, 19, Article 4. https://doi.org/10.1186/s12963-021-00246-3
[3] IBGE. (2024). *Rendimento domiciliar per capita 2024 para Brasil e unidades da federação (PNAD Contínua)*. Agência de Notícias IBGE. https://agenciadenoticias.ibge.gov.br/agencia-sala-de-imprensa/2013-agencia-de-noticias/releases/42761-ibge-divulga-rendimento-domiciliar-per-capita-2024-para-brasil-e-unidades-da-federacao
[4] Cetic.br. (2024). *Pesquisa sobre o Uso das Tecnologias de Informação e Comunicação nos Domicílios Brasileiros (TIC Domicílios 2024)*. Comitê Gestor da Internet no Brasil (CGI.br). São Paulo.

Zones enjoy dense bank branch networks and robust connectivity, whereas the North and West Zones and many vulnerable territories have long remained on the margins of formal financial networks.

The rise of digital payments is redrawing Rio's financial geography. On the one hand, Pix acceptance among local shops creates a fine-grained financial mesh in working-class neighborhoods, partly mitigating "banking deserts" where branches were absent. Each smartphone thus becomes a "bank in the pocket," facilitating transactions in low-income areas and remote areas. On the other hand, weak mobile internet coverage in certain areas reinforces digital segregation: central neighborhoods benefit from all kinds of services and 5G, while large areas of the North and West Zones remain poorly served. Without a stable network, using Pix can quickly become frustrating: payments fail, banking apps load slowly, and users revert to cash for reliability.



Source : IBGE, PNAD Contínua, TIC 2023, Agência de Notícias IBGE, 2024. Prefeitura da Cidade do Rio de Janeiro. (2023). Índice de Desenvolvimento Social da Cidade do Rio de Janeiro por Bairro – 2010 [jeu de données]. Instituto Pereira Passos – Data.Rio.

Against this backdrop, the arrival of instant digital payments was promising. In November 2020, the BCB launched Pix, a 24/7 instant transfer and payment system free for individuals and accessible via smartphone.[5] Uptake was immediate: within three years, 149 million Brazilians (out of ~214 million) used Pix.[6] By 2023, it had become the country's main payment method (46% of

[5] Banco Central do Brasil. (2021). *Relatório PIX: Um ano de pagamentos instantâneos.*

[6] Banco Central do Brasil. (2024). *Relatório Estatístico Pix 2024: Distribuição regional dos volumes de operações*. Banco Central do Brasil

transactions, ahead of cash).[7] National success stems partly from the authorities' aim of financial inclusion: Pix allows millions of "unbanked" or underserved people to access electronic payments without relying on the traditional bank network. In Rio, Pix adoption reflects a double trend. First, a dynamic fintech ecosystem (payment startups, neobanks, mobile apps) has spurred financial innovation.[8] Second, local businesses and services (taxis, street vendors) have massively accepted QR-code and contactless payments. In a few years, the urban landscape has changed: a Pix QR code on a market stall or a smart POS in a street vendor's hand is now commonplace. This penetration of digital tools into the informal economy is a significant novelty, potentially emancipatory (lower costs, more secure revenues), but disruptive for existing balances (competition, regulation of transactions). As shown in the field photographs below, this pattern is readily observable in everyday carioca landscapes.

Pix, QR, and POS: the generalization of digital payments across Rio de Janeiro

Photography (2025). Pix, QR, and POS: the generalization of digital payments across Rio de Janeiro

Structural limits and governance stakes in Rio. Connectivity and device quality remain uneven across the metropolis, with "mobile-only" patterns concentrated in lower-income areas.[9] These conditions shape appropriation rather than mere access: reliance on prepaid data, shared or older handsets, and unstable signal constrains routine Pix use for commerce and household payments.

[7] Source : Banco Central do Brasil. (2025). Evolução das transações por instrumento, mostrando a ascensão do PIX [Graphique]. Banco Central do Brasil. Reproduit dans PIX se consolida como principal meio de pagamentos e transferências

[8] Sampaio, M. C. S., & Ornelas, J. R. H. (2024). Payment technology complementarities and their consequences on the banking sector: Evidence from Brazil's PIX (BIS Papers No 152). Bank for International Settlements.

[9] Comitê Gestor da Internet no Brasil [CETIC.br]. (2024, 11 julho). Pesquisa TIC Domicílios 2023: Principais resultados. https://cetic.br/pt/pesquisa/domicilios/

At the same time, the payments perimeter is widening: the BCB anchors Pix as public infrastructure, while large platforms and local fintechs increasingly layer credit, micro-savings and merchant services on Pix rails; governments also route transfers and public payments through these channels.[10] This assemblage heightens data-governance stakes: without strong safeguards (transparency, purpose limitation, redress), datafication and automated screening risk reproducing exclusion even as transactional inclusion expands.[11]

Key Findings

In just a few years, Pix has become an ordinary payment gesture in Rio, accepted by 94% of micro-entrepreneurs ; for more than half of them, Pix accounts for at least 50% of turnover.[12] Yet appropriation is socially and spatially differentiated, depending on users' devices, connectivity, and trust in digital tools. Wealthier, better-equipped households adopt these solutions more easily than low-income households in underserved areas.

Cash is not going away. Pix operates within a multimodal payment ecosystem. This hybridization is evident across different socio-economic strata: While Pix is widely adopted reaching 91.7%, usage among Brazilians earning 5 to 10 minimum wages (SM), its adoption falls to 67.8% among the lowest-income classes (up to 2 SM). Conversely, the use of cash as a payment method is highest among the poor: 75.0% of individuals earning up to 2 SM still use dinheiro for their accounts and purchases. This reliance on cash, which drops to 59.4% for those earning between 5 and 10 SM, confirms that cash serves as a crucial parallel mechanism where digital inclusion is incomplete.

This hybridization also ushers in new forms of control: transaction data feeds credit-scoring algorithms ("behavioral solvency") that condition access to loans.[13] We thus observe greater financial inclusion coupled with a form of "surveillance capitalism,"[14] where data-generated value accrues to private platforms. The coexistence of inclusion and control creates an ambivalence: without legal safeguards, Pix's expansion risks reinforcing exclusionary mechanisms (algorithmic profiling, full traceability) even as it integrates more users into the formal system.

This multimodal reality is equally driven by merchants and the availability of systems: In the field, a formal–informal hybridization is evident: merchants and users alternate between cash, Pix QR codes, and bank cards depending on context. The acceptance of Pix by commerce has grown significantly, but traditional methods maintain their ubiquity. In 2024, nearly all surveyed establishments accept cash (99.1%), immediately followed by debit card (98.0%) and credit card

[10] Caixa Econômica Federal. (2022). Crédito Caixa Tem: Relatório de expansão e inclusão bancária. Brasília: Caixa.
[11] ANPD. (2024). *Relatório de impacto à proteção de dados sobre sistemas de pagamentos digitais*. Brasília : Autoridade Nacional de Proteção de Dados
[12] Sebrae Rio. (2024, 1 novembre). Noventa e quatro por cento das empresas do Rio aceitam pagamento por PIX. Agência Sebrae de Notícias. Consulté le 27 juin 2025 sur https://rj.agenciasebrae.com.br/dados/noventa-e-quatro-por-cento-das-empresas-do-rio-aceitam-pagamento-por-pix
[13] Finsiders Brasil. (2024, 21 mars). Banco Central planeja usar IA em novo score de risco de fraudes com Pix. https://finsidersbrasil.com.br/pagamentos/bc-planeja-usar-ia-em-novo-score-de-risco-de-fraudes-com-pix
[14] Zuboff, S. (2019). The age of surveillance capitalism: The fight for a human future at the new frontier of power. PublicAffairs.

(97.4%). Pix is also accepted by a vast majority (98.7%), but the high acceptance rate of cash (near 100%) ensures its permanent viability in transactions. Furthermore, when considering the most frequent payment method received by businesses in 2024, while Pix is often dominant, cash remains present (7.2% of frequent payments).[15]

The democratization of digital payments masks persistent structural inequalities. Nationwide, only about 12 % of mobile traffic in Brazil is carried on 5G networks as of H1 2025.[16] Smartphones compatible with 5G in Brazil currently cost on average around R$ 3,000 (approximately US$600 at the exchange rate ~5 BRL = US$1).[17] Meanwhile, in the state of Rio de Janeiro the per-capita monthly household income for 2024 was R$ 2,490.[18]

Adherence to digital services in Brazil is severely constrained by a widespread fear of financial harm. The primary source of anxiety (cited by 80% of respondents) involves the fraudulent use of their identity, or losses due to bank and credit card fraud. Making purchases online (via web pages or applications) generates significant concern, reported by 56% of users (broken down as 29% very concerned and 27% concerned). Accessing online banking applications or pages is also a key worry, reported by 49% of users (25% very concerned and 24% concerned). Furthermore, biometric data (such as fingerprints or facial recognition) represents the sensitive data category sparking the highest level of concern overall. A total of 60% of users expressed worry over providing biometrics (with 32% very concerned and 28% concerned). This anxiety is disproportionately directed toward financial institutions (37% very concerned and 36% concerned) and government organizations (35% and 38% respectively). Users associate the provision of these sensitive details with a high risk of identity theft and fraud, rather than viewing it as a guaranteed security measure. This persistent mistrust has a tangible behavioral consequence, leading to concrete digital abstention: 52% of users reported having stopped using an online service or platform due to concerns about their personal data.[19]

The inclusion enabled by Pix is thus primarily transactional and functional, without a deeper socio-economic inclusion. In this sense, we observe “functional” digital inclusion that does not eliminate structural exclusion linked to poverty, education, or infrastructure quality. Nationwide deployment of Pix relies on shared governance between public and private actors. The BCB leads Pix as a public-interest infrastructure, but fintechs and major platforms deliver innovative applications and

[15] Banco Central do Brasil. (2024). *O brasileiro e sua relação com o dinheiro – Pesquisa 2024*. Brasília.
[16] M2Catalyst. (2025). *Global Mobile Insights Report – H1 2025: Brazil mobile traffic by network type* (p. Table 2). https://www.m2catalyst.com/2025-mobile-traffic-h1/brazil-mobiletraffic-h1-25/
[17]Agência Nacional de Telecomunicações. (2023, 14 avril). Lista de preços dos smartphones 5G homologados pela Anatel. Tele.Síntese. https://www.telesintese.com.br/lista5g/
[18] IInstituto Brasileiro de Geografia e Estatística (IBGE). (2025, February 28). *IBGE divulga rendimento domiciliar per capita 2024 para Brasil e unidades da federação*. https://agenciadenoticias.ibge.gov.br/agencia-sala-de-imprensa/2013-agencia-de-noticias/releases/42761-ibge-divulga-rendimento-domiciliar-per-capita-2024-para-brasil-e-unidades-da-federaca
[19] Comitê Gestor da Internet no Brasil (CGI.br) & Núcleo de Informação e Coordenação do Ponto BR (NIC.br). (2024). Pesquisa sobre o uso das tecnologias de informação e comunicação nos domicílios brasileiros: TIC Domicílios 2023 https://www1.folha.uol.com.br/mercado/2022/10/a-3-dias-da-eleicao-lula-lanca-carta-prometendo-politica-fiscal-responsavel.shtml

services to underserved users. Traditional banks have integrated Pix into their offerings yet struggle with inertia and uneven branch networks.[20]

Analysis of Findings

Differentiated appropriation: between opportunities and constraints. Pix's success in Rio stems from its immediate utility: instant, fee-free transactions via smartphone. For many residents, Pix offers the opportunity to move money easily and securely (less risk of cash theft, remote payment). Appropriation has been rapid across socio-economic groups, including the informal economy. For example, taxi drivers and street vendors use Pix to avoid handling cash and can close sales even when customers carry no cash. Yet adoption has sometimes been a constraint: during the 2020 pandemic and retail modernization, certain shops or services began accepting only electronic payments. Institutional and banking incentives (cashbacks, app-based promotions, pay in installments) further nudged digital use.[21] By 2024, about three-quarters of Brazilians used digital-payment services via Pix (76.4% of the population).[22] A complementary study shows that 63% of Brazilians used Pix at least once per month throughout 2024.[23]

This hybridization of Pix with cash and cards shows that adoption is not a simple replacement of older methods: it is common to see "Pix, cards, and cash accepted" at the same shop. For users, this flexibility is welcome, people choose their payment method based on the situation (amount, potential fees, network availability).[24] Pix is free for individuals under Central Bank rules (with limited exceptions), but smartphone and internet use are not. Pix requires an internet connection, so each transaction consumes mobile or Wi-Fi data.[25] Small ancillary costs such as top-ups or extra receipts may accumulate and weigh on daily budgets, reinforcing selective use of cash for low-value purchases.[26]

Multimodality consolidates Pix as a common backbone (usable by almost everyone) without eliminating alternatives. New practices have also emerged thanks to Pix: "conversational commerce" via social networks.

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[20] Gomes, A., & Silva, T. C. (2024). Fast payment, credit and bank diversification: the impact of Pix adoption on the local credit market structure. EconomiA, 25(2), 377–392. https://www.emerald.com/insight/1517-7580.htm

[21] Araujo, R. V., & Diniz, E. H. (2021). Understanding the use of digital payments in Brazil: An analysis from the perspective of digital divide measures (Rapport de recherche). FGV EAESP. https://bibliotecadigital.fgv.br/dspace/handle/10438/31455

[22] Banco Central do Brasil. (2024, December 20). *Pix supera dinheiro e já é o meio de pagamento mais utilizado no Brasil* (76,4% da população utiliza Pix). https://www.bcb.gov.br/detalhenoticia/20477/noticia

[23] Fundação Getulio Vargas – FGV EAESP, Centro de Estudos de Microfinanças e Inclusão Financeira (FGVCemif). (2025, March 1). *Geografia do Pix* (p. 9: "63,0% dos brasileiros realizaram pelo menos uma transação Pix por mês ao longo de 2024"). https://portal.fgv.br/sites/default/files/uploads/geografia_do_pix_completo.pdf

[24] Ibid., Sampaio, M. C. S., & Ornelas, J. R. H. (2024). p.2

[25] CETIC.br. (2024). *TIC Domicílios 2023 (livro eletrônico)* — tipo de plano (pré-pago 60%) e efeitos do custo de dados/zero-rating sobre o uso (pp. 73–75). São Paulo: Comitê Gestor da Internet no Brasil. https://cetic.br/media/docs/publicacoes/2/20241104102822/tic_domicilios_2023_livro_eletronico.pdf

[26] Ibid. Araujo, R. V., & Diniz, E. H. (2021). p.5

Messaging is the dominant online sales channel for Brazilian firms and the clearest engine of conversational commerce. In 2024, 49% of all companies (with internet access) reported selling via WhatsApp/Skype/Facebook chat, down from 55% in 2023 but still the top channel; email also fell (40% to 34%), while more automated channels (extranet/EDI) remain minority paths. Among firms that do sell online, usage is even more concentrated: 81% use messaging; adoption peaks among small firms (84%), versus 67% (medium) and 62% (large). By contrast, own websites are the preserve of big companies (52% of large sellers vs 32–31% of small/medium), and EDI/extranet climbs steeply with size (up to 26%/21% among large firms). [27]

This channel mix explains the year-to-year dip in the "expanded" e-commerce indicator: the drop in small businesses selling online, many of whom rely on WhatsApp, pulled the aggregate down; CETIC estimates 294,196 small firms sold online in 2023 vs 263,697 in 2024. Yet the chat-first funnel has solidified: discovery (Instagram), negotiation (WhatsApp), instant payment via Pix, and confirmation now occur in a single conversational thread. In 2024 Meta rolled out business AI tools on WhatsApp in Brazil and integrated PIX into WhatsApp's payments, tightening the chat-to-checkout loop that firms already use at scale.

This interconnection between social uses and digital payments creates new opportunities for certain private actors to capture data and host value flows at very fine scales. As major platforms assert themselves as financial intermediaries, one question arises: will tech actors effectively become banks? This prospect sheds light on Pix's creation and the Brazilian state's drive to safeguard monetary and digital sovereignty.

Reconfiguring Urban Dynamics through Digital Payments

In Rio, Pix adoption has tangible urban and territorial effects, facilitating the recomposition of economic circuits between formal and informal areas. Thanks to digital payments, new "digital short circuits" and conversational commerce have emerged, allowing micro-entrepreneurs to sell via social media and receive instant payment through Pix.[28] Low-income workers can receive wages or social benefits directly on their smartphones, without costly or distant intermediaries.[29]

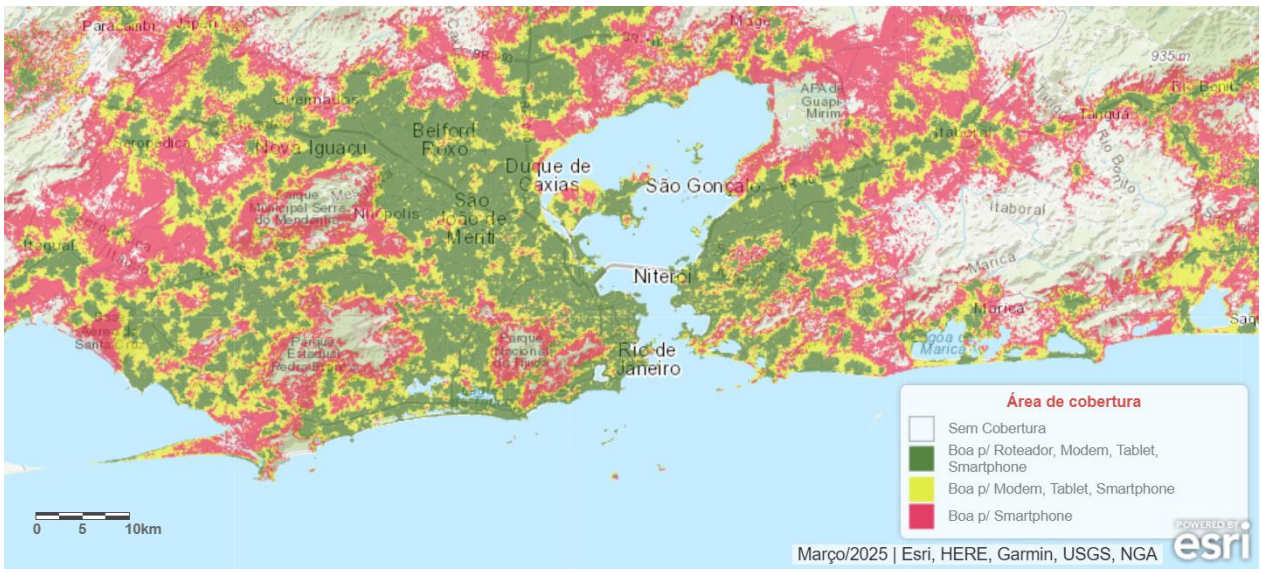
This fluidifies monetary circulation and strengthens local economies. Pix also partly mitigates banking deserts: previously, the North and West Zones lacked branches and ATMs. Now, each Pix-enabled shop serves as a local "payment point", and acceptance among small businesses in Rio is widespread. In short, the territorial mesh of payments is aligning with the urban fabric, an initial response to geographic financial exclusion.

Yet a new form of divide is emerging: digital "white zones." Coverage maps show that while the city center and South Zone enjoy near-total 4G/5G connectivity, peripheral neighborhoods and informal settlements suffer from coverage gaps and degraded service. Without reliable connectivity, Pix infrastructure is of little use. A novel geography takes shape: Pix pushes back exclusion where networks exist but stalls where connectivity fails. Some enclave informal neighborhoods are almost cut off from Pix at peak hours when signals falter, recreating pockets

[27] CETIC.br. (2024). TIC Empresas 2024: Livro eletrônico (pp. 63–68). São Paulo: NIC.br/CGI.br. https://cetic.br/media/docs/publicacoes/2/20250512122204/tic_empresas_2024_livro_eletronico.pdf
[28] Meta. (2023, 11 avril). *Pay small businesses in Brazil on WhatsApp*. https://about.fb.com/news/2023/04/pay-small-businesses-in-brazil-on-whatsapp/
[29] Ibid. Gomes, A., & Silva, T. C. (2024). p.4

of digital isolation[30] within a “smart” metropolis. In short, connectivity conditions inclusion; where networks fail, Pix loses its promise of universality.

Map: Spatial distribution of 4G coverage in Greater Rio de Janeiro, 2024



In sum, Pix partially redraws Rio’s socio-economic map: it connects actors and territories that were previously less connected, but it also projects existing inequalities onto a new screen, that of digital access. The urban impact of these payments thus lies between integration (local meshes, opportunities for the local economy) and fragmentation (heightened polarization between connected and unconnected zones). This shift also improves the traceability of formerly informal flows (Pix transactions leave digital traces), attracting fiscal and security interests.[31]

Data, Algorithms, and Financial Access: New Arbiters of the City

In the longer term, payment traces can feed automated risk models. Without safeguards, Pix histories may be repurposed for algorithmic profiling that influences access to credit and public benefits; Brazil’s LGPD (Art. 20) explicitly frames rights to review such automated decisions and calls for transparency and human oversight.[32] Research on credit-scoring shows that algorithmic

[30] Pagou Fácil. (2023, 14 julho). PIX fora do ar? Veja 6 possíveis causas e como resolver. https://www.pagoufacil.com.br/blog/PIX-fora-do-ar

[31] Banco Central do Brasil. (2023, September 1). *Pix Management Report—Conception and first years of operation* (EN). https://www.bcb.gov.br/content/estabilidadefinanceira/pix/relatorio_de_gestao_pix/pix_management_report_2023.pdf

[32] Autoridade Nacional de Proteção de Dados (ANPD). (2023). *Regulatory Agenda for the 2023–2024 biennium (English version)* https://www.gov.br/anpd/pt-br/centrais-de-conteudo/agenda-regulatoria-para-o-bienio-2023-2024-versao-em-lingua-inglesa.pdf

pipelines can reproduce or amplify social biases, which makes robust, explainable governance essential so that Pix remains a tool of inclusion rather than control.[33] [34]

Pix appropriation in Rio ultimately raises issues of urban governance and regulation. Pix itself is an innovative public policy tool led by the BCB in the public interest, but its effective urban deployment depends on a constellation of actors.

BCB and the State. They guarantee Pix infrastructure (servers, operating rules) and its evolution. The BCB has already adjusted Pix (e.g., night limits to curb fraud) and plans Pix Offline to enable transactions without internet, crucial in poorly covered areas.[35] Examples on the ground include federal initiatives that coupled social protection with banking access: Caixa's smartphone-based microcredit (Crédito CAIXA Tem) and the Auxílio Brasil payroll-deducted loan broadened access for informal workers, though the latter was later suspended.[36] On the supervisory side, Brazil's e-Financeira regime obliges financial institutions to report financial operations to the tax authority, and Receita Federal clarifies it has received aggregated Pix movement data since 2020, with recent rules extending coverage to fintechs and wallets.[37]

Traditional banks. Long dominant, banks have integrated Pix into their channels and reduced back-office frictions, but uneven branch networks and institutional inertia still limit front-line innovation. Rather than "microloans via Pix," Brazil's large public bank CAIXA scaled app-based microcredit (Crédito CAIXA Tem / SIM Digital) contracted directly in the CAIXA Tem smartphone app typically R$ 300 to 1000 for individuals reaching millions of contracts in 2022, which functions as an inclusion lever for low-income workers.[38] [39] At the same time, the algorithmic scaling of such credit raises concerns about over-indebtedness and the ethics of automated scoring, reinforcing the need for transparent criteria, explainability, and effective redress.

Fintechs and platforms. A dense ecosystem of Brazilian providers (e.g., Mercado Pago, PicPay) lets micro-sellers accept Pix through QR codes, payment links, online checkout and Tap-to-Phone, lowering onboarding frictions without a card machine. Some platforms also offer

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[33] Barbaresi, A., et al. (2024). *Algorithmic discrimination in the credit domain: What do we know about it?* AI & SOCIETY**,** 39, 2059–2098. https://link.springer.com/article/10.1007/s00146-023-01676-3

[34] de Almeida, J. E., & co-authors. (2025). *Towards Fair AI: Mitigating Bias in Credit Decisions—A Systematic Literature Review.* Journal of Risk and Financial Management**,** 18(5), 228. https://www.mdpi.com/1911-8074/18/5/228

[35] Banco Central do Brasil. (2025, 24 juillet). *Open Finance – Perguntas e respostas*. https://www.bcb.gov.br/meubc/faqs/s/open-finance

[36] Ministério da Cidadania. (2022, 10 out.). *Crédito Consignado Auxílio Brasil – regras do programa.* Gov.br. https://www.gov.br/mds/pt-br/auxilio-brasil/credito-consignado Serviços e Informações do Brasil

[37] Secretaria de Comunicação Social – Gov.br. (2025, 15 jan.). *Receita Federal sempre recebeu dados sobre Pix.* https://www.gov.br/secom/pt-br/fatos/brasil-contra-fake/noticias/2025/01/receita-federal-sempre-recebeu-dados-sobre-pix

[38] Caixa Econômica Federal. (2022, agosto). CAIXA apresenta aumento de 13,7% da carteira de crédito ampla em um ano e atinge o menor índice de inadimplência do mercado. CAIXA Notícias. https://caixanoticias.caixa.gov.br/Paginas/Notícias/2022/08-AGOSTO/caixa-apresenta-aumento-de-137-da-carteira-de-credito-ampla-em-um-ano-e-atinge-o-menor-indice-de-inadimplencia-do-mercado.aspx

[39] Crédito CAIXA Tem poderá ser contratado por clientes que realizarem a atualização cadastral. (2022, 28 mars). CAIXA Notícias. https://caixanoticias.caixa.gov.br/Paginas/Not%C3%ADcias/2022/03-MARCO/credito-caixa-tem-podera-ser-contratado-por-clientes-que-realizarem-a-atualizacao-cadastral.aspx

installment options tied to Pix collection as a credit product for sellers.[40] [41] In parallel, WhatsApp enables in-chat merchant payments for SMBs in Brazil, tightening the chat to pay funnel typical of conversational commerce.[42] These features broaden acceptance and convenience, while extending platform intermediation into everyday transactions and data flows.

Hybrid governance and scoring. On one side, inclusion advances: the BCB provides common rails (Pix), fintechs supply user-facing interfaces, and local retailers embed usage in everyday commerce. On the other hand, data-driven control expands: transactional events and credit/payment records feed reputation and risk scores. In Brazil, Serasa's "Score em Tempo Real" now updates immediately when a registered debt is settled via Pix inside Serasa's platform reflecting the debt-clearing event, not raw Pix histories.[43] [44] More broadly, Open Finance allows consented sharing of banking data with accredited participants, which can influence credit assessment pipelines; this underscores the need for ethical, transparent governance so that Pix remains a tool for inclusion rather than control.[45]

Policy Recommendations for Inclusive Urban Digitalization

To inform public debate on digital inclusion strategies in the Global South, we outline orientations rooted in this work and converging academic and institutional concerns in Brazil:

Close infrastructure and access gaps. Strengthen digital infrastructure in underserved territories. Concretely: expand mobile coverage in peripheral areas and vulnerabilized territories, possibly via public–private partnerships or alternative technologies, e.g., satellites to connect low-density zones or a fleet of signal-relay drones for crisis situations, deployable everywhere in the country. This kind of initiative would increase the trust of the population and give a lot of legitimacy to the country and a good international image. Support rapid development and real-world pilots of Pix Offline so payments can proceed without networks. Build neighborhood-level access points: encourage QR/POS deployment among merchants, local public services, and NGOs so every district has a dense grid of digital-transaction points. Provide micro-grants or device loans for micro-entrepreneurs and low-income populations.

Such projects may be hindered by the perception that some beneficiaries will divert funds toward immediate consumption rather than productive investment. This fear, often amplified by anecdotal

[40] Mercado Pago. (s. d.). Aceitar Pix no seu negócio (QR, link, checkout). https://www.mercadopago.com.br/ferramentas-para-vender/aceitar-pix
[41] Mercado Pago Empresas. (s. d.). Pix Mercado Pago: vender parcelado (opções de parcelamento vinculadas à cobrança Pix). https://empresas.mercadopago.com.br/pix-mercado-pago-vender-parcelado
[42] Meta. (2023, April 11). Pay small businesses in Brazil on WhatsApp. https://about.fb.com/news/2023/04/pay-small-businesses-in-brazil-on-whatsapp/
[43] Serasa. (2025, 19 fevereiro). O que é Score em tempo real? Entenda o cálculo. (atualização imediata ao pagar dívida via Pix dentro da plataforma). https://www.serasa.com.br/score/blog/o-que-e-score-em-tempo-real/
[44] Serasa. (2025). Pontuação de crédito: pilares e atualização em tempo real. (pilares: pagamentos, experiência, dívidas, consultas, dados cadastrais, contratos). https://www.serasa.com.br/score/blog/pontuacao-de-score-e-como-ela-afeta-suas-financas/
[45] Banco Central do Brasil. (2025, July 24). Open Finance — Perguntas e respostas (compartilhamento consentido de dados). https://www.bcb.gov.br/meubc/faqs/s/openfinance

reports of mismanagement, can deter public and private decision-makers. However, these initiatives have demonstrated that the combined provision of productive assets, training, and targeted monitoring generates significant and persistent economic progress: an analysis conducted across six countries (over 10,000 households) revealed, after 36 months, an increase of 8% in consumption, 5% in per capita income, 15% in assets, and 96% in savings, with benefits outweighing costs in the majority of sites.[46] In the long term, they formalize the informal economy, reduce inequalities, and uplift society from the bottom up. Even if imperfect, such initiatives are a necessary step toward a digitally inclusive society. Brazil, like other emerging nations, must inevitably invest in these policies to prevent the digital divide from becoming a structural barrier to growth. Initial costs and risks of misallocation are far outweighed by systemic gains: an expanded tax base, reduced chronic poverty, and the emergence of a connected middle class.

Build users' skills and trust. Pair financial inclusion with capability-building. In partnership with associations and responsible fintechs, municipalities should run digital education workshops, safe payment practices, managing a Pix wallet, password hygiene, scam avoidance, using receipts and automatic savings. Conduct community mediation or shocking campaigns that everyone will remember (including trusted local figures) to foster confidence and dispel fears. Implement the good uses and show that it is easy to use in shows or social media that kids and teenagers already like. Push developers to deliver data-light, intuitive apps that work on low bandwidth and older devices, via "lite" modes or Pix integration into already widespread services (lightweight messengers). Public authorities can encourage this through accessibility labels and requirements.

Protect data and ensure algorithmic transparency. Apply Brazil's LGPD strictly to payment data: informed consent, purpose limitation, and secure Pix databases. Require transparency for bank/fintech criteria of scoring algorithms. Citizens should understand the criteria shaping their financial scores and have avenues for appeal. Mandate regular, independent audits of credit and fraud models, with public reports to ensure no neighborhood is systematically penalized, e.g., spatial audits mapping the footprint of credit algorithms. Adopt a Digital Urban Finance Ethics Charter among Pix actors to commit to responsible data practices, avoid exploiting vulnerable users, and cooperate with authorities to correct imbalances.

Coordinate actors for inclusive governance. Establish a Rio Digital Financial Inclusion Roundtable bringing together the BCB, local governments, banks, fintechs, telecom operators, and community representatives. Track inclusion indicators (Pix usage by district, fraud incidents, user satisfaction), rapidly identify pockets of digital marginalization, and co-design solutions. Where a favela's Pix use lags, investigate causes (network? training? trust?) and deploy targeted responses. This collaborative governance could make a Global South city a laboratory of inclusion, with benefits for the public sector (agile regulation) and private actors (larger, more confident user base) and ultimately gives stability to the populations who need it.

[46] Banerjee, A., Duflo, E., Goldberg, N., Karlan, D., Osei, R., Parienté, W., Shapiro, J., Thuysbaert, B., & Udry, C. (2015). A multifaceted program causes lasting progress for the very poor: Evidence from six countries. *Science, 348*(6236), 1260799. https://doi.org/10.1126/science.1260799

Conclusion

The case of Rio de Janeiro shows that digital payments, exemplified by Pix, can be a powerful lever for financial inclusion in emerging cities, while introducing new challenges. In five years, Pix has reshaped day-to-day payment habits, giving millions access to fast and secure transactions. Yet inclusion remains fragile and partial: it is primarily transactional, depends on tools and environments that not everyone can command, and does not erase pre-existing socio-spatial divides. Digital infrastructure overlays urban inequalities, softening some (by filling gaps and bridging formal and informal economies) while reproducing others (through connectivity and data). Co-management of monetary flows by the state and private platforms also means that inclusion and control advance together, which calls for sustained vigilance over user rights.

For initiatives like Pix to deliver on their inclusive promise in Brazilian cities, a global approach is needed, combining technical infrastructure, human support, and smart regulation. Rio can lead this agenda: by investing in popular neighborhoods, building citizens' digital skills, and firmly regulating the practices of new financial actors, the city can narrow its internal digital divide, become attractive and serve as a model for other Southern metropolises facing the challenge of inclusive digitalization.

This policy brief aims to clarify these issues and to spur coordinated action so that tomorrow's digital city is synonymous with trust rather than exclusion.