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Navigating the Digital Revolution: The Transformative Effects of Digitalization on India's Banking Sector Within BRICS

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Abstract

This research aims to assess the impact of digitalization on the banking sectors of the BRICS countries, and in particular, the Indian banking sector. Based on the research findings, the contribution of some of the key initiatives, such as the UPI and the Digital India program, in the Indian banking industry to digital transformation has been significant. However, challenges like cybercrime, low digital literacy, and restricted internet accessibility in certain rural areas remain. The thesis proposes ways of strengthening regulation, increasing access to the Internet in rural areas, and developing the digital literacy campaign. It also demonstrates how legal frameworks applied with the purpose of modernization in the digital environment affect the process of digitization in the BRICS member countries and India. It can be concluded that India has market potential in the global digital economy, and consideration of these challenges is crucial for digital banking. The research underlines the critical role of continuous regulatory updates and effective cybersecurity measures to maintain consumers' loyalties and drive further growth in India's digital economy. In addition, several recommendations are also discussed for the way forward.

Keywords: Digitalization, Banking, Digital Transactions, Mobile Payments, Digital Literacy, IT Infrastructure, Cybersecurity, India, BRICS

1. Introduction

With digitization having guided in a new era, the global economy has undergone a radical transformation, and notably, digital transformation has had a huge effect on the world economy, especially while the pandemic is occurring. Digital is having a strong impact on all fields, the impact will increase strongly in the future, and developing countries cannot ignore this trend. With technological advancements, access to information sources has become critical for bridging the knowledge gap that exists in many developing nations. As a result, BRICS member nations continually pursue economic growth that promotes both stronger domestic growth and more engagement in the digital economy (Walter. M., and Masike. M. 2024).

1.1 Emerging Markets, BRICS

The BRICS countries – Brazil, Russia, India, China, and South Africa –united in terms of size and power to form a significant economic entity of the world. BRICS strengthens by enhancing the capability of its economies and markets to ensure digital inclusion and dynamism. Over the last two decades, the increase in digitalization in these countries has resulted in the introduction of many initiatives in various sectors such as health, education, transportation, banking, etc. Leaders of many public and commercial companies, in some nations, are making significant investments by opting to go towards digital growth (T. Nguyen. H., Q. Nguyen. V., and M. Nguyen. T. T. 2021).

The digital economy, in which the use of information technology is an essential component in achieving economic development goals, now pervades all

aspects of most countries' social and economic life, working on various aspects of the global and national economies, including the banking system, trade, energy, transportation, education, health, and so on. The digital transformation of many nations' economies has high hopes in terms of economic development, improved quality of life, and so on, as well as worries about job losses, rising inequality, and increased risks to information security. However, economic digitization has emerged as a goal of the global community's present growth trend (Lazanyuk. I., and Revino. S. 2019).

As a result of ICT growth, a system of the Internet of Things has gradually emerged, with a convergence of many forms of social collaboration. BRICS nations, who are objectively involved in the global process of building a digital economy, should use their national economies' digitalization capacities to bridge the gap with established or advanced countries. Enhancing the position of the BRICS nations in today's global economy is highly reliant on the level of progress of their economic integration in numerous sectors, including science and technology and the use of innovative products (Lazanyuk. I., and Revinova. S. 2019).

1.2 India

The emergence of the internet era has dramatically altered the way the world runs, from how businesses are conducted to the most fundamental day-to-day activities. The upcoming digital era will need the development of technology infrastructures never before seen. The same is true for financial transactions (Sall. M. M., and Mosethe. V. V. 2023).

India which has a booming population and middle class getting up the social hierarchy becomes a leader of the world in digital banking services of the BRICS. India, the world's fifth-largest economy, is struggling to stay up with global financial trends. For many years, India's financial ecosystem was dominated by the trading community, intermediaries, and brokers who employed conventional ways of documenting and analyzing financial transactions [1]. However, with time, conventional ways have been replaced by the coolness of spreadsheets and software used on computers and laptops. This has become unavoidable due to the rapid expansion of digitalization in the financial industry (Chaddha. S., and Jain. S. 2024).

The Government of India passed the Information Technology Act, 2000 (IT Act, 2000) on October 17, 2000, to legalize electronic transactions and commerce. The Reserve Bank of India established a 'Working Group on Internet Banking' to investigate various elements of Internet banking (I-banking). The Group concentrated on three important aspects of I-banking: (i) technical and security challenges, (ii) legal difficulties, and (iii) regulatory and supervisory issues (Singh. B., and Malhotra. P. 2004).

Furthermore, three years short of a decade ago, the Indian government implemented the Demonetization Policy with the primary goal of reducing cash flow in the economy and reducing the usage of counterfeit and fraudulent banknotes. The policy is intended to promote the use of digital payment methods. On a worldwide basis, digital payment systems have grown and continue to develop as a driving force in the financial industry, radically altering the way financial transactions are performed. The country has been impacted by this worldwide upheaval in the financial industry, achieving tremendous gains in digital payment systems (Sall. M. M., and Mosethe. V. V. 2023).

2. Literature review

It is essential to understand the present influence of digitalization in developing markets, with a focus on the BRICS nations, in modern academics and business. The phenomena are extremely relevant in a variety of areas. Digital technologies are crucial for affecting the development of these countries since they are undergoing fast technical innovation and high rates of economic growth. The development paths of developing economies are oriented by the use of digital in several sectors, including banking. To establish connections and clarify the interrelated nature between digitalization and developing markets,

the research, analyses, and discourses that have already been conducted will be examined in this chapter on the literature review. The Indian banking industry will be the main topic of discussion.

The relationship between digitization and emerging markets is a crucial component that has influenced global growth. The developing nations—Brazil, Russia, India, China, and South Africa—in particular are expected to demonstrate stronger economic potential in terms of faster rates of urbanization, industrialization, and population growth. The relationship between the emergence of promising markets and the processes of the economy's digitalization is another trend that has been noted and is likely to remain revolutionary [2]. These markets actively use digital tools to advance economic growth while simultaneously addressing social and economic challenges and identifying new opportunities for sustainable economic expansion and global development.

2.1 Digital Financial Inclusion in BRICS

The advantages of digital financial inclusion include the following: more rapid and widespread access to formal financial services; comparatively lower costs for digital platforms when compared to physical models; availability of customized, and more affordable products and services for a wide range of customers; customer convenience; reduced risks and expenses related to handling cash; and, lastly, the potential for economic empowerment.

Digital Access in Brazil: The percentage of lower socioeconomic class households having internet connectivity increased from 30% to 50% (Between 2017 and 2019). Conversely, the upper socioeconomic strata did not change during the same period, with 99% of households having internet access. The internet access in Brazil also reflects disparities in geography. Compared to 19.2% of respondents in rural regions, just 0.6% of non-internet users stated that the service was unavailable in metropolitan areas. The main obstacle to digital Access in Brazil is related to income. Cell phones are an excellent source of internet connection for Brazil's lower-income population. In 2019, 85% of lower-class internet users only utilized their cell phones to access the network. Even while smartphone internet usage is increasing, the use of telephones for payment declines with income (BRICS Digital Financial Inclusion Report 2021).

Digital Literacy in Brazil’s Banking: To facilitate the sending and receiving of money using QR codes, the Brazilian government introduced Pix, an immediate payment system. This unique approach has resulted in the completion of 70% of online banking services and 16 million Brazilians having access to the financial system. With 85% of Brazilians having digital access to financial services in 2021, the country is developing at its fastest rate in decades, leading Latin American financial inclusion growth.

Digital Access in Russia: At the beginning of 2023, there were 127.6 million internet users in the Russian Federation or 88.2 % of the population. In January 2023, there were 106.0 million social media users in Russia or 73.3 % of the country's entire population. In early 2023, there were 227.0 million active mobile phone connections in Russia, which represents 156.9% of the country's entire population [3]. Customers in Russia are increasingly attracted to the ease and accessibility of digital banking. One noticeable development in the Russian Digital Banks sector is the growth of neobanks, which are entirely digital and have no physical branches. The country's vast land area has made it impossible for traditional banks to maintain a physical presence in every location, making Internet banking a more realistic option for many Russian citizens [4].

Digital Literacy in Russia’s Banking: Russia's Financial Inclusion Strategy for 2018–2021 prioritizes enhancing financial inclusion for the elderly, people with disabilities, and other low-mobility populations. Well-developed Internet infrastructure, digital education, and high levels of involvement and literacy may be found in major cities like St. Petersburg and Moscow. On the other side, the lack of fiber broadband is more common in rural regions, which

have less educational resources, decreasing the general level of digital literacy in the area.

Digital Access in China: China is home to the world's biggest digital community, with around 1.09 billion netizens as of 2023. The country's internet penetration rate was 78%, lower than neighboring South Korea and Japan, which had rates of 90%. Main drawback: internet infrastructure development in distant areas is moving slowly. In 2023, the average internet access rate in rural China was less than 67%, even though first-tier cities like Beijing and Shanghai had above 80% adoption rates [5].

Digital Literacy in China's Banking: The fact that either a person owns a smartphone or has access to the internet increases the population's share of digital banking users significantly. The most popular ones now are Aibaba's (Alipay) and Tencents (WeChat Pay) which are both platforms for any financial activities from payments to investments. They offer innovative apps that deliver full-spectrum banking solutions ranging from booking transactions through personal finance and investment products. One of the main reasons why these digital services have been adopted at a very high rate is the convenience and efficiency of digital banking, an activity that is even practiced by older generations as a result of education process campaigns.

Digital Access in South Africa: On the African continent, South Africa came in third place for the most internet users. South Africa has 41.2 million active internet users as of early 2022, only surpassed by Egypt and Nigeria, two countries with far larger populations. Aside from that, the nation's 28.62 megabits per second (Mbps) internet speed ranked second fastest in all of Africa. In terms of internet freedom in the continent, South Africa led the pack in 2022 with a score of 73 points. The percentage of people with internet access has grown over the past four years, from 62.4% to over 80%. Men were somewhat more likely than women to use the internet [6].

Digital Literacy in South Africa's Banking: The major banks, such as Standard Bank, First National Bank, and Absa Bank, have adopted complex online and mobile banking systems that allow their customers to perform lots of activities flexibly, like making bill payments and transfers from one account to another. Individuals in rural areas lack access to some basics, such as online learning and information; hence, they cannot fully embrace digital banking. The other factor that could potentially offset the gains made in the adoption of digital banking is the high cost of data, as certain geographical locations may not have efficient internet connections. To bridge these gaps, the South African government and a few banking institutions have embarked on efforts to help individuals increase their levels of digital literacy.

2.2 Digital Transformation Landscape in India's Banking Industry

2.2.1 Principal Forces Behind Digital Transformation

Customer Expectations Shifts: Customers desire faster, more convenient, and customized services. To meet evolving customer expectations, banks must use digital technology to improve the customer experience (Gilbert. C., and Bower. J. L. 2002).

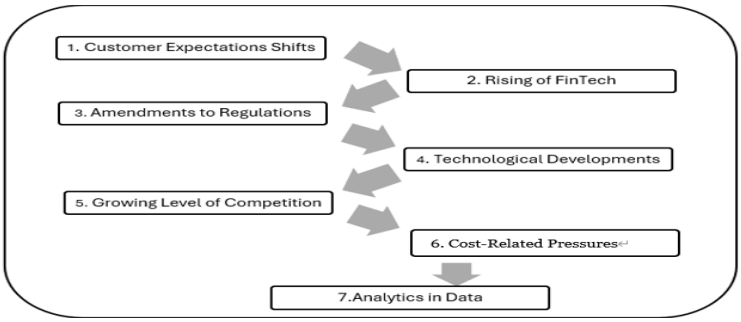

Figure 1. Key Drivers of Digital Transformation (Adapted from Swamy. V. 2023)

Rising of FinTech: FinTechs are now able to enter the financial services sector because to technology, which has lowered entrance barriers. Even while operating at a smaller size, they have successfully separated the financial services. Better convenience and customer experiences have benefitted customers as a result. Innovations in the Indian payment business is a prime example. FinTech companies innovate financial services to challenge the banking industry. To compete, banks need to work together, invest in, or build FinTech capabilities.

Amendments to Regulations: Regulations such as Open Banking and data protection promote digital transformation in banks, leading to enhanced digital capabilities.

Technological Developments: Blockchain, cloud computing, artificial intelligence (AI), and machine learning (ML) are being adopted by banks to stay competitive and satisfy consumer needs for improved efficiency and innovative services.

Growing Level of Competition: Competition among digital banks and IT businesses is on the rise. Banks require creative and digital technologies to differentiate themselves.

Cost-Related Pressures: Banks aim to reduce costs and increase efficiency by implementing digital transformation, automating procedures, and improving operations (Figure 1).

Analytics in Data: Data analysis skills are necessary for banks to reduce risks, promote digital transformation, and customize services (Swamy. V. 2023).

2.2.2 Indian Financial Sector

Since its inception in 2015, the Digital India initiative has grown to become a game-changing force that has sped up India's economic development while converting the nation into a knowledge-based economy and digitally empowered society. This goal is being realized through three primary pillars: strong digital infrastructure, accessible government services, and empowered citizens. Establishing a widespread digital infrastructure to guarantee a comfortable lifestyle is the cornerstone of India's digital revolution. This aim has been accomplished in large part because of the Digital India program, which has been expanded with a total budget of ~INR 14,903 Cr from 2021–2026.

The Ministry of Electronics and Information Technology (MEITy) has been receiving crucial support from the National e-Governance Division (NeGD) in areas like program management, project development, technology management, capacity building, awareness-raising, and communications-related activities under the flagship Digital India Programme. Numerous National Public Digital Platforms, including DigiLocker, UMANG, Rapid Assessment System, OpenForge, API Setu, Poshan Tracker, National AI Portal, MyScheme, India Stack Global, and many more, have been developed and are managed by NeGD. The government created the e-Marketplace (GeM), a specialized platform with 11,900 product categories and 321 service categories for various commodities and services acquired by government organizations, departments, and PSUs, to increase openness in government procurement. Initiatives like Aadhaar, the distinct digital identification program, have strengthened the digital revolution by giving millions of people access to financial inclusion and necessary services.

Digital payments in India's banking industry are expected to reach $135.2 billion, with a compound annual growth rate (CAGR) of 12.7% from 2020 to 2025. In India, there were 141 million online banking customers and 425 million mobile banking users by August 2021. Bank IT spending reached $8.6 billion in 2020 and is projected to reach $11.3 billion by 2023. Digital banking use grew from 42% in 2019 to 66% in 2020, with mobile banking becoming the most popular banking channel. According to a poll by PwC India, 87% of Indian banking industry participants said that digital transformation was their top priority. These statistics illustrate customers' growing use of digital banking channels and banks' significant IT investments, as well as the potential for digital

transformation in India's banking industry (Swamy. V. 2023).

In India, a variety of digital financial mechanisms are employed for trade and business purposes. Aadhaar Enabled Payment System (AEPS), ATM Cards, Micro ATMs, Bank Prepaid Cards, Internet Banking, Mobile Banking, Point of Sale (POS) Terminals, Unified Payments Interface (UPI), Mobile Wallets, Unstructured Supplementary Service Data (USSD), and so on are a few examples.

2.2.3 Digital Transformation Strategy for India Banks

The Indian economy has grown significantly because of the contribution of emerging technology. Artificial intelligence and cloud computing are two examples of technologies that have made Indian businesses more productive and effective. An insight into some emerging trends-

FinTech: India is today one of the fastest-growing FinTech marketplaces globally with over 2100 FinTech startups here and a hotspot for foreign investors. It is also ranked as the third largest FinTech hub in the globe, and it is anticipated to produce $150 billion by the fiscal year ending 2025. The demographic in India is quite strong with the population below 35 years looking forward to embracing new forms of financial technology. Moreover, the recent policies of the Government of India like the implementation of the Goods and Services Tax and the demonetization drive have opened up a vast scope for the FinTech enterprises in the country. As India has over 2000 FinTech companies, the financial industry is well-digitized and is fostering innovation and self-sufficiency in all sectors of society [14].

promotes safe, inclusive, and transparent transactions in areas such as KYC authentication, supply chain, identity management, document verification, record management, healthcare, and financial transaction validation [7].

Internet of Things: The IoT is transforming India's banking and financial sectors by combining equipment with built-in sensors that capture real-time data, facilitating fast growth for small businesses. IoT technologies improve operational efficiency and connection, which are critical for supply chain management and urban planning. Programs such as the 'Centre of Excellence for IoT and AI', established by MeitY and NASSCOM, provide financial assistance and mentorship to deep-tech firms. Google also plans

Artificial Intelligence: Integrating AI into governance and business provides automation and security against new risks, with the government's IndiaAI effort promoting inclusivity, innovation, and social impact. The Union Budget for FY 2022-23 designated three AI centers of excellence at top institutions to encourage multidisciplinary research in agriculture, health, and sustainable cities, therefore enhancing the AI ecosystem and people resources. With PM-Kisan, a farmer-friendly AI chatbot was introduced in September 2023 and quickly gained popularity, with over 500,000 users on its first day. With the digital tech talent gap expected to grow by 3.5 times by 2026, MeitY and NASSCOM's FutureSkills Prime program seeks to provide workers with critical skills. Because of these initiatives, India was placed first in the Stanford AI Index 2023 for AI talent penetration [7].

Blockchain: Blockchain is a rapidly developing technology that has amazing potential to completely transform India's IT scene. It

to digitize MSMEs with its $10 billion investment under the Digitization Fund, while Microsoft plans to create data centers and upskill one lakh developers through AI Odyssey, which will provide a strong foundation for banking innovations. These improvements set India prepared for breakthroughs in digital banking, especially when combined with a highly qualified IT workforce and encouraging legislation [7].

2.2.4 Notable Initiatives of Digital Transformation in Banking of India

Unified Payment Interface (UPI)

The National Payments Corporation of India (NPCI) introduced UPI (Figure 2), which enables quick money

transfers between bank accounts using a mobile device. One of the consumer apps with the quickest growth in India, UPI was introduced in 2016 and allows for instantaneous, real-time interbank transactions via mobile devices. PayTM, Google Pay, PhonePe, and several more companies have developed on top of UPI to provide Indians simple, user-friendly tools that have revolutionized their payment habits [8].

Figure 2. Logo of Unified Payments Interface (UPI)

UPI is a mobile-based, 365x24x7 'fast payment' system that allows users to send and receive money immediately using their Virtual Payment Address (VPA). The advantage of a VPA-based transaction is that the remitter does not need to share account or bank data. Both person-to-person (P2P) and person-to-merchant (P2M) payments are supported. It enables quick money transfers via both 'pull' and 'push' payments. With UPI, non-financial transactions like checking balances are also possible. It allows several bank accounts to be connected to a single

transactions and enable e-payments via banks directly [10]. The software works with all Indian banks that use UPI, which is based on the Immediate Payment Service (IMPS) infrastructure and allows users to transfer money immediately between any two of the 170 member institutions.

e-RUPI

In 2021, the Indian government launched e-RUPI, a digital payment system based on electronic vouchers, as a way to smoothly transfer welfare funds to qualified beneficiaries. This one-time payment system allows customers to redeem electronic vouchers at merchants who accept UPI e-Prepaid Vouchers without the use of a card, digital payments app, or Third-Party Application Provider (TPAP) mobile application, whether the provider is a bank or not.

Aadhaar Enabled Payment System (AePS)

Aadhaar-based authentication makes banking services more accessible, allowing users to conduct financial transactions using their Aadhaar number and biometric authentication. AePS is a bank-led platform that enables online interoperable financial inclusion transactions at PoS (Point of Sale/ MicroATM) via any bank's Business Correspondent with Aadhaar identification. You can perform six different kinds of transactions using AePS. In this case, a client simply has to provide their bank name, Aadhaar number, and the biometrics they provided at enrollment to complete a transaction. It allows a bank customer to access their Aadhaar-enabled bank account and perform basic banking operations such as cash deposits and withdrawals, fund transfers within or between banks, balance inquiries, and obtaining a mini-statement through a business correspondent by using their Aadhaar as identification [9].

Bharat Interface for Money (BHIM)

Bharat Interface for Money (BHIM) is a mobile app created by NPCI that allows you to conduct simple, fast, and rapid financial transactions over the Unified Payments Interface (UPI). app created by NPCI based on UPI to promote digital

Internet banking. Organizations would use SMS or QR codes to disseminate the e-RUPI to beneficiaries for a particular purpose or activity. It allows for offline transactions to be carried out even on feature phones, encouraging adoption in rural and remote regions (BRICS Digital Financial Inclusion Report 2021).

2.2.5 Prevalent Online Payment Platforms in India

As of 2024, some of the most highly used digital payment platforms in India are:

Google Pay

Google Pay, sometimes known as "G-Pay," is one of India's most popular electronic procurement systems,

allowing users to easily complete UPI transactions and direct bank transfers. Customers can make payments easily using a registered phone number that is connected to a bank account or by scanning the QR code, and it has a simple and user-friendly interface [11].

PhonePe

With the biggest user base in India, PhonePe functions as a comprehensive platform that facilitates UPI transactions, direct bank transfers, e-wallet services, and recently included international payments. The PhonePe Switch feature allows users to make immediate bookings and reservations directly from within the app [11].

Paytm

Paytm is a one-stop shop that offers e-wallet, direct bank transfer, and UPI functionality. It allows users to perform different kinds of bookings and reservations such as – electricity bill recharge, education fee payment, flight tickets, and many more, directly and instantly through the app. Besides the payment banking segment, it presents a list of financial services like insurance, mutual funds, and banking, where it has its own Paytm Payments Bank. Paytm is well-known among local merchants and enterprises for its voice alert products and financial services [11].

Amazon Pay

Originating from the massive e-commerce platform, Amazon Pay facilitates quick and safe payments for goods purchased on Amazon and any associated website. For Amazon consumers, it also makes bill payment and UPI basis transactions easier. It also offers secure and user-friendly payment options.

BHIM App

The National Payments Corporation of India, or NPCI, introduced the UPI-based BHIM software as the government's top goal to promote simple and safe digital transactions. This is widely used for merchant transactions, bill payments, and individual money transfers.

RuPay

RuPay is an Indian smart card processor and payment network launched by the NPCI. This was established to meet the objective of the Reserve Bank of India, which is to establish a domestic, open, and multilateral system of payments [12]. It is set to be an indigenous brand entity in India different from international ones such as Visa and Mastercard, among others, to minimize their reliance on these foreign card networks. RuPay provides several facilities, such as a debit card facility, a credit card facility, and a prepaid card facility. They are available from several Indian banks for consumers to use at ATMs, POS terminals, and for online commerce.

2.3 Research Findings from Relevant Papers and Journals

Lazanyuk. I., and Revinova. S. 2019 studied the current situation of the formation and development of the digital economy in the BRICS countries. In their research, they conducted a comparative study of the BRICS countries based on essential needs such as data availability and dependability, as well as the capacity to compare countries across borders. It has been demonstrated that digitalization has a beneficial impact on per capita GDP development only if ICT distribution and use reach a critical point. To get a favorable economic response from digitization, companies, and the general public must learn and adapt to new technology over time.

The BRICS countries have made great progress in developing and transforming digital economies. Pix, for example, is expected to be a game changer in the Brazilian retail payments system due to its increased efficiency, safety, and competitiveness, while the Financial Payments System (FPS) in Russia has expanded consumers' access to financial services by allowing them to make interbank transfers instantly using only their mobile phone numbers, as long as their banks are connected to the system. Furthermore, the Unified Biometric System (UBS), which was established in June 2018, is a Russian national digital platform that allows users to open bank accounts and

receive loans remotely using biometric personal data identification (by face and voice recognition). Additionally, the founding of the China Payment and Clearing Association in 2011 enhanced the coordination of the infrastructure supporting China's payment networks.

With an emphasis on India's digital transformation, The Indian banking sector is now experiencing an IT revolution. The technological changes have created rivalry among banks. The Indian banking sector has seen a rise in overall banking automation as a result of this. The globalization and liberalization policies, along with the financial reforms that were started in the early 1990s, gave banks a whole new operating environment. Products and services like "Anywhere Banking," "Tele-Banking," "Internet Banking," "Web Banking," "E-Banking," and so forth have become trendy, and banks are attempting to stay competitive by providing their clients with creatively packaged technology-based services (Singh. B., and Malhotra. P. 2004).

Furthermore, according to the BRICS Digital Financial Inclusion Report 2021, interoperability among payment systems in India has enabled unprecedented simplicity of transactions, while strong client protection measures have made India's retail payment system one of the safest in the world. In August 2016, India introduced the Unified Payments Interface (UPI), a mobile-based, round-the-clock, 365x24x7 "fast payment" system that enables users to send and receive money instantaneously using a Virtual Payment Address (VPA) that they have created. In India, UPI has grown to become one of the most widely used payment solutions since its modest launch in 2016. Then, in 2021, the Indian government introduced e-RUPI, a digital payment system using electronic vouchers, as a program to smoothly transfer welfare funds to qualified recipients.

According to the European Commission, India's rate of digitization was the highest among the major economies between 2011 and 2019. Between 2011 and 2019, India's digitalization grew by 11%, matching China's rate of expansion. However, as digitalization grows in India, there are both challenges and opportunities.

In 2019, Kumar et al. carried up the research titled "Digital India: Opportunities and Challenges" intending to examine the essential elements of the Digital India program and assess its possible influence on different industries. The study uses a qualitative methodology that includes in-depth reviews of case studies, government policy, and expert interviews. Significant prospects are found in the study in fields including talent development, digital infrastructure, and e-governance. It also draws attention to issues with cybersecurity, the digital divide, and the application of policies.

3. Research methodology

The research is carried out on a case study examination of the BRICS and Indian banking industry with the main application of the qualitative research method. Therefore, this research focuses on language and comprehending observations of what has already been discovered in the relevant field.

3.1. Data Collection

This study relies on secondary sources for its data. All of the information used is compiled from a wide range of public sources, such as publications from the Reserve Bank of India, the Ministry of Finance, the Government of India, research papers on the digitalization and banking sectors of the BRICS and India, periodicals, magazines, newspapers, websites, etc. and the majority of the literature sources are from papers and articles published between 2002 and 2023. The secondary statistics data population consists of digital payment consumers living in Brazil, India, Russia, China, and South Africa. For a comparative analysis study, a variety of websites and research findings are taken into account.

3.2. Case Study Analysis

Looking at Table 1. it was understood that India has a massive internet user base, with 692 million, representing 48.7% of its population which means a

significant market potential in the digital economy. When it comes to growth rate of internet usage in compared to other nations of the BRICS members, India's highest growth rate of internet usage shows its fast growth towards digitalization with an increase of 11.3%, starting from 2020. Moreover, 32.8% of the Indian population aged 16 to 64, use mobile payments based on a monthly user basis, which is the highest among the BRICS nations, followed by Brazil with 32.4%. India's economic growth, advanced technological infrastructure, for example, high smartphone affordability, more 4G networks around the country, and the Indian government involvement play a critical role throughout their digital transformation journey.

3.2.1 A Comparison Between India and BRICS

Countries	Internet Users in Million	% of Internet Users vs Population	Growth Rate of Internet Users (Year-On-Year Change)	% of Mobile Payments Use Each Month (Age 16 to 64)
Brazil	181.8	84.3%	4.1%	32.4%
Russia	129.8	89%	4.7%	23.9%
India	692	48.7%	11.3% (Since 2020)	32.8%
China	1050	73.7%	1.9%	25.3%
South Africa	43.48	72.3%	0.8%	20.8%

Table 1. Internet Users & Mobile Payment Usage in BRICS By 2023 (Source: DATAREPORTAL)

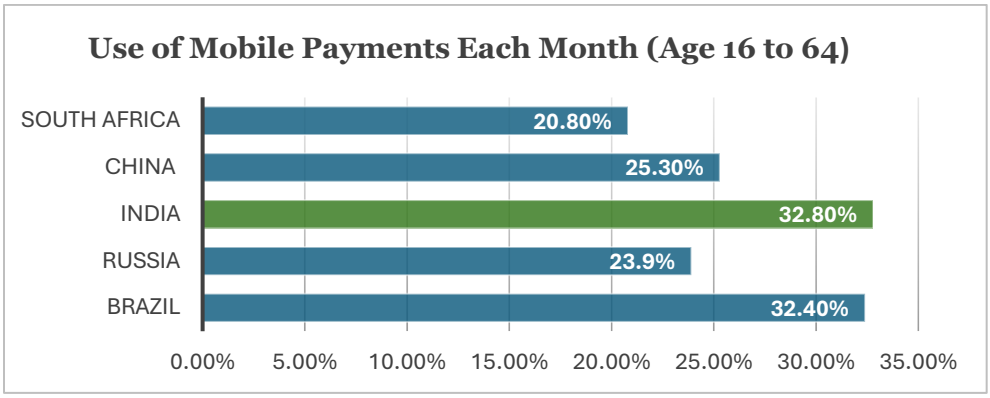

Figure 3. Bar Chart of Mobile Payment Usage in BRICS By 2023 (Source: DATAREPORTAL)

The introduction of the Unified Payments Interface (UPI) and programs like Digital India by the Indian government make Indian people more familiar with digital payment applications and systems. In general, more adoption of smartphones and FinTech advancements are the key driving factors of the internet and mobile payment usage of the BRICS countries. Furthermore, in the cases of the other BRICS countries except India, it can be seen that due to conventional banking preferences in Russia, it has only 23.9% of monthly mobile payment usage (Figure 3.), while Brazil has the highest at 32.4%. Along with 1.05 billion internet users, China has the highest percentage of mobile payment users 25.3%. With 20.8% mobile payment usage, South Africa has the lowest rate which resulted from problems with the digital divide and financial challenges.

Year	Volume of Digital Payment in Billions	Internet Penetration Rate
2019	23.26	33.7%
2020	34	43.4%
2021	43.74	46.3%
2022	71.95	48.1%
2023	113.95	51.5%

Table 2. Digital Payment Usage & Internet Penetration Rate in India from 2019 to 2023 (Source: Statista)

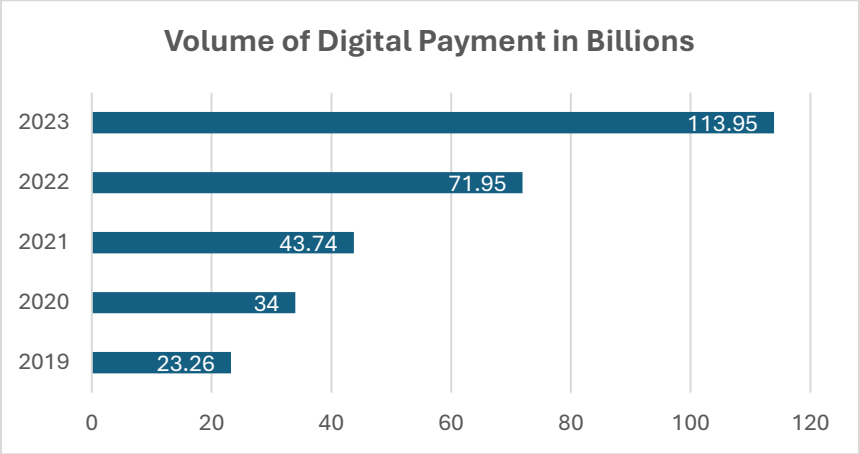

Figure 4. Bar Chart of Digital Payment Usage in India from 2019 to 2023 (Source: Statista)

Year	Volume of Digital Transactions in trillion Indian Rupees
2020	42
2021	60
2022	106
2023	166

Table 3. Volume of Digital Transactions in India from 2020 to 2023 (Source: Statista)

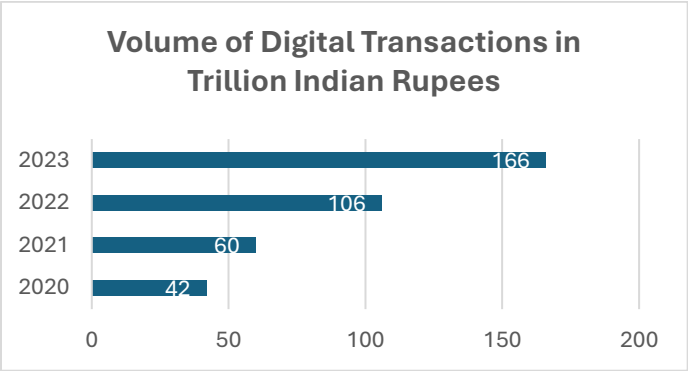

Figure 5. Bar Chart of Volume of Digital Transactions in India from 2020 to 2023 (Source: Statista)

Based on further insights into the analysis of the changes in the digital economy in India and their IT infrastructure advancements, it is possible to conclude that internet penetration rate and digital payment usage go hand in hand. When the internet penetration rate gradually went up from 33.7% to 51.5%,(Table 2) there was exponential growth in the sectors involving the use of digital payments, which was from 23.26 billion to 113.95 billion (Figure 4). This gradual growth of both categories also caused a somewhat similar fluctuation in the volume of digital transactions, which rose from 42 trillion INR to 166 trillion (Figure 5) INR in between the periods of 2020 and 2023(Table 3.). The result is mainly attributed to 4.2.2 Impacts of the Legal Framework on Digital Transformation of Banking in BRICS the Indian government-initiated demonetization drive in the last quarter of 2016. The primary motive of the said policy is to decrease cash circulation in the Indian economy as well as the circulation of forged banknotes. Furthermore, the breakthrough of the COVID-19 pandemic has been a key driver for substituting cash with digital means of payment to implement social distancing measures since the end of 2019 and early 2020. Overall, the analyzed data enlightens how the advancement of technology and policy actions can affect the digital financial environment not only in India but in other countries as well.

Countries	Legal Frameworks	Impacts
Brazil	General Data Protection Law (2018) National Cyber Security Policy (Still Working On) Regulatory Sandbox (Since Dec 1, 2020)	Personal Data Protection Cybersecurity E-payments, Fintech
Russia	Data Protection & Privacy Regulation (2014) Basic Guidelines in 2018	Data Privacy FinTech Development
India	ICT Act (2000) Localization of Data (2018) Data Governance Framework (Still Developing) Regulatory Sandbox in 2019	Data Protection Payment Systems Operating Non-personal Data Digital Wallets
China	Data Security Law & Personal Information Protection Law in 2021	Data Protection, Cybersecurity

	Cybersecurity Law (2017)	Cybersecurity
	Password Law (2019)	Encryption
	Fintech Regulatory Framework	FinTech Development
	Personal Information Protection Law (2013)	Data Privacy
South Africa	Electronic Transactions & Communications Act 2002	Cybercrime
	Intergovernmental FinTech Working Group	FinTech & Innovation

Table 4. Legal Frameworks & Their Impacts in BRICS (Adapted from ITC BRICS Digital Economy Report 2022)

The table (Table 4) is constructed to summarize and make an in-depth analysis of some of the impactful present legislations governing the digital transformation of the BRICS nations' banking sectors, as well as the implications for other aspects of the digital economy. According to the studies of the legal frameworks, it shows that In Brazil, there is the General Data Protection Law for personal data protection, the National Cyber Security Policy for cybersecurity, and the Regulatory Sandbox regarding e-payments and fintech innovation. By legislating the regulation regarding data protection in 2014 and providing the basic guidelines in 2018, Russia has shown its awareness of individual data privacy. India enacted the ICT Act in 2000, which mandates data localization for payment systems and data security. In addition, a regulatory sandbox for digital wallets and a rising data governance framework partly contribute to a more secure digitalized transformation in India.

The Password Law provides more safety layer of encryption to China's robust legal framework including the Data Security Law, the Personal Information Protection Law, and the Cybersecurity Law. Meanwhile, the fintech regulatory framework serves as the primary catalyst for the growth of fintech in China. The Data Protection Act of 2013, the Electronic Transactions & Communications Act against cybercrime, and the Intergovernmental FinTech Working Group are South Africa's responses to the issues of data privacy and fintech advancement. Overall, these regulatory frameworks demonstrate each country's commitment to ensuring digital transactions, protecting data, and fostering fintech innovation.

4. Discussion

4.1 Challenges and the Way Forward

There are still many issues associated with the structural change in the banking sector of India in the digital era. The current legal approaches such as the ICT Act and the data localization policies underscore the need to update the laws regularly because of the dynamic threat landscape and leveraging new technology in the digital ecosystem. However, cybersecurity is still a concern; and advances in information technology of the Indian banking industry pressure and speed up the adoption of necessary circumstances for organizations to employ safe as well as closely monitored networks with precautionary measures and procedures against cyber threats. The fundamentality of measurements and wide-scale hacking incidents or cyber-crime remains a sizable threat to the feasibility and viability of online banking, and other means of payment.

On one hand, complex legal frameworks and high legislation digital in the Banking sector of India while transforming into a more digitalized format will tend to be unhelpful to FinTech. Such measures like the ‘dual regulatory regime’ including the ‘regulatory sandbox’ allow for some level of discretion, this work argues that there is still a need for a more rational and open legal regime that will encourage innovation in consumer protection. Lack of steady and reliable access to internet services in rural areas affects the penetration of digital banking services due to the lack of commonly accessible gadgets. Lastly, there are also the limitations including a lack of digital literacy and institutional culture differences. A large number of

the population is still not informed or educated about how they can protect banking details when engaging in the Banking business over the Internet. This shortfall is mainly seen most notoriously in differences in the adaptation of technology around these divisions. It also exacerbates accessibility challenges because much of the content as well as the banking interfaces themselves are conducted in English making those of other nationalities inconvenient.

These challenges can only be met by the enhancement of the regulations or more importantly, real-time updates which is very important to meet fast upgrading technologies in the country. These are achieved through measures like ensuring that changes to cybersecurity requirements are made yearly and the conformity to the laws of data protection is crucial. Such acts should be used in the current investment in strong cybersecurity facilities and capable policies in networks to prevent cyber threats. Up and proper public policies are required when carrying out businesses in the FinTech segment. Moreover, it is indeed of crucial significance to update the technological development within rural areas. Nowadays, building a concrete partnership between the government and private industries is necessary for the timely provision of working Internet connections and affordable Internet devices. It can be achieved by the establishment of a Public-Private Partnership. Thus, it is possible to specify the kinds of activities promoting the closing of such gaps, such as the extension of existing programs related to digital literacy for the residents of rural regions. And then, last but not least it is necessary to ensure the multiple language versions of the digital banking interfaces to minimize limitation caused by the language difference. It would provide banking services in multiple languages as per people's preferences in different regions and also to reach out more users for digital-based banking services.

5. CONCLUSION

In 2021, the BRICS conducted its first digital health summit. At the summit, the necessity of creating, implementing, and expanding digital technology to enhance the provision of health services was highlighted. According to the ITC BRICS Digital Economy Report 2022, the BRICS Strategy for Economic Partnership 2020–2025 offers guidelines for enhancing collaboration in three main areas: sustainable development; digital economy; and trade, investment, and finance. The digital progress of the BRICS nations varies, and the strategy emphasizes how important it is to bridge the digital gap and make sure that all parties benefit from digitization. Moreover, it can be seen that there are also several important factors to encourage digitalization through cooperation between the BRICS nations including: improving the quality of goods and services produced by the BRICS countries through digitalization; discussing regulatory issues regarding digital transformation experiences; addressing the digital divide through the development of digital skills and infrastructure; and exchanging best practices for the creation of big data platforms, smart cities, and national unique identification systems.

In the framework of the BRICS countries, the Indian banking industry has undergone a substantial digital transformation and focuses on the uninterrupted operation and availability of digital payment systems, which is contributed by concrete and effective government regulatory systems, fast-growing internet usage, and sophisticated technology infrastructure. The RBI also collaborated with the National Payments Corporation of India (NPCI) and other authorized PSOs in terms of the better performance of online payment systems. The government's Direct Benefit Transfer (DBT) payments were made easier via the National Automated Clearing House (NACH)-Aadhaar Payment Bridge System (APBS), which was one of the reasons for increasing digital transactions. To make card payments at PoS terminals safer from a health perspective, the RBI raised the per transaction limit for contactless card payments utilizing NFC-enabled EMV Chip cards. These steps, along with continuous IT infrastructure development, are pivotal to maintaining India's digital financial sector growth. Despite the significant progress made, India still

confronts several challenges, such as cybercrime, a lack of online literacy, and limited internet connection in rural regions. It is critical to address these issues by strengthening laws and regulations, ensuring the privacy of digital transactions, and creating more public-private partnerships to support Internet networks in several areas of India. These actions can build up consumer trust and loyalty and reach out to more consumers across the nation.

In summary, by updating legal frameworks regularly and encouraging fintech innovation, India can secure its position as a leader in the digital banking revolution within the BRICS bloc. The enhancement of internet accessibility and IT infrastructure in rural areas, along with targeted educational programs, will drive more access to digital banking services, thereby supporting India's ongoing economic growth and integration into the global digital economy.

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