FINTECH ECOSYSTEM ACROSS DEVELOPING COUNTRIES : CROSS-COUNTRY EXPLORATORY COMPARISON

Khaled Mahmud *
Md. Mahbubul Alam Joarder **
Kazi Sakib ***

Received on 30 January, 2023; Accepted on 13 April, 2023; Published on 30 April, 2023
DOI : https://doi.org/10.58964/JBAART06

Abstract

Fintech has emerged with transformative potentials to impact financial growth and stability in any nation. While extant literature has steadily grown in scope and depth on fintech adoption factors and its impact on financial inclusion, a cross-country perspective is still largely missing. In this study, we conducted a qualitative research to examine the current situation of fintech ecosystems in 18 developing nations that are selected based on World Bank GNI per capita categorization. We have compared these nations according to parameters taken from the literature which include population, median age, GNI per capita, literacy rate, mobile phone connections, number of internet users, unbanked population, investment in fintech, number of fintech companies, and regulation. A cornerstone measurement throughout our analysis was country ranking from Global Findexable Ranking 2021. The findings suggest that nations with high population, median age, GNI per capita, literacy rate, mobile phone connections, internet usage, number of fintech companies, investment in fintech, and low unbanked population enjoyed higher fintech ranking. Countries with highly regulated fintech industries like India, China, and Indonesia have been at the top of the ranking. A notable exception here is Vietnam, which has actually slipped down the rankings from the previous year. The paper provides a number of policy recommendations based on the exploratory findings for fintech ecosystems in developing nations, in general and the ecosystem in Bangladesh, in particular.

Keywords : *Fintech, Developing nations, Bangladesh, Findexable global ranking, comparison, Fintech regulation*

JEL Classification : *E52, F40, F63, F65, M20, O14, R51*

1. INTRODUCTION

Financial Technology, more commonly referred to as Fintech, is a term that has been in use as early as 1993 (Zimmerman, 2016) and has subsequently gained popularity slowly and steadily. It can be defined as technology that targets certain bank business divisions with the intention of separating customers from them by developing services and solutions through technology. Fintech is a type of financial innovation

* Associate Professor, Institute of Business Administration, University of Dhaka, Bangladesh
** Pro-Vice Chancellor, Bangabandhu Sheikh Mujibur Rahman Digital University, Bangladesh
*** Professor, Institute of Information Technology, University of Dhaka, Bangladesh

made possible by technology that creates new goods and services with a lasting impact on financial markets, institutions, and the provision of financial services (Financial Stability Board, 2022). It also refers to the interactions between finance and technology (Maier, 2016), the digitalization of conventional financial media (Ferrari, 2016), and the customization of financial services using technology (Sia, Soh, & Weill, 2016). Customers may now quickly complete payments, investments, or insurance premium payments utilizing fintech.

Investment in fintech has grown steadily in recent years. According to Pulse of Fintech 2021 report by KPMG, global fintech investments in 2021 recorded $210.1 billion with 5,684 deals (KPMG, 2021). These values include the venture capital, private equity, and mergers and acquisitions in each year. We see a general upward trend in the investments, which peaked at $213.8 billion in 2019, just before the COVID-19 pandemic. In 2020, global investments in fintech lost steam but got back on its track again in 2021 to reach $210.1 billion.

Fintech is changing consumer behavior by encouraging a more self-service-based approach. In the financial services industry, fintech is still in its infancy in many countries. Many other countries have successfully adopted fintech in financial service industries and moved on to other fintech business models such as blockchain and cryptocurrencies, asset management, securities trading, insurance, online banking, crowdfunding, peer-to-peer lending, and online accounting (Soloviev, 2018).

In one study, 5 elements of the fintech ecosystem have been identified: fintech start-ups, government, financial customers, traditional financial institutions, and technology developers (Lee and Shin, 2017). We have also identified 2 other elements that can have a huge impact on the fintech ecosystem, which are investors and academia. These 7 elements of the ecosystem work in tandem for a fluid operation. Industry 4.0 has come to the forefront as technology grew rapidly and brought enormous change in businesses and their operations. People are changing their financial behavior pattern due to the adoption of fintech services (Anshari, 2020). The first automated teller machine (June, 1967) initiated the radical innovation in financial industry (Lazo and Wood, 2002).

Technology firms are taking advantage of internet and mobile platforms. They are helping to increase the level of financial inclusion and thus ensure stability in developing nations (Arner et al., 2015). The Sustainable Development Goals of the United Nations recognize this potential and include goals for both traditional and digital inclusion indicators as Target 8.10. Numerous anecdotes demonstrate how fintech is expanding access to financial services, particularly for those who were previously unbanked or underserved, including country-based case studies (Suri and Jack, 2011; Tarazi and Breloff, 2010) and regional studies (Sy et al., 2019; Berkmen et al., 2019; Kshetri and Loukoianova, 2019; Lukonga, 2018; Blancher et al., 2019).

Within this context, this study takes a customary comparison approach of fintech ecosystems in developing nations across the world. The 18 selected countries

surveyed in this paper represent a diverse range of socio-cultural and economic factors. However, the common aspect across these is the potential of fintech to bring transformative changes for millions.

2. LITERATURE REVIEW

The major portion of extant literature on fintech focuses on the limitations of conventional financial inclusion, which is made possible by financial institutions like banks, and how fintech can aid accelerated financial inclusion for the world's unbanked and underbanked (Alexander et al., 2017; Chueca Vergara and Ferruz Agudo, 2021; Wolbers, 2017; Tao et al., 2022). This is determined by metrics that reflect the availability of and/or usage of conventional financial services, such as the proportion of people with bank accounts and ATMs, or by combining various data into a composite index (Beck et al., 2007; Honohan, 2008). By examining pertinent indicators, such as mobile money accounts and financial transactions made on mobile phones, several recent research have evaluated the level of digital financial inclusion (Sy et al., 2019; Davidovic et al., 2019; Cámara and Tuesta, 2017). These metrics, however, only record one facet of digital financial inclusion at a time and do not provide a whole picture by integrating different aspects, such as, access and usage.

The first body of study focuses on the factors that influence fintech success (Hasan et al., 2021; Hassan et al., 2022; Schindler, 2017), and in our perspective, these factors can be separated into two categories. The first subgroup investigates the factors at the corporate level that influence the performance of a fintech company (Cappa et al., 2022; Collevecchio et al., 2023). According to Lee and Teo (2015), there are five essential success factors or variables, which can be expressed using the acronym LASIC (low margin, asset-light, scalable, innovative, and compliance simple). As per the findings of the second subgroup, environmental factors may affect a fintech company's success. There are not many quantitative empirical research works available right now on the national level factors that influence the creation of fintech companies (Kumar et al., 2021). Additionally, the majority of these studies assume that all countries are similar. With our study, we aim to provide some comparative evidence on the creation and activity of fintech companies in developing countries.

The Financial Stability Board identifies variables on the supply side, such as, COVID-19 support measures, Institutions' existing digital infrastructure, Regulatory environment for FinTechs and BigTechs, Robust business lines, and Wide client network, as well as demand sides such as Payment habits, Reduced physical mobility, Search for convenience, and Additional household savings as drivers of digitalisation in finance during the pandemic. One of the key technological advancements that make room for fintech development is mobile device accessibility. Haddad and Hornuf (2019) draw attention to the importance of technological factors. Using a cross-national dataset, they analyze the economic and technological aspects that influence businessmen to create fintech enterprises. They find a link between a country's development, venture capital accessibility, and economic growth.

Lacasse et al. (2016) discuss the fintech phenomenon as a rival to banks and emphasize on the potentially disruptive effect of fintech startups on financial intermediaries. Conversely, Klus et al., (2018) demonstrate the potential drivers and benefits of cooperation between banks and fintech companies. In a related study, Jagtiani (2018) demonstrates how the availability of alternative data and broad access to data, that may be used in credit scoring in the modern economy, can influence the emergence of fintech businesses. According to Buchak (2017), a lack of regulation for new business models, that causes a shortage of funding and regulatory hurdles, can promote the expansion of fintech businesses.

Claessens et al., 2018 show that key influences on fintech credit include GDP. Additionally, the authors discover a negative sign on the variable representing the normalized regulation index and assert that stricter financial regulation prevents fintech from developing in the credit market. The results of the literature on the growth of fintech companies and their effects on the banking industry are sometimes ambiguous. With our study, we have extended the factors to compare developing countries.

Frost (2020) concludes that fintech is being adopted across markets worldwide, but not evenly. Unmet demand for financial services is a major driver of adoption in some countries, particularly in emerging nations. The promise of fintech is to increase financial inclusion. Frost (2020) also found that there are numerous supply-side and demand-side elements that influence the fintech industry. According to the data, underserved market niches and emerging market and developing economies (EMDEs) are strongly influenced by unmet demand (i.e., financial inclusion). The same paper identified that fintech adoption has been shown to be stronger in areas with the following characteristics: (i) unmet demand for financial services; (ii) favorable macroeconomic conditions; (iii) accommodating legislation; and (iv) demographic factors, such as a young population, which increase trust in new providers. The implication is that when fintech improves financial inclusion, this is probably good for economic development and growth.

However, the factors that determine financial development are dynamic, multi-layered, and influenced by regional and technical factors (Ali et al., 2021; Dong et al., 2015; Hasan et al., 2022; Niu et al., 2020; Stewart and Jürjens, 2018). Fintech adoption is affected by demographic and socioeconomic factors (Loko and Yang, 2022), individual perception of the usefulness, risks, and benefits of using novel fintech platforms and services (Parasuraman and Colby, 2015; Stewart and Jürjens, 2018), as well as systemic drivers of ecosystem (Arner et al., 2020; Beck, 2020; Collste et al., 2017; Loo, 2019; Noreen et al., 2022; Vovchenko et al., 2019; Xu and Xu, 2019).

While extant literature increases in scope and depth in identifying factors of fintech adoption at individual and systemic domains, a customary comparison of fintech ecosystem across nations was absent. The relationship between financial performance, financial inclusion, fintech adoption, and financial development across countries, in

particular, has not been thoroughly studied. This paper aims to take the first attempt to fill that void. By taking an exploratory approach, the study first identifies comparison parameters taken from the aforementioned literature and undertakes a cross-country comparative description of fintech ecosystem and the characteristics thereof. While doing so, a cornerstone metric was the Global Findexable Rankings of 2021 and 2020.

3. METHODOLOGY

This paper enables a comparative exploration of fintech among different nations in the existing literature, by comparing its key drivers. We identify these drivers from a survey of extant literature. The 11 selected parameters, proposed in this study for the comparison of fintech ecosystem in selected countries are listed in Table 1, which also mentions the 18 developing nations from all around the world selected for our comparison with Bangladesh. Country selection is based on the World Bank 3-tier categorization which follows per capita Gross National Income (GNI) (Hamadeh et al., 2021). Countries with a GNI per capita of $1,085 and lower are classified as low-income countries, while lower-middle countries have an income of $1,086-$4,255 and upper-middle-income countries have a per capita income of $4,256-$13,205.

To conduct a viable comparison with Bangladesh, we selected 18 countries from all these 3 tiers in light of the availability of information on their fintech industry (Figure 2). From our literature review, we identified the parameters to use for comparison among developing nations to get a comprehensive picture of fintech. Figure 1 depicts the conceptual framework of the current study.

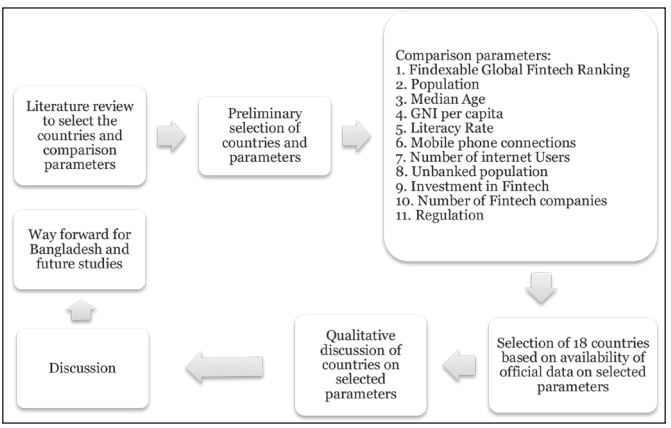

Figure 1 : Conceptual framework of this study

This study has been conducted to have a better understanding of the current situation of fintech in developing countries all over the world, which is exactly the characteristic of exploratory research. The current work is exploratory. It is based on secondary data. The aim is to enable a customary comparison of fintech ecosystem across selected nations.

Table 1 : List of comparison parameters and sample countries

Study instruments	Selected elements
Parameters selected for comparative analysis	Findexable Global Fintech Ranking, Population, Median Age, GNI per capita, Literacy Rate, Mobile phone connections, Number of internet Users, Unbanked population, Investment in Fintech, Number of Fintech companies, Regulation
Countries included in the sample	China, India, Indonesia, Vietnam, Pakistan, Bangladesh, Russia, Türkiye, Ukraine, Egypt, Tunisia, Nigeria, Rwanda, Kenya, South Africa, Brazil, Peru, Mexico

Figure 2 : Geographical depiction of selected countries

The secondary data is gathered from various journal articles, books, websites, polls, and other sources. Comprehensive analyses of the fintech industries in the 18 selected developing nations were done using digitally available data, news, and reports. For the acquisition of secondary data, a sizeable number of local, national, and worldwide journals, books of references, newspapers, and magazines related to this subject were used. Special working papers have been looked upon. Additionally, websites for many institutions including the World Bank, Asian Development Bank, and others offered useful information. The study adopts a qualitative methodology, and the research design entails gathering, arranging, and analyzing these data samples in order to draw reliable research conclusions. The study's scope is constrained to the 18 countries it covers, including Bangladesh, and excludes startups in related fields or other developed countries.

4. COMPARATIVE FINDINGS ACROSS COUNTRIES

Based on selected parameters, this paper compares 18 nations in terms of their overall fintech ranking as well as a number of related variables. In this section, we briefly present the comparative picture. The concluding subsection provides an overview of the comparative regulatory landscape across the 18 nations included in the sample.

4.1 Findexable Global Fintech Ranking

Findexable calculates its fintech country ranking using a proprietary algorithm developed in conjunction with data partner StartupBlink. The Global Fintech Index scores each location for a) the quality of those companies, b) the quantity of privately owned fintech companies, and c) the local business environment. From the Global Fintech rankings published by Findexable, we can see (in Figure 3) the position of the countries chosen[1]. 65 countries made the list in 2020 and 83 countries were included in the list in 2021. Compared to 2020, countries like Brazil, China, Russia, Kenya, Türkiye, and Indonesia improved their position in the rankings in 2021, while India, Mexico, South Africa, Ukraine, Nigeria, Peru, Vietnam, Egypt, Pakistan and Bangladesh dropped in the rankings. For countries like Vietnam (19 positions), Bangladesh (17 positions), Pakistan (15 positions), and Egypt (12 positions), the drops were steep. Rwanda and Tunisia, countries that were not ranked in 2020 broke into the rankings in 2021 at the 61st and 68th positions respectively.

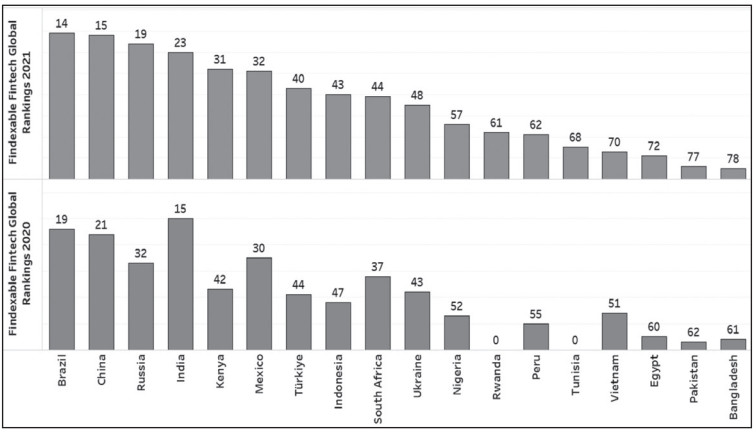

Figure 3 : Findexable Global Fintech Rankings 2020 and 2021
Source: (Findexable : The Global Fintech Ranking 2020)

4.2 Demographic Characteristics

To understand adoption and performance of fintech across the selected countries, we looked at their population and median age in years. A population is defined as the complete set or group of individuals in a country. A number of studies have identified population as the driving force of demand for fintech services while a young population has enabled fast, seamless adoption of fintech services in the country (Frost, 2020). From Figure 4, we see that while Brazil, China, and Russia, the top three countries in this list, have a median age of more than 30, India, Kenya, Mexico, and Turkiye have median ages below 30. By far, 11 out of the 18 countries have a median age below 30. It should be noted that Kenya (20), Nigeria (18.6), and Rwanda (19.7) have a very young population, which might have played a big part in fintech adoption in their countries.

1. A value of "0" means the country was unranked in that year.

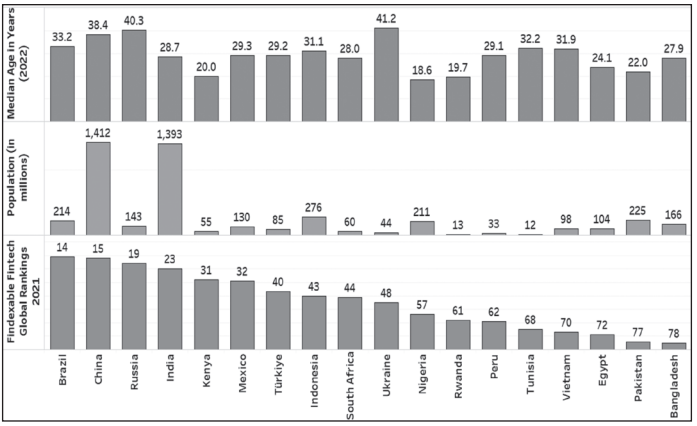

Figure 4 : Population & Median age by country
Source: (WorldBank, 2022); (WorldPopulationReview, 2022)

4.3 GNI per Capita

Gross Domestic Product (GDP) is defined as the total market value of a country's all finished goods and services in any year. Gross National Income (GNI), on the other hand, is the sum of income received by the country from its residents and businesses from home and abroad. Thus, GNI transcends national boundaries in favor of computing the income of all the citizens of the country. We chose GNI per capita over GDP as it shows a more complete picture of the per capita income of the country. As depicted in Figure 5, we see that countries that are ranked higher in the latest Findexable ranking have a generally higher gross national income per capita except for India (US$ 2,170) and Kenya (US$ 2,010). Similarly, countries ranked lower have a comparatively lower GNI per capita except for Peru (US$ 6,520). Bangladesh has a GNI value in the lower end of US$ 2,620.

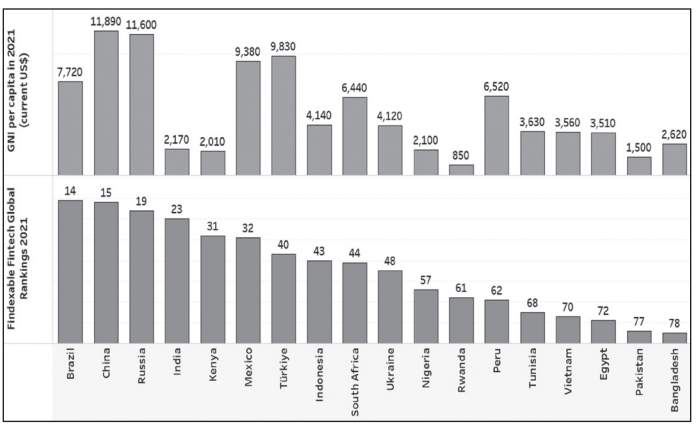

Figure 5 : GNI per capita
Source: (WorldBank, 2021)

4.4 Literacy Rate

The literacy rate is the percentage of the population that can read and write (UNESCO, n.d.). Adult literacy rate is considered for people aged 15 years and above. Across nations, we observed countries that are ranked higher in the latest Findexable ranking have a higher literacy rate among adults (above 90%) except for India (74%) and Kenya (82%). Conversely, Figure 6 shows us that countries with a lower ranking have a comparatively lower literacy rate among adults except for Ukraine (100%), Peru (94%), and Vietnam (96%). Pakistan has the lowest literacy rate at 58% while 75% of Bangladesh's population is literate.

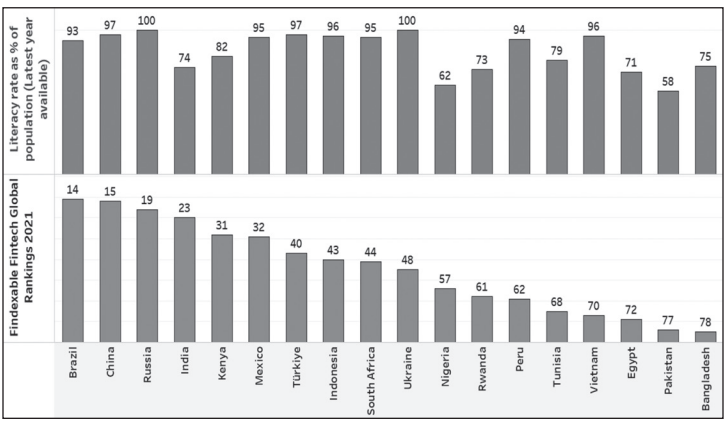

Figure 6 : Literacy Rate (% of adults) by country

Source: (WorldBank, 2021)

4.5 Mobile phone connections and Internet users

Mobile phone connections correspond to the number of active mobile phones expressed as a percentage of the total population of a country. Similarly, internet usage is also calculated as a percentage of the total population. Internet users are individuals who have used the Internet (from any location) in the last 3 months, according to (World Bank, n.d.). It is to be noted that many countries have mobile phone connection of more than 100%, signifying that the total number of mobile phones owned by the citizens is more than the total population. Many citizens might own more than 1 mobile handset.

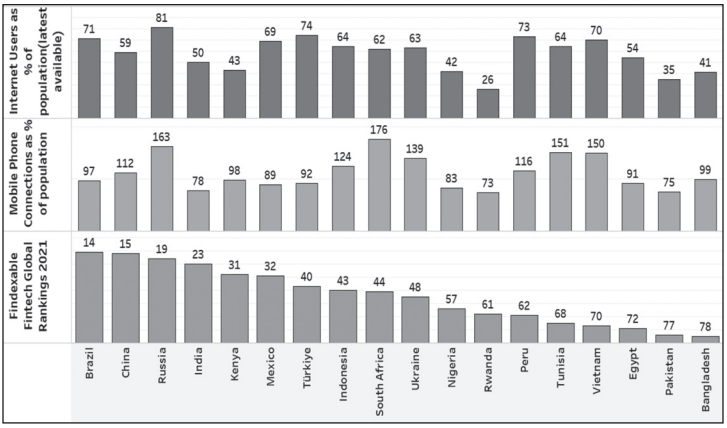

Figure 7 : Mobile phone connections and Internet Usage (as % of total Population)
Source: (Statista, Mobile Internet usage worldwide, 2022)

From Figure 7 above, we can see that countries ranked higher in 2021 have a generally high percentage of mobile connections except for India. They also have a higher rate of internet users except for China, India, and Kenya. Conversely, countries ranked lower have a generally low rate of mobile connections except for Rwanda and Pakistan. They also have a lower percentage of the population using internet as evidenced by the data for Rwanda, Ukraine, Pakistan, and Bangladesh.

4.6 Unbanked Population

Findings from World Bank (2021) survey point to fresh ways to promote financial inclusion, particularly by utilizing digital payments, encouraging account ownership among the unbanked, and enhancing the usage of financial services by those who currently have accounts. A sizeable chunk of the unbanked population means there is a gap for financial services and hence, an opportunity to flourish for fintech companies. Thus, to see how the number of unbanked people influences fintech ranking, we look at the unbanked population percentage of each country. Unbanked population represents the number of people not receiving financial services, such as, bank accounts, debit cards, etc. per 100 of the population.

From Figure 8, we can see that countries ranked higher in Findexable e.g., Brazil (30%), China (20%), Russia (24%), India (20%) and Kenya (18%) have lower unbanked populations. Countries ranked lower have lower banked populations. Bangladesh has an unbanked population of 50%, which means that in future, Bangladesh has a huge potential to rapidly expand its fintech industry to include this part of the population under financial services as this will be easier to achieve than through traditional banking services.

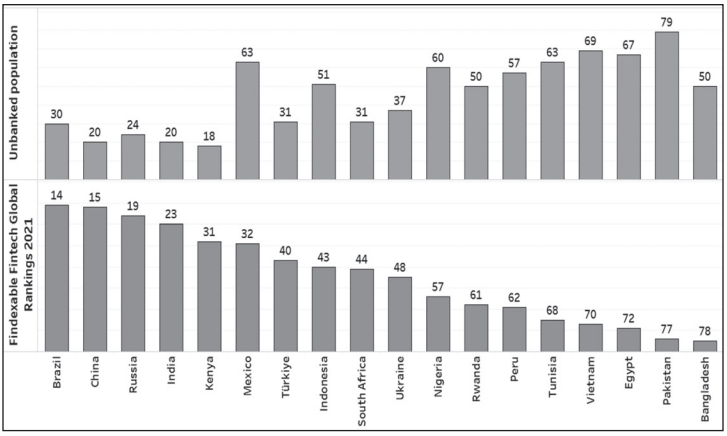

Figure 8 : Banked Population (as % of total population)

Source: (Acuant.com, 2020)

4.7 Investment in Fintech

Investments in fintech, among other factors, can determine how the fintech sector flourished in a country and to what extent. Needless to say, a country with higher amount of monetary investment in fintech has a greater probability of its successful adoption and consequently, higher global fintech ranking compared to countries with lower amount of investment, ceteris paribus. We look at the investment, in millions of US$, in fintech, in each of the 18 countries.

From Figure 9 below, we can see that countries ranked higher have higher investments in fintech. In fact, China (2,005 mil US$), India (1,500 mil US$), and Brazil (1,300 mil US$) support this conclusion. However, comparatively, Russia (59 mil US$) has a dismal amount of investment in fintech. Only 3 countries in this list, namely Rwanda (50 mil US$), Peru (3 mil US$), and Tunisia (23 mil US$) have a lower amount of investment in fintech than Russia. Turkiye (64 mil US$) seems to lag behind in investments. Countries ranked lower have low investments except for South Africa (589 mil US$), Nigeria (800 mil US$), and Ukraine (786 mil US$). Bangladesh, despite having an investment of 380 million US$, which is greater than many higher-ranked countries, is languishing at the end of the ranking.

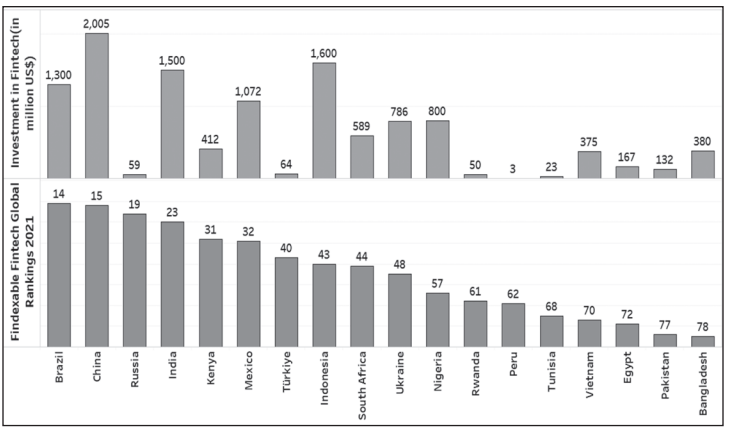

Figure 9 : Investment in Fintech companies in 2021 (million US$)

Source: (BusinessStandard, 2021); (FintechTimes, 2022); (Statista, 2022); (TheDailySaba, 2021); (FutureStartup, 2021)

4.8 Number of Fintech Companies

Global Findexable Ranking incorporates the number of fintech companies as one of the 3 key determinants for country rankings. From Figure 10 below, we observe that in 2021, India has the highest number of fintech startups of over 7,000. Other high-ranked countries like Brazil (1,380) and China (2,532) have high numbers of companies as well, while Russia (745), Kenya (536), and Mexico (507) have a moderate number of companies. Indonesia (1,079) and South Africa (980) have a surprisingly high number of fintech companies. Countries ranked lower in the ranking have only a few hundred companies in their countries. Rwanda (52), Peru (26), and Tunisia (27) have an exceptionally low number of fintech companies.

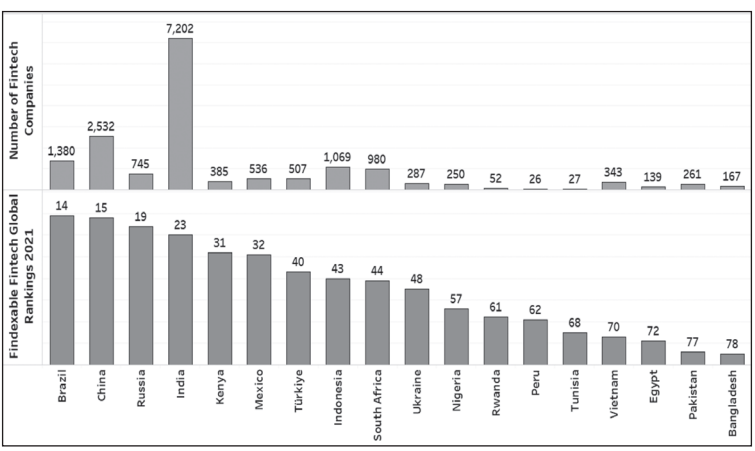

Figure 10 : Total number of Fintech Companies as of 2022

Source: (Tracxn, 2022)

4.9 Regulation

Apart from jurisdiction-specific differences in approach, we observed a degree of convergence in fintech regulation across developing nations that are included in this paper. Indeed, regulators across these nations were found to inch closer to tougher and more specific regulations for fintech. Main focus includes customer safety, anti-money laundering net, and promoting faster and more cost-effective innovation with the help of regulatory "sandboxes". In the following few paragraphs, we summarize recent states of fintech regulation across the 18 countries, in the order of their 2021 Global Findexable Ranking, starting with Brazil.

The Central Bank of Brazil, BCB, is the primary regulatory authority for fintech in **Brazil**. Fintech businesses dealing in insurance and asset management are also regulated by the Brazilian state body SUSEP (Superintendência de Seguros Privados) and the Brazilian Securities and Exchange Commission (CVM). The Brazilian Senate is currently evaluating a bill (PL 3.825/19), which aims to make an authorization for crypto exchange activities from BCB mandatory in the future. Federal law 13.709/2018 and some other laws regulate the collection, use, transmission, and any other kind of processing of personal data that is carried out in Brazilian territory, irrespective of the origin of the person or company.

Moreover, BCB has made some mandatory rules (Resolucao 85/2021), such as the requirement to have certain provisions in their IT agreements and a requirement to have a cybersecurity policy in place, to regulate fintech businesses (Melito and Pascoal, 2022). On Friday, March 11, 2022, the BCB published stiffer regulations for fintech companies, basing them on the size and complexity of these businesses and establishing higher requirements for capital. According to Reuters, the new regulations will be applied from January 2023 and be fully implemented by January 2025.

The oversight of fintech goods and services is not the purview of a single regulatory entity in **China**. Different regulatory organizations oversee various fintech services and products. The People's Bank of China (PBOC), the China Banking and Insurance Regulatory Commission (CBIRC), and the China Securities Regulatory Commission are the principal regulatory bodies (CSRC) (Shi, 2021). China's 14th Five-Year Plan emphasized how China would leverage technological innovation to fuel development. Regulations on bank online loans stipulate that internet banks must be subject to financial regulations. Small and medium-sized banks and others have been ordered by the CBIRC to stop issuing cross-regional internet loans. Using fintech for green finance and financial inclusion will receive increasing focus over the plan period. The strategy also highlights the need for new finance laws as well as additional antitrust and licensing restrictions for internet platforms. Experts have suggested that a national data bank be developed and controlled by a specific organization.

As of January 2022, there is no all-encompassing fintech license in **Russia**. It is suggested that financial operations be grouped into "blocks" and comprehensive

regulation based on uniform licenses be used in place of different requirements for each type of financial activity. The Central Bank Officials believe that it will take at least a year to get ready for the first stage of norm unification (Central Bank of Russia, n.d.). Organizations with varying degrees of purview with respect to fintech services and ecosystem regulations in Russia include Ministry of Finance, Federal Tax Service, Federal Financial Monitoring Service (Rosfinmonitoring), and Federal Anti-Monopoly Service.

The primary regulator for FinTech in **India** is the central bank- the RBI. Other supplementary authorities include SEBI, IRDAI, Ministry of Finance, and Ministry of Electronics and Information technology (Kakkar et al., 2022). In India, the fintech industry's regulatory environment is disjointed (Sanyal, 2021). Fintech services and products are not specifically subject to any laws or regulations. It is challenging to shape the regulatory environment when there is no clear set of regulations for fintech services, yet authorities recognized that India's fintech industry needed to be governed.

The Joint Domestic Financial Sector Regulators Forum was established in 2013 in **Kenya**. It was formed by a MOU signed by CBK, CMA, IRA, the Retirement Benefits Authority (RBA), and the Sacco Societies Regulatory Authority (SASRA). The main goal was to promote collaboration. The event offers a chance for regional coordination to advance the FinTech industry in Kenya. The CBK and the Monetary Authority of Singapore (MAS) also inked a Cooperation Agreement in 2019 (PWC and UK Aid, 2022).

Latin America's first country to adopt a fintech regulating statute was **Mexico**. The Law to Regulate Financial Technology Institutions was introduced by the Mexican government in March 2018. Only two types of institutions can be regulated under this law: crowdfunding institutions and electronic payment fund institutions (Spnaish acronym: "IFPE"). According to Mexico's fintech law, only 3 types of fintech entities can be licensed: 1. collective financing (crowdfunding) institutions, 2. electronic money institutions (EMI), and 3. innovation model (a.k.a. "sandbox model"). A business must provide to the public a certain amount of crucial financial information. If they are from high-risk nations or have issues with fighting terrorism and money laundering, transactions with international FTIs are prohibited (Kereibayev, 2022).

There are no specific regulations addressing fintech in **Türkiye**, apart from legislation on payment entities and e-money entities, as per our review. However, rules were issued by the regulators on the use of technology. Measures need to be taken by institutions to ensure the security and efficiency of financial services infrastructure (İnal and Tüzün, 2021).

The Financial Services Authority (Otoritas Jasa Keuangan), often known as OJK, and the Central Bank of Indonesia (BI) oversees the regulation of fintech in **Indonesia**. The Digital Financial Innovation Legislation for Fintech Firms, a new regulation governing the development of fintech companies in Indonesia, was published by the

OJK in September 2018. A number of procedures must be followed in order to create a fintech firm or digital service platform. Notably among these is a 12-month long regulatory sandbox period. After this, startups or existing companies can apply for a permit from OJK and be subject to further review (Cekindo Indonesia, 2022).

There are currently no laws or regulatory agencies that are specifically applicable to fintech products and services in **South Africa**. However, some fintech products and services may come within the jurisdiction and control of broader financial services regulatory frameworks and, as a result, be managed by regulatory bodies tasked with monitoring such frameworks. In South Africa, main regulatory overseeing authorities are the Financial Sector Conduct Authority (FSCA), the Prudential Authority (PA), the National Credit Regulator (NCR), the South African Reserve Bank (SARB), and the Financial Intelligence Centre (Tibane et al., 2021).

In **Ukraine**, the Law of Ukraine on Payment Services entered into force recently, marking a new chapter in the country's financial business environment and regulation. It provides for better security and efficiency of financial services provision by aligning it with the similar laws of the European Union. Harmonization of Ukrainian legislation to the one of EU is of a great priority for Ukraine. The London Payment System (LPS) has introduced a number of new types of payment services. LPS also provides for a regulatory sandbox environment for testing services, technologies, and tools based on innovative technologies. It also establishes the system of open banking, which allows access to different payment accounts of a client in a single account (Grechyna, 2022).

Nigeria, as of our findings, does not have a specific law governing fintech. The primary organization tasked with upholding Nigeria's financial stability and integrity is the Central Bank of Nigeria (CBN) (Obasoyo, 2022). There is currently no complete list of fintech goods or services that are forbidden. The regulatory bodies respond to fintech-related problems as they appear. The CBN has taken a cautious approach to virtual currencies. The CBN issued a circular in January 2017 warning banks and other financial institutions to stop dealing with virtual money since it is not accepted as legal cash in Nigeria. It published its Proposed Rule on Crowdfunding (Draft Rules) in March 2020 for public comment. If accepted, it suggests terms under which private enterprises would be allowed to solicit funding from the general public if the required framework and process were in place.

The National Bank of Rwanda (BNR) is the principal regulatory authority for fintech in **Rwanda**. The BNR still needs to develop a dedicated regulatory framework for financial technology. The current regulatory approach covers payment services, insurance, pensions, banking services, deposit taking, and few others (Uwamahoro, 2021). Based on BNR's evaluation of the perceived risk, the capital required amount has been determined. Without raising money, entrepreneurs do not need to deposit funds in a bank account. The startups merely need to show BNR their funds and guarantee that they can operate their businesses. In other words, that funding could eventually be used to invest in their business.

Peru saw a new regulation go into effect on 1 February 2022, for the temporary performance of activities in novel new models. This regulatory framework has been advocated by the Superintendency of Banking, Insurance, and Peruvian Pension Fund Administrators (SBS). It describes the requirements that must be fulfilled in order to create pilot tests, including the ideal duration, the required number of participants, risk management, and eligibility requirements. It is also claimed that further standards might be developed for the operation and mutual recognition of various local and global sandboxes. If it is now legal for them to do so, businesses are free to perform any action online (Garrigues, 2021).

The Central Bank of Tunisia (BCT), in January 2020, officially launched a Regulatory Sandbox, taking a step towards faster and efficient fintech innovation in **Tunisia**. It offered a test environment to monitor the experimentation of innovations by financial technology companies on a small scale (allAfrica.com, 2020).

Vietnam's regulatory framework on fintech services is currently under development. However, the country has taken strides forward in recent years to promote its fintech ecosystem (Thanh et al., 2022). The majority of Vietnam's existing digital payment legislation govern e-wallets and mobile money. Prime Minister Decision 316 on March 9, 2021, is the most current one and permits mobile money to be used to pay for low-value goods and services. In Vietnam, a payment account formed at a business bank must be connected to an e-wallet. It is forbidden to engage in fund intermediation (such as the supply of credit) or charge interest using e-wallets.

Vietnamese legislation restricts the performance of banking-related operations to only be done by credit institutions, which has limited P2P enterprises' ability to be a conventional bank disintermediation player. Vietnam's legal system is often underdeveloped and ambiguous when it comes to cryptocurrencies and digital assets. Cryptocurrencies are not considered to be fiat money because they are neither legal property nor payment instruments as defined by the 2015 Civil Code.

The Financial Regulatory Authority (FRA) and The Central Bank of Egypt (CBE) are the main regulators of fintech in **Egypt**. In the beginning of 2020, Law for regulating and developing the use of fintech was (Badawy Law Office, n.d.). According to fintech law, startups may apply for a brief fintech startup license that has a two-year maximum validity. The law gives the FRA regulatory powers over the fintech industry, including the power to provide licenses and certifications for fintech and services, according to the report of the House CIT Committee on the measure. The legislation defines fintech technology as increasing the use of banking and non-banking financial services, and the FRA is tasked with promoting financial inclusion through its usage.

It was found that there was a lack of a regulatory framework to promote fintech in **Pakistan** (Perlman, 2020). As a result, this became a huge hindrance for the growth of fintech ecosystem in Pakistan. This means Pakistan has manifested one-size fits

all regulatory regime. Financial technology needs special attention and cultivation for growth.

Bangladesh formed the Bangladesh Mobile Financial Services (MFS) Regulations in February 2022. The Regulatory FinTech Facilitation Office (RFFO) has also been set up in Bangladesh Bank to oversee fintech. Bangladeshi regulations require that no branch-based service of the digital banks will be provided. Instead, they will provide services, including lending and collection of deposits, online. (Fintech Global, 2022).

5. DISCUSSION

We have seen how the 11 factors identified are related to the Fintech ranking of countries. Countries with a high population, median age, GNI per capita, literacy rate, mobile phone connections, internet usage, number of fintech companies, investment in fintech, and low unbanked population claimed a higher ranking in the Findexable Fintech country Ranking 2021, bar a few exceptions in each case. All of these are consistent with existing literature except for the fact that countries ranked higher have a high median age. A few studies (Frost, 2020) suggested otherwise. A younger population might make adoption of fintech in a country easier and hence allow it to obtain a higher rank.

The problems of integrating new financial technology into the existing regulatory framework are linked to the primary issues of fintech regulation across the world (Amit et al., 2023). For instance, emerging solutions like e-wallets and cryptocurrencies are exempt from regulation by conventional financial institutions. New legislation are necessary. Such laws must be developed and put into place over time as fintech develops ever-more-advanced tools for the market. As a result, there is not necessarily a definite blueprint for how fintech services should be run under a given state's laws.

The major objective of fintech regulation is to lessen the industry's susceptibility to attacks from malicious users. The legislative framework primarily aims to identify and deter the use of financial technology instruments for illicit purposes, safeguarding both service providers and consumers in the process. Each brand-new fintech solution entails both potential opportunities and risks. The World Bank and the Cambridge Center for Alternative Finance (CCAF) estimate that during the epidemic, cybersecurity risks to fintech companies increased by 15%. In addition to being a potent weapon against assaults, regulation must also serve the interests of market participants. As a result, even if the existing regulations in the field of fintech vary from region to region and are often revised, this presents new challenges.

Most nations have developed their regulatory frameworks for fintechs in recent years in sync with the industry's explosive growth. In most nations, there has been an increase in institutional acceptance, regulatory clarity and scrutiny, and industry consolidation in recent years. Securities regulators have made clarifications and initiated enforcement actions about how securities laws apply to trading in digital assets.

Instead of adding financial services to the regulatory system, reducing the regulatory load on fintech by distinguishing what is uniquely a digital strategy aids in maintaining compliance requirements. For activities that are currently uncontrolled, regulation is not always necessary or possible. Future-oriented fintechs must make sure they are completely compliant with all rules and regulations.

Many countries like China, India, Vietnam, and Indonesia have a detailed regulatory framework in place already. Except for Vietnam, the other countries mentioned are ranked higher in the Findexable Fintech ranking, which might suggest that a strong regulatory framework can catapult the country's fintech industry into better positions. However, a few of the countries we have discussed, namely Russia, Turkiye, South Africa, Rwanda, Tunisia, Pakistan, and Bangladesh lack any all-encompassing regulatory guideline, which may be one of the factors holding back increased and rapid fintech adoption in those countries.

Over the last decade, the fintech industry has experienced significant growth. The global market was valued at around US$ 112.5 billion in 2021, and is projected to grow at a compound annual growth rate (CAGR) of 25 percent to be valued at US$ 310 billion by the end of 2022 according to US-based Total. Vantage Market Research (n.d.) estimates that the fintech market will grow at a CAGR of over 19.8% until 2028. Developing countries should take advantage of this global flow and start working on fintech policies to nurture this sector to bolster their economies.

6. RECOMMENDATIONS

This section lists our recommendations for the development of a vibrant fintech ecosystem in developing nations, in general and Bangladesh, in particular. These recommendations, grouped here in five key domains, are based on our findings from the survey of fintech ecosystems in 18 countries in this paper. Ecosystem participants including governments, investors, startups, customers, and technology enablers will find it helpful to direct their attention towards enabling regulation, prudent investment, effective collaboration, and time-appropriate upskilling of the current and next generation of workforce, and accelerate innovation in the fintech ecosystem for better value creation.

6.1 Regulation

Developed countries like UK have pioneered the regulation of fintech to effectively convert into a new industry. As nations take the transformative journey through industry 4.0 and towards Industry 5.0, there is an increased need for a thoroughly-planned and well-regulated fintech industry to reap the maximum benefits by enabling companies to thrive. However, the regulations should also ensure that consumers are not taken advantage of. In this regard, our findings suggest that the following few steps can be taken:

a) To prioritize drawing up an all-encompassing regulatory framework and specific regulations for specific fintech industries. Assigning related ministries

and departments to oversee specific fintech sectors can increase efficiency. India and China can be ideal developing countries to follow in this regard.

b) To ensure that barriers to entry for fintech companies are the bare minimum to encourage new companies to enter into the market. This can result in healthy market competition and keep consumer exploitation to a minimum.

c) To create a fintech taskforce to coordinate between various fintech-overseeing departments and oversee them. This task force can work as the government's fintech department and contact point for the private sector.

d) To ensure basic fintech courses are taught at the university level. This can expose undergraduate students to this new sector and pique their interest on this subject for them to follow later on.

6.2 Investment

Investment, both public and private, will lead the fintech adoption in developing countries like Bangladesh. Supporting an infant industry like this will require:

a) To initiate tax breaks for investment in fintech. This will likely increase the amount of investment in fintech allowing existing companies to expand and new companies to enter the industry.

b) To roll out extensive R&D for fintech that will lead to streamlining of the industry rapidly.

c) To offer grants for fintech companies which can be institutionalized through a public-private partnership to fund new, promising fintech companies.

6.3 Collaboration

Collaboration among all stakeholders is key to greater fintech success in Bangladesh, as it is across the developing markets we surveyed in this paper. Regular dialogue and coordination, management, and facilitation of work between various financial service providers, government ministries and departments, fintech companies, and regulators are all integral part of the effort. Academia is a crucially important stakeholder here. To support market development and financial inclusion, we must collaborate. We have to maintain and increase connectivity between academia and industry.

6.4 Upskilling

Bangladesh has always enjoyed an exceptional demographic dividend, which holds true till now. Having a median age of only 29 years, Bangladesh has a vast pool of young talents who can be engaged in this lucrative fintech industry. A fintech ecosystem is as good as the talent that fuels innovation and new business models for value creation. Equipping the next generation of the workforce with the right tools and training will be a capacity-building exercise for the whole country. Support must be given to help people, financial institutions, and even government and non-government organizations strengthen their capacity to work together. For potential

innovators, fintech companies, and service providers who will carry out and guarantee the application of digital financial services, a capacity-enhancement program must be devised.

6.5 Innovation

Perhaps the most salient and effective feature of vibrant fintech ecosystems is their ability to foster and harness innovation. Creating a competition for fintech innovation where people and fintech businesses may participate and showcase their innovations can increase interest in fintech. To compete for the chance to present their products to all participating banks, insurance companies, and other financial service providers, fintech startups and innovators may be asked to participate in the challenge. This will simultaneously be a chance to introduce fintech innovation to the appropriate individuals from various institutions.

7. CONCLUSION

Due to the advent of fintech, technology companies are taking on the roles previously fulfilled by traditional financial institutions. This exploratory study extended the limited research on the comparison of fintech among developing nations. It is the first to consider 11 distinct variables for comparison. No previous study, to the best of the authors' knowledge and thorough search in peer-reviewed databases, has empirically explored the situation of the fintech industry on 18 different countries. Existing research on fintech comparison has primarily focused on just fintech adoption. This is one of the earlier studies to collate and create a situational analysis of the fintech industry in different nations.

However, there remains much work to be done on fintech around the globe. This study has been a humble attempt to add to the existing literature on fintech. The focus has been primarily on comparing Bangladesh with developing nations; the study has limitations as this is only a qualitative study. Future endeavors can be focused on time series analysis taking into account the macro environment. Quantitative studies in the future will allow for numerical analysis that will add a new dimension after this study. Another limitation is that this paper has only worked with developing economies. While this has been done to compare countries that are somewhat similar in economy size as well as fintech adoption, including developed countries in future comparative studies can work to better point out the gaps between countries just getting into the fintech era and countries that have successfully adopted fintech.

REFERENCES

Acuant.com. (2020). The World's Unbanked Population. *Acuant.com.*

Ahmed, O. (2019). Intrinsic Motivators for Job Satisfaction in the Pharmaceutical Industry of Developing Countries Using Bangladesh as a Case Study. *Thammasat Review*, 22(2), 110-134. https://doi.org/10.14456/tureview.2019.15

Alexander, A. J., Shi, L., & Solomon, B. (2017). How Fintech is Reaching the Poor in Africa and Asia: A Start-Up Perspective [Brief]. *EMCompass*, no. 34. Retrieved from http://hdl.handle.net/10986/30360

Ali, M., Raza, S. A., Khamis, B., Puah, C. H., & Amin, H. (2021). How perceived risk, benefit and trust determine user Fintech adoption: A new dimension for Islamic finance. *Foresight, 23*(4), 403–420. https://doi.org/10.1108/FS-09-2020-0095

allAfrica.com. (2020). Tunisia: BCT Announces Official Launch of Regulatory Sandbox. *allAfrica.com.* Retrieved from https://allafrica.com/stories/202001210707.html

Amit, S., Kafy, A.-A., & Barua, L. (2023). Systemic Barriers to Financial Inclusion in the Banking Sector of Bangladesh. In T. Endress & Y. F. Badir (Eds.), *Business and Management in Asia: Digital Innovation and Sustainability*, 121–138. https://doi.org/10.1007/978-981-19-6418-3_8

Anshari, M. A. (2020). An overview of financial technology in Indonesia. *Financial technology and disruptive innovation in ASEAN*, 216-224.

Arner, D. W., Barberis, J. N., & Buckley, R. P. (2015). The Evolution of Fintech: A New Post-Crisis Paradigm? University of Hong Kong Faculty of Law Research, Paper No. 2015/047. https://dx.doi.org/10.2139/ssrn.2676553

Arner, D. W., Buckley, R. P., Zetzsche, D. A., & Veidt, R. (2020). Sustainability, FinTech and Financial Inclusion. *European Business Organization Law Review, 21*(1), 7–35. https://doi.org/10.1007/s40804-020-00183-y

Badawy Law Office. (n.d.). Egypt FinTech Overview, Law and Regulations. *Badawy Law Office*. Retrieved from https://www.badawylaw.net/egypt-fintech-overview-law-and-regulations/#:~:text=The%20FinTech%20law%20seeks%20to,adhere%20to%20transparency%20and%20rational

BCBS. (2018). Sound Practices: Implications of fintech developments for banks and bank supervisors. *Basel Committee on Banking Supervision*. Retrieved from https://www.bis.org/bcbs/publ/d415.pdf

Beck, T. (2020). Fintech and financial inclusion: Opportunities and pitfalls. *Asian Development Bank Institute*, ADBI Working Paper Series, paper no. 1165. Retrieved from https://www.adb.org/sites/default/files/publication/623276/adbi-wp1165.pdf

Beck, T., Demirguc-Kunt, A., & Peria, M. S. M. (2007). Reaching out: Access to and use of banking services across countries. *Journal of Financial Economics*, 85(1), 234-266.

Berkmen, P., Beaton, K., Gershenson, D., del Granado, J. A., Ishi, K., Kim, M. S., Kopp, E., & Rousset, M. V. (2019). Fintech in Latin America and the Caribbean: Stocktaking. *International Monetary Fund*. IMF Working Papers, Paper No. 2019/071

Bhardwaj, N. (2022). What Trends are Driving the Fintech Revolution in India? *India Briefing*. Retrieved from https://www.india-briefing.com/news/what-trends-are-driving-the-fintech-revolution-in-india-23809.html/#:~:text=Growth%20of%20Fintech%20in%20India,a%20rapidly%20evolving%20e%2Dcommerce

Blancher, N. R., Appendino, M., Bibolov, A., Fouejieu, A. P., Li, J., Ndoye, A., Panagiotakopoulou, A., Shi, W., & Sydorenko, T. (2019). Financial Inclusion of Small and Medium-Sized Enterprises in the Middle East and Central Asia. *International Monetary Fund*. IMF Departmental Papers, Paper No. 2019/002

Bömer, M., & Maxin, H. (2018). Why fintechs cooperate with banks—evidence from germany. *ZVersWiss*, 107, 359–386. https://doi.org/10.1007/s12297-018-0421-6

Bruene, J. (2021). The 187 Fintech Unicorns of the 21st Century. *FintechLabs*. Retrieved from https://fintechlabs.com/the-184-fintech-unicorns-of-the-21st-century-may-2021-update/

Buchak, G. M. (2017). Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks. *NBER*, Working Papers, no 23288.

Business Standard. (2021). Retrieved from https://www.business-standard.com/article/companies/india-based-investors-2nd-to-provide-fintech-investments-in-apac-in-2021-122031600550_1.html

Cámara, N., & Tuesta, D. (2017). DiGiX: the digitization index. *BBVA Research*, 17/03 Working Paper.

Cappa, F., Collevecchio, F., Oriani, R., & Peruffo, E. (2022). Banks responding to the digital surge through Open Innovation: Stock market performance effects of M&As with fintech firms. *Journal of Economics and Business*, 121, 106079. https://doi.org/10.1016/j.jeconbus.2022.106079

Cekindo Indonesia. (2022). Bank Indonesia Launches Regulation on Fintech. *Cekindo Indonesia*.

Central Bank of Russia. (n.d.). The Central Bank's Advisory Report for Public Consultations on Improving the Admission Process to the Financial Market. *The Central Bank of Russia*

Chueca Vergara, C., & Ferruz Agudo, L. (2021). Fintech and Sustainability: Do They Affect Each Other? *Sustainability*, 13(13), Article 13. https://doi.org/10.3390/su13137012

Claessens, S., Frost, J., Turner, G., & Zhu, F. (2018). Fintech Credit Markets Around the World: Size, Drivers and Policy Issues. *Bank for International Settlements (BIS) Quarterly Review*. Retrieved from https://ssrn.com/abstract=3288096

Collevecchio, F., Cappa, F., Peruffo, E., & Oriani, R. (2023). When do M&As with Fintech Firms Benefit Traditional Banks? *British Journal of Management*. https://doi.org/10.1111/1467-8551.12701

Collste, D., Pedercini, M., & Cornell, S. E. (2017). Policy coherence to achieve the SDGs: Using integrated simulation models to assess effective policies. *Sustainability Science, 12*(6), 921–931. https://doi.org/10.1007/s11625-017-0457-x

Davidovic, S., Loukoianova, E., Sullivan, C., & Tourpe, H. (2019). Strategy for Fintech Applications in the Pacific Island Countries. *International Monetary Fund*. IMF Working Papers, Paper No. 2019/012

Dong, B., Sivakumar, K., Evans, K. R., & Zou, S. (2015). Effect of Customer Participation on Service Outcomes: The Moderating Role of Participation Readiness. *Journal of Service Research, 18*(2), 160–176. https://doi.org/10.1177/1094670514551727

Ferrari, R. (2016). FinTech Impact on Retail Banking – From a Universal Banking Model to Banking Verticalization. In *The FinTech Book* (eds S. Chishti and J. Barberis). https://doi.org/10.1002/9781119218906.ch65

Financial Stability Board. (2022). FinTech. *Financial Stability Board*. Retrieved from https://www.fsb.org/work-of-the-fsb/financial-innovation-and-structural-change/fintech/

Findexable. (2020). The Global Fintech Ranking 2020. *Findexable Limited*.

Findexable. (2021). Global Fintech Rankings Report: BRIDGING THE GAP. *Findexable Limited*.

Fintech Global. (2022). Bangladesh to form regulatory guidelines on digital bank operation. *Fintech Global*. Retrieved from https://member.fintech.global/2022/04/13/bangladesh-set-to-form-regulatory-guidelines-on-digital-bank-operation/

Fintech Times. (2022). Kenya and Its Fintech Ecosystem in 2022. *The Fintech Times*. Retrieved from https://thefintechtimes.com/kenya-and-its-fintech-ecosystem-in-2022/

Frost, J. (2020). The economic forces driving fintech adoption across countries. *Bank of International Settlements*. BIS working paper no 838.

Future Startup. (2021). Bangladesh Startup Funding Report 2021. *Future Startup*. Retrieved from https://futurestartup.com/2022/01/04/bangladesh-startup-funding-report-2021/

Garrigues. (2021). Peru moves forward in fintech regulation: The SBS approved the Regulation of Innovative Models. *Garrigues*. Retrieved from https://www.garrigues.com/en_GB/new/peru-moves-forward-fintech-regulation-sbs-approved-regulation-innovative-models#:~:text=in%20new%20window-,Peru%20moves%20forward%20in%20fintech%20regulation%3A%20The%20SBS,the%20Regulation%20of%20Innovative%20Models&text=February%201%2C%202022%20is%20the,models%20will%20come%20into%20force.

Gomedici. (n.d.). Retrieved from https://gomedici.com/bangladesh-the-rising-fintech-star-in-south-asia

Grechyna, M. (2022). New Ukraine's Fintech Legislation: Embracing Innovations. *Finextra*. Retrieved from https://www.finextra.com/blogposting/22563/new-ukraines-fintech-legislation-embracing-innovations

Haddad, C., & Hornuf, L. (2019). The emergence of the global fintech market: economic and technological determinants. Small Business Economics, 53(3), 81–105. https://doi.org/10.1007/s11187-018-9991-x

Hamadeh, N., Rompaey, C. V., & Metreau, E. (2021, July 01). New World Bank country classifications by income level: 2021-2022. *World Bank Blogs*. Retrieved from https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2021-2022

Hasan, M., Noor, T., Gao, J., Usman, M., & Abedin, M. Z. (2022). Rural Consumers' Financial Literacy and Access to FinTech Services. *Journal of the Knowledge Economy*. https://doi.org/10.1007/s13132-022-00936-9

Hasan, R., Ashfaq, M., & Shao, L. (2021). Evaluating Drivers of Fintech Adoption in the Netherlands. *Global Business Review*, 09721509211027402. https://doi.org/10.1177/09721509211027402

Hassan, M. S., Islam, M. A., Sobhani, F. A., Nasir, H., Mahmud, I., & Zahra, F. T. (2022). Drivers Influencing the Adoption Intention towards Mobile Fintech Services: A Study on the Emerging Bangladesh Market. *Information, 13*(7). https://doi.org/10.3390/info13070349

Honohan, P. (2008). Cross-country variation in household access to financial services. *Journal of Banking & Finance*, 32(11), 2493-2500.

Hsu, S. (2021, March 10). More Fintech Regulation on the Horizon in China. *The Diplomat*. Retrieved from https://thediplomat.com/2021/03/more-fintech-regulation-on-the-horizon-in-china/#:~:text=More%20regulations%20can%20be%20expected,the%20central%20bank%20digital%20currency.

İnal, E., & Tüzün, H. A. (2021, March 01). FinTech in Turkey: overview. *Thomson Reuters Practical Law*. Retrieved from https://uk.practicallaw.thomsonreuters.com/w-018-4170?transitionType=Default&contextData=(sc.Default)&firstPage=true

Jagtiani, J. L. (2018). The Roles of Alternative Data and Machine Learning in Fintech Lending: evidence from the Lending Club Consumer Platform. *Federal Reserve Bank of Philadelphia*, Working Paper no. 18-15.

Kakkar, V., Arora, S., Varma, G., & Pareek, K. (2022). Fintech Laws and Regulations 2022 | India. *Global Legal Insights*. Retrieved from https://www.globallegalinsights.com/practice-areas/fintech-laws-and-regulations/india

Kereibayev, O. (2022). How to Comply with Mexico's FinTech Law. *The Sumsuber*. Retrieved from https://sumsub.com/blog/how-to-comply-with-mexico-fintech-law/

Klus, M. F., Lohwasser, T. S., Friedrich, H., & Moormann, J. (2018). Strategic Alliances between Banks and Fintechs for Digital Innovation: Motives to Collaborate and Types of Interaction. *The Journal of Entrepreneurial Finance*, 21(1). https://doi.org/10.57229/2373-1761.1346

Koop, A. (2022). Top Heavy: Countries by Share of the Global Economy. *Visual Capitalist*. Retrieved from https://www.visualcapitalist.com/countries-by-share-of-global-economy/#:~:text=The%20global%20economy%20can%20be,than%20half%20of%20global%20GDP.

KPMG. (2021). Pulse of Fintech H2'21. *KPMG*.

Kshetri, N., & Loukoianova, N. (2019). Blockchain adoption in supply chain networks in Asia. *IEEE IT Professional*, 21(2), 11-15.

Kumar, V., Nandini, N., & Amit, A. (2021). Platform-based mobile payments adoption in emerging and developed countries: Role of country-level heterogeneity and network effects. *Journal of International Business Studies, 52*(8), 1529–1558. https://doi.org/10.1057/s41267-020-00346-6

Lacasse, R., Lambert, B., Osmani, E., Couture, C., Roy, N., Sylvain, J., & Nadeau, F. (2016). A Digital Tsunami: FinTech and Crowdfunding. *International Scientific Conference on Digital Intelligence*.

Lazo, B. B.-, & Wood, D. (2002). An Historical Appraisal of Information Technology in Commercial Banking. *Electronic Markets*, 12(3), 192-205. https://doi.org/10.1080/101967802320245965

Lee, D. K. C., & Teo, E. G. S. (2015). Emergence of FinTech and the LASIC Principles. *Journal of Financial Perspectives*, 3(3). Retrieved from https://ssrn.com/abstract=3084048

Lee, I., & Shin, Y. J. (2017). Fintech: Ecosystem, business models, investment decisions and challenges. *Business Horizons*, 61(1), 35-46.

Loko, B., & Yang, Y. (2022). Fintech, Female Employment, and Gender Inequality. *SSRN Scholarly Paper*, paper no. 4137201. https://papers.ssrn.com/abstract=4137201

Loo, M. K. L. (2019). Enhancing Financial Inclusion in ASEAN: Identifying the Best Growth Markets for Fintech. *Journal of Risk and Financial Management, 12*(4), Article 4. https://doi.org/10.3390/jrfm12040181

Lukonga, M. (2018). Fintech, inclusive growth and cyber risks: Focus on the MENAP and CCA regions. *International Monetary Fund*, Working Paper Series, paper no. 2018/201.

Maier, E. (2016). Supply and demand on crowdlending platforms: connecting small and medium-sized enterprise borrowers and consumer investors. *Journal of Retailing and Consumer Services*, 33, 143-153.

Melito, G., & Pascoal, M. H. (2022). Fintech Laws and Regulations Brazil 2022-2023. *ICLG.com*

Niu, G., Wang, Q., & Zhou, Y. (2020). Education and FinTech Adoption: Evidence from China. *SSRN Scholarly Paper*, paper no. 3765224. https://doi.org/10.2139/ssrn.3765224

Noreen, M., Mia, M. S., Ghazali, Z., & Ahmed, F. (2022). Role of Government Policies to Fintech Adoption and Financial Inclusion: A Study in Pakistan. *Universal Journal of Accounting and Finance, 10*(1), 37–46. https://doi.org/10.13189/ujaf.2022.100105

Obasoyo, O. (2022). Nigeria: An Examination Of The Regulatory Framework Of Financial Technology In Nigeria. *Mondaq*. Retrieved from https://www.mondaq.com/nigeria/fin-tech/1175728/an-examination-of-the-regulatory-framework-of-financial-technology-in-nigeria

Parasuraman, A., & Colby, C. L. (2015). An Updated and Streamlined Technology Readiness Index: TRI 2.0. *Journal of Service Research, 18*(1), 59–74. https://doi.org/10.1177/1094670514539730

People's Bank of China. (2022). *pbc*. Retrieved from http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/3307529/index.html

Perlman, L. (2020). Regulatory Framework for Fintechs in Pakistan. *USAID*. Retrieved from https://pdf.usaid.gov/pdf_docs/PA00X9F9.pdf

PWC, & UK Aid. (2022). FinTech in Kenya: Towards an enhanced policy and regulatory framework. *The City UK*. Retrieved from https://www.thecityuk.com/our-work/fintech-in-kenya-towards-an-enhanced-policy-and-regulatory-framework/

Sanyal, S. (2021). A GUIDE TO THE FINTECH LAWS AND REGULATIONS IN INDIA. *Analytics Insights*. Retrieved from https://www.analyticsinsight.net/a-guide-to-the-fintech-laws-and-regulations-in-india/

Schindler, J. W. (2017). Fintech and Financial Innovation: Drivers and Depth. *SSRN*, Scholarly Paper No. 3029731. https://doi.org/10.17016/FEDS.2017.081

Shi, J. (2021). First-step analysis: fintech regulation in China. Lexology. Retrieved from https://www.lexology.com/library/detail.aspx?g=dd76eb54-cc69-45e8-b0ef-a8037a9e402f

Sia, S. K., Soh, C., & Weill, P. (2016). How DBS Bank Pursued a Digital Business Strategy. *MIS Quarterly Review*, 15(2).

Soloviev, V. I. (2018). Fintech Ecosystem and Landscape in Russia. *Journal of Reviews on Global Economics, 7*, 377-390.

Statista. (2022). Total value of investments into fintech companies worldwide from 2010 to 2022. *Statista*. Retrieved from https://www.statista.com/statistics/719385/investments-into-fintech-companies-globally/

Statista. (2022). Fintech in Mexico - statistics & facts. *Statista*. Retrieved from https://www.statista.com/topics/5277/fintech-in-mexico/#dossierKeyfigures

Statista. (2022). Mobile Internet usage worldwide. *Statista*. Retrieved from https://www.statista.com/topics/779/mobile-internet/#topicOverview

Stewart, H., & Jürjens, J. (2018). Data security and consumer trust in FinTech innovation in Germany. *Information & Computer Security, 26*(1), 109–128. https://doi.org/10.1108/ICS-06-2017-0039

Suri, T., & Jack, W. (2011). Mobile Money: The Economics of M-PESA. *National Bureau of Economic Research*, Working Paper, no. 16721. https://doi.org/10.3386/w16721

Sy, A. N., Maino, R., Massara, A., Perez-Saiz, H., & Sharma, P. (2019). FinTech in Sub-Saharan African Countries: A Game Changer? *International Monetary Fund*. IMF Departmental Papers / Policy Papers 2019/004.

Tao, R., Su, C.-W., Naqvi, B., & Rizvi, S. K. A. (2022). Can Fintech development pave the way for a transition towards low-carbon economy: A global perspective. *Technological Forecasting and Social Change*, 174, 121278. https://doi.org/10.1016/j.techfore.2021.121278

Tarazi, M., & Breloff, P. (2010). Nonbank E-Money Issuers: Regulatory Approaches to Protecting Customer Funds. Focus Note 63. Washington, D.C.: *CGAP*.

TBS News. (2021). Bangladesh least active fintech country in Asia Pacific: Report. *TBSNews*. Retrieved from https://www.tbsnews.net/tech/bangladesh-least-active-fintech-country-asia-pacific-report-265792

Thanh, P. H., Duc, D. M., & Hiep, N. H. (2022). How Vietnam legally adapts to the emergence of Fintech. *Vietnam Law and Legal Forum Magazine*. Retrieved from https://vietnamlawmagazine.vn/how-vietnam-legally-adapts-to-the-emergence-of-fintech-48465.html#:~:text=Vietnam's%20existing%20regulations%20on%20digital,2014%20guiding%20intermediary%20payment%20services.

The Daily Saba. (2021). Turkey's fintech ecosystem advances with $64M investment in 2021. *The Daily Sabah*. Retrieved from https://www.dailysabah.com/business/finance/turkeys-fintech-ecosystem-advances-with-64m-investment-in-2021

Tibane, B., Franklyn, C., Geral, D., Kern, K., Dyer, L., & Nyali, X. (2021). First-step analysis: fintech regulation in South Africa. SA Financial Markets Journal. Retrieved from https://financialmarketsjournal.co.za/first-step-analysis-fintech-regulation-in-south-africa/

Tracxn. (2022). FinTech Startups in Bangladesh. *Tracxn*. Retrieved from https://tracxn.com/explore/FinTech-Startups-in-Bangladesh

UNESCO. (n.d.). Literacy Rate. *UNESCO Institute for Statistics*. Retrieved from http://uis.unesco.org/en/glossary-term/literacy-rate

Uwamahoro, R. (2021). How Fintech Startups can Deal with Regulatory Compliance in Rwanda. *UNCDF*. Retrieved from https://www.uncdf.org/article/6636/how-fintech-startups-can-deal-with-regulatory-compliance-in-rwanda

Vantage Market Research. (n.d.). Fintech Market - Global Industry Assessment & Forecast. *Vantage Market Research*. Retrieved from https://www.vantagemarketresearch.com/industry-report/fintech-market-1543

Vovchenko, N. G., Galazova, S. S., Sopchenko, A. A., & Dzhu, O. S. (2019). FinTech Ecosystem as an Instrument of Sustainable Development Provision. *International Journal of Economics & Business Administration (IJEBA), VII*(Special 2), 147–155.

Wolbers, J. J. A. (2017). *Financial technologies paving a bright new path for the world's unbanked population* [Master's Thesis]. University of Groningen.

Worldometer. (2023). Countries in the world by population. *Worldometer*. Retrieved from https://www.worldometers.info/world-population/population-by-country/

World Bank. (n.d.). Internet users (per 100 people). *The World Bank*. Retrieved from https://databank.worldbank.org/metadataglossary/millennium-development-goals/series/IT.NET.USER.P2

World Bank. (2021). The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19. *The World Bank*. Retrieved from https://globalfindex.worldbank.org/

World Bank. (2021). Retrieved from https://data.worldbank.org/indicator/NY.GNP.PCAP.CD

World Bank. (2021). Retrieved from https://data.worldbank.org/indicator/SE.ADT.LITR.ZS

World Bank. (2022). Retrieved from https://data.worldbank.org/indicator/SP.POP.TOTL

World Population Review. (2022). Retrieved from https://worldpopulationreview.com/country-rankings/median-age

Xu, Z., & Xu, R. (2019). Regulating fintech for sustainable development in the People's Republic of China. *Asian Development Bank Institute*. ADBI Working Paper Series, paper no. 1023. Retrieved from https://www.econstor.eu/handle/10419/222790

Zimmerman, E. (2016). The Evolution of Fintech. *The New York Times*. Retrieved from https://www.nytimes.com/2016/04/07/business/dealbook/the-evolution-of-fintech.html